Responsive Aesthetics for Yogic Meditation: An Innovative Design Theory for Holistic Health that supports Autonomy and Effective Training

by

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Abstract

In an effort to contribute a novel theory to the design of emergent *wellbeing technology*, this paper presents a creative process involving mixed methods taken by the author in producing a design work, referred to as the prototype. The theory formulated by the author concerns the innovation of holistic health practices, specifically a set of prescriptions that posit an effective simulation of yogic meditation experience through computer technology. The resulting theory is then exercised throughout the development of the thesis prototype—resulting in a design work that employs a relatively new interface that immerses the user in a digital simulation where embodied engagement and responsive aesthetics make up the core of the functionality, in what is intended to be a multimodal holistic wellbeing experience. Additionally, the prototype and its ongoing iterative development are documented.

Keywords: wellbeing technology, yogic meditation, holistic health, mixed methods, design theory.

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If right now I were giving an award acceptance speech I believe a music cue would be cutting me off, so without further ado…

To my practice—in the realms of both spirituality and design

To the teachers of my practice

To those mentioned under Acknowledgements (I couldn't stop myself)

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1.0 Introduction

In an effort to contribute a novel theory to the design of emergent *wellbeing technology*,[1] this paper presents a creative process involving mixed methods taken by the author in producing a design work, referred to as the prototype. The theory formulated by the author concerns the innovation of holistic health practices, specifically a set of prescriptions that posit an effective simulation of yogic meditation[2] experience through computer technology. This design theory is arrived at through a combination of i) the author's own practice-based intuitions and experiential knowledge of both holistic health and design, and ii) extensive investigation and research across multiple disciplines that is brought to points of convergence in synthesis. The resulting theory is then exercised throughout the development of the thesis prototype—resulting in a design work that employs a relatively new interface (i.e. motion sensing with the Xbox Kinect as of 2010) that immerses the user in a digital simulation where embodied engagement and responsive aesthetics make up the core of the functionality in what is intended to be a multimodal holistic wellbeing experience. Borrowing from Eastern views of the subtle energy body, as derived from meditation and yoga practices, symbolism plays a central role in the design of aesthetics for this prototype. Because the design process is highly iterative, there is a constant evolution of the prototype expected even beyond the scope of this paper within the parameters of an ongoing REB (research ethics board) user testing study approved by OCAD University.

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[1] Although not a common term, wellbeing technology is used by the author to refer to computer technology works that are designed with the intention to foster a wellbeing experience for its users.

[2] Yogic meditation refers to a style of meditation that more actively brings the body into meditation practice, as this is fundamental to yoga.

1.1. Creative Process

The creative process taken by the author is essentially one of mixed methods as it involves design research that draws from personal practice, multidisciplinary investigation that is then synthesized through theoretical reflection, and, as mentioned, materially realized through iterative design of a prototype based on both informal and formal feedback. A mixed methods approach to the thesis project is a result of the author's background and skillset in psychology, communications, culture and new media studies, technology, gaming, and design. Accordingly, previous research done by the author has spanned from scientific disciplines that more strictly enforce study protocols to phenomenological experiences where more subjective dialogs are taken as valuable insights to creative projects. Serving as a visual mantra to the thesis work presented in this paper, **Figure 1.** and **Figure 2.**, shown on the following page, illustrate the creative process.

Figure 1. *Creative Process Visual Mantra 1*

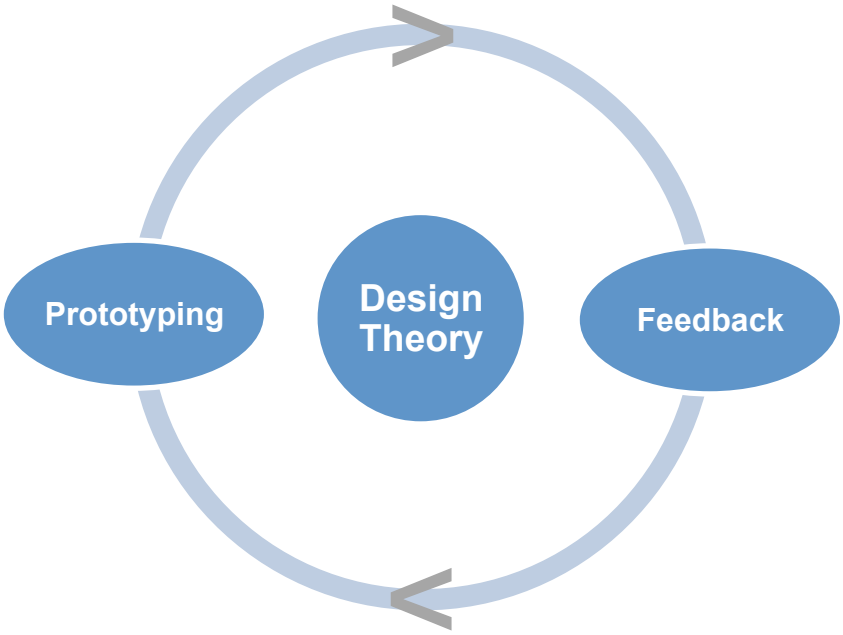

Figure 2. *Creative Process Visual Mantra 2*

1.2. Holistic Health Practice

Outside of academia, the author is well practiced in meditation (Kundalini, Mindfulness, and Visualization), Moksha yoga, and Gōjū-ryū karate (martial art). All three of these practices reference the mind-body relationship, particularly emphasizing the role of healthy breathing in physical and psychological empowerment. Because the author feels that these practices promote an effective dialog of self-directed wellbeing, there is a motivation to extract learning from these practices and inject it into scenarios where it may be perceived as useful—this line of thought speaks to the author's intuitions as is described in **Section 1.4**. Accordingly, many of the sources from which knowledge is presented are only thematically related and strung together to demonstrate the movement of the author in realizing a prototype that has simultaneously been subject to the design theory formulated in this paper. It is also important to understand that the designer's *personal style* of practice in meditation, yoga, and martial arts—as opposed to the style of unique variants of these practices—has greatly informed the direction of the research and development of the prototype.

1.3. Design Practice

Critical making directly speaks to the mentioned mixed methods approach and so the author, first and foremost, identifies as a *designer*. While new technology finds its way into much of this paper's discussion, the designer has *designed* with technology[3] only as a tool that enhances a current practice or makes it less problematic, as opposed to considering technology as an end-all-be-all solution.

[3] Technology as used by the designer more specifically denotes computer technology.

The designer's preliminary research and graduate work has, over the course of a year-and-a-half, set the stage for the research presented in this paper, which has also directly influenced the development of the thesis prototype. Preliminary explorations included: i) the role of nature in wellbeing and the adoption of aesthetics borrowed from nature by experience design technologies, and ii) the development of sense of self and its role in wellbeing, through healthy inter- and intrapersonal dialogs mediated by technology. These past investigations have in many ways come to play important roles in the thesis work and thus are discussed at various points in **Section 2**. The first area (i) reviews the biophilia hypothesis, as written about by Stephen R. Kellert and Edward O. Wilson, and how the aesthetics of nature enable humans to achieve a greater sense of wellbeing, contributing to both increased cognitive function and emotional clarity as per varied exposure ranging from active to passive (Kellert & Wilson, 1993; Bates & Marquit, 2011). The second section (ii) draws analogies between writings from across different disciplines in order to illuminate the increasingly automatic nature of online identities and data analytics practices that, much like medical analysis and assessment (Rose, 2007), can strip users of autonomy due to the use of fixed algorithms for meaning making and organization (Galloway & Thacker, 2007). The essence of this idea is that there is a tendency for individuals to lose themselves in or become enveloped by large institutional structures that are formed with an inherent rigidity in order to serve some *productive* purpose (Deleuze, 1995), leaving little to no space for personal expression—arguably the ultimate determinant of sense of self (Turkle, 2011).

With the topic of wellbeing at the forefront of preliminary design research, and natural aesthetics and sense of self as specific channels through which wellbeing was approached, the designer's graduate projects were conceptualized accordingly. Several of the projects served as musings for what could ultimately evolve into the final thesis prototype. Collaborative works telEmpathy [Interaction design], shown in **Figure 3.**, and eHive [Interaction design], shown in **Figure 4.**, were interaction design projects that explored intuitive and anonymous ways for individuals to express emotion within a group in order to facilitate deep conversation that is often avoided in formal settings, ideally leading to more personal forms of peer-to-peer bonding. **Figure 5.** and **Figure 6.** show ORGONA [Digital game], a game made exclusively by the designer using a combination of Processing [Software], Arduino [Hardware], and the Xbox Kinect [Motion sensing input device], borrows its name from psychologist Wilhelm Reich's controversial concept of the Orgone Accumulator,[4] a device that channels anti-entropic life-force energy used to heal and empower individuals who face mental and physical disorders (Bellis, n.d.). The game interfaces primarily with the body in order to empower physicality; input is taken in the form of breath where exhaling is detected by an electret microphone connected to the Arduino, and input is also taken in the form of body movement along the x-axis by the Kinect. The game allows users to stand in front of a screen onto which is projected a backdrop of a natural landscape as well as an animated

[4] It is important to note that the designer's choice to reference Wilhelm Reich's Orgone Accumulator in naming the design work ORGONA was done so in a playful manner. The controversial claims and conspiracy associated with Reich's work are in no way supported or reflected by the designer's work, rather the concept of an arguably fictional device with such a capacity for healing is what is referenced. For an introduction to Reich visit: http://inventors.about.com/od/qrstartinventors/a/orgone.htm

cloth with pseudo-realistic motion physics. The cloth responds to breath input, shooting up into the air as if it were being swept up by a gust of wind. As the cloth floats higher, the background of the game environment scrolls up accordingly to give users a sense of realistic progression through space, providing a sense of reward. Users can propel the cloth up and out of the Earth's atmosphere, even into the Milky Way. Also featured in this game was a looping soundtrack of soft and relaxing music that ran throughout the entirety of the game. If the user is unable to keep the cloth afloat they run the risk of having the cloth fall so that the background of the game environment scrolls down towards the starting point.

ORGONA was the major catalyst for the thesis prototype as it covers many similar concepts: responsive aesthetics that interface with the body, the importance of breath as borrowed from meditation and yoga practices, and the fostering of physical and psychological empowerment.

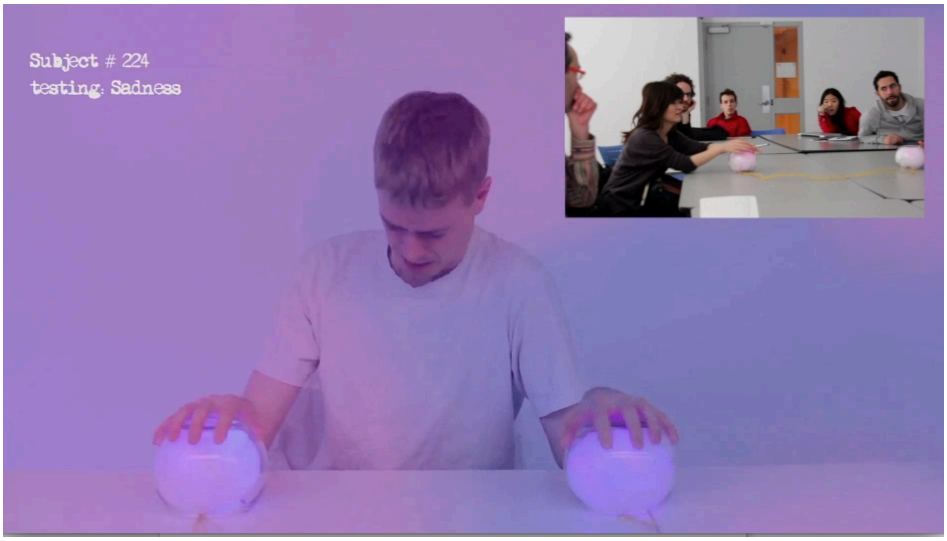

Figure 3. *telEmpathy by Cathy Chen, Harjot Bal, and Maayan Cohen*

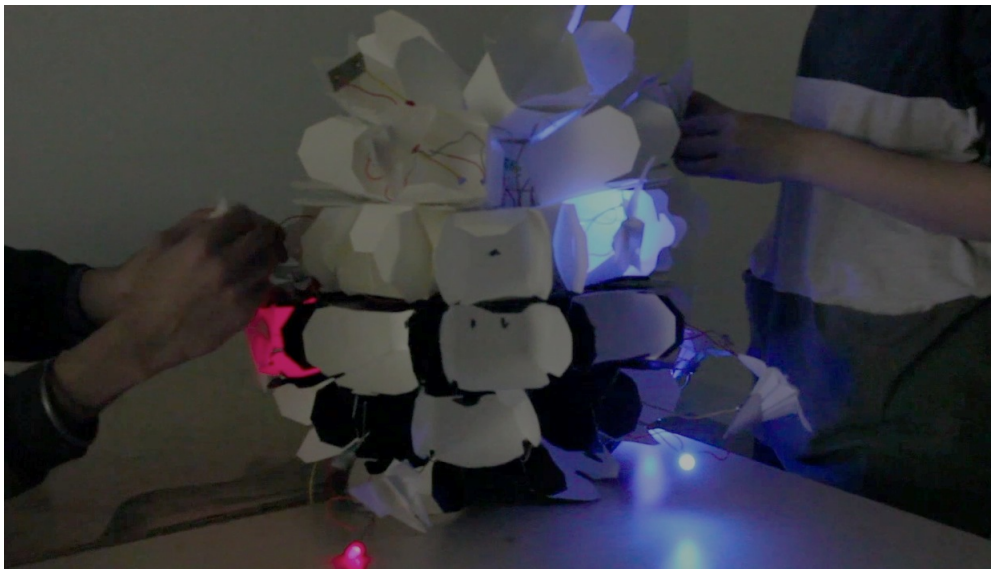

Figure 4. *eHive by Harjot Bal, Cathy Chen, and Maayan Cohen*

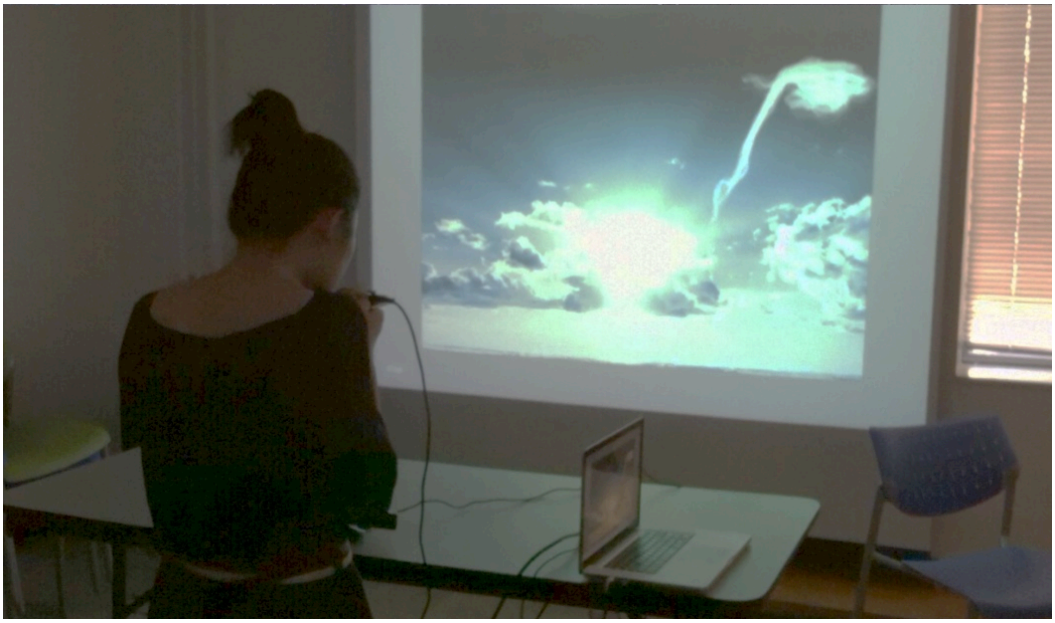

Figure 5. *ORGONA by Harjot Bal*

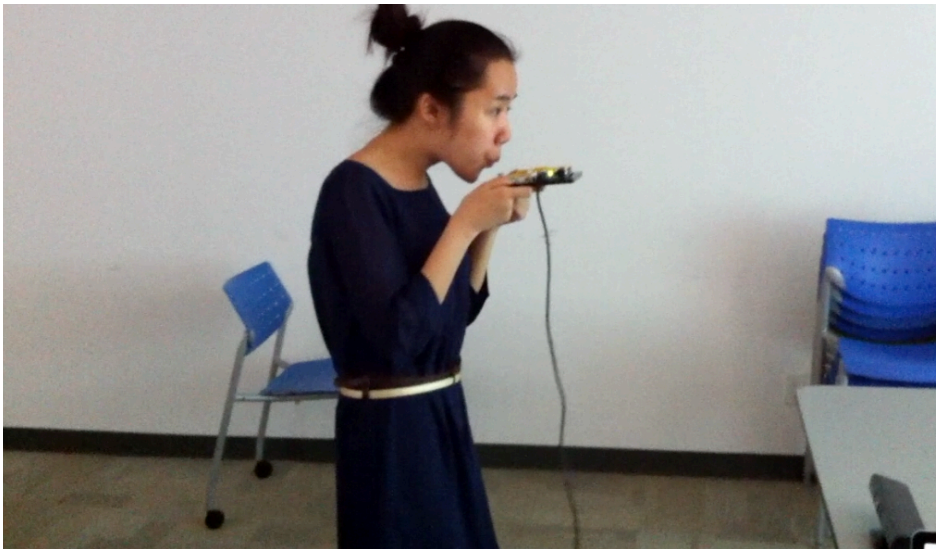

Figure 6. *ORGONA by Harjot Bal (2)*

1.4. Intuitive Vision

Another facet of the personal approach that the designer has employed, and tends to employ in other cases as well, is an initial deference to intuition about what a potential design project might look and function like. Having produced design works of a similar vein, the designer feels that an initial vision is key in curbing subsequent research explorations. Intuition has been written on as a research method; intuitive inquiry can play a powerful role in directing one's course of study and is designated as part of a hermeneutical approach—one that is about interpretation (Anderson, 2004; May, 2005). The interpretation of the designer's own prior knowledge and experience are reflected not only by the research methods used but also in the direction and content of the project.

The initial vision that the designer had in mind was to continue with interaction design works that focused on breath awareness and embodied physical empowerment. ORGONA was a project that could be innovated upon as the designer had a foundation of code on which to continue experimenting. The designer also wanted the wellbeing narrative of a potential design to be more transparent, distinct from the more *gamey* feel that ORGONA had, so that it might seek application in a testable setting. Critical theory discourse regarding the perception of increasingly automatic network identities that escape users' control, as touched on in **Section 1.3 (ii)**, was also an area thought of as interesting to explore. There was also a general interest in emphasizing a potential design paradox that would see technologies being used to grant power to the user through intuitive interaction that worked with one's body in creating a wellbeing experience. The initial intuitive vision that consolidated preliminary research and past graduate work was

for an interaction design that would cleanse a user's body of representations of data that were superimposed onto it, taking what was initially an individual enveloped in data, imagined as analogous to one being *stressed out*, and cathartically washing this data or stress off of the body visually, mediated by deep breathing as input, see **Figure 7.** and **Figure 8.** for initial brainstorm plans. Breathing, an embodied physiological process that is highly valued in meditation and yoga practices, seemed like an appropriate part of the functionality of such an experience that would bring a highly physical element into play. Because the designer wanted to maintain a level of transparency in the thesis prototype as a wellbeing technology, more visually bringing the body into the interactive, or *responsive*,[5] experience seemed harmonious with the interconnected mind-body dialogs found in meditation, yoga, and martial arts practices. However, one design concern was with the accessibility of this potential experience; the presence of spiritual doctrines, as is common with certain holistic health practices, could possibly create an undesired power dynamic; possible tensions between those familiar and accepting of such spiritual doctrines versus those who are not. It was for this reason that no one singular holistic health practice was adhered to in conceptualizing a potential experience. Even the act of sitting down, cross-legged, or holding stereotypical yoga postures was challenged by the designer's intuitions. Instead, an aesthetic that more actively engaged the body, if even just by standing, was an investigation the designer was more interested in taking on. This thinking was the move by the designer in considering more active forms of meditation as

[5] Responsive is used interchangeably with interactive in this paper. Because interaction means activity between two subjects—often understood as two people, it is perhaps technically correct to use the word responsive to denote user engagement with a system.

reflective of the practice-based intuitions discussed here. Yogic meditation, effectively a combination of yoga and meditation practice, was the ideal practice that would happily marry with the intentions set through intuitive planning of the design experience; both physical and mental faculties are engaged and together the technology can afford a variety of responsive aesthetics.

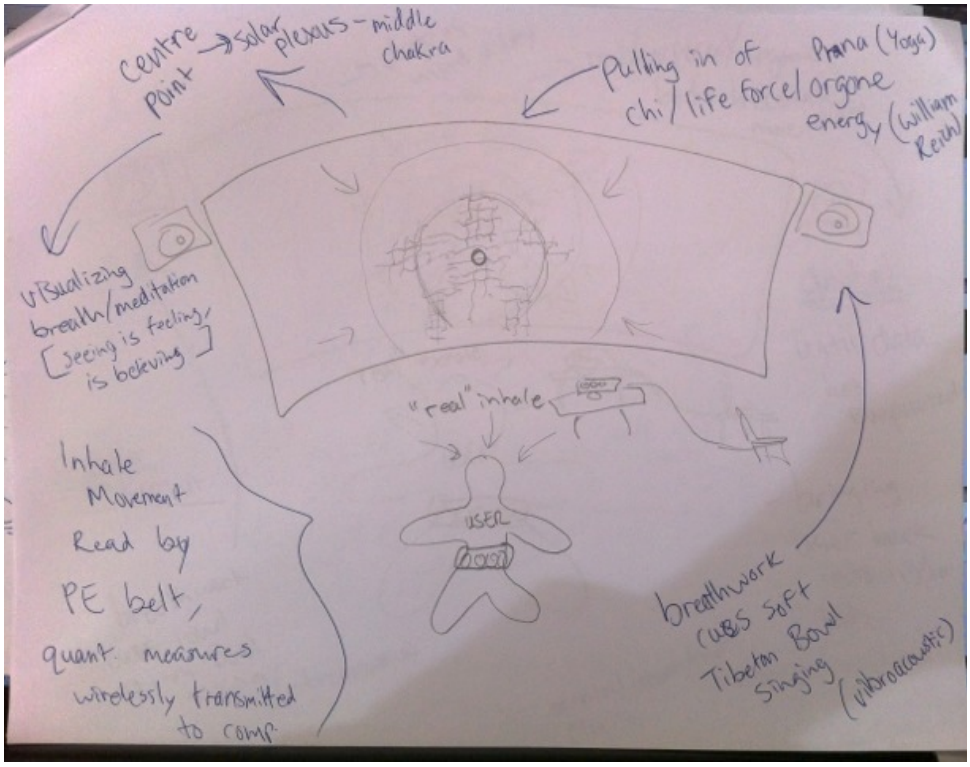

Figure 7. *Intuitive Vision: Brainstorming*

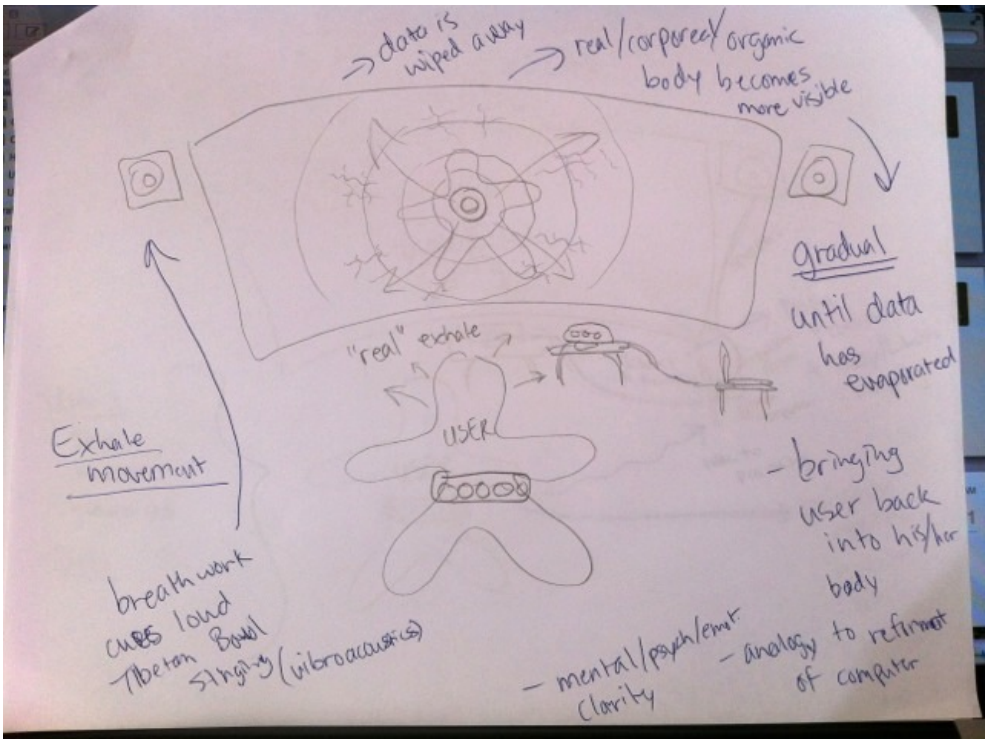

Figure 8. *Intuitive Vision: Brainstorming (2)*

1.5. Outline of Paper

In addition to familiarizing the reader with the designer's creative process and previous work, this paper provides a horizon scan of inspirational works, reviews relevant existing literature, and reflects on related theoretical discourses. This is followed by a synthesis of all research and formulation of a novel design theory for effectively bringing holistic health practices, such as yogic meditation, to responsive multimodal technology that affords rich, immersive experience. The initial development phase of the prototype, as a physical manifestation of conducted research, is documented after the theory is discussed. Also included in this paper is a description of the REB approved user testing study that was sought to keep the thesis prototype in constant evolution according to a highly iterative design process involving a variety of users. The REB study will continue beyond the scope of this paper, in an effort to refine details within the design experience and also to work with insights gained through the predominant informal acquisition of feedback. The paper closes with a reflection of the thesis as it stands and insights gained through the formulation of the design theory and its application to the prototype.

2.0 Exploration and Multidisciplinary Research

This section covers a horizon scan, literature review, and ends with a theoretical reflection of overarching themes. Due to a multidisciplinary research approach and the proposition of a novel design theory, various works and concepts, both thematically related and disparate, will be presented to reflect all segments of research trajectory.

2.1. Horizon Scan and Literature Review

Health care and entertainment works designed for various points within the spectrum of wellbeing technologies were reviewed and analyzed in an effort to better inform the development of the thesis prototype.

2.1.1. Inspirational Research Projects and Prototypes

Technology-aided meditation and wellbeing design is an increasingly popular phenomenon. The Calming Technology lab at Stanford University, directed by Neema Moraveji, is actively involved in developing *calm* interfaces and meditation-based applications for new technologies [Website: http://www.calmingtechnology.org]. Breathwear is a recent project from Moraveji's lab that uses the iPhone to bring breathing patterns to the awareness of the user throughout the day (Wongsuphasawat, Gamburg & Moraveji, 2012). The project is designed around the concept of calm technology; calm design is a practice that involves intentionally creating technologies to operate and communicate in the periphery of one's attention, demanding less input from the user (Weiser & Brown, 1996). Breathwear uses a respiration belt that is worn with clothing and plugged into the iPhone; the user simply goes about their day and can check in with the Breathwear app for a report of breathing activity. The technology also prompts users with exercises when unhealthy breathing is detected. This silent logging of user behavior is designed to avoid any stress encountered from being continuously reminded of performance, and it is likely that the novelty of this software remains in tact with such subtle approaches to user engagement. Breathwear offers a standardized protocol, with

the basic intent of bringing awareness to breathing, and therefore it is easily applicable to a large audience.

In addition to offering a more standardized protocol, technology can afford a more complete experience—one that is multimodal and highly responsive. The Confronting Pain: Redefining Mobility (CPRM) lab at Simon Fraser University, lead by Dr. Diane Gromala, has been actively involved in designing immersive therapeutic experiences simulated by technology [Website: http://www.confrontingpain.com/projects]. The Virtual Meditative Walk program developed by the CPRM lab uses a combination of a projected virtual environment (VE), a unidirectional treadmill, and biofeedback sensors to offer users a relaxation experience (Gromala et al., 2011). The project is intended to place users, typically those suffering from chronic pain, in a VE that reflects back to them their performance in reaching a state of meditation as they navigate through the virtual world, ideally an aid to help cope with or resolve issues around mobility. The user is expected to rely on visual and sonic indicators within the virtual world to assess personal performance. The CPRM project Sonic Cradle, based on the crux of mindfulness meditation, offers users a highly responsive audio interface that responds to respiration patterns (Vidyarthi, Riecke, & Gromala, 2012). Sonic Cradle was designed to invoke visual sensory deprivation so that users could more easily focus on one central activity—modulation of breath work. The Virtual Meditation Chamber, perhaps one of the more prominent projects to come out of the CPRM lab, offers a VE experience in which users see a virtual sunset, among other abstracted representations, while being narrated to by a guiding voice intended to induce

meditation. The project also features a visual avatar body to be used as a cue for guided muscle relaxation. The Virtual Meditation Chamber ornaments the user with physiological sensors and hardware; testing apparatus includes a head-mounted display, headphones, a galvanic skin response sensor, a heart-rate sensor, and a respiration belt. The usage of these external components may however be a compromise for virtual reality (VR), as discomfort and even minimally invasive equipment can keep users from feeling fully immersed, becoming physical reminders of the *real* world.

The CPRM researchers cite the role played by VR in lowering patient reliance on non-pharmacological analgesics as the motivating factor in designing VR therapy and training applications (Gromala et al., 2011). Such applications are to be understood as distinct from *VR distraction*, a term applicable to one of the more popular examples in the history of VR in health care: SnowWorld (Hoffman et al., 2004). SnowWorld, designed by cognitive psychologist Hunter Hoffman and computer scientist David Patterson, is still used to immerse patients undergoing treatment of wounds in a virtual world where they can visually explore an arctic environment and throw snowballs at various creatures (Frank & Carter, 2012). VR used as distraction has been consistently found effective in helping patients overcome perception of pain that accompanies various acute treatment procedures, much more so than with the substitution of VR with video games (Hoffman et al., 2000; Botella et al., 2008; Dahlquist et al., 2009). This effectiveness is not observed when pain is chronic, so this may be dealt with by taking more personalized approaches to designing VR, as per the efforts of the CPRM lab. Researchers have generally attributed VR-related decreases in pain perception to patients' multimodal

preoccupation (Hall, Navvab, Maslowski & Petty, 2012). It might also be assumed that immersion and, specifically, the adoption of a virtual body to which the virtual world provides congruent contextual feedback may be the reason for a shift in pain perception. This view lends itself to the importance of embodied experiences—those that rewire our sensorial system to augment or completely alter what is perceived. Gromala has also been interested in notions of embodiment in virtual reality, having produced works such as Dancing with the Virtual Dervish (Gromala & Sharir, 1994) and Taro(t)ception (Levisohn & Gromala, 2009) she has explored the concept of proprioception—one's awareness of his or her own body in any given context. Her work is highly interdisciplinary and blends together her experience as an artist and designer, with particular attention to discourses surrounding the body in immersive environments (Dolinsky, Gromala, Sharir & Ayiter, 2011). Accordingly, the CPRM lab has chosen to experiment with VR as a platform for self-awareness as related to chronic pain perception (Gromala et al., 2011). Meditation and relaxation are the techniques used to induce this self-awareness overtime and this is likely due to VR's successes in psychotherapy and health care in general as well as the clinical use of MBSR (mindfulness-based stress reduction) and MBCT (mindfulness-based cognitive therapy) (Carmody & Baer, 2009). What comes into question then is the decisions made regarding simulation aesthetics; VR used in addressing PTSD (post-traumatic stress disorder) and even phobias, known as exposure therapy, tends to follow certain narratives or requires simulated contents specific to patients' goals (for example, to overcome an extreme fear of flying a virtual airplane boarding experience is visually and aurally simulated) (Rothbaum et al., 2006;

Rizzo et al., 2006). It is also curious as to why extensive discussion about the aesthetics of VR simulations is often left out of research altogether—perhaps the core functionality of such an expensive and complex system receives priority over factors that might seem secondary to the overall intent of the project. However, the concept of verisimilitude, the degree to which something appears real or true, may play a pivotal role in the effectiveness of VR (Haoran, 2003). Having ubiquitous access and exposure to a varied range of displays throughout the course of one's day, each subject to increasingly rapid cycles of iteration, arguably raises the standard of graphics, audio, and customization—*smart* displays that provide functionality similar to that found on a computing device. As a result, immersion cannot solely be associated with VR experiences but also, for example, with 3D films using sound fields more complex than even 7.1 surround sound (Faria, Zuffo & Zuffo, 2005) and console games that interface directly with the user's entire body through skeletal tracking. Mixed reality (MR) such as augmented virtuality (AV) simulations (Milgram & Kishino, 1994), those that offer responsive interfacing, are perhaps new alternatives to VR that may be just as effective. It is important to note that AV used as an alternative should aim to work with the user's body as a point of reference around which the experience is contextualized, as the inability to do so may present the same difference observed among the efficacy of immersive VR and 2D video games.

Outside of institutional research, there have been several short-term design explorations in the field of meditation and wellbeing. Some notable prototypes and installations that inspired the aesthetics and functionality of the thesis project are discussed as follows. Works include: i) Channel of Mindfulness, a combination of an app

for the iPhone and a peripheral hardware device modeled after a Tibetan Prayer Wheel into which the iPhone is plugged, is used as a spinning antenna that plays meditation-inducing sound frequencies so long as the user keeps the antenna spinning [Website: http://portfolio.yufangised.com/Channel-of-Mindfulness], ii) 'Meditation' is an installation piece that allows users to influence the shape, movement, and sound of light-projected colored waves that emanate from a circular loudspeaker embedded in a wall—the installation is a responsive piece that detects body movements [Website: http://www.thecreatorsproject.com/videos/minha-yangs-imeditation-1208i-at-new-york-event-2011], iii) 'Brain Station' uses a BCI (brain-computer interaction) wearable light bulb helmet that converts brainwaves into photovoltaic energy used to brighten the bulb according to the user's mental state [Website: http://www.zero1biennial.org/brainstation-lunchtime-meditation], iv) 'The Treachery of Sanctuary' is a large user-performance piece that shows users' virtual shadows onscreen with special interaction effects like flying virtual birds that hover around and occasionally come to rest on calmly-standing users [Website: http://www.thecreatorsproject.com/blog/how-it-works-chris-milks-ithe-treachery-of-sanctuaryi], and v) 'Gold Noise Meditation' is an experimental setup of several portable radio units that each channel unique broadcasts in order to create a dualistic provocation of desirable and undesirable noise—enclosing a user within a circle of these radio units challenges users to tune in and out of overlapping streams, facilitating one's focus on the present moment [Website: http://goldnoise.org].

The discussed works appear to blend design and art practice, with underlying provocations and subjectivities that have been injected into each piece as a reflection of

the creators' intuitions. Although it is not usually common practice to design a standardized technology for wellbeing that borrows heavily from artistic intuitions or subjective experiential knowledge while keeping the design eligible for efficacy tests in real-world application, there is arguably something inherently appealing about creative works and their playful, often symbolic, nature. If standardized design is to be successfully married to a subjective aesthetic, user experience goals should offer a high level of versatility and universality. There should also be a high level of transparency in regards to aesthetic direction—perhaps a psychological deconstruction of symbolic elements—as this more effectively brings artistic intuition into the creator's design hypotheses while simultaneously holding him or her accountable to subjective design methods.

2.1.2. Inspirational Examples in Gaming

Although gaming may seem out of place in a discussion on mind-body or holistic wellbeing, the field has seen great innovation and has progressively made efforts to improve the range of health and fitness titles available. Some of these titles take advantage of the more immersive forms of MR and AV in order to personalize experiences by mapping the user visually into the game while also allowing body posture and movement detection. One such example is *Your Shape: Fitness Evolved 2012* [Game: Your Shape: Fitness Evolved 2012, Ubisoft, 2011]; this game offers several different upper and lower body workout sessions, fitness games, and yoga classes, with real-time feedback on user performance. The game mirrors the user through the Kinect camera, literally reflecting one's presence in the virtual world. Although other similar games have

designed experiences where the body is invisibly detected but not shown, the concept of understanding one's position and movement through reflection is arguably familiar and requires no dramatic cognitive accommodation—the universal experience of identifying and analyzing oneself through a mirror easily supports this method of visualization. Seeing one's reflection relative to a virtual world and virtual characters allows for more accuracy in performing game exercises and in making adjustments.

In attempting to locate mind-body wellbeing practices (extending beyond physical fitness) within gaming, it seems easy to perceive video games in general as agents of distraction that pull the user away from other forms of mental preoccupation, most of which are based in one's physical or practical reality. As noted from the VR distraction case of SnowWorld, the success of distraction has much to do with the role of immersion. In *Mindfulness and Video Game Play: A Preliminary Inquiry* (Gackenbach & Bown, 2011), the authors investigate a possible link between the elicitation of immersion and presence as part of gaming and the state of attention and awareness in mindfulness. Motivation for this investigation was rooted in the observed similarity between scales used in study assessments to determine mindfulness and scales used to determine psychological absorption. The main point of interest found among the study's observations reveals that gaming is often used as a means to escape and shift one's awareness to an objective that appears to have no practical value to the user; in doing so one's awareness is taken off of other personal matters which may otherwise be difficult to detach from (Gackenbach & Bown, 2011). The mechanism with which video games are able to achieve this shift in focus is what could potentially be incorporated into a

successful holistic health learning experience. It is important to note that immersion in this case extends to include the content of the game—how engaging a virtual activity might be—rather than how occluded one becomes from physical reality due to VR's multimodal envelopment. Bridging this shift in attention back to fitness games' approach to body visualization warrants exploration of how *game* experiences can pull users out of physical reality preoccupations while simultaneously distracting them with novel discourses regarding their mind-body health.

Active engagement, as observed with video games, was of particular interest in the development of the thesis prototype because with it comes an affordance of training or conditioning. Hungarian psychologist Mihaly Csikszentmihalyi has written extensively on the concept of *flow,* which involves attaining optimal moments of experience while completing an established goal where both the perceived challenge and skill level are balanced and feedback is rapid (Csikszentmihalyi, 1998). Csikszentmihalyi's work on varying mental states suggests a definitive difference between flow and relaxation, two states that may be difficult to clearly identify in regards to the practice of mind-body wellbeing. While relaxation and mental calm are often associated with meditative experiences, practices involving physiological regulation (breathwork modulation for example) require focused attention and can be trained for, similar to the way in which a sense of flow is elicited; once a user has attained a sense of flow, disruptions are less likely to take away from immersive engagement (Csikszentmihalyi, 1998). The role of flow and immersion in any possible intersection with the practice of mind-body

wellbeing proves to be a valuable source of insight in developing a training or conditioning experience.

A game that greatly inspired the thesis prototype is *Leela* [Game: Leela, THQ, 2011], a game for the both the Nintendo Wii and Xbox 360 that has the option to use the Xbox Kinect as a means to interface directly with the user. Leela was created by spiritual health icon Deepak Chopra and primarily teaches users Chakra-based physical exercises and also offers passive meditation guidance. Verbal narration is used to guide users through meditation and physical exercises that correspond to the onscreen visual aesthetics. While this game might not be so accessible for users unfamiliar with Chopra's spiritual doctrine, it offers a glimpse of wellbeing design through augmented virtuality that greatly supports the mind-body relationship. Symbolic aesthetics are especially captivating in Leela, as they are very intimately superimposed on the user's virtual representation [Game: Leela, THQ, 2011].

Other examples of games for wellbeing that prioritize psychological symbolism in a vein similar to Leela often avoid visualization of the body and instead remove all traces of human presence from the experience, supposedly in an effort to emphasize natural, peaceful vistas that represent clarity. American video game developer *thatgamecompany* has been responsible for the following games that have garnered critical acclaim for their unique approach to designing moments of mental rest in gaming: i) *flOw*, a game in which the user navigates an aquatic microorganism that grows as it consumes other microorganisms [Game: flOw, thatgamecompany, 2007], ii) *Flower*, a game in which the user influences the movements of a flower petal through a large nature space—the petal

is propelled by a gust of wind corresponding to user navigation which, in turn, allows users to additively pick up more petals and positively influence the surrounding game environment while doing so [Game: Flower, thatgamecompany, 2009], and iii) *Journey*, a game in which users play as an ambiguous robed figure situated in a seemingly vast desert that, at times, seems to share characteristics with an underwater world—although there is no descriptive text or instruction, there is a strong implication that the playable character needs to progress to a large mountain off in the distance, ever-present in the game environment [Game: Journey, thatgamecompany, 2012]. It is apparent that these games aim to create open-to-interpretation, free-play experiences rather than to promote specific, subject-based messages or storylines. According to co-founder of thatgamecompany Jenova Chen, there is no serious agenda behind these titles, rather there is an interest in creating unique play experiences that evoke emotion through novel gameplay mechanisms, visual aesthetics, and sound (Game Informer…, 2010). Borrowing from these creative works in gaming, it is possible to evoke feelings or sensations in users without creating a distinct narrative. This style of using functionality and aesthetics to enrich an almost purely open-to-interpretation experience grants more flexibility and artistic experimentation to the thesis prototype where similar developments are possible.

2.1.3. Visualization in Meditation

The use of visualization for meditation practice is not only common but can be crucial in achieving a meditative state. In their paper titled *BODY-MIND-SPIRIT: The Benefits of VISUALIZATION*, Hoffart and Keene define visualization as: “the creation of

mental images, or the devising of a story, and is one way to access the imagination, involving one, several, or all of the senses as bridges between mind, body, and spirit. Many terms are similar to visualization: guided imagery, centering, focusing, distraction, or meditation. Though each of these approaches varies slightly, the intent of all of them is to use the mind to get in touch with the inner self" (Hoffart & Keene, 1998, p.44). Several meditation practices rely on guided imagery techniques, with intentions including: i) the creation of a peaceful mental space, ii) the redirection of one's thoughts to creative imagination in order to detach from mental chatter and external distractions, and iii) the process of bringing awareness to specific *things* or processes in an effort to shift attention (Van Kuiken, 2004). Although research on positive physiological impact with guided imagery is still only gaining momentum, reports of the psycho-supportive benefits that accompany guided imagery are consistent positive indicators warranting its use (Roffe, Schmidt & Ernst, 2005).

Visualization can be used during the induction phase of meditation practice, abstractly synonymous with a warm-up stretch. Due to the nature of creative visualization during meditation, it is important to reiterate and clarify key terms that are often associated with the assessment of virtual reality experiences—given the acknowledgement of visualization as a virtual process executed by the brain (Doyle, 2009). As previously discussed, immersion is the degree to which one is present in an experience and though it is sometimes used interchangeably with the term absorption there is a difference in that absorption can be used to address one's involvement with some stimuli whereas immersion is more concerned with the depth of presence one has

attained (Dhiman, 2012). Absorption can then be seen as a product of immersion. Absorption also addresses the concept of selective focus where one may become temporarily immune to stimuli from the external environment (Austin, 1999). As a result, a logical assumption would take absorption as an indicator of one having reached a meditative state.

In locating these concepts within the practice of non-traditional meditation that is centered on active engagement it can be assumed that visualization and guided imagery offer a degree of immersion such that these imaginative or virtual simulations are not only methods through which individuals connect with their inner selves, as mentioned by Hoffart and Keene, but they are also techniques for detaching from both the external world and one's own mental chatter, ideally leading to absorption in the process of visualization. The content of meditation visualizations usually stays within the realm of nature or, by extension, the body (Van Kuiken, 2004). For example, meditators are often encouraged to envision lush meadows, beaches, or areas of greenery. Research, primarily in the fields of space- and eco- psychology, consistently links exposure to nature (both active and passive—physical interaction and remote or virtual viewing) with benefits to wellbeing under the umbrella of the 'biophilia hypothesis' (Bates & Marquit, 2011). Experiments conducted on active and passive exposure to nature report improvements to emotional health as well as cognitive functioning. The body can also be brought into the visualization experience through imagination of different parts of the body as they respond to the rhythm of one's inhalations and exhalations (Van Kuiken, 2004). Relaxation scripts used in meditation induction may also focus on the movement of

subtle energies from the crown of one's head down through to the toes of their feet. Redirecting attention in this way makes visualization a key element in the practice of active engagement meditation; learners are pulled out of other scattered or fixed mindsets and required to experiment with creative thinking while developing metacognitive awareness of personal behaviors with an overall goal of maintaining absorption. The problem that exists then is that while creative visualization requires effort and caters to certain implicit goals, meditative healing or learning through relaxed reflection may be compromised due to one's adherence to visualization effort as part of the induction protocol. This is the initial paradox found in learning non-traditional, active engagement meditation—this is the call that the designer wishes to answer in the development of the thesis prototype.

2.1.4. Chakras and the Subtle Energy Body

The metaphysical concept of Chakras and other similar energy centers within the body originates from Eastern yogic traditions (Fernros, Furhoff & Wandell, 2008; Meadow, 1993; McMurray, 2005). These traditions are found rooted in Hinduism and Buddhism and can be understood as equivalent to personal development models used in Western psychology (Meadow, 1993). Chakra-centered yoga, such as Tantric yoga, is essentially the reference to symbolic modes of healing, through the chakral and subtle energy body, as part of regular poses and posture exercises (Meadow, 1993). This yogic practice offers an aesthetic and holistic model for wellbeing. Symbolism in yoga, and also sometimes in meditation, is used specifically to identify and isolate unique psychological processes that are intertwined with physiological processes. Glands and

major nerve plexuses referred to in contemporary physiology are surprisingly compatible with chakra energy points specified by yogis over thousands of years (Meadow, 1993). The seven major chakras, said to be located along the spinal column, are all connected sequentially starting with the Root chakra, which is found at the base of the spine and represents family, survival, and instinct. The Sacral chakra is found just below the navel and represents influence of the external world including pleasure, power, and money. The Solar Plexus chakra is found below the sternum and over the stomach and represents the self—confidence, esteem, acceptance. The Heart chakra is found in the middle of the chest and represents love and emotions. The Throat chakra is found in the internal and external throat and represents communication and will. The Brow chakra, also called the Third Eye, is found in the middle of the forehead and governs mental and intuitive processes. The Crown chakra is found at the top of the head and represents connection to the Divine and the collective (McMurray, 2005; Meadow, 1993). Typically, the chakras are said to appear as orbs of lights, each of a different color according to the *ROY G BIV* (red, orange, yellow, green, blue, indigo, violet) spectrum derived from physicist Sir Isaac Newton's seven major colors (Coffey, 1912). From the Root chakra to the Crown chakra the ROY G BIV spectrum applies respectively. Each chakra is also said to govern physiological processes close to its location on the body in addition to even larger overlapping systems throughout the entire body, however there are slight discrepancies within the field on this topic. Regardless, chakra body energies makes for a highly holistic concept even within itself and suggests that there is perhaps more power already contained within the body for personal wellbeing than is generally known. Yoga,

tangentially an active form of meditation, is used to access these energy points of the body with Prana—the breath of life (Khalsa, 2007). Breathwork is of great importance in both yoga and meditation as it is used to support the physical needs of the body and to regulate calmness and relaxation (Khalsa, 2007). While there are some sources of conflict in the field of chakras and yogic healing regarding specifications (number, size and color of chakras), what the general consensus among the literature offers is an interesting aesthetic for symbolic healing. This concept and aesthetic grants individuals a sense of autonomy over personal wellbeing and speaks well to theories of personal development and self-empowerment in psychology. Vibration is often referred to as a form of communication used by subtle energies and it is believed that achieving higher vibrations through wellbeing practice (McMurray, 2005) propels one towards self-actualization, very similar to a personal progression towards the top tier of psychologist Abraham Maslow's Hierarchy of Needs (McMurray, 2005). The concept of the subtle energy body as a medium for symbolic healing has great affordances for aesthetics that speak to the mind-body relationship. In directing this research towards the development of the thesis prototype it was not important to validate or to accurately reproduce the chakras through simulation. Instead, drawing on the metaphors and visual symbols so richly articulated on in yoga research was enough of an aesthetic to work with for the prototype.

2.1.5. Holistic Wellbeing Applications in Health Care

While MBSR (Mindfulness-based Stress Reduction) and MBCT (Mindfulness-based Cognitive Therapy) have both seen popular uptake in healthcare as adjunctive or conjunctive therapies (Carmody & Baer, 2009), and in schools as regular workshops,

more experimental interventions that speak through artistic representation or offer interaction with technology are still hard to place, especially if they are not directly comparable to the likes of VR. Aligning new innovative works with existing practices that have already gained acceptance seems to be instrumental not only in acquiring support but also in seeking context for use. Mindfulness related treatments are largely based in Yoga practice, and are regarded as part of the movement that helped to popularize Yoga in the West (Salmon, Lush, Jablonski & Sephton, 2009). Although mindfulness addresses the mind-body relationship through awareness of self, it does so more passively than Yoga. Yoga emphasizes physical movement and the intimate relationship between mind and body, an approach that is more prevalent in Eastern cultures:

> The absence of movement therapies in Western psychotherapy and clinical practice is notable but certainly understandable, given that what Freud termed the 'talking cure' has historically placed more emphasis on cognitive factors than on physical aspects of behavior. It also reflects in part the mind/body dichotomy that has traditionally characterized Western health and medical care. In addition, relatively few somatically-based practices have been thoroughly empirically validated, despite their broad popularity. (Salmon, Lush, Jablonski & Sephton, 2009, p. 61)

Bringing the body more explicitly into therapeutic practices was an interesting point of exploration in the development of the thesis prototype. This extends beyond known theories of physical exercise and its role in generating endorphins (Randall, 2012) or bringing variety to predominantly non-physical treatment options; there is an appeal to new embodied experiences that discussions on VR have touched on—especially evident in studies that have employed VR for eating disorders and body attitudes (Riva, Bacchetta, et al., 2001; Riva et al., 2003). This makes for a fascinating exploration of

whether individuals are susceptible to the programming of new feelings and attitudes about themselves, and specifically their health, through responsive aesthetics that impose symbolic dialogs onto representations or abstractions of the body. A precursor to this line of thought is the efficacy of guided imagery techniques that promote positive visualization about one's own health as documented in reports from various medical and holistic nursing journals. Guided imagery employed in this vein, sometimes accompanied by music—known as the Bonny Method (Burns, 2001), was found effective in relieving stress and accelerating the healing of wounds (Holden-Lund, 1988), in reducing fatigue, mood disturbance, and cortisol levels in adults undergoing psychotherapy for various diagnoses (McKinney et al., 1997), and in cutting postoperative use of narcotics by almost 50% in patients undergoing elective colorectal surgical procedures (Tusek, Church, and Fazio, 1997). However, it is possible that some individuals are unable to readily practice visualization techniques as part of meditation on their own because they find it hard to rehearse mental imagery or positive affirmations. This may also be the case if individuals are suffering from psychiatric illness or trauma that impacts neurocognitive capacity as these patients may lack imaginal aptitude for visualization exercises (Moller & Bal, 2013). This understanding also supports the outsourcing of visualization to innovative technology interventions. The use of simulated visualization that brings the body back into the dialog of healing recognizes the importance of lending autonomy and agency to users when it comes to their health and wellbeing—a point highlighted in a discussion on Nikolas Rose's work (see **Section 3**). This may ultimately, and ideally,

result in individuals being able to participate in their own wellbeing outside of technologically mediated experiences, having identified the body as a portal to wellbeing.

2.2. Theoretical Reflection

The following sections entertain social and theoretical discourses around autonomy and the body as well as symbolic acts in healing. These explorations may read as digressions from the initial direction of the paper but form a necessary component of the multidisciplinary approach to research exercised by the designer, as critical making looks to deconstruct as wholly as possible every facet of design.

2.2.1. Autonomy and Embodiment

The discussion in this section looks at the body as a vulnerable interface onto which meaning can be imposed. This discussion closes with a reflection of how critical discourses concerning the body can help inform the research trajectory of this paper.

In "The Politics of Life Itself: Biomedicine, Power, Subjectivity in the Twenty-First Century" (Rose, 2007) Nikolas Rose dissects the processes that have, in his opinion, distanced the self from the individual, resulting in a loss of autonomy. Specifically, Rose contrasts the nineteenth and twentieth centuries where the former had individuals more concerned with the corporeal self versus the latter where emphasis has been placed on the molecular self. He suggests that this shift accompanies a need to be directed by those who have access to the molecular self; medical professionals are able to evaluate MRIs and various microscopic developments within human bodies and, more importantly, imbue these representations with meaning. Such practices build on ways of seeing that were initially more symptom-driven and assessed at the corporeal level. Of particular interest

to Rose is the concept of the medical gaze, that which takes power away from individuals and lends itself to subjectivity. In conjunction with a shift that suggests that personality and mood are products of fluctuations within the molecular body there is an underlying *somaticization of individuality*—one's sense of self is a manifestation of his or her physiology. Because the molecular self is subject to analysis and scrutiny, as Rose indicates, there is an implication of some *normal* standard of health that is often measured against. The concept of the molecular self and its fluctuations suggests that disease and cure, or even treatment, have somewhat of a cyclical relationship that is driven by potential risk. It is almost as though one is never completely free of disease, threat, or *abnormality*, consequently introducing the opportunity for one to modulate themself through medicine or other appropriate interventions in order to remain in a state of optimal health—what Rose proposes is the rightful responsibility of a *biological citizen*. Additionally, there are new forms of what Rose refers to as *biocitizenship* that include informational and digital varieties, those which account for technological advances that have made information greatly accessible and, in turn, present individuals the opportunity to assess and evaluate themselves. Accordingly, one must remain aware of his or her genetics or perceived risk of disease, an act Rose refers to as the *regime of the self*. With psychiatric diagnoses more implicated in neurobiology now more than ever (Rose, 2007), as opposed to psychoanalytical approaches that dealt with the subconscious, it appears that the mind is what the brain does and, as Rose puts it, "the space between person and organs flattens out" (p. 198).

Gilles Deleuze's discussion in his *Postscript on Control Societies* brought to light the shift from disciplinary societies to control societies and its effects on the functions of institutions. Deleuze conveys that in control societies there does not exist a sense of completion and, in contrast, disciplinary societies are typified by different phases of life or one's progression through an institution that has both a definitive start and finish. The source of control in society, Deleuze implies, comes from the inability to escape participation in some kind of *productive work*. In relation to Rose's work, it would appear that the individual is unable to escape risk to the body. If possibility of risk to the body cannot be escaped and must be addressed through regulation with interventions such as pharmaceuticals, then the body is said to be under control of agents external to the self. Thus, Rose's demonstration that individuals have become victim to the somaticization of individuality would logically extend the notion of one's body having control imposed on it to one's sense of self also being subject to control. It is necessary then to determine the source of control. In both the cases of Deleuze and Rose, the source is corporations functioning as components of a capitalist agenda. Rose addresses advertising for pharmaceuticals that often appeals to peoples' desire to maintain or return to a *normal* life, suggesting one's true sense of self is achievable through modulation via external, manufactured sources such as medicine. There is a much wider spectrum of effect that medication has on the individual than is disclosed or thought pertinent to mention (Rose, 2007).

In reflecting on the discussions of both Rose and Deleuze, it is apparent that the body may be subject to discourses of what is computed and presented as normal. In the

case of this argument, reclaiming autonomy over the body is synonymous with reclaiming autonomy over sense of self. The discourses of medicine, and specifically, in this case, the discourses of the pharmaceuticals industry, might be matched with equally convincing discourses that shift the power dynamic from the medical gaze to a *spiritual gaze* (Ross & McSherrys, 2010). The premise of a spiritual gaze, as referred to in holistic nursing literature, suggests granting power to spiritual beliefs and practices (including holistic health) that employ prayer, faith, meditation, symbolic acts, and even physical body exercise, such as yoga. The discussion in **Section 2.1.5** has presented some of the benefits of weaving the spiritual gaze into modern health care practice; changes in psychological interpretation of one's health can support and affect the outcome of one's treatment and recovery. The spiritual gaze gains credibility only proportionately as holistic health practices (complementary and alternative medicine) are recognized and deployed in health care. Of course, it is extremely difficult to make a case for a pharmaceutical-free life for everyone at any given point in his or her life, nor is it necessary or appropriate. What remains important is the initiation of a new discourse that supports an alternative dialogue in the field of health—a goal that is as ambitious as it is relevant to reclaiming autonomy and empowering the mind-body relationship.

2.2.1.1. Breath Retraining and the Spiritual Gaze

Respiratory psychophysiology is the branch of psychology and physiology that looks at the interrelated processes of the mind and body where respiration is concerned. In his article *The Modification of Breathing Behavior: Pavlovian and Operant Control in Emotion and Cognition*, Ronald Ley presents breath as the only vital function that is

under both direct voluntary control and involuntary control, modulating autonomously in proportion to perceptual experience when there is no conscious effort (Ley, 1999). Given this understanding, the process of breathing is linked to how one thinks and feels, as per involuntary control. In a similar vein, heart rate also functions similarly, and in addition is directly tied to breathing rate (Ley, 1999). Because of the dual nature of control over breathing, one can regulate his or her own breath and heart rate and in turn, intensity of thoughts and feelings. This discussion presents a scientific deconstruction of the deep breathing activities promoted in holistic health practices including both meditation and yoga. Through this approach of presenting credible scientific information relevant to holistic health practices, the spiritual gaze merges with the medical gaze and gains potency in its conviction. This is perhaps the best way to explain the beneficial aspects of the ambiguities a part of wellbeing that are tied to inaccessible spiritual doctrines.

Ley also discusses *breath retraining* (Ley, 1999, p.453-454); the practice of exercising voluntary control over breathing in an effort to regulate other connected processes of the body and mind. Effectively, this is the heart of yoga practice. Continuing to use the exercise of deep breathing as the core functionality of the thesis prototype, as was done in the ORGONA project, seems fitting for the design of any wellbeing technology—even more so for the design of an innovative holistic health interface.

2.2.2. Symbolic Acts of Healing

A particularly fascinating tangent that was also explored in the process of the thesis research includes theories surrounding the unconscious mind. With overtones that echo the works of Sigmund Freud and Carl Jung in psychoanalysis, eccentric filmmaker

and playwright Alejandro Jodorowsky is a practitioner of a creative therapy that he himself coined; Psychomagic (Jodorowsky, 2010). Jodorowsky uses symbolic acts, acts that are identified as irrational to heal the mind of traumatic events and psychological obstacles to wellbeing. It is hypothesized by Jodorowsky that the unconscious mind speaks to performance, drama, and the arts—as it is the home of dreams (Jodorowsky, 2010). Consequently, symbolic acts, those that seem almost ritualistic, may impact the unconscious mind greatly, releasing issues that have lain dormant over years or even generations. According to Jodorowsky, psychological issues have a tendency to manifest physically on the body as well and these physical representations can also be alleviated through therapeutic Psychomagic (Jodorowsky, 2010). This way of interpreting health very clearly speaks to the mind-body relationship, offering a representation to issues that may be so deeply embedded in one's psyche. Alejandro Jododrowsky works with the Tarot in many of his one-on-one healing sessions (Jodorowsky, 2010). The Tarot is essentially a pack of 78 playing cards used for the purposes of divination (Huson, 2004). Each card has a name and unique, highly symbolic imagery assigned to it. During a Tarot reading, the party acting as the healer, Jodorowsky's role, will draw a select number of Tarot cards from a shuffled deck (Jodorowsky, 2010). The Tarot is believed to speak to one's questions through symbolic imagery—a language that is essential to interpret in talking to one's *higher self*,[6] or the divine source. This skill is exercised like a muscle over its use with the Tarot and one ideally learns to listen to the intuitive voice within as a result (Jodorowsky, 2010). Aside from this exercise, faith is incredibly important in the

[6] Higher self, as used by the author, refers to one's soul or the part of his or her personality that is most *enlightened*—this may also refer to one's intuitive faculty or *inner voice.*

practice of Psychomagic; Jodorowsky attributes such power to the party in the role of the healer that even nonsensical, or completely made up rituals can speak to the depths of one's psyche so long as there is faith in the healer or healing modality (Jodorowsky, 2010). Divination or symbolic acts can therefore be seen as mere channels through which one is able to tap into hidden or unperceivable issues.

As mentioned in previously discussed works, symbolism as an aesthetic is a important factor for innovative wellbeing technology because it has the capacity to awaken creative problem solving, which, in turn, subtly speaks to blockages that may be affecting one's perception of self and personal health. Symbolism is important in faith and as mentioned in research on guided imagery and visualization it can have a surprisingly positive impact on health.

3.0 Design Approach

The designer's approach in making the prototype began with a synthesis of all research, filtering coherent arguments and design choices into a rough working build of a responsive environment based on ORGONA and ORGONA *Underwater* [Interaction design]. This section references research and insights from **Section 2**.

3.1. Synthesis

Symbolism, beyond Jodorowsky's characterization, is often captured in metaphors and analogies used in the telling of stories, some of which may be cultural or religious. Nature also affords symbolic attributions, especially in the case of aesthetics that reference nature, as seen in the examples of VR and gaming discussed in **Section 2**. Because holistic health practices draw on concepts such as the subtle energy body and

chakras, both of which are believed by practitioners to be intimately linked to embodied wellbeing, symbolic aesthetics that make reference to an actual holistic concept, already centered around the body, as a part of the healing modality would make for a novel exploration in the aesthetics of wellbeing technology. This is in comparison to projects that abstract too far from the healing of oneself (with the body as the identifier) and instead present users with beautiful vistas and landscapes. While these abstractions may be perceived as relaxing and peaceful, they are still external from self, and in turn, from the body, and so they may have temporary effects that are hard for users to reproduce autonomously. Symbolic acts *magically* performed on the body by an external source are perhaps of little difference, unless the symbolic act is linked to an autonomous action exercised by the user. This is the major point of interest for the thesis—symbolic acts of healing performed by the user on his or her representation of body. In further connecting this with previously discussed research and theory, such performance is believed to grant the user with a heightened sense of autonomy in the practice of wellbeing, while simultaneously engaging actively in an experience that keeps alive a sense of flow as outlined by Mihaly Csikszentmihalyi. The use of yoga- and meditation-style breathwork as input that must be synchronized with symbolic healing presented to the user is an extension of the functionality in ORGONA, and also increases the likelihood of wellbeing due to the benefits of breath retraining as borrowed from the field of respiratory psychophysiology (Ley, 1999).

One consistency across the uses of visualization in both holistic health practices (meditation) and technologically mediated simulations (VR and video games), as found

in research presented in **Section 2**, is that visualization acts as an agent in cognitive shifts in attention. This indicates that visualization has the capacity to not only capture attention but to also sustain distraction from other mental preoccupations. And found particularly in the case of VR was that multimodal engagement greatly enhances this effect. Due to innovations like relatively new interfaces supporting motion (i.e. Xbox Kinect) it is possible that immersive experience can be reproduced in ways highly comparable to VR. When visualization is used to bring attention to the body, represented through augmented virtuality, it is possible that the mind-body relationship is strengthened, as the shift in attention requires the user to come into awareness of their body as a reflective, and responsive representation of self.

In combining these insights from research with the designer's intuitive vision for the project, a comprehensive theory was formulated and is provided in the following section.

3.2. Theory

Holistic health practices can be successfully innovated by new technologies that afford multimodal experience and demonstrate an aesthetic that more directly brings the body into the healing practice, ultimately providing a more intuitive form of training in healthy behavior while lending a greater sense of autonomy to the user over his or her own wellbeing. Specific prescriptions of the theory include: i) the use of the Xbox Kinect as an innovative and versatile motion sensing technology, ii) the simulation of symbolic aesthetics that depict healing performed on a representation of the user's body borrowed from yogic meditation practice that references the subtle energy body, iii) the use of

breathwork (deep inhalation and exhalation) also borrowed from yogic meditation as the core functionality which allows the user to navigate the experience.

3.3. Prototyping

The initial prototype, presented as proof of concept, was developed using the functionality of ORGONA and is described in the following section. **Figure 9.** and **Figure 10.** show the first prototype, following **Section 3.3.1**.

3.3.1. Version 1: Untitled (ORGONA Underwater build 2.0)

This version of the prototype was essentially an iteration of ORGONA where underwater imagery was used as a background onto which breath input, exaggerated exhalation where one is blowing into the Arduino mic sensor, would result in the formation of transparent ripples on top of the imagery. The user's body was represented on screen as a light and transparent bubble so that the user could track their movement across the screen while blowing ripples into the water. The imagery used was later changed to represent ethereal scenery, one depicting fantastical movement into the cosmos. These types of images reflect the aesthetic of the natural world, that which is not manmade, as is supported by the biophilic approach to visualization. The visualization of ripples of water was an attempt to seek unique ways to aestheticize catharsis and the emanation of chakra energies within the subtle body.

3.3.2. Prototype Specifications

The following table presents details of the components of this prototype.

Experience Element	Hardware/ Software (Platform)	Extensions (Tools & Processes)	Files (Data)
Visual Simulation	Processing (software)	Open source library for mass of center body tracking: OpenKinect OpenProcessing reference for water ripples: "Water Simulation" by ramayac, licensed under Creative Commons Attribution-Share Alike 3.0 and GNU GPL license. Work: http://openprocessing.org/visuals/?visualID=43543 License: http://creativecommons.org/licenses/by-sa/3.0/ http://creativecommons.org/licenses/GPL/2.0/	Royalty free stock photo of underwater imagery: Image ID 1402456 from http://www.sxc.hu Royalty free stock photo of cosmos imagery: Image ID 1213708 from http://www.sxc.hu
Audio	Processing (software)	Open source library for embedding audio: Minim	Royalty free music: Pensif by Kevin MacLeod http://incompetech.com/music/royalty-free/
Interaction	Arduino (hardware and software)	Electret microphone and circuitry to Arduino UNO microcontroller with USB to Macbook Pro. Original code for interfacing electret microphone with software.	N/A

Table 1. *Prototype Specifications: Version 1: Untitled (ORGONA Underwater build 2.0)*

3.3.3. Initial Suggestions

Suggestions from OCAD University faculty and students who had been exposed to this build were to explore more physical and natural ways of measuring breathing. This was to be undertaken by the designer by developing a custom-made Arduino respiration belt, to worn by potential users. In order to possibly eliminate a mediating device, there was a suggestion for using the Kinect to detect respiration through real-time calculation of shoulder movement or expansion and contraction of the chest. These suggestions concerned with the interaction between the user and the technology.

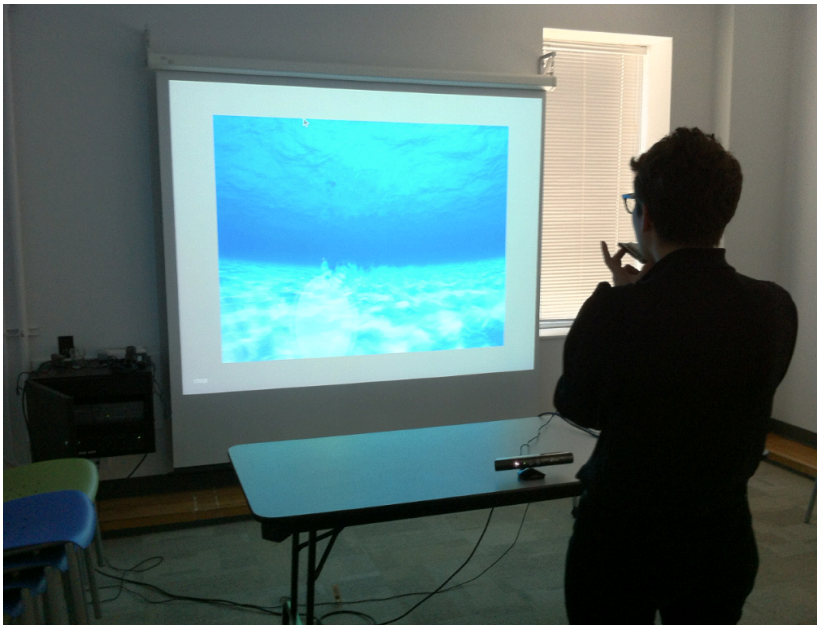

Figure 9. *Prototype Version 1: Untitled (ORGONA Underwater build 2.0)*

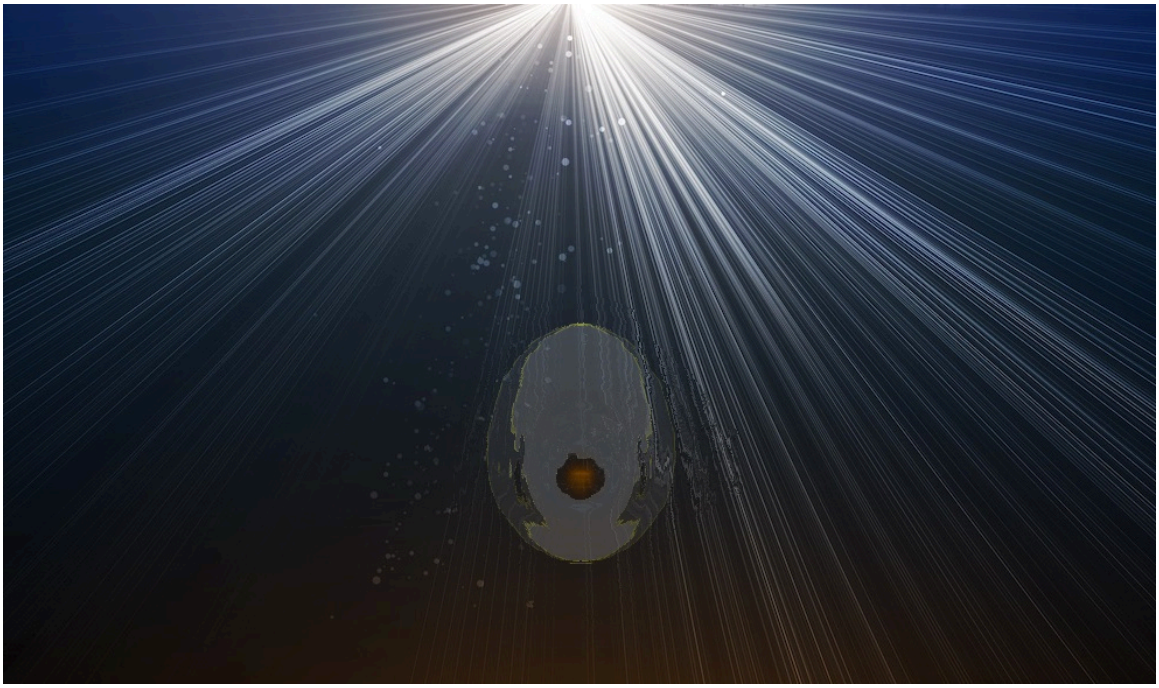

Figure 10. *Prototype Version 1: Untitled (ORGONA Underwater build 2.0) (2)*

4.0 Study and Design Iteration

The study described in this section was to be conducted originally in January but due to delays with REB Approval and problems encountered in prototype iteration development, the study—the source of formal feedback—was run over the course of a week at OCAD University and will continue to run beyond the scope of this paper. Informal sessions were held at both OCAD University and Rosedale Wellness Centre. Prototype Version 2 was the iteration subjected to feedback. Version 3 of the prototype was the version shown at a final graduate thesis exhibition and it also continues to be under development beyond the scope of the graduate program. The following sections more thoroughly detail the study.

In moving forward from Version 1 of the prototype to Version 2, the initial suggestions received in the form of informal feedback were acted upon. See **Section 4.2.** for details on Version 2 of the prototype.

4.1. REB Approved User Testing

The study is run primarily under the direction of the Principal Student Investigator: Harjot Bal, MDes Candidate at OCAD University. The study also has a qualified collaborator, Co-investigator: Dr. Henry J. Moller, Neuropsychiatrist and Medical Director at Rosedale Wellness Centre and Associate Member of the KMDI UofT (Knowledge Media and Design Institute at the University of Toronto) who supervises participants recruited from the Rosedale Wellness Centre—a site in addition to the OCAD University campus where the study is being conducted. Faculty Supervisor and Graduate Program Director of IAMD (Interdisciplinary Master's in Arts, Media and

Design) Dr. Barbara Rauch has reviewed the protocol and parameters of the study to ensure its value to the thesis work. The study was granted approval by the REB (research ethics board) at OCAD University on February 15th, 2013 (see **Appendix B: REB Approval**) and due to delays in approval the study remains open beyond the scope of this paper in an effort to continue the development of the prototype outside of the thesis. It is important to note that demonstrations of the prototype during Encounter critique sessions,[7] as well as informal testing and discussions within the OCAD University Digital Futures graduate workspace, were highly useful in substituting the REB approved study through delays. The prototype will continue to evolve based on feedback gained from the study, if so desired by the designer, beyond the graduate program—within the parameters outlined by the REB Approval.

4.1.1. Purpose

The study was initiated primarily to gain feedback from a variety of participants on the development of the thesis prototype. The prototype is subject to an iterative design based on feedback of both those in the design field and potential end-users. The larger purpose that this study serves is the development of a novel design theory that aims to enhance holistic health practices. Specifically, the approach i) uses the vast affordances of new technologies in developing a multimodal experience, ii) demonstrates an aesthetic that more directly brings the body into healing practice, and iii) provides a platform for the effective training and exercise of healthy behavior—deep breathing.

[7] Encounter is the name ascribed to the showcasing and feedback sessions of graduate student thesis work in the Digital Futures Master's program.

It is the feedback acquired from participants that allows the iterative design process to unfold, helping the prototype evolve. The designer's role as an experienced and adept student of holistic health practices works in balance with knowledge gained from study participants in order to satisfy the combination of subjective and objective design methods.

4.1.2. Study Design

Each consenting participant is briefed on the intentions and setup of the thesis project and then takes on the role of a potential user following a standardized protocol (see **Appendix A: User Testing Package**, Forms 1, 2, and 5). Users are provided with a pre-testing questionnaire that precedes their engagement with the prototype (see **Appendix A: User Testing Package** Form 3). Next, users engage with the prototype in a closed room under the supervision of the Principal Student Investigator (Note: At Rosedale Wellness Centre, users are be supervised by both the Principal Student Investigator and the Co-investigator due to potential risks outlined in the REB Application—see **Appendix A: User Testing Package** Form 2). The project is minimally invasive and requires the user to stand and engage in simple physical movements in front of a Kinect camera to view a representation of their body on a projection screen and attend to audio, both of which use responsive aesthetics to train the user to participate in deep breathing. The supervisor(s) take notes on an observations sheet during the engagement (see **Appendix A: User Testing Package** Form 3 (cont'd)). Once the engagement with the prototype is finished, users are provided with a post-testing questionnaire upon the completion of which ends the testing session (see

Appendix A: User Testing Package Form 4). One testing session takes approximately 15-30 minutes to complete. Users willing to participate on more than one occasion may do so easily without the study requiring any further adjustments. Additionally, the development of the prototype is better informed through comparative analysis of reports from repeat users.

4.1.3. Participants & Sites

A variety of participants for the study include students and faculty from the OCAD University Graduate Studies department who have at least some knowledge of, or skillset in, design. The other selection of this variety includes patients from Rosedale Wellness Centre who have tried or are interested in holistic health practices to overcome any of the following: sleep-related issues, stress, anxiety, and depression. While participants from OCAD University are recruited and tested on campus at the Digital Futures graduate workspace, participants from Rosedale Wellness Centre are recruited through the BrainLight program, a light and sound meditation treatment program that works in conjunction with an automatic massage chair (Moller & Bal, 2013), administered by collaborator Dr. Henry J. Moller and tested at Rosedale Wellness Centre in a closed room, booked in advance for single user testing sessions.

All participants are required to be between 18 to 65 years of age (inclusive) and, under precautionary measures, the study excludes those who suffer from: light-sensitive migraines or seizures, breathing-related problems that would only be negatively-impacted by participation, and women who are pregnant.

4.1.4. Data

Because the data collected from participants of the study is mostly qualitative, with the exception of data that can be quantified to approximate efficacy using the Likert scale values as measures, there is a less structured approach to the analysis and presentation of findings. Future study outside the scope of this paper and the graduate program, will likely take a more structured approach in reporting and in analysis of findings from the study (under the terms indicated by the REB Approval).

4.1.5. Collection and Recording

As per the designated input forms in the User Testing Package (see **Appendix A: User Testing Package** Forms 2, 3, and 4), all information relevant to the study is recorded and collected within the timeframe of a testing session. The recording of data is not reformatted beyond the collection of the input copy for the purposes of research presented in this paper. Findings for Prototype Version 2 can be found in **Section 4.2.3**. and findings for Versions 3 can be found in **Section 4.3.3.**.

4.1.6. Ethical Considerations

Potential risks that participants acknowledge in their briefing and consent include onset of seizures in those who suffer from epilepsy triggered by visuals that could be perceived as bright (it is important to note these visuals will be projected onto a screen or wall from a computer rather than being presented in the form of blinking lights). Psychological risks include any sensitivity users may feel when asked questions about their current state—whether they are stressed, relaxed, etc., and to what degree. Additionally, testing is conducted under the supervision of Dr. Henry J. Moller for

participants from Rosedale Wellness Centre. Dr. Henry J. Moller will engage if there is an emergency or a breach of appropriate conduct with or by a patient at anytime.

Users will not be identified throughout the course of the study—with the exception of the consent form where a user is asked to print their name and sign. The Principal Student Investigator will store all information of this nature (identifying) safely in order to maintain confidentiality outside of the researchers. Participant-based observations will be kept confidential at all times (to stay within the research team's possession only). Information collected regarding participants' general states (mental and physical) serves the possibility to able to categorize users during analysis. Anonymity is enforced and used to prevent any identification of participants—a User ID system is in place to maintain anonymity, with the exception of the consent form, which is the only identifying documentation. Any collected data will be accessible only to project investigators and supervisors.

4.2. Version 2: Interactive Chakra-based Breathwork

This prototype was more heavily informed by the research presented in this paper, as Version 1 was intended to be a proof of concept or an experimental piece. This prototype was designed to be tested and exhibited in a dark room with a large projection screen where the user is immersed in an intimate healing experience. The style of exhibition for the prototype in a gallery setting is shown in **Appendix A: User Testing Package** Image 1.

The first process of developing this prototype involved the coding of a visual simulation. This development process was an attempt to adhere to the research collected

and presented in this paper. Working with the initial suggestions, the designer began to build a more intuitive interface for the interactive breathing element of the project. Designing a wireless respiration belt with a stretch sensor to replace to the wired Arduino-electret microphone controller was undertaken. After having spent a month developing the respiration-sensing belt, the designer realized that its usage was not conducive to a wellbeing experience due to buggy, erroneous, and unstable wireless data streams sent to the receiving computer via XBee communication. On the occasions where the belt was able to correctly function—with a reliable stream for the XBee wireless communicator, the technology required the user to demonstrate exaggerated inhalation and exhalation in order to affect the visual simulation—this made the training aspect of the interaction an issue of concern. The designer decided to put aside the use of a respiration belt, the core technology for which is shown in **Figure 11.**, and act on initial suggestions that indicated the use of the Kinect to visually detect breathing; this would also make the experience wireless and keep the interaction minimally invasive. As a placeholder mechanism, until the designer learns and employs code in Processing for accurate detection of respiration-related body movement, the movement of a user's arms both up and down (relative to the body's midpoint) is coded to represent inhalation and exhalation respectively. This alteration attempts to keep the intuitive motion of breathing an embodied experience, as there is no additional sensor added to the experience. In order to tie the movement of one's arms up and down to breathing, audio cues were used. Detection of one's arms as *up* would cue a sound of inhalation along with the appropriate visual simulation, and detection of hands down would do the same for exhalation.

Simultaneously, the visual simulation was becoming far more complex than ORGONA. The simulation was able to achieve an aesthetic fitting to the premise of the research on visualization of the body; see **Figure 12.** and **Figure 13.** as follow. A video clip (VIDEO 1) of this demo can be viewed online using the following URL link: http://harjotbal.com/THESIS_Video1. Alternatively, the video demo can be viewed through the accompanying material available with this publication, see **Appendix D**.

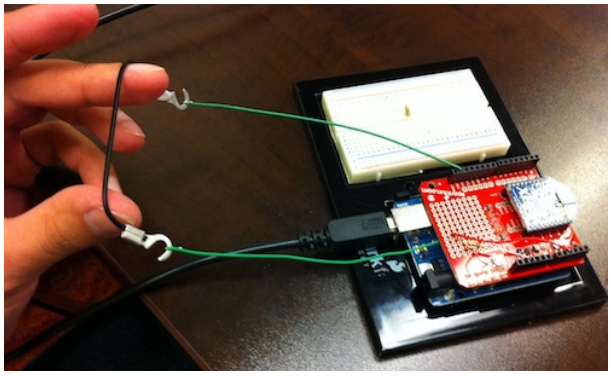

Figure 11. *Prototype Version 2: Respiration Belt (development stopped)*

Figure 12. *Prototype Version 2: Interactive Chakra-based Breathwork*

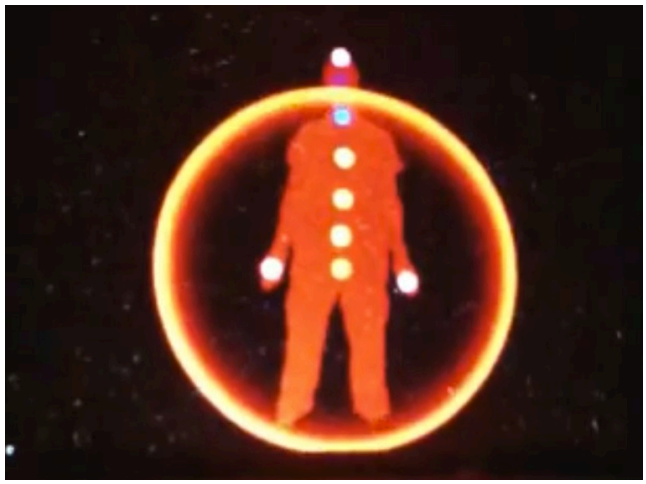

Figure 13. *Prototype Version 2: Interactive Chakra-based Breathwork (2)*

The prototype depicts the body as a transparent spirit-like form that traces the outline of one's body, colors it in, and mirrors the reflection on screen. The background is that of an image depicting the cosmos. A fully drawn-in user, depicting a visible face, body features and clothing, was not part of the chosen aesthetic to be mirrored back to the user because the Xbox Kinect camera sometimes clips out parts of the user's body or adds extraneous background detail to the figure. Additionally, the depiction of a soft subtle energy body seems to heighten the sense of symbolic reflection. At the beginning of the experience colored orbs are shown on the body to represent the chakras as symbols that rely on the embodiment of a spirit body. There is a progression from a fully shown subtle energy body with all chakras superimposed on it to the gradual removal of all visual elements until only one element is left used to depict breath—this element is yet to be determined but will likely be isolated audio of inhalation and exhalation with no visuals. Small beads that appear as fireflies visualize the process of breath moving in to, and being expelled out of, the body while the chakras and other energy orbs show emanating pulses of circles that also represent the movement of breath. The overall aesthetic is one that intends to represent cathartic healing through breathwork, as well as the achievement of gradual transcendence of the user from a responsive, embodied spirit to a single orb of energy that fades into nothingness. Audio in this prototype is much more experimental at and in reflection, represents a potential missed opportunity of the Version 2 prototype. The prototype uses human-recorded sounds for inhalation and exhalation played through a loudspeaker so as to offer an opportunity of synchronization with simulated breathing that is tied to one's physical performance, as computed by the Kinect camera. There is

also a subtle audio track that plays looped in the background that was chosen because of its stereotypically enigmatic and relaxing nature. The development of the audio is likely to evolve in the next iteration of the design. The designer was conscious of using too much in the way of audio for an immersive experience simply because of its tendency to overpower breathing rhythm that often needs to be heard aloud by the student in meditation and yoga practice. The auditory aesthetic could benefit from more attention; it was simply not a major part of the initial intuitive vision for the project. The audio in Version 2 was, however, being evaluated for testing—users were asked to rate the audio and then explain their opinion on its function and value in the healing experience.

4.2.1. Prototype Specifications

The following table presents details of the components of this prototype.

Experience Element	Hardware /Software (Platform)	Extensions (Tools & Processes)	Files (Data)
Visual Simulation	Processing (software)	Open source libraries for skeletal tracking and body drawing: OpenNI, NITE OpenProcessing reference for breath bead animation: "Attraction/Repulsion" by Henderson, licensed under Creative Commons Attribution-Share Alike 3.0 and GNU GPL license. Work: http://openprocessing.org/visuals/?visualID=18798 License: http://creativecommons.org/licenses/by-sa/3.0/ http://creativecommons.org/licenses/GPL/2.0/	Royalty free stock photo of cosmos imagery: Image ID 1217855 from http://www.sxc.hu
Audio	Processing (software)	Open source library for embedding audio: Minim	Royalty free music: Mirage by Kevin MacLeod http://incompetech.com/music/royalty-free/ Personally recorded breathing sounds using GarageBand for Mac.
Interaction	Kinect	The Kinect Camera plugs into power outlet and to the computer on which the Processing software is running. All code related to Kinect is handled by Processing.	N/A

Table 2. *Prototype Specifications: Version 2: Interactive Chakra-based Breathwork*

4.2.2. Informal Feedback

This version of the prototype was subject to in-class critique sessions and an *Encounter* exhibit. There were also several occasions on which the designer would reveal a demo to friends, family as well as graduate students and faculty from OCAD University. Informal feedback was largely positive and observers appreciated the overall experience. For informal testers, there was a confusion of how long one should stay in an inhale position before gong into exhale. The visuals were remarked on as very intuitive, as they depicted a mirrored reflection of one's self. The use of different colored chakras

was a concept users were not generally familiar with. Each exposure to the prototype needed to be introduced with a short training session that had the designer physically demonstrate inhalation and exhalation poses that the Kinect would detect. Users were able to pick up these movements very quickly. A few informal testers desired a more extensive narrative. Informal testing also took place at Rosedale Wellness Centre and feedback was also mostly positive. In one case a user found the visuals and audio breathing cues to be "mesmerizing". Although informal testers did see the value of the prototype in bringing awareness to breath and fostering relaxation, there continued to be confusion over what the ultimate progression in the experience was. A narrative that stretches the experience was understood to be an important next goal.

4.2.3. Formal Feedback

Formal testing—that which adheres strictly to the protocol outlined in the previous sections—has taken place at OCAD University and will continue to run on campus as well as at the Rosedale Wellness Centre until the designer is satisfied with the development of the prototype (observing REB parameters in the process). Across the focused participation sessions of 5 users with the prototype, the following trends and findings were found in users' input forms:

- The experience was found to have a short-lived but strong calming effect.
- The experience was useful in distracting attention from one user's negative mindset while others reported this distraction as a "reprogramming of clarity".
- The experience effectively brought awareness to breathing.
- The visuals were rated as helpful indicators of performance.

- Audio was a helpful indicator of performance but would sometimes not synchronize with movements.
- Arms movements were perceived as intuitive and natural ways to signify breathing.
- In moments when skeletal tracking failed or was inaccurate, users were confused and unsure of whether or not to ask the study administrator for help.
- Users are confused with the end-goal in the time that the experience runs.
- The experience seems too short to users and the beginning feels “random” and “fast”, where some users would instead prefer a slow introduction and gradual interaction before being put into the “thick of the practice”.
- Visual cues for inhaling and exhaling were suggested to be reversed where the emanating circles are concerned, as they are not perceived to be congruent with true inhaling-expansion and exhaling-contraction of the body.
- Background audio music was reported as least significant, the breathing sound cues were found to be helpful and were reported to have offered an entrainment value (synchronization of one’s breath with breath heard from audio)
- Background music was reported by one user as being unrelated to holistic health as its composition was too complex and electronic.

The feedback received from formal testing provided the designer with a useful amount of information for enhancing the prototype for its next iteration, Version 3.

4.3. Version 3: ORGONA Prana

Version 3 of the prototype builds directly on Version 2 with an extended narrative, contributing to an overall longer and more complete experience, as was suggested from prior feedback sessions. Version 3 includes an induction protocol with a hovering blue-green light that when touched by the user's hands begins the wellbeing experience. The cosmos imagery is now active as opposed to static—inhalation and exhalation influence the movement through the cosmos through clockwise and counterclockwise rotation. This was an effort to create a greater sense of immersion with the experience. The chakra orbs feature sound effects for when inhalation and exhalation are complete, acting as cues for progression. As with Version 2, the user's body disappears once the chakra sequences are completed and the cosmos environment changes to one of an abstract tunnel through which an orb that now represents the user is guided to move. Once this second stage is cleared all visual elements are gradually removed so that only audio remains. If the user continues to gesture breathing beyond this point, the moving cosmos reappears and the user is able to breathe back into the chakras, this time in reverse order, to complete the experience, visually attaining a state similar to that encountered on start. Upon successful completion, the prototype code resets itself automatically so that users may go in and out of the experience. Images from Version 3 are included as **Figures 14.**, **15.**, **16.**, and **17.**, in the following pages. A full video of the experience as well as the exhibition setup are available online for viewing; see **Appendix C** for details.

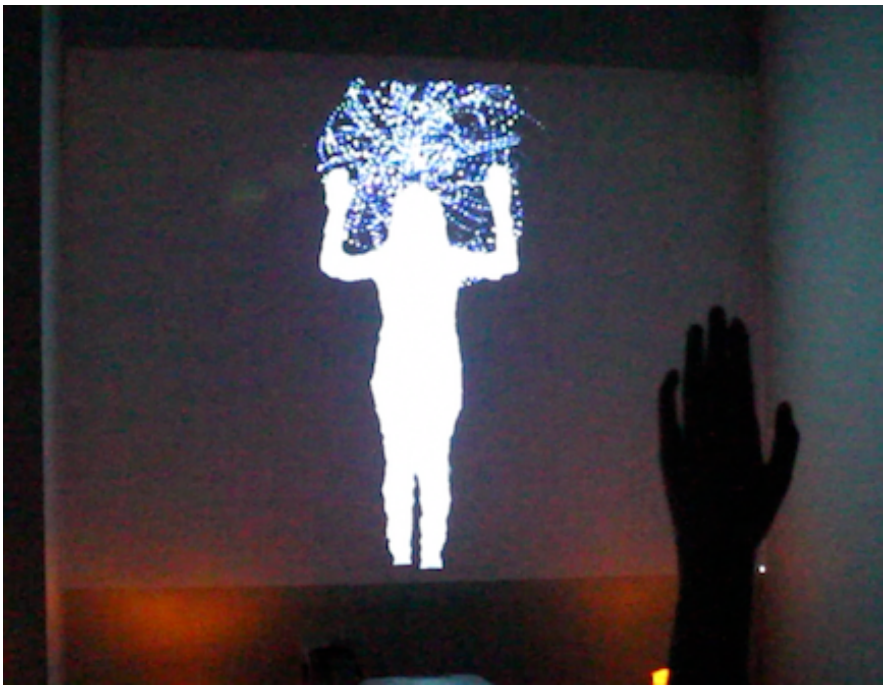

Figure 14. *Prototype Version 3: ORGONA Prana*

Figure 15. *Prototype Version 3: ORGONA Prana (2)*

Figure 16. *Prototype Version 3: ORGONA Prana (3)*

Figure 17. *Prototype Version 3: ORGONA Prana (4)*

4.3.1. Version 3: Prototype Specifications

Experience Element	Hardware/Software (Platform)	Extensions (Tools & Processes)	Files (Data)
Visual Simulation	Processing (software) Adobe Photoshop (software): Image editing	Open source libraries for skeletal tracking and body drawing: OpenNI, NITE OpenProcessing reference for breath bead animation: "Attraction/Repulsion" by Henderson, licensed under Creative Commons Attribution-Share Alike 3.0 and GNU GPL license. Work: http://openprocessing.org/visuals/?visualID=18798 License: http://creativecommons.org/licenses/by-sa/3.0/ http://creativecommons.org/licenses/GPL/2.0/ Rotozoomer" by Luis Gonzalez, licensed under Creative Commons Attribution-Share Alike 3.0 and GNU GPL license. Work: http://openprocessing.org/visuals/?visualID=3685 License: http://creativecommons.org/licenses/by-sa/3.0/ http://creativecommons.org/licenses/GPL/2.0/ "3D Tunnel in 200 Bytes" by Luis Gonzalez, licensed under Creative Commons Attribution-Share Alike 3.0 and GNU GPL license. Work: http://openprocessing.org/visuals/?visualID=3621 License: http://creativecommons.org/licenses/by-sa/3.0/ http://creativecommons.org/licenses/GPL/2.0/	Royalty free stock photo of cosmos imagery: Image ID 1217855 from http://www.sxc.hu
Audio	Processing (software)	Open source library for embedding audio: Minim	Royalty free music: Mirage by Kevin MacLeod http://incompetech.com/music/royalty-free/ Sound Effects (Creative Commons 0 License): 1) Orb.wav: http://www.freesound.org/people/Erokia/sounds/163725/ 2) Orb2.wav: http://www.freesound.org/people/Erokia/sounds/172852/ Personally recorded breathing sounds and induction chakra tones using GarageBand for Mac.
Interaction	Kinect	The Kinect Camera plugs into power outlet and to the computer on which the Processing software is running. All code related to Kinect is handled by Processing.	N/A

Table 3. *Prototype Specifications: Version 3: ORGONA Prana*

4.3.2. Formal Feedback

The second round of formal testing that took place prior to exhibition mounting of the thesis project was held entirely at Rosedale Wellness Centre. This testing allowed the designer to deal with any problems or alterations that may have surfaced in the process of developing Version 3. This round of testing included 5 clients of the Rosedale Wellness Centre. Findings from this round of testing are included as follows:

- 4 out of 5 participants reported an overall positive experience that they would be willing to engage with on a repeat basis.
- 3 out of 5 participants rated the experience as very relaxing.
- All participants reported positive benefits to awareness of breathwork.
- Visuals were unanimously agreed upon as the most valued indicator of performance.
- Audio sound effects were reported as sometimes unclear as indicators of inhale/exhale completion.
- The movement of arms and synchronization with breathing was understood clearly and no participants reported confusion with such movement.
- Audio sounds for human breathing were reported as relaxing and instructive.
- 1 participant recommended a more quantitative measure or performance to be shown onscreen as a more credible number.
- 3 out of 5 participants encountered confusion regarding the eventual end of the experience, not knowing whether they should continue the breathwork exercise of stop.

The feedback received from the second round of formal testing was more reassuring of corrections and additions made to the second iteration than it was in insightful of new alterations. This was perhaps due to a highly positive reception of the project by testers. Most of the subjects used language in their reporting that suggested they were reminded of spiritual experiences about enlightenment and soul exploration. Participants, much like those from prior testing, were optimistic about the experience and felt compelled to offer suggestions and recommendations that they felt would heighten the experience. Version 3 continued to be subject to minor fixes and developments to prepare for its debut in the graduate thesis exhibition.

4.3.3. Informal Feedback

Because this version of the prototype was prepared for the graduate thesis exhibit, informal feedback was gained through the exhibition mounting and setup testing, as well as during the duration of the exhibit where visitors would engage with the project. Some insights gained through informal feedback were to attempt to conceal as much of the technology as possible so that the experience appears to be more immersive. Due to the setup of the project for the exhibition, the orientation of the showroom combined with the positioning of the Kinect camera became sensitive to users walking into the experience while it was already in use—causing clipping and distortion to user bodies shown onscreen. Feedback in response to this effect encouraged the designer to reconsider the orientation of the setup. Some users asked for the system to recognize when they had exited the experience prematurely so that subsequent users would not need to request a system reset in order to engage.

Code was executed by the designer to address all concerns regarding entering and exiting, as well as interruption. The orientation of the project in the room was difficult to compromise due to the ideal showcasing of the prototype; as a result, the designer marked out a space for interaction with physical props such as candles and furnishings so that visitors would implicitly understand the way in which the space was ideally used. All technology was concealed by fabric, with the exception of the short-throw projector and the Kinect camera, both of which needed to be unobstructed in their placement.

All forms of feedback, whether specific to functionality and content or showcasing and context of use, were extremely valuable to the designer throughout the development of the different iterations of the prototype. Although while extensive testing may have allowed the designer to indirectly assess the validity of the design theory, the prototype remains one carved largely out of research and personal influence.

5.0 Conclusion

This paper was used to document the designer's research and design movements over the course of a yearlong thesis project. The combination of a multidisciplinary approach to research as well as guidance from personal holistic health and design practices effectively led the designer to formulate a novel design theory to be aimed at wellbeing technologies in the field of holistic health. The theory aimed to innovate the field of holistic health by introducing an original design prototype that offers an immersive multimodal experience, demonstrates a symbolic healing aesthetic on a representation of body, while offering a platform for the exercise of autonomous training of healthy behavior.

Feedback from user testing, both informal and formal, helped the prototype progress and evolve. The creative process undertaken by the designer throughout the thesis journey was one of mixed methods, and so required a great amount of versatility and exploration of disparate sources of knowledge. The user testing study will continue to unfold and aid the development of all future iterations. The design process may not have directly validated the novel design theory but the research and insight from personal practice speak to the rationality of why a design, such as the one demonstrated in the prototype, is relevant and important to wellbeing technology. This relevancy and importance is referenced in the novel design theory proposed by the designer, stating that the creation of a multimodal learning experience that visually simulates the user and symbolic healing can actually provide a means for empowering users to engage in healthy behavior while reclaiming a sense of autonomy in their personal wellbeing.

Findings from user testing are great sources of confidence for the project, as most users who came to engage with the prototype had positive comments to share. Many users who were highly invested in the project conveyed their support by communicating suggestions, recommendations and even suggesting that the designer should consider developing the project into and commercial product. It is the designer's belief that once useful insights from real holistic health practice are combined with research and critical theory and simultaneously subjected to the development of a technologically-mediated experience that is iteratively designed through testing and user involvement, that only then can a viable product result from the initiative. This, according to the designer, is the best practice of critical making as it builds on an idea with reason and motivation rooted

in enhancing an existing design approach while remaining faithful to practice-based design principles. The designer accomplished the realization of a prototype that demonstrates what is believed to be an ideal set of aesthetics for empowering users to engage in healthy behaviors that also promote as sense of optimism and autonomy in one's own wellbeing practice, as is borrowed from yogic meditation practice. Distilling this manifestation into a commercial product would involve strategic decision-making surrounding development for a viable platform and very specific user-centered design studies. This project may be advanced in such a fashion should the designer consider developing it into a product, as it has successfully demonstrated functionality and style of content.

5.1. Reflection

The designer has learned much from this entire process. The manifestation of a prototype that is reflective of research and other personal intentions of the designer is a challenging undertaking, but also a rewarding one. For the designer to have seen work that evolved from a place of passion (in the designer), and to be able to articulate very abstract and sometimes controversial issues in a way that could potentially be useful to society, is a great pleasure. The designer has actively worked with the prototype to augment personal wellbeing—indicating a potentially successful tool designed for the designer in practice.

The thesis journey has also granted more power to the designer's intuition. As mentioned in **Section 1.4.**, the designer's initial intuitive vision very strongly guided the progress of research and development. In receiving largely positive feedback for the

prototype, the designer feels that the exploration was indeed necessary and contributes significantly to similar works in the field. Feedback suggesting that the prototype needs a complete narrative and extension in length are perhaps indicators of users' appreciation for the project and eagerness to see it advance.

5.2. Future Directions

As mentioned at different points in this paper, there is a likelihood that the prototype will continue to evolve outside of the graduate program. This future growth may lead the project to a very focused round of user-centered design testing, where the prototype is refined to be more specialized and has intention to serve a very specific purpose within a real-world context, with a typical type of user. One such possible application is use by patients in health care with an interest in innovative holistic health practices that aid in the assistance of relaxation meditation or simple breathwork training.

Collaborator Dr. Henry J. Moller is interested in seeing this technology possibly deployed at the Rosedale Wellness Centre outside of user testing, as the prototype appears to have great potential application in a clinic focused on holistic health practices for its patients. The research and study insights from the thesis work have also been injected into simultaneous and upcoming works by the author that could potentially be brought to national and international conferences where the work is opened to other researchers and academics for discussion. The novel design theory for aesthetics, as discussed in the paper, is one that affords translation to a wide variety of potential future projects. In turn, doing so would continue to strengthen and possibly validate the design theory.

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7.0 Appendices

7.1. Appendix A: User Testing Package

The User Testing Package follows this cover sheet.

Appendix

Forms

1 Brief
2 Consent
3 Pre-Testing Questionnaire + Observation Notes
4 Post-Testing Questionnaire
5 Chakral Body Concept

Images

1 Diagram of Interactive Project
2 Workshop Advertisement Poster

Brief

Form 1

Interactive Chakra-based Breathwork is an engaging multimodal healing experience simulated by technology. The aim of this project is to reinforce healthy breathing through physical and psychological empowerment. This is explored by using audiovisual cues that reference the holistic concept of chakras--a concept that brings the body into the healing experience through metaphor and analogy. The efficacy and design of this healing experience are under study.

A member of the research team will supervise participants as they engage with the project in a closed room. The project is minimally invasive and requires the user to stand in front of a Kinect camera to view their body on a projection screen in front of them that reacts to respiration rate.

For any clarification or inquiry, please consult with the participation administrator.

Form 2: Consent

Date: February 14, 2013
Project Title: Iterative Design for Interactive Multimodal Holistic Therapy

Principal Investigator:
Harjot Bal, Graduate Student
OCAD University
(416) 910-7803, harjot.bal@me.com

Faculty Supervisor (if applicable):
Dr. Barbara Rauch, Graduate Program Director
Interdisciplinary Master's in Arts, Media and Design
OCAD University
(416) 977-6000 Ext. 4653, brauch@faculty.ocadu.ca

Co-Investigator:
Dr. Henry J. Moller, Medical Director
Rosedale Wellness Centre
(416) 975-0499, henrymoller@hotmail.com

INVITATION
You are invited to participate in a study that involves research. The purpose of this study is to reinforce healthy breathing through physical and psychological empowerment. This is explored by using audiovisual cues that reference the holistic concept of chakras--a concept that brings the body into the healing experience through metaphor and analogy. The efficacy and design of this healing experience are both being studied.

WHAT'S INVOLVED
A member of the research team will supervise you as you engage with the project in a closed room. The project is minimally invasive and requires you to stand in front of a Kinect camera to view a representation of your body on a projection screen that will react to your respiratory patterns. Participation will take approximately 30 minutes of your time.

POTENTIAL BENEFITS AND RISKS
Possible benefits of participation include therapeutic effects on both your mental and physical health. Wellbeing is the ultimate goal of the project and there is a possibility that you will be able to carry this experience over into your daily life for sustained benefits. It is possible that the scientific community/society could benefit through the research provided by this study that supports an increased range of health care and the innovation of holistic health practices by technology. This study is motivated to explore alternative approaches to health and healing that do not advocate the use of pharmaceuticals or other more invasive agents. Potential risks may include onset of seizures to those who suffer from epilepsy from viewing visuals that could be perceived as bright (however, these visuals will be projected from a computer rather than in the form of coloured blinking lights). Psychological risks may include the sensitivity you may feel when asked questions about your mental state; whether you are stressed, relaxed, etc. and to what degree. Testing will be conducted under the supervision of Dr. Henry J. Moller, who will engage if there is an emergency or breach of risk at anytime.

CONFIDENTIALITY
You will not been identified throughout the course of this study--with the exception of the consent form where you are asked to print your name and sign. Information collected regarding general psychological states of participants, such as yourself, will be useful in framing research insights. Investigators will store all information of this nature safely in order to maintain confidentiality outside of the researchers. Participant-based observations will be kept confidential at all times (to stay within the research team's possession only). Information collected regarding general states of participants will serve to categorize users for research reporting. Anonymity will be enforced and prevent any identification of participants—a User ID system will be in place to maintain anonymity, with the exception of this consent form which is the only identifying documentation. Any collected data will be accessible only to all project investigators and supervisors [Harjot Bal, Dr. Henry J. Moller, and Barbara Rauch].

VOLUNTARY PARTICIPATION
Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time, or to request withdrawal of your data (prior to data analysis beginning ***February 30, 2013***), and you may do so without any penalty or loss of benefits to which you are entitled. For participants recruited through the Rosedale Wellness Clinic only, there is a possibility that your data, stripped of identifying information, will be used in a future study conducted by Dr. Henry J. Moller. You will be informed of this fact by Dr. Henry J. Moller should there be a future study that makes secondary use of any collected data from this study. If you wish to opt-out of any such possible future study please do not check the final box under the Participant Acknowledgements list.

PUBLICATION OF RESULTS
Results of this study may be published in a student thesis, and/or presentations to conferences and colloquia. In any publication, data will be presented in aggregate forms. Quotations from interviews or surveys will not be attributed to you without your permission.

Feedback about this study will be made available through the PSI (Harjot Bal) online at http://harjotbal.com.

CONTACT INFORMATION AND ETHICS CLEARANCE
If you have any questions about this study or require further information, please contact the Principal Student Investigator (Harjot Bal) using the contact information provided above. This study has been reviewed and received ethics clearance through the Research Ethics Board at OCAD University [2013-08]. If you have any comments or concerns, please contact the Research Ethics Office through jburns@ocadu.ca.

PARTICIPANT ACKNOWLEDGEMENTS
By checking each of the boxes below, I verify the following:
☐ i) I am over the age of 18 years and under the age of 65 years.
☐ ii) I am not prone to epileptic seizures.
☐ iii) I do not have any complications related to breathing that would be put me at risk by my participation in this study.
☐ iv) I do not have any brain injury or condition that would be put me at risk by my participation in this study.
☐ v) I am not pregnant.
For individuals recruited through Rosedale Wellness Clinic only (OPTIONAL):
☐ vi) I opt-in for contributing to my data to any future study that is secondary to this study as long as my data is stripped of identifying information.

CONSENT FORM

I agree to participate in this study described above. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: _____

Signature: _____ Date: _____

Thank you for your assistance in this project. Please keep a copy of this form for your records.

User ID: _____ [Assigned by administrator to maintain data stripped of identification.]

Pre-Testing Questionnaire

Form 3

User ID _____ Date _____

First-time participants only

Have you had any experience with holistic health practices (including meditation, guided visualization, hypnosis, relaxation techniques, sound therapy, reiki, accupuncture, etc.)?

Yes No

If yes, have any of your experiences involved a computer, digital device, or programmed technology?

Yes No

Please rate your interest in personal wellbeing experiences provided by technology.

1 Not at all interested 2 3 Somewhat interested 4 5 Very interested

How relaxed do you currently feel?

1 Not at all relaxed 2 3 Somewhat relaxed 4 5 Very relaxed

How would you rate your current mood state?

1 Negative 2 3 Neutral/Mixed 4 5 Positive

How aware of your breathing are you usually?

1 Not at all aware 2 3 Somewhat aware 4 5 Very aware

Observation Notes

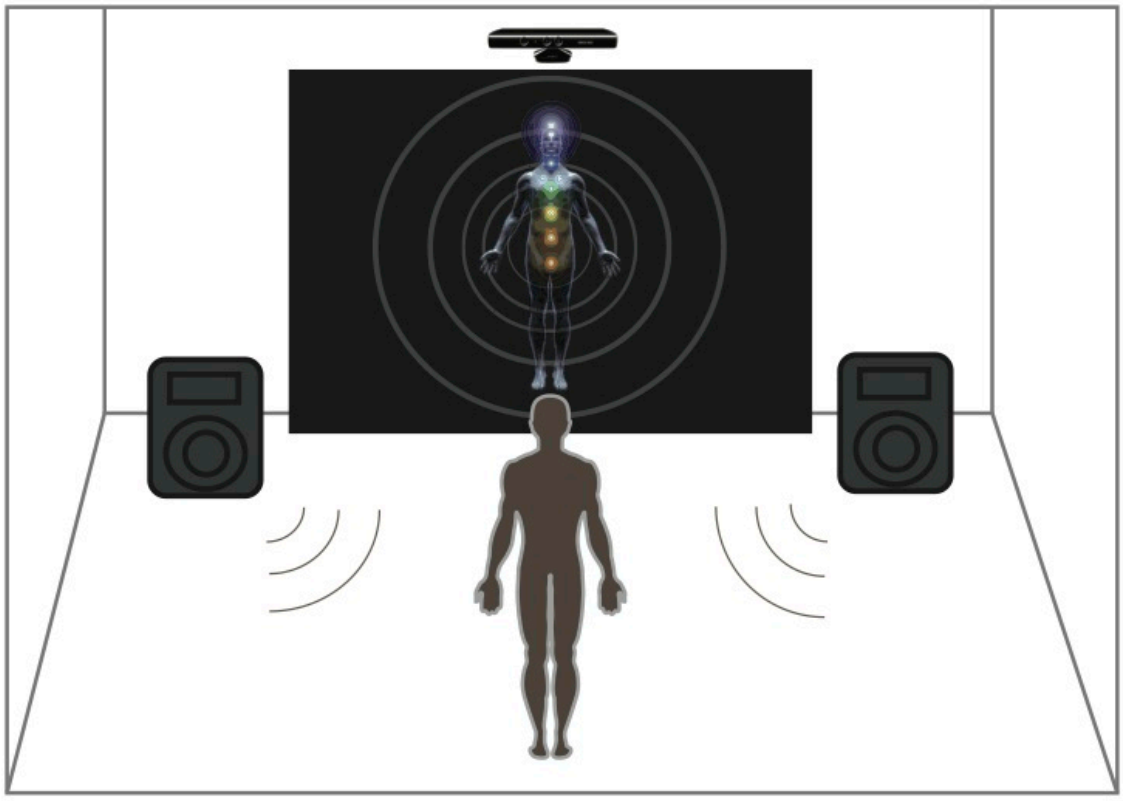
Form 3 (cont'd)

The space below is for the administrator to make notes while observing participants engage with the project.

Diagram of Interactive Project

Image 1

NOTE: This is a tentative representation of the user testing setup.



Post-Testing Questionnaire

Form 4

User ID _____ Date _____

How relaxed do you currently feel?

1 Not at all relaxed | 2 | 3 Somewhat relaxed | 4 | 5 Very relaxed

How would you rate your current mood state?

1 Negative | 2 | 3 Neutral/Mixed | 4 | 5 Positive

How enjoyable was your experience with the session?

1 Not at all enjoyable | 2 | 3 Somewhat enjoyable | 4 | 5 Very enjoyable

How valuable do you feel your experience with the session was?

1 Not at all valuable | 2 | 3 Somewhat valuable | 4 | 5 Very valuable

Which feature of the session do you feel was most valuable?

Visuals | Audio | Both | Neither

How comfortable was your experience with the session?

1 Not at all comfortable | 2 | 3 Somewhat comfortable | 4 | 5 Very comfortable

How aware of your breathing has the session made you?

1 Not at all aware | 2 | 3 Somewhat aware | 4 | 5 Very aware

Please rate the value of the breathwork training you experienced in the session.

1 Not at all valuable | 2 | 3 Somewhat valuable | 4 | 5 Very valuable

Post-Testing Questionnaire

Form 4 (cont'd)

Please use the space below to articulate on your experience with the visuals.

_____
_____
_____
_____

Please use the space below to articulate on your experience with the audio.

_____
_____
_____
_____

Please use the space below to articulate on your experience with the breathwork element.

_____
_____
_____
_____

Please use the space below to articulate on the possible value of the experience to your personal wellbeing.

_____
_____
_____
_____

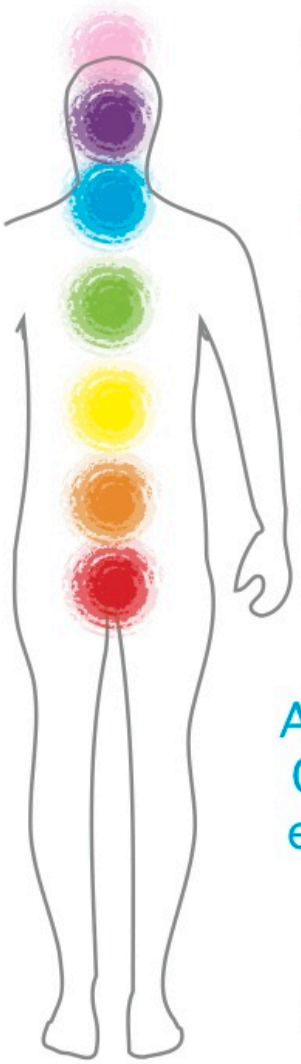
Please use the space below for any comments, suggestions, questions, or concerns regarding your experience with the session.

_____
_____
_____
_____

Thank you!

Chakral Body Concept

Form 5



Freedom, collective consciousness, detachment, escape, peace.

Insight, clarity, intuition, imagination, understanding, intellect.

Communication, expression, tact, intelligence.

Love, emotional wellbeing, compassion, tenderness, warmth.

Confidence, control, personal power, creativity, spiritedness.

Pleasure, comfort, addiction, violence, stability.

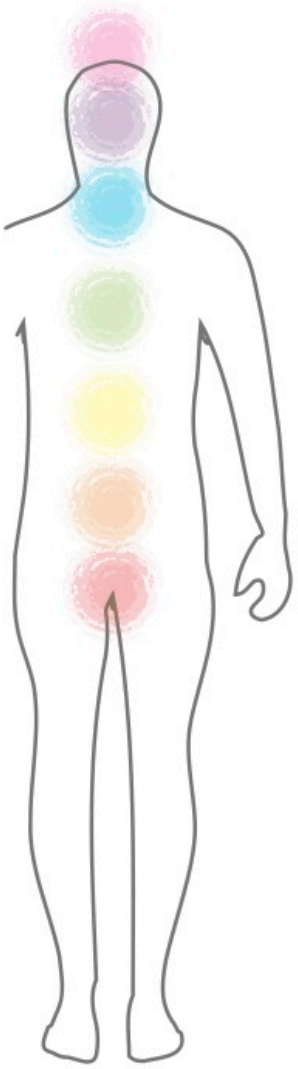
Instinct, survival, sexuality, vitality.

According to the holistic concept of Chakras, the body contains 7 major energy points that govern different physiological and psychospiritual processes.

Experienced yogis believe that breathing with meditative focus on these different Chakras promotes balance and wellbeing.

Usability Research
OCAD U + Rosedale Wellness Centre

Interactive Chakra-based Breathwork



Learn to breathe better

Learn to feel better

For a limited time, OCAD U (in collaboration with Rosedale Wellness Centre) will be holding FREE Interactive Chakra-based Breathwork sessions as part of a technology design study.

Individual sessions on a turn-by-turn basis. Email harjot.bal@me.com or call 416-910-7803 for more information.

7.2. Appendix B: REB Approval

The REB Approval follows this cover sheet.

Research Ethics Board

February 15, 2013

Dear Harjot Bal,

RE: OCADU92, "Iterative Design for Interactive Multimodal Holistic Therapy."

The OCAD University Research Ethics Board has reviewed the above-named resubmission. The protocol dated February 15, 2013 and the consent form dated February 15, 2013 are approved for use for the next 12 months. If the study is expected to continue beyond the expiry date (February 14, 2014) you are responsible for ensuring the study receives re-approval. Your final approval number is **2013-08.**

While the OCAD U REB has approved the secondary use of your research data, any new study involving this data will still need REB approval for that study, regardless of whether the data is identifiable or not.

Before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required. It is your responsibility to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the OCAD U REB prior to the initiation of any research.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided. The template is attached.

Best wishes for the successful completion of your project.

Yours sincerely,

Tony Kerr, Chair, OCAD U Research Ethics Board

OCAD U Research Ethics Board: rm 7520c, 205 Richmond Street W, Toronto, ON M5V 1V3
416.977.6000 x474

7.3. Appendix C: Exhibition

Video documentation of the project can be viewed online using the following links:

- VIDEO 2: Exhibition Setup

  http://harjotbal.com/THESIS_Video2

- VIDEO 3: ORGONA Prana

  http://harjotbal.com/THESIS_Video3

7.4. Appendix D: Accompanying Material

The following accompanying material is available upon request from the Ontario College of Art & Design Library:

VIDEO 1: Prototype Version 2 Demo

VIDEO 2: Exhibition Setup

VIDEO 3: ORGONA Prana

Anyone requesting the material may view it in the OCAD Library or pay to have it copied for personal use.