

# Generative Misbehavior at Play

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**As a generative mode of architectural production, this paper considers misbehavior to be an active agent that subverts the normative conditions of material, process, and end use. An instigator of the creative process, generative misbehavior shifts the rules of design and function of architecture to disrupt a fixed, static or controlled approach that obeys strict rule-sets. The work discussed in this paper exposes three oppositional provocations of play, or acts of making, lodged in material intuition, fabrication technique, and heuristic discovery in loosely programmed yet occupiable spatial works of architectural design. Investigated through a case study using fabric formwork as a construction method, play is incited through experiential experimentation typically overshadowed by pre-configured, pre-programmed, or preconceived labels, methods and artifacts of what we already know, deem acceptable or familiar. Through acts of search, release and play the resulting cast forms come together as a playscape installation.**

## INTRODUCTION

In his book *Creativity: The Magic Synthesis*, twentieth century psychiatrist Silvano Arieti describes the creative process as “a way of fulfilling the longing or search for a new object or state of experience or existence that is not easily found or attained.”<sup>1</sup> His claim that this occurs not only during the creative process but also finds validity in the creative product itself shares close affinity with the desire that current architectural practices have in working directly with materials to test design ideas. Matter remains inert unless acted upon. Yet, an interplay of both cognitive and physical acts favoring discovery is necessary for creative synthesis. Engaging with materiality at the inception of an idea opens up the possibility of matter to inform design decisions rather than treating it as an objectified receptacle of form through a set of instructions. Material and computational expert Achim Menges reinforces the importance of the relationship between matter and maker as a generative design agent that activates a designer’s intuition.<sup>2</sup> A second degree of intuition in creative acts exists between how one might be compelled to engage with a made work once it is finished, allowing for unexpected coincidences to emerge.

Arieti continues to describe creativity as one of the most empowering ways for humans to become released from habituated behavior and seek alternatives to customary decisions. Such indeterminate productivity in the creative design process is activated through play. This concept finds

credibility in psychoanalyst D.W. Winnicott’s theories that claim in order for playing to have to affect in the outside world it must be part of doing and not just thinking.<sup>3</sup> This also occurs when an object or space is contemplated or approached by another who did not create the work. Once the made artifact exists in the world, it is open to interpretation, and interaction between the work and the participant becomes a fertile space in which a playful experience can happen.

Interrelated creativity can be found in works of various artists and architects demonstrating similar ideas about play. In his sculptural work, artist Isamu Noguchi moved fluidly between site, composition and matter, engaging a creative design process that translated across design elements through bodily acts of play. Momo Taro’s nine large rock pieces at Storm King Sculpture park had to be split at their source river bed in Japan in order to be lifted, shipped and relocated to their new site. Adapting to the availability of the medium, Noguchi recomposed his initial concept, shaping and choreographing landscaped and material surfaces to stimulate discovered use and invite exploration inside, under, around, on top, and between the sculptures. Similar to his other play structures and large playscapes designed without a definitive function in mind, inhabitable spatial qualities emerge naturally. Comparably, sculptor Gonzalo Fonseca’s colossal play-models are mini-architectural worlds whose mutable scales invoke abstract dynamic relationships between real and imagined, heightening alternate perceptions of the viewer. Carved out slabs of travertine coupled with over-sized mobile pieces blur figure and ground, exteriority and interiority. Alternatively, architect Herman Hertzberger’s spaces encourage inventive interaction beyond one particular intended function. Primarily designed and scaled for children, playful geometries, such as his sunken and raised geometric concrete urban forms, or his Montessori school’s interwoven spatial qualities of rooms, walls and stairs, replace the singular reductive aspects of spatial and social design with those not driven by program.

In relation to the play ideas conveyed and achieved in these works, this paper expands on the role of play in design. Broken down into three “Acts” that abandon strict rule-sets in the making of or engaging with artefacts, emphasis is placed on the crucial role that play has in the creative process. The first Act, *Search, not follow*, prioritizes the act of finding over the default tendency to concede to predetermined methods that ‘play it safe.’ The second Act, *Release, not hold*, calls attention to design thinking informed by material intuition.

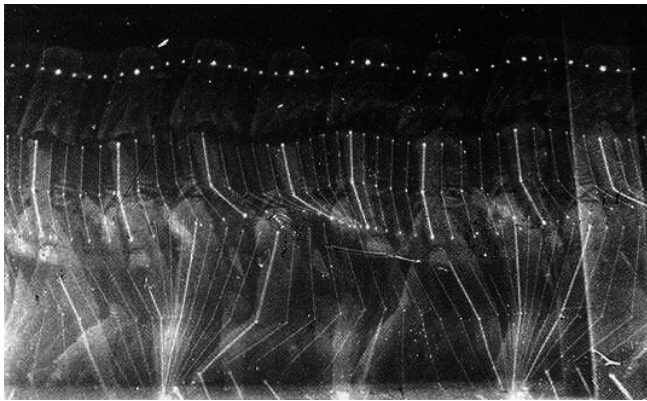


Figure 1: Etienne-Jules Marey, ca. 1890-1, Man Walking.

The third Act, *Play, not prescribe*, questions the design of spaces that prescribe particular uses or contexts in favor of those that permit the body to take command of spatial decisions. These three provocations and how they overlap to incite play are explored in the design and construction of an architectural case study. The design-build project entitled *Inhabiting Surface* imagines an outdoor play-scape environment as a testing ground for generative misbehavior as an agent in architectural design. Here, the notion of play is probed in unprogrammed hands-on experimentation as an opportunistic condition that fuels the desire for novelty in design. Play is also encountered in unforeseen instances of the human body inhabiting space through haptic and spatial discovery. The investigations in this paper show work from a two-semester sequence hands-on fabrication course using the technique of fabric formwork and variable formwork design, including small and large-scale cast prototypes, a collaborative workshop, and a half-scale installation that became known as *Twisted Ground*. Considering the creative process itself as a strategy for play, critical decision making in design thinking and making are established through generative feedback alternating between material, maker, process and user.

### ACT I: SEARCH, NOT FOLLOW (ANALYTICAL BEHAVIOR)

Other than its weave, fabric itself has no structure. When used as formwork for casting wet material, it invites formal discovery, yet also demands support. As a way to test this material as a fabrication method for mass customization that could yield variable results, the approach towards formwork design was to create an apparatus that could displace the fabric incrementally. As an informative means of understanding movement as agency for design, the first prompt was to consider motion studies. Against a gridded background, Eadweard Muybridge's stop motion sequential photographs of bodies in action deconstruct motion capturing successive moments as a series of still images. The human figure carrying out typical daily activities or animals caught in flight or stride are seized frame by frame. Alternately,

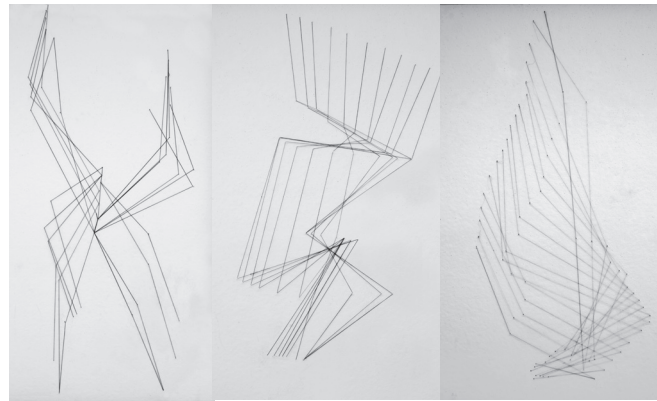


Figure 2: Pin and string stop motion sequence studies. mapping incremental movements of actions associated with play.

through chronophotography achieved by reflective points attached to human limbs, physiologist Etienne-Jules Marey treats the body as an animate machine. Recording proximities of bodily motion as a composite image in a single frame, anatomy and physiology are merged. [Figure 1]. Similarly, Marcel Duchamp's drawing *Nude Descending a Staircase* represents a time-lapse image of one figure through multiple overlapping silhouettes, depicting an entire sequence as one continual flow. In contrast, Leonardo Da Vinci's Horse studies zoom into the anatomy of limbs to freeze moments in time of muscles, joints and skin acting in unison, emphasizing form as a manifestation of movement. Close examination and curiosity of how the body physically moves as a whole as well as specific actions that cause certain parts to move in unison shows how these analytical techniques searched to reveal anatomical time-space relationships.

In a workshop setting, these studies precipitated initial ideas of how the apparatus could behave as a mobile scaffolding starting with the human body. Similar to Richard Serra's *Verb List* which uses the infinite form of the verb to dictate acts he performed when creating his works, students performed action words in the context of play - to throw, to stretch, to climb, to twist, to wiggle - measuring out each other's figures as stop-motion studies. Using string to represent the directional force-line of limbs and pins to mark the position of joints, the body was used as an indexical tool for mapping out a range of motion against a vertical wall surface. Broken down into twenty increments, one inch apart, and recorded as one drawing, the body's structure was captured in motion [Figure 2].<sup>4</sup> Translating ideas of motion to formwork design generated a vehicle for mental play in the workflow. In laws of mechanical physics, Newton's law of inertia states that a body will remain at rest or in motion unless acted upon by an external force. In this case, the fabric became the body and the external force came from string. The string-pin movement drawings became analogous to understanding how forces in the fabrication technique could increasingly alter the orientation and movement of the fabric. The apparatus was constructed using simple wood frames and posts to support

the string positions. The loose yet static form of the fabric demanded precise attention towards points of contact with the apparatus. Using only string to guide and shift the fabric, point and line forces pushing and pulling against or penetrating the planar cloth created surfaces and volumes when loaded with wet plaster. Several iterations tested variable forms that could be generated from one apparatus.<sup>5</sup>

In this approach, searching implies a sense of not knowing that provokes the imagination, a systematic method that makes and remakes its own rules. Direct hands-on manipulation in this modality forces perceptual design decisions to be made through emergent and progressive discoveries rather than arising from following a recipe. As architectural theorist Sanford Kwinter notes, the state of “becoming or “middleness” in generative systems is fundamental in physical relationships of an object and its creation.”<sup>6</sup> This engagement prioritizes the relationship with human motor-skills in relation to cognitive design thinking rather than pre-programmed sequenced actions, often the case in digital computation. As a form-finding strategy that could generate variability, the enacted gestures became the agent of mobility. Formwork is no longer a fixed condition, but rather activated by the body behaving like an instrument that instructs a process rather than executing a particular task. Interactional approaches through openness of experience and conscientiousness have been described by Arieti as being closely related to creative behavior. Ideas about form-finding methods bridging imagination, cognitive and spatial perception can also be found in theories about play. Child psychologist Jean Piaget claimed that geometrical intuition in making comes from conceptualized intuitions of past and anticipated actions. Spatial concepts, including relational processes, such as folding, rotating, or scaling up, “can only effectively predict these results by becoming active themselves, by operating on physical objects, and not simply evoking memory image of them.”<sup>7</sup> While engaging in familiar actions while being confronted by string as the primary tool for generating formal moves in relation to the fabric abandons the possibility of strict mimicking as a learning paradigm. With body and hand having agency, this exercise unites maker with technique in the process through spontaneous dialogue. When technique becomes actualized thought from continual interaction between tactile and mental fields of perception, the made artifact carries with it “intention and specificity.”<sup>8</sup> This became evident in the materiality of the made artifact.

## ACT II: RELEASE, NOT HOLD (MATERIAL BEHAVIOR)

In Newton’s universal law of gravity, weight is defined as a force caused by the gravitational attraction of the earth. Despite the strategic positioning of the string to act out the play-verbs, the cloth seemed to reveal its own formal play [Figure 3]. Material intuition invoked by fabric forming allowed the plaster to have its own opinion. In areas where

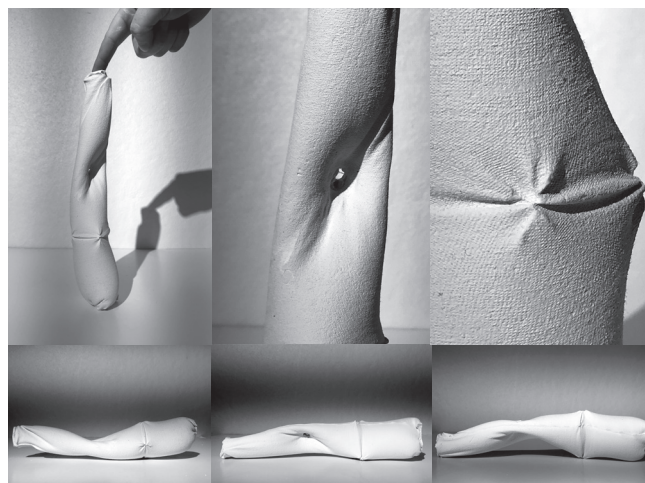


Figure 3: Small scale plaster form exploring “to twist”; cast vertically and expressed horizontally

the string did not touch the fabric, the cloth offered little resistance creating superfluous bulging, unwanted creasing or instances of unexpected sensuous curves. *Release, not hold* permits weight to inform the plastic substance to find its own shape against the flexible cloth and allow unexpected forms to emerge. Architectural theorist Juhani Pallasmaa notes that form-finding necessitates surrendering to opportunities that involve risk and experimentation that can only be discovered by physical touch.<sup>9</sup> Used more consequentially than a formulaic device, form-finding techniques using flexible formwork inform shapes that are strongly embedded into memory and matter. Once the plastic matter is cast it becomes solid, rigid, fixed in time and space - its form becomes a witness to material behavior. Allowing the plaster to take its shape as it hardens, the product is both deduced and heuristic requiring haptic knowledge. In *The New Materiality*, philosopher Manuel DeLanda notes that today’s making culture has moved away from Aristotelian thinking about matter as an “inert receptacle for forms that come from the outside.”<sup>10</sup> Evoking the realism of Renaissance sculptures that heighten particular moments of bodily gestures and clothing these structures reveal real-time deformations that occurred in the fabric. Both maker and technique are evidenced in the bends and folds as traces left on the surface that mark out instances of its making. The resulting forms transcend a retinal experience by exploring spatial tactility and a deeper engagement with the physicality of a material’s textural qualities difficult to experience through visual sight. The result becomes a thickened space that offers a multisensory experience of inhabiting surface.

The various small-scale plaster forms were observed and the apparatus formwork was evaluated for its ability to capture the expression of initial gestures and the possibility to generate variable forms. Misbehavior of material and technique demanded a search for more rigorous control in

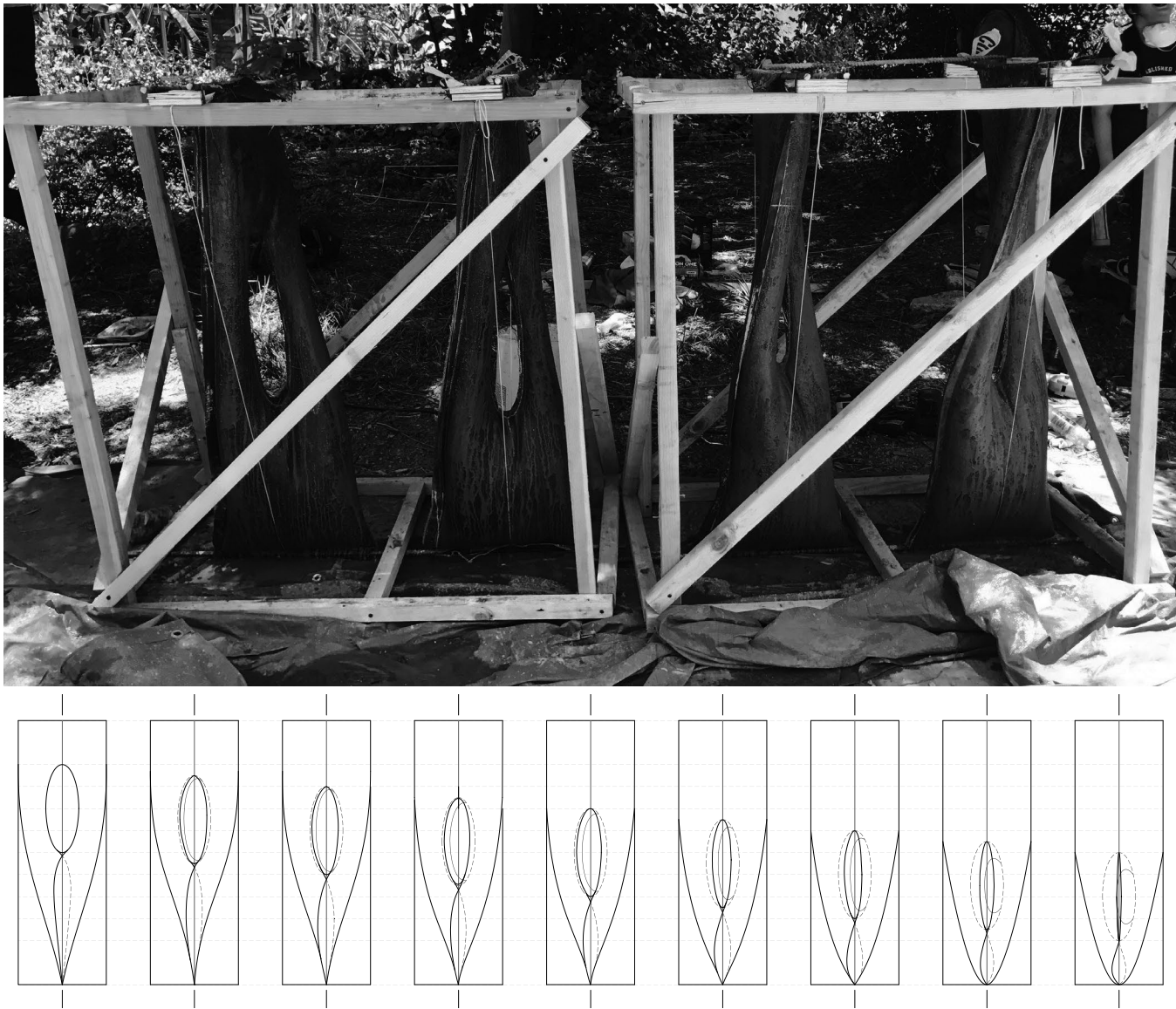


Figure 4: Top: Cast fabric form concrete structures suspended in apparatus. Bottom: Post-construction diagrammatic drawing of incremental displacement of opening in tailored fabric formwork.

eliminating unwanted deformations while welcoming newly revealed curvatures. Rather than using string to guide its shape, a more refined approach of tailoring the fabric was necessary in combination with cutting the cloth strategically in relation to the warp and weft of its weave. Increasing structural complexity of forms were explored: one-sided topographies, two-sided free-standing surfaces, folded surfaces, and voided surfaces. Slender free-standing forms reorientated horizontally is when the interplay between column and beam first emerged [Figure 3].

### ACT III: PLAY, NOT PRESCRIBE (ASSOCIATIVE AND SOCIAL BEHAVIOR)

**SCALING:** Plaster forms with the most structural stability and least amount of material used were considered for enlarged studies. The hole in the formwork allowed the form to

respond favorably to the operation 'to twist', offering release of tension in the fabric to control unwanted creases. The plaster cast was then scaled up by a factor of eight to create large-scale prototypes. Concrete was used instead of plaster and woven geotextile fabric replaced the cotton cloth for its ease of release and reusability, its weave oriented to reduce stretching. Using a ratio of 1:3, the fabric was sewn to create ten flat sacs each measuring 16"x48" with an opening at the top for pouring. An oval shaped opening measuring 6"x16" and centered in the sac's width was cut out of the fabric and sewn all around, and displaced along the sac's length every 1-1/2" to create the ten variable molds [Figure 4]. The design of variable formwork for the application of modular assemblies proved to be greatly informed by material experiences where form and surface are integrated as spatial experiences. Since algorithms in computational software use



Figure 5: Installation in-situ of ten structures, dimensions: 16" x 48" x varying thickness.approx. 4" to 7"

a formalized top-down method from input of a finite sequence of instructions to produce variable outputs, they do not consider the non-object field that materiality affords. A matrix studying the operation of twisting at different points along the length of the sac aided in visualizing ratios and formal possibilities, identifying variations of the overall module as well as how they could be aggregated. A more exacting and limiting rule set was governed by the apparatus to move the sac. The apparatus design then became an enlarged wooden frame with notches along the members to adjust the top and bottom angles of the twist. Poured vertically as "columns" and placed horizontally as "beams," gravitational forces adapted to the openings in each module that permitted material reduction and served to shape the forms while maintaining structural integrity. Compressive forces in the standing form were maintained and the steel reinforcement in each leg on either side of the hole took on load bearing qualities when used horizontally. *Play, not prescribe*, challenges rules of dictating what we deem to already know, and invites playful associations as an alternate way of experiencing the world. The column to beam translations of the cast structures show a play in function once reimagined in space. As Pallasmaa notes, "understanding architectural scale implies the unconscious

measuring of the object or the building with one's body, and of projecting one's body scheme into the spacing question."<sup>11</sup>

SITING/NAMING: Design-build projects do not always have a site a priori. Due to time and budget constraints and stability of the prototype which demonstrated precariousness in tipping over if played on and required approvals, the original location of a concrete surfaced school yard was no longer possible. Both site and stakeholder changed, and so did the rules. The new site became soft earth with a central tree as a visitor's welcome area at Cal Poly Pomona's Lyle Center for Regenerative studies. By changing the ground condition, the displaced prototypes found an opportunity to become part of the landscape. The organization of the play-structures around the tree re-imagined the act of twisting to instruct arrangement, orientation, and siting [Figure 5]. Mental play is engaged through the site's new reading and associative qualities, recalling a dispersed object-field condition of fallen branches that emerge or sink into the ground. Ideas from Robert Irwin's writing, *Seeing Is Forgetting the Name of the Thing One Sees* suggest that an individual's perception has the power to keep an object's qualities alive through open playful inquiry.<sup>12</sup> Although aggregation was organized through creative place making, when engaging with the made artifact, one understands or hears: I am not a tree,

nor a branch, a bench, a stool, or a step - I am not a static fixed object in the mind. Imagery, Arieti argues, is the most elementary human cognitive function that permits one to escape passive behavior that adapts to or accepts the limits of reality, and entices motivation to find new meaning.<sup>13</sup> During the installation, the play area was given the name *Twisted Ground*.

**INHABITING:** From a young child, a human adapts to social cues, codes and situations for use of space, losing personal identification with the built environment that emerges out of spontaneous play from imagination. Typically associated with social disobedience, inappropriate usage, or ill-functioning machines, misbehavior connotes a negative way of being and is often judged as improper or out of control. As a generative mode of architectural production, misbehavior can be used to subvert the normative conditions of use in search of the unexpected or unspoken. Newton's third law of motion states, for every action there is an equal and opposite reaction, while the rule of superposition in physics claims the net response caused by two or more impulses is the sum of the responses that would have been caused by each individually. In *Twisted Ground*, as the earth pushes up against the concrete, the body pushes down against both form and ground. The achieved scenario of the playscape invites unusual bodily occupation and exploration of form. Part of the earth mounds upward to touch and support the structure, while other surfaces float above the ground. Varying heights challenge new ways of laying, climbing, sitting and facing one another rather than being controlled and determined by its programmed functions. The texture of the fabric imprinted onto the surfaces catch the sunlight, rain water, and invite human touch.

## CONCLUSIONS

This research proposes a new paradigm for design as an open-ended rather than fixed condition, destabilizing yet expanding the role of the designer. It favors a generative condition capable of production or reproduction where three parts that drive the creative process in design – technique, material, and end-use – can influence one another laterally to disrupt isolated systems or imposed afterthoughts of design. Curiosity in the creative process invites *search, not follow* as a learning paradigm in making, challenging goal-oriented paths towards design solutions. A condition poised to seek and accept new forms of design, un-programmed spaces reside in a state of unknowing, resisting completion, and thereby buzzing with thickened potential for a deeper exchange between body, space and material substance. Assimilation of process to product is inevitably enabled by the manipulation of matter and how that materiality is then experienced in the built environment. By actively engaging with material, the creative process can be generated from live agents and in-situ situations, grounding human experience in how we know and connect to our built environment, and how

the designer creates new fabric of cultural history that unites space, place, context, and environment. Rather than design as a prescribed condition demanding a certain form of utility, it invites conversation and absorbs our individual cultural values not thrust as an externally driven set of values upon them. Putting these provocations into practice commands architecture to claim its dynamic position by resisting control, throughout its inception and beyond its completion. Making is the most potent tool to re-imagine architecture as play.

## ACKNOWLEDGEMENTS

The work presented in this paper was supported by a departmental grant from New York Institute of Technology's (NYIT's) School of Architecture and Design. A five-day intensive workshop where students first learned to scale-up their plaster models into fabric form concrete prototypes took place at NYIT's sculpture barn assisted by fabric form experts Remo Pedreschi, Professor of Architectural Technology at the University of Edinburgh's College of Art, architect Ronnie Araya, formerly from C.A.S.T. lab at the University of Manitoba. The workshop included architecture students from NYIT and landscape architecture students from Cal Poly Pomona. *Inhabiting Surface* began as a collaborative project between myself and Cal Poly Pomona Department of Landscape Architecture Assistant Professor Rennie Tang to create playscapes for schoolyard environments. The final installation at the Lyle Center for Regenerative Studies was organized and supervised by myself and assisted by Prof. Tang and her colleagues.

## ENDNOTES

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