

THE FLUCTUATING BORDER BETWEEN ARCHITECTURE AND THE BODY IN SHIVER

Colleen Ludwig

Shiver is an immersive, interactive environment that uses physiological and psychological aspects of skin as visual metaphors and sensory mechanisms. The edge between body and space forms an ever-present, fluctuating borderland. My research on skin biology and the phenomenology of space results in a work that engages the body surface, activates the senses, and brings the body into direct relationship with its environment.

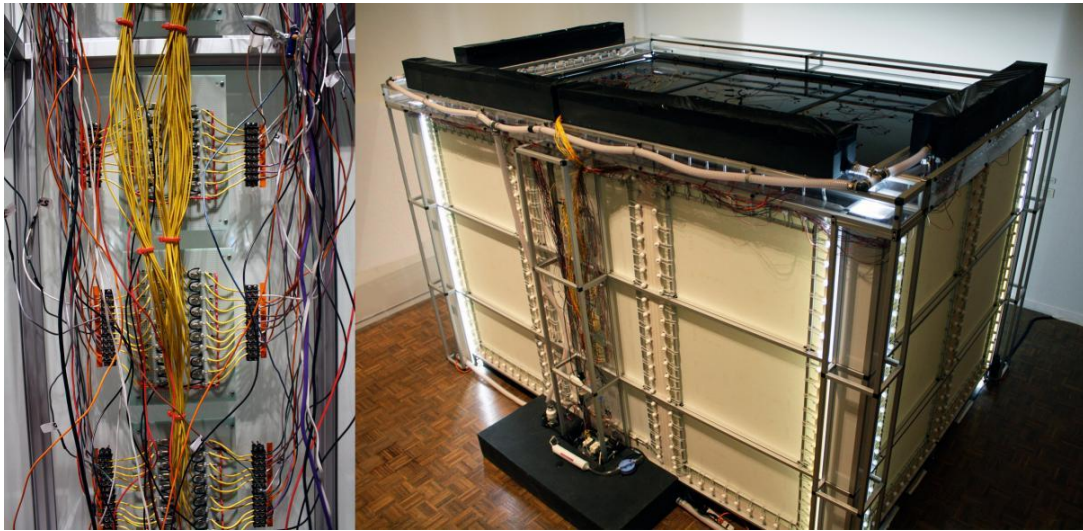


Fig 1. Shiver, exterior and detail, 2011, Colleen Ludwig, aluminum framework, fabric, plumbing, electronics and programming, 10' x 14' by 12.5'. Photographs by Colleen Ludwig.



Fig 2. Shiver, interior and detail, 2011, Colleen Ludwig, aluminum framework, fabric, plumbing, electronics and programming, 10' x 14' by 12.5'.

Shiver is an immersive, interactive environment, that integrates programming, electronics and a recirculating water system into a pre-fabricated, architectural framework with specially treated fabric walls. The resulting room is filled with cascading water flows, which develop organic patterns and conjure an impression of compassionate space. *Shiver* is a meditative place for mindful sensing of the body as it integrates itself into the surrounding environment. I created this artwork to poetically articulate the fluctuating border between architecture and the body. It is the first room in a series called *Elemental Bodies*. Each of these rooms set conditions which ask participants to experience their skin as a mediating border between viscera and atmosphere. [1]

Upon entering the artwork, visitors activate trickling flows of water. A sensor matrix in the ceiling tracks people as they explore the room. That data is used by microprocessor software to move the vertical water flows along the walls in response to a visitor's position. Individual streams naturally form curvy rivulets that cling to, and creep along, minor topographies in the water-resistant fabric walls. The patterns are similar to what is seen on wet human skin. Due to surface tension and capillary action, the flows bulge and contract slightly, giving them a shivering effect.

Groups of contiguous water streams form *nodes*, which grow from a central stream to widths of 3, 5, or 7 streams. Nodes get bigger as you approach a wall and smaller as you withdraw, creating the illusion of water emerging from, and receding into, the wall membrane. Multiple kinetic responses of the water flows in *Shiver* encourage participants to walk slowly and change vantage points, in order to cause the room to react in different ways. Although the exterior is heavily equipped with mechanical contraptions, the water formations enliven the interior space and bring primary focus to the organic. The effect can be both soothing and unnerving, as the beautiful, watery forms invade a space we expect to be dry and neutral. The invitation to touch the flows is implied, but not stated. This adds tension, as each viewer must weigh the desire to touch the water with possible unintended consequences, including wetness, surprises, altering the water paths or breaking the piece.

The physiological and psychological aspects of *skin* are used in *Shiver* as both visual metaphors and sensory mechanisms. Visitors are encouraged to examine their agency in constructing boundaries between themselves and their immediate environment. The space between a visitor's body and the room's skin is excited by the swelling, shrinking and shifting water flows. These changes shift people's perceptions of the scale, moisture and heaviness of the installation space. The title of the piece, *Shiver*, refers to skin response to light touch, air movement or close proximity to another living being. As visitors walk around the room, the rivulets are programmed to move symbiotically along the walls. A non-verbal conversation emerges, and the room itself appears to be highly empathetic. My desire is for viewers to return that perceived empathy through their movement in the space. This haptic feedback loop creates a sense of physical intimacy, within a space that functions as if it is a sentient organism.

In the *Elemental Bodies* series, my premise is that the edge between body and space forms a fluctuating borderland that is always present. The viscera of the physical body is encased by skin, but the senses extend the border of the corporeal self. This boundary varies in accord with physiological, psychological and environmental changes. Skin shields our interior workings and makes them mysterious, but also acts as a profound mediator between our inner and outer world. *Shiver* is meant to heighten awareness of such negotiation.

My perspective on skin has been reinforced by studying its biological and structural functions. These are described and analyzed in non-clinical language in *The Body's Edge: Our Cultural Obsession with Skin*,

written by pathologist Marc Lappé. [2] He compares our common perceptions to biological reality: “Until recently,” he says:

“we have tended to think of the skin as...a watertight covering that enfolds ourselves and our organs and keeps them separate from the world out there. We visualize the skin in purely Euclidian terms, as a two-dimensional sheet that envelops us in a kind of perpetual Saran Wrap. ...In actuality...the skin is a highly convoluted, vulnerable, three-dimensional landscape. [It] has valleys, ridges, and folds, much as does the earth’s surface. And, like the earth, it is shot through with pores, holes and channels that greatly increase its surface area and make it anything but a smooth, two-dimensional surface.” [3]

Lappé continues:

“The skin is actually designed to permit a constant flow of insensible [unmeasurable] water percolating upward from its deeper layers. ...This water resistance but not waterproofness of the skin is due to the coexistence of two different pathways. ...These pathways take the form of molecular sieves that interpenetrate the skin much as wormholes pass through ancient wood. ...These channels are positioned underneath the skin like the honeycomb of a beehive. This structure provides tiny interstices where...slightly salty water constantly percolates upward to the skin surface through the underlying dermis, much as a plant receives replenishment from its roots.” [4]

In the collection of clinical essays, *Biophysical Properties of the Skin*, author J.R. Kanagy opens his chapter on water absorption with a declaration: “The relation between water and skin is one of the most important phenomena of life on this earth.” [5] He explains that most body water is bound in gels of connective tissue and cell bodies. “Water is, in a sense, skeletal in that the physical properties of...tendon, ligament, bone and the tough connective-tissue structures...are altered very appreciably by both increases and decreases in this content of bound water.” [6] In an essay on electrical properties of skin from the same book, Dr. Robert Edelberg writes: “In addition to its role in thermoregulation and water-balance, the skin is also a tactile sensory organ, and its mechanical characteristics greatly influence the nature of the neural pattern which occurs where it makes contact with an object.” [7]

While *Shiver* doesn’t schematically represent skin, its architectural presence and water interactivity invite comparison to these biological descriptions. Lappé, Kanagy and Edelberg’s observations reveal a framework for skin that is architectural in nature and intrinsically linked to water. In *Shiver*, the structural and sensing systems are two physically integrated layers located outside and inside the wall membrane. In concert, they offer an experience of *ourselves-in-space* and construct a loose representation of sensing. The beautiful, refreshing presence of water in *Shiver* reflects Lappé’s assertion that: “Our sense of psychic well-being is inextricably linked with our skin.” [8]

Edelberg’s statement regarding touch evokes the use of our hands, but our primary touching experience is through the skin as a whole, by far the largest organ in our body. Skin pushes against the exterior world, touching air or clothing at every single point on our surface. Our skin’s contact with space is critical to forming our experience of space. Skin enables us to gauge the size and ambiance of the environment. It reveals details of our location through temperature, humidity, electrical charge and air movement. Skin sensing is a major component of the intuition mechanism, and helps us predict interactions with other living beings through subtle perception of factors such as heat, tension, fear, conductivity and health. Together with the eye, skin allows us to comprehend our surroundings without directly using our hands to touch them. In addition, skin’s high degree of permeability causes us to be in constant interchange with our domain, contributing to metabolism, immunology, temperature regulation, absorption

and health. Skin is multi-purpose, resilient and interweaves us with our immediate environment. We meld with space. Our boundary is not an edge. It is an atmosphere.

My ideas about the role of space in human experience are further defined by architect and theorist Juhani Pallasmaa in his 1996 book, *Eyes of the Skin: Architecture and the Senses*. [9] Pallasmaa outlines an architectural history that is dominated by “ocular-centrism” and calls for design that is “multi-sensory” and “puts the body at the centre.” He places touch at the core of that mission. “Touch is the sensory mode that integrates our experience of the world with that of ourselves. “[M]y body remembers who I am and where I am located in the world.” [10] Citing noted anthropologist Ashley Montagu’s book, *Touching, The Human Significance of Skin* [11], Pallasmaa notes:

“All the senses, including vision, are extensions of the tactile sense; the senses are specialisations of skin tissue, and all sensory experiences are modes of touching and thus related to tactility. Our contact with the world takes place at the boundary line of the self through specialized parts of our enveloping membrane.”

He poetically compares sight and touch: “The eye is the organ of distance and separation, whereas touch is the sense of nearness, intimacy and affection. The eye surveys, controls and investigates, whereas touch approaches and caresses.” For Pallasmaa, “Architecture is the art of reconciliation between ourselves and the world, and this mediation takes place through the senses.” [12]

Shiver is meant to open the senses to the expanse of the room. As we move through physical space, our awareness wanders as we attune ourselves with touch, sound and sight. Electrical conductivity and heat radiate off the skin like an aura. Involuntarily, we exercise an innate ability to modulate our senses in order to become more responsive or more isolated from our immediate environment. We may self-protectively shut down our awareness – subconsciously, but with purpose - in order to avoid unpleasant sensations. Physiological and psychological pain are sometimes more feared than actually felt, and may provide us with a great deal of self-information, if we are willing to pay attention. Adding to our confusion about the value and need for sensation are recent commercial technologies, which encourage us to distrust our senses and rely on personal, electronic devices for presumed accuracy about the natural world. The mobile app preempts our skin’s natural ability to know that the weather is changing. We fill gaps of time by scrolling through our smart phones, fascinated by their responsiveness to touch while ignoring or discounting our own abilities to experience sensation through our skin.

For Pallasmaa, the room takes on sentience simply by its existence. “A work of art functions as another person, with whom one unconsciously converses. When confronting a work of art we project our emotions and feelings on to the work. A curious exchange takes place; we lend the work our emotions, whereas the work lends us its authority and aura. Eventually, we meet ourselves in the work.” [13]

For the construction of *Shiver*, it was important to me to contain the water phenomena within a room-sized space to amplify the relationship between a visitor’s skin and the wall membrane. A *room* is broadly defined in the dictionary as, “a space that can be occupied,” [14] and this applies to skin as much as to space. A room becomes the casing of your casing – containing, mirroring and doubling *all-of-you*. It has its own atmosphere, which determines what you will wear and permits or denies the effect of air movement on skin. The size and texture of a room defines your body language and the scale of your gestures. Its layout and furnishings dictate the extent of your impact by describing your range, movement, vocal magnitude and timbre. For most of us, the idea of *who-you-will-be-today* is created in rooms, as we navigate questions of social position, authority, formality and vulnerability.

Shiver was created to be a temple of compassion. It will not ignore or overlook you, but pours with sensation. One could argue that *Shiver* has the visual representation of the body flipped inside out. Images of guts, spine, nerve-endings and muscle are depicted by the circuitry, wiring, valves and exoskeleton of the room. Inside, the clean, smooth walls create an impression of the skin surface. This delineation between the convoluted outside and minimalist inside of the room is meant to separate *structure* from *experience*. Exterior technology evokes biology, but also references psychological filters such as memory, presupposition and wishful thinking – mechanisms we construct to mediate our experience of the world. The spare, monochromatic interior allows for a meditation on pure biological sensation without context, just as the water flows create their serpentine forms without obvious topography.

Although technology in *Shiver* is visible, it remains mysterious, and one's understanding of personal agency becomes slippery. The room's reactions to viewer movement can sometimes be anticipated, but at other times may frustrate or surprise. While many interactive artworks use a mirroring strategy to form the relationship between the viewer and the work, *Shiver* is somewhat less predictable. Leading, following and joining are additional tactics for engaging with this work. The level of intimacy with the room is akin to that shared with parents, lovers, close friends and self. You have to work, as with your human intimates, to comprehend the messages passing back and forth. This dyadic relationship with the visitor may eventually lead to a perception that the room is being sneaky, teasing or flirtatious. The water flows on the wall membrane express a feeling of being *turned on*, wet and shivering in anticipation. [15] The sturdy architectural presence of the room softens, and you become conscious of the physical volume of your body and the space within the room. Ultimately, you experience a perception that the room has a consciousness of its own. Comments from visitors to *Shiver* provide evidence that my intentions are realized: "It taught me a valuable lesson about slowing down and listening," "It has secrets, some it will share, some it won't" and "It is like foreplay. You try one thing and if that doesn't work, you have to try something else."

Organic elements in the four works planned for the *Elemental Bodies* series include water, air movement, heat, magnetism and tingling. Each element has a distinct way of engaging the body surface, activating the senses, bringing the body into direct relationship with its environment, and to the forefront of consciousness. The connection between our inner and outer ecosystems is made palpable. Lappé says: "In a strange way, we identify our skin with our innermost selves." [16] The works in "Elemental Bodies" restate the value of skin as a sensor that gauges conditions and acts as a harbinger for intuitive knowing.

References and Notes:

1. *Shiver* is supported by a UW-Milwaukee Research Growth Initiative and Center for 21st Century Studies Fellowship. Credits include Ryan Lampe for Architecture and Engineering and Greg Surges, Kavi Laud for Interactive Programming.
2. Marc Lappé, *The Body's Edge: Our Cultural Obsession with Skin* (New York: Henry Holt and Company, Inc, 1996).
3. *Ibid.*, 71.
4. *Ibid.*, 33, 72-73, 177.
5. J.R. Kangy, "Sorption of Water by Collagen," in *Biophysical Properties of the Skin*, ed. Harry Elden, 373 (New York: Wiley-Interscience, 1971).
6. *Ibid.*, 374.
7. Robert Edelberg, "Electrical Properties of the Skin," in *Biophysical Properties of the Skin*, ed. Harry Elden, 514 (New York: Wiley-Interscience, 1971).
8. Marc Lappé, *The Body's Edge: Our Cultural Obsession with Skin* (New York: Henry Holt and Company, Inc, 1996), 11.
9. Juhani Pallasmaa, *Eyes of the Skin: Architecture and the Senses* (Hoboken, NJ: John Wiley & Sons Ltd, 2005).
10. *Ibid.*, 39-41, 11.
11. Ashley Montagu, *Touching, The Human Significance of Skin* (New York-London: Columbia University Press, 1971).
12. Juhani Pallasmaa, *Eyes of the Skin: Architecture and the Senses* (Hoboken, NJ: John Wiley & Sons Ltd, 2005), 10-11, 46, 72.
13. *Ibid.*, 66.
14. Oxford Dictionary, "room," Oxford Dictionaries Online, <http://oxforddictionaries.com/definition/room?region=us> (accessed June 29, 2011).
15. *The Rocky Horror Picture Show*, dir. Jim Sharman, from a play by Richard O'Brien, adapted by O'Brien and Jim Sharman (1975). References line: "I see you shiver with anticipation."
16. Marc Lappé, *The Body's Edge: Our Cultural Obsession with Skin* (New York: Henry Holt and Company, Inc, 1996), 11.