

Stimulating the Theatre of the Mind *Diluvio: Teatro delle Ombre*

Manuel A. Báez

Azrieli School of Architecture and Urbanism, Carleton University, Ottawa, ON, Canada;
manuel.baez@carleton.ca

Abstract

Inspired by the 500th anniversary of Leonardo da Vinci's death in France on May 2, 1519, *Diluvio: Teatro delle Ombre* (Deluge: Theatre of Shadows) offered an interactive and immersive exhibition/installation as part of *Cinquecento: Carleton Celebrates Leonardo da Vinci*, the 2019 year-long commemorative initiative at Carleton University. The project was conceived as the culmination of a series of *Diluvio* installations from the author's Crossings Interdisciplinary Research Collective Workshop offered at the Azrieli School of Architecture and Urbanism. Overall, the series of projects were inspired by Leonardo's *Deluge* drawings and his reflections on the reciprocal inter-connections within nature as revealed by his studies of the flow of water, air, light, shadows, and energy. The rich complexity of such phenomena is revealed and experientially encountered by working with the highly pliable properties of woven aluminum wire-mesh that's folded into the classic Miura-ori tessellation pattern. The inherent attributes of this membrane and the sculptural work resulting from this process are revealed through evocative shadow projections activated by the public within the unlit exhibition space. Inspired by Plato's *Allegory of the Cave*, the immersive experience offered a deluge of self-activated shadow-projections as a way of stirring, triggering, and thus revealing the highly resonant, fertile and imaginative potential lurking within the *theatre of the mind*.

Diluvio: Teatro delle Ombre

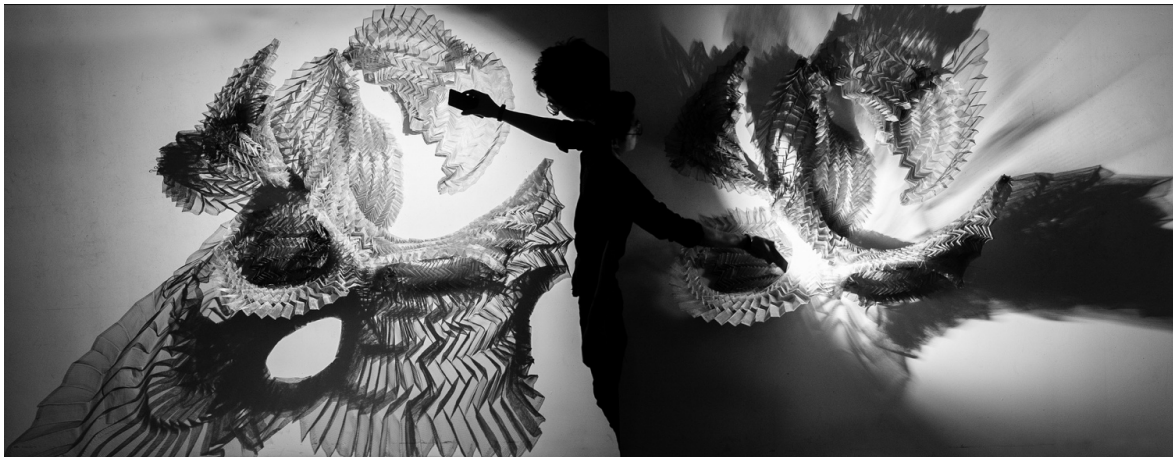


Figure 1: © M. Báez, *Diluvio: Teatro delle Ombre* exhibition/installation, interactive shadow-projections using cellphone flashlights. Folded aluminum wire-mesh sculptures.

“ ... Look into the stains on walls, or the ashes of a fire, or clouds, or mud, or similar places, in which, if you consider them well, you may find really marvelous ideas ... because by indistinct things the mind is stimulated to new inventions.”

“You who speculate on the nature of things, I praise you not for knowing the processes which Nature ordinarily effects of herself but rejoice if so be that you know the issue of such things as your mind conceives.”
Leonardo da Vinci [9]

Exemplified by the quotes above, Leonardo da Vinci had a lifelong obsession with our imaginative potential and perceptive capabilities. Correlations between his insightful speculations concerning visual perception and Plato's *Allegory of the Cave* [8] have inspired the theme of *Diluvio*. The illusions of perceived reality are metaphorically presented in Plato's classic allegory as being interpreted by cave dwellers chained to a wall. Their restricted vision only allows the perception of shadows projected on a wall by a fire behind them and objects in between. This is the limited reality of the prisoners, while unbeknownst to them, the true nature of reality and the light entering their cave lurks behind casting the deceptive impressions. While acknowledging the metaphoric shadows as illusions, Leonardo emphasized that they also offer insights into the nature of perception, the imagination and how this fertile process can be understood and leveraged. He recommended musing on and interpreting such elusively vague phenomena as cloud formations, shadows, resonant patterns, including, as in the quote above, evocative stains on walls, as a way of stimulating and expanding the imagination [4,9]. Such a reflective process can conjure up highly resonant and evocative mental images, offering insightful clues regarding the inner workings and creative potential of the individual mind. "Learn how to see," Leonardo advises us regarding this versatile process, "realize that everything connects to everything else."

Experientially Learning How to See

Expanding upon Leonardo's reflections on perception and nature's inter-connections, the experiential working process and material properties incorporated into *Diluvio* build upon previous research from the Crossings Interdisciplinary Research Collective [1,2,3]. Previous work explored the morphological, integrative and generative potential of fundamental processes lurking within the diverse realm of natural phenomena. Through the emergent properties of woven and/or folded flexible membranes that perform as highly integrated tessellations, a variety of forms, structures and installations were conceived. The inherent properties of the cellular units and their increased combinations, along with the nature of the materials and processes involved, allowed for haptic and intuitive learning processes to occur.



Figure 1: © M. Báez, *Diluvio: Teatro delle Ombre, interactive shadow-projections and sculptures.*

Working with sheets of aluminum wire-mesh, *Diluvio* explored the potential of a significantly larger woven field, compared to the scale of previous explorations. This allowed for self-similarity at these different scales of organization to be compared, along with related complex combinatorial properties to be investigated. Additionally, by folding the mesh into the Miura-ori tessellation pattern, the flexibility of the folded membrane acquires a higher degree of pliability due to the additional deformability provided by the mesh weave. The cellular regularity, deformable properties, and structural potential of the pattern offers great possibilities for collapsible structures, as seen by its initial and subsequent application in deployable structures [5,7]. The cellular membrane consists of Miura unit cells with its smallest constituent component being a parallelogram. In previous work, where paper was folded from a field pattern of equilateral triangles, the parallelogram had fixed acute angles of 60° and obtuse angles of 120° [1]. In contrast, the woven mesh was folded into the classic pattern with parallelograms that can deform from an orthogonal shape into one with more acute and obtuse angles, see Figure 5. This allowed for experiential explorations

and improvisations through the much higher degree of overall shape-shifting deformability. Subsequently, this included exploring the shadow projections offered by the variety of possible sculptural configurations, leading to *Diluvio: Teatro delle Ombre*. Throughout this process, inspiration was drawn from Leonardo's speculations and studies of natural phenomena, with the Miura-ori pattern playing a critical part through related self-folding and organizing patterns found in leaves, petals, insect wings and elsewhere in nature [5]. Leonardo's studies of the properties of water and related phenomena, including, most notably, his evocative *Deluge* drawings [6], were the main sources for the conceived sculptural installations.



Figure 3: © M. Báez, *Diluvio: Teatro delle Ombre*, interactive shadow-projections and sculptures.



Figure 4: © M. Báez, *Diluvio: Teatro delle Ombre*, interactive shadow-projections and sculpture details.

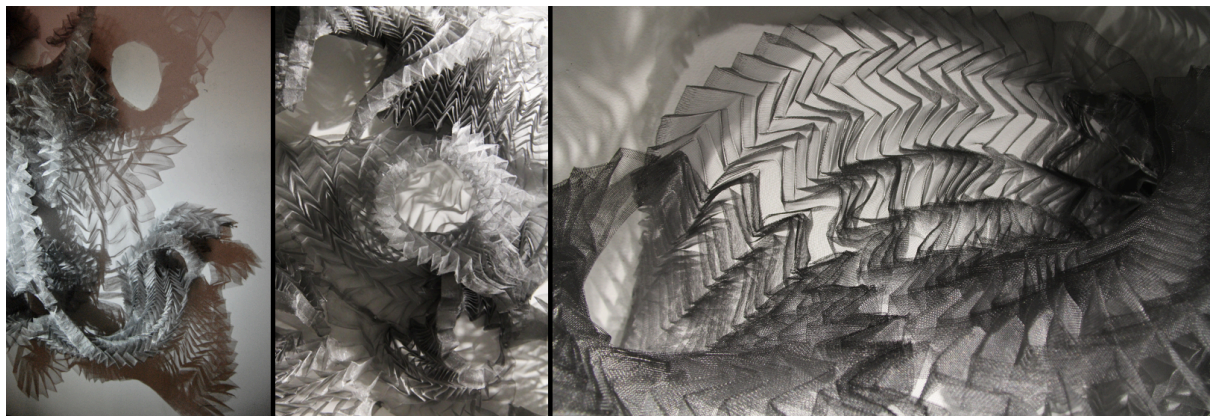


Figure 5: © M. Báez, *Diluvio: Teatro delle Ombre*, interactive shadow-projections and sculpture details.

Summary and Conclusions

Diluvio: Teatro delle Ombre offered an experiential working-process whereby one is able to conceive fluidly sculptural configurations while simultaneously discerning how the fluid pliability of the folded membrane was induced. This embodied property of both the folded membrane and the sculptural installations was activated and revealed, initially, through hands-on manipulation and, eventually, through a moving light source (i.e., a cellphone flashlight) and the projected shadows. To those “who speculate on the nature of things,” as Leonardo reminds us, these mysteriously evocative shadow-projections and their related associative-activations, offer a possible way to “know the issue of such things as your mind conceives.” Thus, participants were encouraged to ponder and interpret the elusively evocative forms, shadows, and resonant patterns encountered as a way of stimulating and expanding their imagination while gaining insights into the inner workings of the human mind and its conceptions.

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