# Fabricating Play


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**INTRODUCTION**
Experimental architecture during the 90s was transitioning out of and reacting to the previous phase of architectural experimentation, which displayed traits of fragmentation, as exemplified by the deconstructivists or perhaps the later phase of postmodernism in architecture aiming to communicate meaning or narrative through historical references and formal juxtapositions. The influence of the computer began to inspire a new type of formal exploration that sought smoothing, both formally and spatially in the immaterial world of cyberspace. With the rise of the implementation of digital tools in the process of architectural design, it became possible to accelerate and consider not only new modes of representation, but also new methods of fabrication and new formal typologies. Initial "paperless" architecture of the 1990s, such as the *Virtual House* by Peter Eisenman, de-emphasized the production of the material object as it explored the realm of the virtual.

The introduction of more complex animation software such as Alias Wavefront and Maya to the architectural design process allowed designers to move beyond traditional methods of formal composition utilizing static grids, intersecting masses and volumes, and folding of angular planes to the use and articulation of surface derived geometries. Greg Lynn's book *Animate Form* (1999) outlines theories in support of topological explorations of architectural form that is not considered

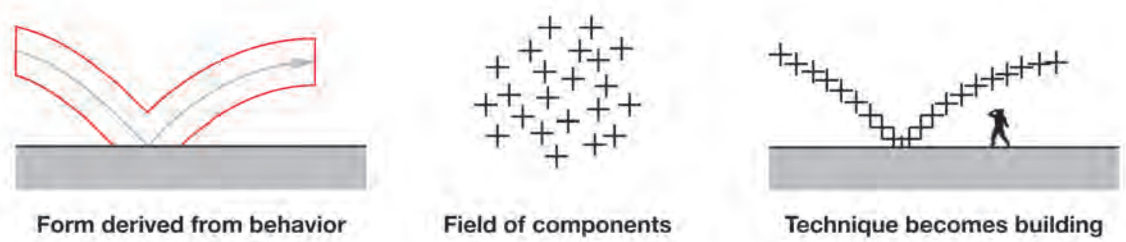


*Figure 1: Form derived from behavior, fields, and techniques.*

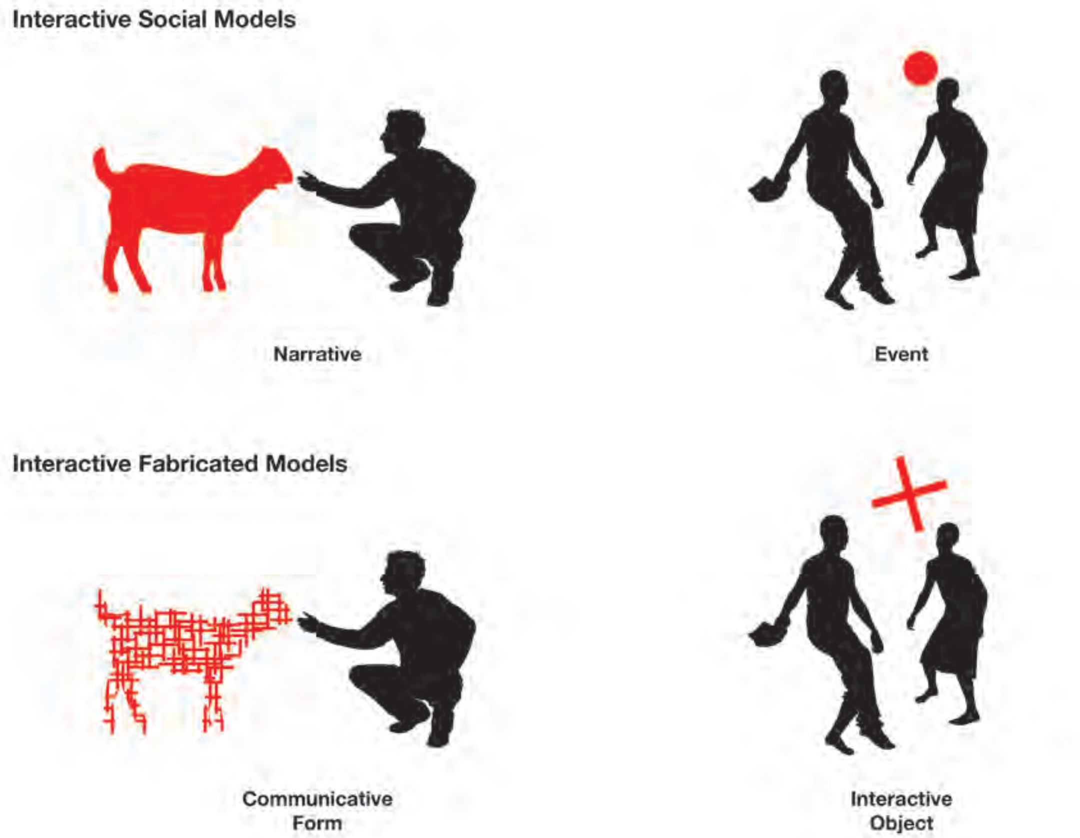


*Figure 2: Communicative form and interactive fabrications.*

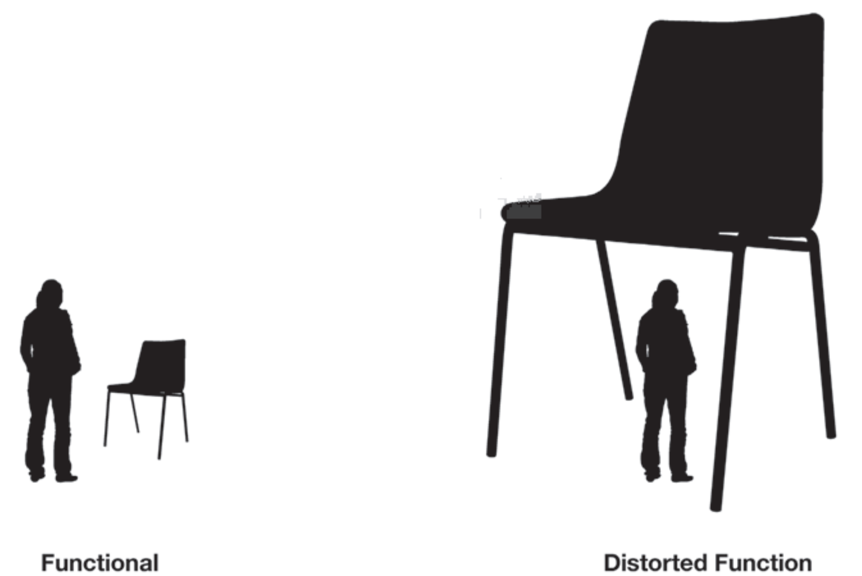


*Figure 3: Distorted function.*

static, but rather behavioral, in which the vectors or paths of "geometric particles that change their position and shape according to the influence of forces"[1] become the final project form.

Digital fabrication tools such as the CNC router, laser cutter, and 3D printer became more readily available; designers began to experiment with the production of mass component fabrications. Stan Allen's essay "*Field Conditions*" (1999) theorizes models for architecture described as "bottom-up phenomena, defined not by overarching geometrical schemas, but by intricate local connections. Interval, repetition, and seriality are key concepts. Form matters, but not so much the forms of things as the forms *between* things."[2] Moving through the first decade of the 21st century, the gap between digital design and physical production shrank, and many projects began to rely heavily on simple techniques to organize part-and-whole aggregations. These techniques in many cases became the signature of the resulting project, as demonstrated in Aranda and Lasch's Pamphlet *Architecture 27: Tooling* with project headings such as "*Spiraling, Packing, Weaving, Blending, Cracking, Flocking, and Tiling*."[3] These projects exemplify a synthesis of bringing together the years of implementation of the forms derived from behavior of calculus based forms and component distributions as described in Lynn and Allen's texts respectively (fig. 1). In the wake of the adaption of these tools to implementation in general architectural practice through utilization of commercialized Building Information Modeling (BIM) software, there still remains some ground to tread in terms of formal exploration based on the traits of digitally developed forms as our technologies evolve, but perhaps the infatuation with technique and the possibility of limitless formal results can be set aside in favor of new (or perhaps previous) conceptual models to drive the architectural projects such as narrative and event. With this in mind, there opens up a possibility to consider the use of the systematic processes of computation in design to be directed towards the development of the architectural object that not only considers the operations embedded in the development of form, but how the resulting objects may activate user participation through communicative form and interactive fabrications (fig. 2).

## METHOD

Scaled models or renderings may represent these interactive models, but they would not allow real interaction. Furniture provides a useful size for testing limits of fabrication, material, and performance at full scale. While not building, furniture may act as a prototype to implement methodologies and employ thinking through systems at different scales. Just as a chair is not a building at a smaller scale, these constructs cannot be scaled directly to become architecture (fig. 3). However their attitude and relationships between space, structure, and material can be scaled directly. The two design-fabrication research projects I will present here explore these issues at this scale. Both projects investigate part to whole assemblies of mass-produced and mass customized units seeking economy in the simplicity of the unit and system of connection to produce variety, but ultimately seek to engage and alter behavior in public space. The first project is the *Massimals* series, an ongoing design investigation that began in 2010 with Akari Takebayashi within our collaborative research practice, Design Office Takebayashi Scroggin (DOTS). *Massimals* explores the fabrication systems packaged in the narrative construct of a petting zoo. The second project, *The Play Lounge*, is the result of an elective course I taught in Spring 2013 entitled *Tectonics, Typology, and Distribution* exploring these issues through research, discussion, and fabrication (fig. 4). The course begins with an analysis of a set of simple toys in order to extract concepts of "play" to use as a model to develop a series of big interactive furniture.

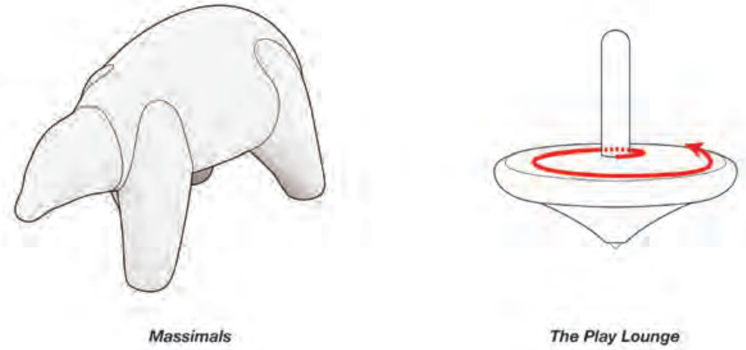


*Figure 4: Massimals and The Play Lounge (Spinning Top drawn by Edward Madden)*

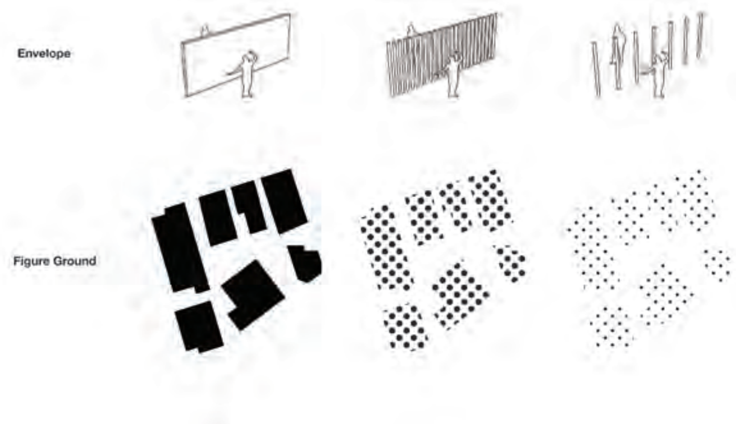


*Figure 5: Dissolving surface and mass.*

## *MASSIMALS*

Building envelopes no longer constrained to traditional hierarchies of primary structure and infill have become dynamic fields able to express nuances of structural forces or content though gradations of porosity leading to the dissolution of the monolithic. What if we consider this model in relation to mass? Figure ground relationships could be broken down into spatial networks defined by series of masses or volumes distributed in close proximities (fig. 5). The *Massimals* project considers this by the arrangement of a series of lumbering polar bear forms (fig. 6). These fabrication prototypes are developed to consider the possibility of new relationships between assembly processes and the volumetric envelope to examine how physical form can engage the public realm.

These design objects are abstractions of animal forms built in the manner of massing studies produced in an architectural design practice. Like massing models, they are volumetric, devoid of details, and fabricated from one material such as chipboard, polystyrene foam, and foam core utilizing conventional assembly techniques such as contour models, egg-crate structures, pixilated massing, and folded plate (fig. 7). The suggestive forms and their specific arrangement imply docile behavior similar to animals in a petting zoo augmenting the way visitors approach and engage built form.

Rather than porous field configurations developed from bottom up phenomena or amorphous forms derived from behavioral techniques or adaptive envelopes, *Massimals* are top down, determined forms defined by mass and overall shape. The material system gives each variation on the massing typology it its unique character (fig. 8). Resolution of the application of these material and assembly systems played an important role in determining the degree of abstraction of the shape. In most cases, material sheet thickness will decide this, but in the case of the tessellated model, we could be more selective. We chose the iteration situated just before it lost stability and began to look more like an aardvark.

The *Massimals* project seeks to expand the possibilities of built form and potentially how we interact with buildings. Though abstracted by the techniques of fabrication, the object's recognizable affinity towards the shape of polar bear and its arrangement in the narrative of a traveling herd or a petting zoo brought curiosity and playful interaction from the viewers. It is architectural design research, but not a model representation of something other than itself. Each Massimal expresses a familiar character in negotiation with material, construction, site specificity, and contextual parameters as an opportunity to drive design experimentation and while simultaneously engaging users within their proximity. While the recognizable forms within the herd prompted playful interaction and the arrangement of the volumes produced a passive mingling, we wondered how this could become more active and perhaps develop a kind of feedback loop (fig. 9).

### *RAINBOW MASSIMAL*

When DOTS was later commissioned to add another Massimal to the series, we used the opportunity to make it large enough to inhabit its belly. This big Massimal was presented at the annual Beaux Arts Ball held in Lexington, Kentucky, in 2012. In the sprit of the ball, a costume party, we gave a larger version of the *Egg-crate Massimal*

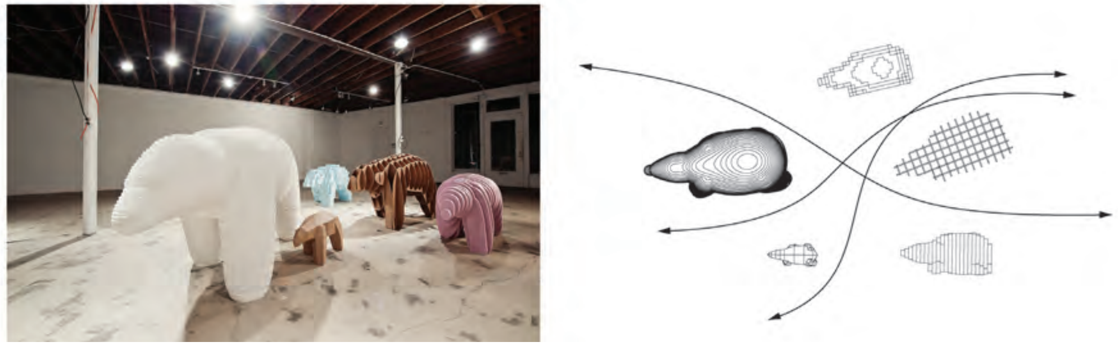

*Figure 6: Massimals, at Land of Tomorrow Gallery (LOT), Lexington, KY and figure-ground plan.*

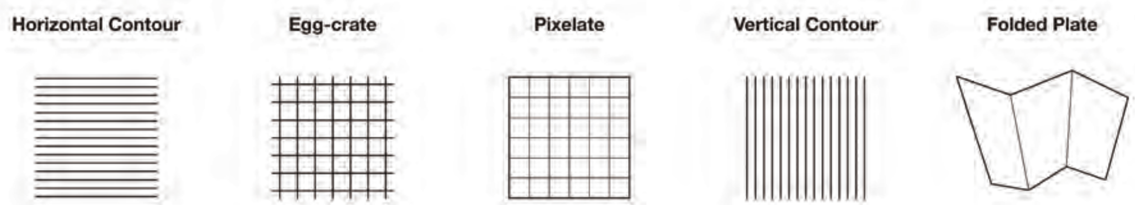


*Figure 7: Assembly techniques.*

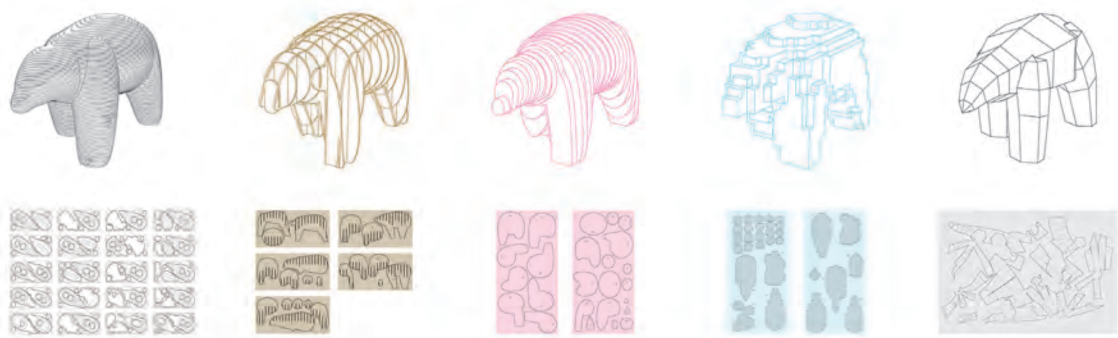

*Figure 8: Massimals and material cut-sheets.*

*Figure 9: Massimals "petting zoo."*

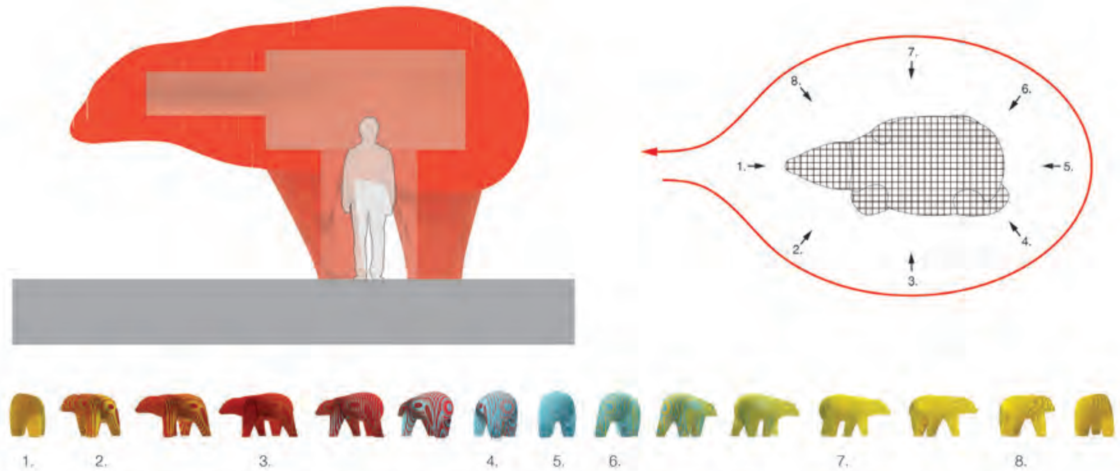


*Figure 10: Rainbow Massimal, section and path with color transformation frames.*


*Figure 11: Rainbow Massimal, elevations.*

a "costume" by assigning each elevation a unique color. Due to the gradual transformation of the profiles of the egg-crate technique, a continuous and dynamic visual transformation emerges as you moved around the exterior; thus, we named it the *Rainbow Massimal* (figs. 10 and 11).

### *THE PLAY LOUNGE*

The explorations and discoveries of the *Massimals* projects provided the foundation for my elective, *Tectonics, Typology, and Distribution*, which again considered the relationship between these systematic assemblies and user participation. The projects emerged through discussion and making over the course of fourteen weeks exploring issues of form, scale, material, seriality, and mass production.

As a research exercise we investigated a series of simple, non-electronic toys of no particular distinction, to understand what activities inspire interaction with the user. The *Rainbow Massimal* presented an example of how interactivity can scale up (fig. 12). It presents a simple relation between an object and user movement to present an effect. At a smaller scale, the zoetrope, a precursor to the motion picture projector, presents an animation as the object spins to present a succession of frames within its rotating cylinder. For the *Rainbow Massimal*, this relationship between object and viewer is inverted as we shifted the movement from the rotation of the object viewed to the viewer in order for the effect to work (fig. 13). In the course, we consider this how we could scale the interactivity of the toys to the size of big furniture pieces or BIG toys.

The interactivity of each toy was analyzed to foreground the activities they facilitated were charted. As with the *Massimal*, we selected one simple shape to move forward: the spinning top. The assembly method would also employ systematic processes of aggregation and connection of simple units. Off the shelf components were tested for potential interactions between soft and hard materials. The final material unit selections—rubber ball, foam noodle, and vinyl tubing—would dictate the organization of their deployment. The linear foam noodles were arrayed as profiles to produce a soft donut; rubber balls were aggregated into a cluster; and the vinyl tubing woven though a frame producing concentric rings became the elastic skin of a rocking and spinning top (fig. 14). Each of these off-the-shelf materials could be adjusted for comfort by tightening profiles and density of the noodles, deflating the balls from their initial rigidity, and gauging the tension on the tubing to allow relaxed seating (fig. 15). What was tested with one unit would be applied to all within that piece. Each toy had a simple, repetitive connection logic that allowed the final constructions to be manufactured fast and cheap (fig. 16).

*Figure 12: Toy interaction chart by Derek Taylor.*

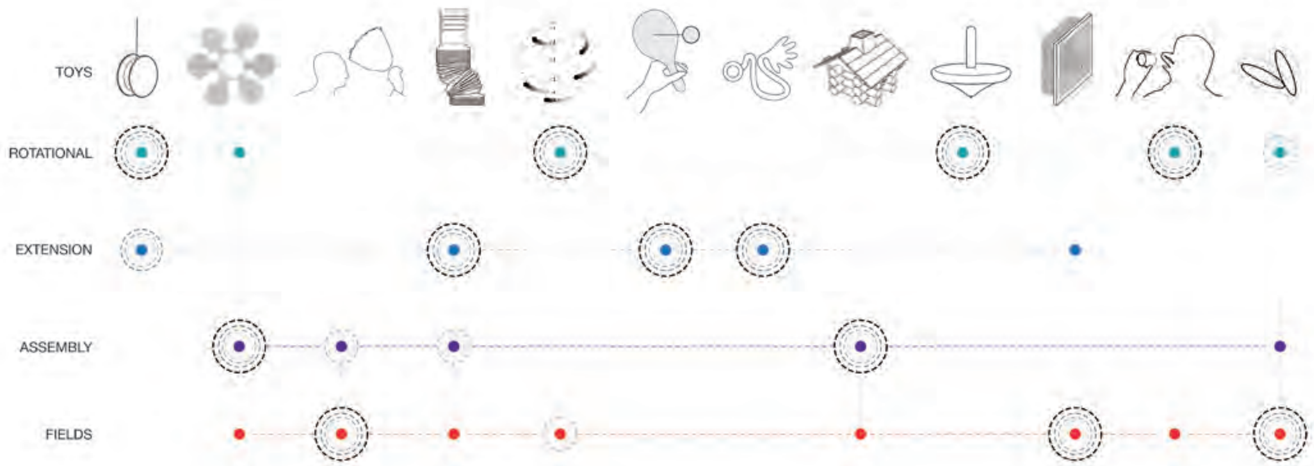


*Figure 13: Zoetrope.*

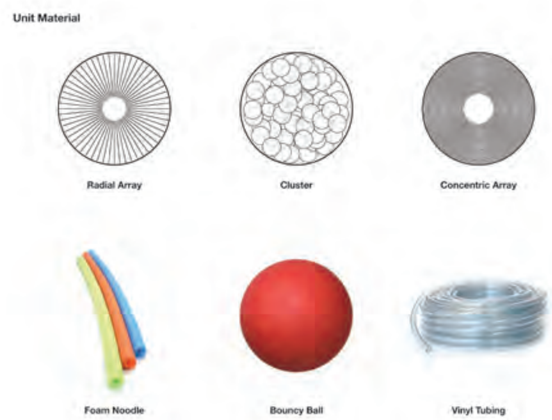


*Figure 14: Unit aggregation and material.*

*Figure 15: Adjusting unit material.*

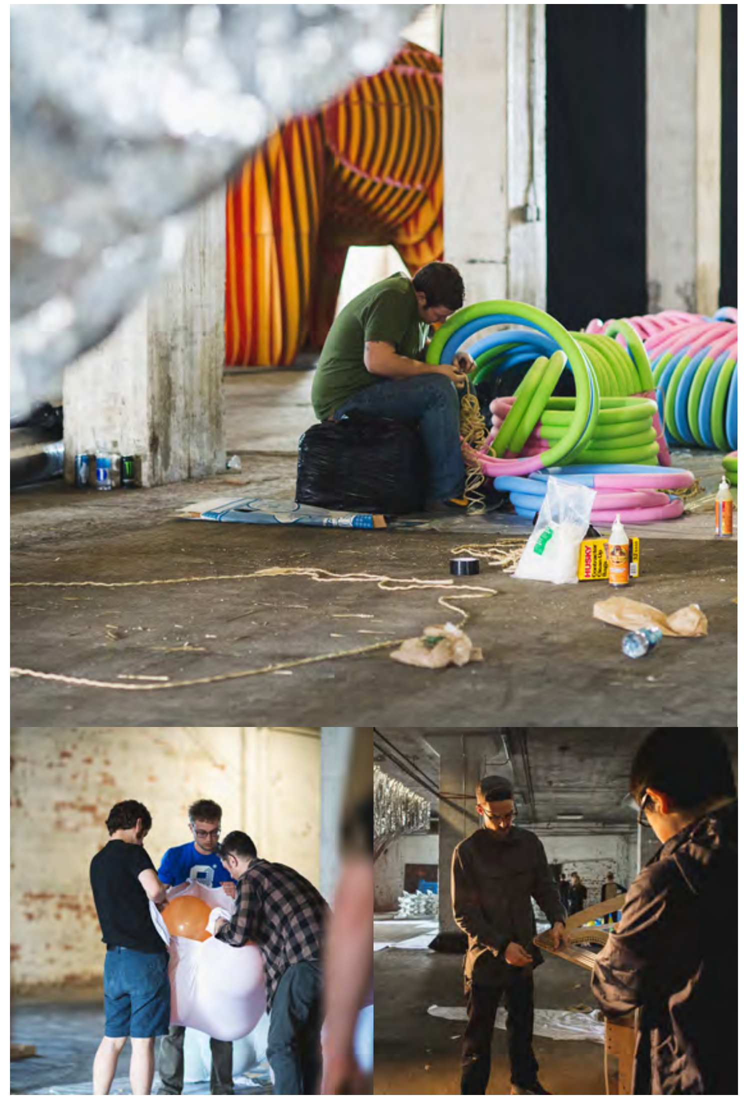

*Figure 16: The Play Lounge, assembly.*

Figure 17: The Bubble Bunch, from above.

Figure 18: The Rocker

Figure 19: The Foam Donut at the 2013 Beaux Arts Ball (photographs by the author).

Figure 20: The Bubble Bunch, scale shift.

Each toy became activated by physical engagement and encouraged a variety of playful behaviors. *The Bubble Bunch* deviated from the formal typology through making its engagement in the form of a 3D puzzle that could become enclosure or a set of distributed elements (fig. 17). *The Rocker* necessitated at least two people for balance and could take up to 6 people to generate the rocking and rotating movement (fig. 18). Its mirror-clad exterior of *The Rocker* gave the effect of a disco ball when in motion. *The Foam Donut*'s durability is open to a variety of interpretations about how to interact with this massive soft shape (fig. 19).

## POSSIBLE FUTURES

While these objects from *Fabricating Play* are currently residing in a state of furniture or furniture-like constructions, the interactivity they suggest could potentially translate to a larger scale (fig. 20). Could we have reconfigurable environments? Buildings? Cities? The contribution of the investigation suggests that we may consider place as not solely defined by built form, but rather by engagement with active bodies (fig. 21).

## ENDNOTES

1. Greg Lynn, Animate Form (New York: Princeton Architectural Press, 1999) 103.

2. Stan Allen, Points + Lines: Diagrams and Projects for the City (New York: Princeton Architectural Press 1999) 92.

3. Benjamin Aranda and Chris Lasch, Tooling (New York: Princeton Architectural Press 2006

## IMAGE CREDITS



Figure 21: The Bubble Bunch, at Lexington PARK(ing) Day (photographs by the author).

## PROJECT CREDITS

**Massimals**
*Design:* Jason Scroggin, Co-Principal, Design Office Takebayashi Scroggin [DOTS]; Akari Takebayashi, Co-Principal, Design Office Takebayashi Scroggin [DOTS]
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**The Play Lounge**
*Design and Fabrication Team:* Ryan Bashore, Adam Eaton, Jeffrey Guiducci, Ye Jin, Jamie Lam, Edward Madden, Joseph O'Toole, Brian Richter, Kevin Setser, Eric Stephens, Derek Taylor, Cynthia Trefilek, Caroline Wahl, Breana Woodville
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