

BODY|FORM|SPACE

Geometric translations of the body in motion

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Abstract. This paper presents a novel approach to digital investigation of body, space, form and motion to expose issues of spatial perception. The spatial experience as generated from, and translated by, the human body is the focus of this work. The work explores the representational value of the body's sense-image, the context and spatial/visual literacy of the *learned* sense of space-time generated from the study of the human body. Here the body is conceived not just in space but also in time, affording the ability to reinterpret the body and its dynamic motion engaged not as a static condition, but as a set of event spaces. Motion here is defined as a multiplicity of continuities that can be subdivided by artificial boundaries that describe space, time and body. The study of a series of bodies and movements is described that explore the human condition as a series of differential lines (form + time) and framed structures (bodies + motion). The intention is to examine the relationship between human form and metaphysical simultaneity as generators of architectural form. The work is structured by a research approach that dissects and isolates the representational concept/image from the body in a way that might offer an alternative description to the traditional historic models.

1. Introduction

The body|form|space study discussed here can be described as a speculative methodology for the discovery of spatial organizations derived from contemporary study of the corporeal metaphor in architectural thought and representation. The contemporary issues of difference and continuity, line and surface, as well as representation and simulation are all in play throughout this work. The study here has been of the value and control of

differential line systems to describe, order, and define space. This has been achieved through an investigation of the separate structures of disconnected, differential lines rather than the connective, curvilinear lines generally derived from the “graphic method” (Hodge, 2006) developed by Étienne-Jules Marey and Eadweard Muybridge.

This research seeks to investigate the representational value of geometric descriptions of differential and continuous lines through digital modeling and animation to approach a rigorous investigation of space, form and motion using the human body as vehicle for discovery. The research methodology is designed to expose issues of linearity in abstract spatial constructs used simultaneously in the human perception of space and time. The spatial experience as generated from, and translated by, the human body through visual sensory perception is the focus of the work that looks at line, frame and section as conceptual devices to describe spatial experience in architecture and architectural representation.

Since the time of Vitruvius architects have described form and space through symbolic, metaphorical, geometric and proportional relationships to the human body. This corporeal metaphor seeks to relate space and body through formal geometric systems of description. The body|form|space study examined varied types of body movement (*Fig. 1*) in the general conditions of the “graphic method” as a starting point in a geometric study of body, form, space and movement.



Figure 1. “body-space” Jimena Amaral. *Initial body movement study with overlaid lines.*

2. Human Form + Metaphysical Simultaneity

The spatial experience as generated from, and translated by, the human body is the focus of this work. As society continues on the path of further cybernetic extension of the body’s sense-image, the context and spatial/visual literacy of the *learned* sense of space-time will continue to evolve, transform and alter (McCullough, 2004) as cultures stretch to engage both edges of the physical and virtual worlds.

The corporeal metaphor seeks to relate space and body through formal geometric systems of description that attempt to transcend the mere description of the body, but achieve metaphysical clarity of the bodily sensory experience. If the body is conceived not just in space but also in time than the ability to reinterpret the body and its dynamic motion engaged not as a static condition, but as a set of event spaces. The intention is to examine the relationship between the human form and metaphysical simultaneity as generators of architectural form.

Metaphor was developed as both a conceptual structure and a representational method in the body|form|space study. The geometric representation of the *body in motion* study led to increasingly complex and sophisticated (*Fig. 2*) visual forms. The computational devices of the modeling and animation work lead to imagery that embodied the simultaneity and multiplicity of the motions and bodies themselves. The work itself became the new referent, embodying all of the information of the original corporeal event. The metaphor became the vehicle itself.

In the essay, *Toward a Poetics of Architecture*, Dalibor Vesely (2004) discusses the architect owing contextual reality of the visible world to the metaphorical structure of the visual construct. The work conducted in the body|form|space study proved out this contention in the development of the animated studies. The contextual reality of each component of the differential line studies, and later blended space studies, elevated the work from a description of the physical state of the body to a metaphysical expression of the simultaneity of the corporeal metaphor.

3. Bodies + Motion = Differential Lines

The theoretical background for this study lies in three primary areas. The first of which is the late nineteenth century works (Lolli, 2000) of Étienne-Jules Marey and Eadweard Muybridge, specifically the “graphic method” of visual study of bodies on motion. This formal way of describing multiple

positions of the subject body is easily done today using simple video and photographic techniques to capture body and motion in time. The second area of study lies in Martin Heidegger's study of phenomenology in *Art and Space* (2001) where he describes *space* linked to *being* as fundamental to the understanding of architecture. The body and the corporeal metaphor play against this understanding of space that is not perceptible with the senses. The third area of foundation to this study lies in the work of Oliver Lang's *Differential Notational Systems* (2000) as a process of abstract differentiation revisiting the representational concepts of Gilles Deleuze.

The methodology applied for the body|form|space study was based on the synthesis of these three competing conceptual lenses of inquiry. Several types of body and motion studies were captured using video and photographic means to document the subjects. These descriptions were then developed using a differential notational system that began in the spirit of the "graphic method" of study of the differential positions (*Fig. 2*) but altered by the metaphorical emphasis on the visual artifact to communicate the space of being as the manifestation of the body's sense-image.

In the essay, *Body Matters*, Greg Lynn (1998) discusses the changing attitudes towards the geometric description of the human body and the corporeal metaphor in architecture. He proposes that our historical use of geometric descriptions of the ideal human form as an architectural language is lacking a relationship to our reality because they lack specificity and definition of bodies in time or space.

Motion is a continuity that can be subdivided by artificial boundaries that describe space, time and body. If the continuity is broken by boundaries that are conceived as datum lines that designate meaning one might begin to project space within them, therefore describing motion as the difference between one line and another. This offers a way to describe spatial organizations through the projection of lines of meaning. Broken into line fragments that describe body and motion so that they might have meaning, lines may act as descriptive linguistic elements. Meaning is accomplished by making distinctions and connections between these elements. Abstraction and computational manipulations of context and spatial relationship are means to project these boundaries through derived lines of body and motion.

The intention of the first phase of the body|form|space study was to develop a broader understanding of line by studying the relationship between profile and contour as both analytic and generative operations. In this study profiles were understood as either the edge of a 3D form as seen from a particular view (*Fig. 1*) or a 2D silhouette projection of edges onto a picture plane. Contour lines were defined as topographical polylines developed within the models (*Fig. 2*) to draw, record and define surfaces. The goal was to examine the relationship between human scale and

metaphysical simultaneity, examining the ways in which ambiguities can provide organizational models for design. The visual work led to a broader understanding of the potential relationship between the human body and architecture. Each visual construct revealed the physical metaphor of architectural assembly and as an experiential phenomenon of the living/perceiving body in space. Each of these conditions simultaneously described the physical body in space and the metaphysical experience of the body and body movement that transcend any fixed moment in the temporal/spatial sequence. The acceptance of the two conditions of profile and contour implies an oscillation between the classical idea of architecture formed in the human image and conversely the human image formed by architecture. This relationship observed in the work offered the recognition of the necessary alignment or resonance between architecture's physical and mental constructs.

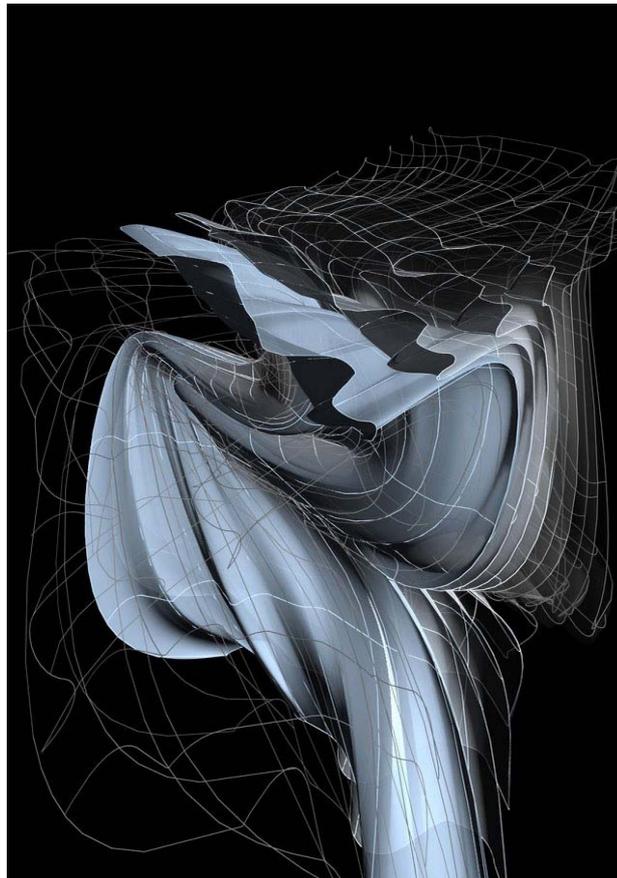


Figure 2. “in-between-space” Beret Dickson. Development of a spatial envelope from a series of differential lines.

4. Form + Time = Blended Spaces

The second phase of the study took the visual artifacts of the first portion of the study as a metaphorical/literal construct to be developed into an animated study. As each component of the body|form|space study was derived from a motion study each then was explored as an animated sequence of imagery (*Fig. 3*) that developed the ambiguities of the structured motion graphic into an animated sequence. These studies were neither purely subjective endeavor, nor were they objective factual description (Pérez-Gómez, 2000) of the bodies in motion. They were hybrid, metaphysical blended spaces that were the manifestation of the temporal studies as form re-animated in time to develop blended spaces that followed the ambiguous structures discovered in the corporeal study. The geometric translations of the body in motion were developed in three successive exercises that prioritized three types of inquiry to develop the blended spaces that merged body and time.

The corporeal metaphor seeks to relate space and body through geometric systems of description. Early Renaissance theories of proportion and the relationship (Pérez-Gómez, 2000) of the human body to mathematical projections of harmony produced architecture that was abstract in the sense that its primary aim was to achieve ideal relationships of the parts to the whole based on the corporeal metaphor to human form. The interrelationships of the parts to the whole generated simple geometrical forms that sought to reconcile the complexities of the subject.

Lines can be produced simultaneously as profile and contour through displacements of the point of view as degrees of intensity located along the continuity of space and time. In this study the work strived to develop an understanding of the potential relationships between the human body and architecture, a physical metaphor of architectural assembly and as an experiential phenomenon of the living/perceiving body in space.

Sections can be developed by studying the relationships between synthetic description and analytic definition as both interpretive and generative operations. The assignment was to examine the relationship between section and description. Sections were produced simultaneously as synthetic acts that served to make connections or analytic acts that serve to isolate issues through displacements of the point of view as related to descriptive conditions.

Frames can be produced simultaneously as containers keeping things in or containers keeping things out through displacements of the point of view as related to positive/void conditions. In this study, the assignment was to further develop the understanding of the potential relationships between the human body and architecture, as both a physical metaphor of architectural

assembly and as an experiential phenomenon of the living/perceiving body in space.



Figure 3. “composite-form-space” Carl Lostritto. A combination of continuous and discontinuous lines in a blended space animation.

5. Conclusion

The results of the body|form|space work thus far suggest the development of a broader understanding of space and form through the study of the relationship between the body and motion in abstract representational constructs of the “graphic method” and differential line analysis. The research produced a series of video segments, animations and digital models of spatial investigations that tried to analyse the inherent organizational structures in the body movements.

Architects have long used alternate media (painting, sculpture, film etc.) as spatial, compositional, and organizational explorations that project architectural issues and trajectories that must be transformed to become

architecture. The media studies from this work hold much potential in their hybrid condition that oscillates between image and form.

Further iterations of this study will seek to reveal ideas of scale and proportion embedded in the work through a series of images and animations that describe the architectural (spatial) significance or potential of the forms generated in the profile and contour studies. The intention is to dissect the work into its constituent parts then recombine them through a synthetic act to re-design an abstract interpretation of the collective understanding of the initial study.

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