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Dialectic is the refereed journal of the School of Architecture at the University of Utah since 2012 providing a forum for the true spirit of dialectical thinking. This journal brings together the most compelling opposing voices in the discipline today, interrogating the issues, values, methods, and debates that are important to the community of educators at the University of Utah and abroad.  

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Dialectic VI: Craft  

The Art of Making Architecture  

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First Cover image: Mobile Robotic Tiling © Gramazio Kohler Research, ETH Zürich  

Back Cover image: Traditional Japanese wood planes are used for smoothing and shaping wooden components in the joinery and wooden fixtures handcraft workshop of the fourth generation Shinkei family in Mikuni on the Japan Sea in Fukui Prefecture, Japan. Photo: Ben Simmons (2008).
DIALECTIC VI: CRAFT – THE ART OF MAKING
ARCHITECTURE

The crafts, according to standard narration, have been in decline in Western societies since the weakening of guilds, the freedom of trade guaranteed by the French and American Revolutions, and the rollout of industrialization during the nineteenth century. The list of casualties caused by free market, mechanical mass production, and anonymized distribution is long. Local food production, processing of material by weavers, tailors, and shoemakers, and the making of everyday household tools, goods, furniture, and buildings all have taken a hit. Conversely, its endangered position in industrialized urban capitalism has transformed craft also into a site of resistance. From Luddites to the Arts-and-Crafts-movement to DIY and hacker cultures of today, one can draw a continuous line of critique against mechanized drudgery. These movements instead emphasize creativity, individuality, and personal expression. The joy of the craftman materialized in the human trace (and imperfection) highlighted by John Ruskin in the West and Sōetsu Yanagi in the Japanese merger movement does not only insist on a different set of values which elevates the crafted object into the realm of the artwork. It also carries a distinct vernacular connotation. The Red House by William Morris and Philip Webb, for example, was conceived as a poetic rural counter model to urbanization spurred by industrialization.

It carried high hopes for not only crafting different type of objects, but also alternative communities, communal lifestyles, and utopian classless societies that would be a long distance from alienating work.

Architects, in order to participate in the aristocratic liberal arts and sciences, sustained a difficult relationship with craft. This is clearly true at least since the Italian Renaissance. As Mario Carpo has argued, Albertïs notion of the building as a mere copy of a preconceived design contributed to the disengagement of concept from material practice. Such detachment still haunts the profession. There are exceptions, such as Gottfried Semper. His insistence on origins of architecture in crafts was developed in reaction to a twofold challenge: a) industrial pre-fabrication of standardized elements of Crystal Palace, and b) the encounter with “primitive” material cultures of colonized peoples in Crystal Palace. Once the working classes took control of means of production, Karl Marx tried to sketch out the future of labor as liberating self-expression. Yet as firm believer in progress, he considered the crafts as something of the past. Despite his claims for a materialist dialectic, Marx did not entirely escape the long tradition of Western philosophers who privileged mind over body, repose over labor, and thought over craft. Martin Heidegger took an alternative trail. He reasoned about craft and the nature of a thing. His pupil Hannah Arendt was critical of this stance and put (political) action above (philosophical) contemplation, (sustaining) labor, and (producing) work. This in turn sparked a reaction in her student Richard Sennett to write The Craftsman. While Arendt remained skeptical against the instrumentality of productive work, Sennett highlights the strength of tradition, skill, and refinement embedded in practice. Yet he muddles the notion of “craft” with his praeological inclusion of every human repetitive activity.

Given this state of discourse in the second decade of the twenty-first century, this issue of Dialectic asks for the critical potential of a discussion (re-introduction?) of the concept of craft into the maestrom of contemporary spatial practice and current architectural thinking, beyond pure nostalgia for the lost quality of handmade objects. Should we think of the craft at the level of detail and joinery like Mies van der Rohe? What about the death of detailing incurred at the hands of diagrams, images, glue, and clamping, as Rem Koolhaas argues? What is the role of craft—normally related to the human body, tools and responsive material—in the immaterial society and virtual economy? Where is the potential (and danger) of “digital craft,” as proposed by Bernard Cache and others? And even if we stay a moment with more traditional concept of craft: what kind of bodies bring forth these repetitive practices? Does craft have a gender? Where are the mistrespecies of architecture? And is there—hidden in the routine and (bodily) memory of practice—a resistance to innovation, to change? Shall one think about the tradition and convention of practice as the anti-avant-garde of architecture? Does it possess an anti-avant-gardist mannerist turn, as alluded by T.S. Eliot and Robert Venturi? Most of all, what is actually the “craft of architecture”? Shall we reason about craft and the nature of a thing. His pupil Hannah Arendt was critical of this stance and put (political) action above (philosophical) contemplation, (sustaining) labor, and (producing) work. This in turn sparked a reaction in her student Richard Sennett to write The Craftsman. While Arendt remained skeptical against the instrumentality of productive work, Sennett highlights the strength of tradition, skill, and refinement embedded in practice. Yet he muddles the notion of “craft” with his praeological inclusion of every human repetitive activity.

Ole W. Fischer
Mira (Mimi) Locher, FAIA, LEED AP

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The School of Architecture of the University of Utah is pleased to present the sixth volume of our journal Dialectic. Conceived and realized by the faculty under the leadership of then Chair of the School of Architecture, Prescott Muir, Dialectic is a platform for exploring timely issues from divergent viewpoints. While Dialectic I focused on topics and work internal to the School, the second volume, Dialectic II: Architecture between Boom and Bust, turned outward to look at the role of the economy in architectural practice and education. Dialectic III: Dream of Building or the Reality of Dreaming explored the pedagogy and practice of a topic important to our curriculum and that of many other schools of architecture, design-build. With the fourth volume, Dialectic IV: Architecture at Service?, we took a hard look at the idea of how architecture does or does not serve society. Dialectic V: The Figure of Vernacular in Architectural Education pushes at the definition and the very existence of the concept of vernacular architecture. Building from the previous volume, the current volume, Dialectic VI: Craft – The Art of Making Architecture, presents a critical assessment of the role of craft in architecture in the past and present, as well as potential future roles.

In our location of Salt Lake City, Utah, we can see the historic role craft has had in the making of the city, as well as the resurgence of craft in the present-day. Chosen in 1847 by Mormon pioneers fleeing religious persecution in the east as “the place” for their permanent home, Salt Lake City occupies the sub-humid to semi-arid region bordered by the Wasatch Mountains on the east and the Great Salt Lake and the Great Salt Lake Desert on the northwest and west. Hardy an oasis, the location of Salt Lake City offered few easily obtained building materials. Wood from the mostly coniferous mountain forests was plentiful, though difficult to transport, while the soil proved adequate for creating mud and straw adobe bricks. Thus, adobe and wood were the initial building materials of choice.

Within six years of the founding of the city, the settlement had stabilized and grown enough to support the start of construction for the Salt Lake Temple (still the main temple for the followers of the Church of Jesus Christ of Latter-day Saints, or LDS), and the following year plans started for the construction of the governor’s house. These two important buildings exist today in the historic city center known as Temple Square and represent fine examples of building craft from the mid-nineteenth century. With a desire to express permanence and durability, locally quarried sandstone initially was used for the foundation of the Temple. However, during the off-and-on forty-year construction, the sandstone was found to be too soft, and much of it was replaced with granite-like quartz monzonite from nearby Little Cottonwood Canyon. Stonemasons sculpted didactic images in the six stone towers of the Temple, featuring symbolic connections to the foundation stories of the faith. In contrast, the stucco-faced Greek Revival governor’s home, known as the Beehive House, has a sandstone foundation and walls constructed of handmade adobe bricks reinforced with wood. The porch (originally a single story but later expanded to two stories), features simple but elegantly carved wood columns and balustrades.

A third building, constructed in the early 1890s to rival the architecture of the Salt Lake Temple (and at times seen as being a challenge to the LDS Church), which also is important to the history of the city and expressive of the construction craft of the time, is the City and County Building. Built to provide space for a city council hall and a county courthouse, the City and County Building was constructed by freemasons in the Richardsonian Romanesque style. The building is faced with Utah sandstone and features elaborate carvings of important people and places of Utah on the walls and clock tower.
These symbols of power and permanence that long have dominated the landscape of downtown Salt Lake City are now overshadowed by skyscrapers faced with stone veneer or those of steel and glass. The handcrafted detail of the historic buildings has been lost to the industrial processes of the twentieth century and the twenty-first-century desire for clean lines and transparent surfaces. Here, as elsewhere in the industrialized world, the craft of construction has changed dramatically from hand-based skill to machine-based precision. Still, if we look around the edges of the construction industry, we can find a few highly skilled master craftspeople – the carpenters, plasterers, and stonemasons who strive to maintain the traditional methods. All too often, however, the fruits of their labor are located in private homes, hidden from view and public access, and celebrated only by a privileged few. No longer does the public have ready access to handcraft at an architectural scale.

Despite this, craft is very much alive and visible in Salt Lake City, albeit at a different scale. Building on the Mormon pioneers’ skill in preserving food (canning, pickling, and indeed even fermenting) and the history of brewing and distilling (dating back to 1850 in Salt Lake City), we have our share of fine “craft” foods and drinks. Breweries and distilleries produce spirits of all kinds, and farmers’ markets are filled with stands selling canned, bottled, and dried locally grown vegetables and fruit. We also have thriving industries producing award-winning craft chocolate and cheese. But not all craft in Salt Lake City is food-related; well-established businesses manufacture outdoor goods, many of them featuring handcrafted merchandise such as wood and fiberglass snowboards and bamboo ski poles.

Will this interest in craft foods and handmade sports equipment transform into a desire for a greater use of and access to craft in architecture? What does craft mean in twenty-first-century building construction, and how might analog and digital processes connect to create new forms of craft? Dialectic VI offers a range of viewpoints and ideas on the concept of craft and its relationship to the making and understanding of architecture from the past to the future. The authors of the essays in this volume tackle issues of the relevance, territory, and meaning of craft today, with an eye toward the future. I invite you to peruse this volume, to ponder—and savor—the craft of architecture.
VITA ARCHITECTURA. ARCHITECTURE, CRAFTSMANSHIP, AND THE PUBLIC WORLD

HANS TEERDS

ABSTRACT

In his book The Cave (2004), the Portuguese writer José Saramago provocatively describes the decline of public space and the loss of craftsmanship as two sides of the same coin, causing contemporary men to lead soulless lives.1 In his elusive style, he draws the late working life of potter Cipriano Algor against the background of what he calls “The Centre,” a huge building located in the city, containing everything that can be imagined. It’s a shopping mall as well as an apartment building, an office, and leisure-dome, far bigger than anything known. While The Centre expands and absorbs all public life, it causes the end of Algor’s pottery. As a craftsman, he cannot fulfill the increasing levels of standardization and mass production. The Centre requires of its suppliers. The story contains melancholia, as well as a hint of Saramago’s Marxism, but the lament about the loss of tradition, craftsmanship, and public life brought by the victory of modernity, capitalism, mass production, and predictability hits a nerve. It speaks from a renewed interest in craftsmanship, urban factory-places, open kitchens, authentic produce, craft beer, urban farming, etc.2 The link drawn between craftsmanship and public space is at the heart of the profession of architecture: it influences the public directly, both positively and negatively. This article will investigate the relationship between the craftsmanship of the architect and the public world, which is neither loose nor neutral. Since architecture constitutes the public world, the craftsmanship of architectural designers is a public matter.

The craftsmanship of the architect differs from that of potter: the latter immediately makes with his hands what he has envisioned in his mind, whereas the architect, in most cases, does not make the end product with his own hands. In the classical image, the architect produces the drawings to which the craftsmen on the construction site, the carpenter and the plumber, refer to to construct the designed building. The construction of a building thus requires the craftsmanship of the architect as well as the craftsmanship of the construction workers. Therefore, the craftsmanship of the architect needs to include knowledge of actual construction, of the craftsmanship of the carpenter and the plumber. Design is the connection between the faculty of imagination, the skills of drawing, and the knowledge of making.3 Today, this image is challenged, particularly when the architect is left out of the building process, or when his role is reduced to developing only an idea of a building, or to designing a façade around a building that is developed by an engineering company or construction firm.

THE ARTIFACT AND THE PUBLIC WORLD

I use this term public “world” rather than public “space” pointedly, to refer to the distinction the philosopher Hannah Arendt made between the “earth” and “world.”4 With the first, she meant the natural globe, depicted by the cycle of nature. The world, on the other hand, is the earth made fit for human habitation and the human community. The world is established through human intervention in the cycle of nature.5 The distinction matches roughly the one between the natural and the cultural sphere, between the cyclicality of nature, and the perpetuity of culture. As the notion of culture already suggests, for Arendt the world is always world-in-common. The human being is not alone on earth, but shares it with others. Human artifacts play an important role in this commonality of the world. They not only transform the earth into the world but are also shared with others. No political life (that is the public appearance through actions of plural people) is possible without a world that is in common. The artifacts bridge the private and the public, the individual and the community. This means, according to Arendt, that ar-

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Hans Teerds
tifacts not only guarantee a certain continuity in space (to have the world in common with contemporaries), but also in time (to have it in common with our predeces-sors and generations to come). Both continuities of the world are rendered by her as prerequisites for sensible political life, offering orientation and remem-brance.

The production of artifacts plays a pivotal role in her 1958 book The Human Condition. Here, Arendt con-sciously focuses on the vita activa, excluding the vita contemplativa. In the tradition of philosophy, she ar- gues, the first has been largely overlooked, causing a blind spot amongst philosophers on the value of ac-tive life, particularly on political life. The book certainly evolved from her experiences in Nazi Germany prior to World War II, where she as a Jew was excluded from public life, as well as from her critical reflection upon Karl Marx’s attempt to read human, social, and politi-cal life through the lens of labor. The agenda behind The Human Condition is to rescue particularly the hu-man activities bound to political life from the threads of the tradition of philosophy as well as from the Marx-ist worldview. Arendt divides the vita activa into three categories: activities done to survive, she calls “labor”; those undertaken to create the world, she calls “work”; and those to be politically active she calls “action.”

Since Arendt focuses on the realm of action, her reflec-tions on the realm of work have received less at-tention. The craft of architecture falls into the category of labor. Arendt, however, masks it by focusing on the end product. Arendt particularly recognized the mind-less attitude in the increasing influence of labor-thinking on the production of artifacts, on what would be the realm of work. The attitude of the laborer differs strongly from that of the worker. The first attitude is cyclical, re-petitive, and almost mindless, while the other involves thought, competence, excellence, and control over the end product. Arendt particularly recognized the mind-less attitude in the increasing influence of economic reason-ing behind the nineteenth and twentieth century fram-ing of the profession as “work,” which causes a loss of standards—being their utility or beauty—to judge the very artifacts produced.

ARENDT VERSUS SENNETT

In his study The Craftsman, sociologist Richard Sennett critically examines Arendt’s “disturb” of the homo fa-ber. Arendt certainly recognizes the utilitarian outlook that is at the heart of production as a thread for the realm of action and speech, which had entered, togeth-er with the increasing importance of economic prin-ciples, modern bureaucracies. According to Arendt, uncertainty is the very characteristic of political life. Action, after all, is unpredictable. Its outcome depends upon the response of others. Action only will be effective when it is action-in-concert. Action thus needs to persuade peers in order to come-into-action. For Ar-endt, action and speech, interaction between people is not a means but an end in itself. It discloses the agent within a web of human affairs. Applying the utilitarian attitude of the homo faber—the linear thinking of means and ends—upon the realm of action would threaten the delicate processes of action and speech, and resistence. Political life cannot be “made” or “planned,” as it does not offer “products” that simply can be ordered, used, or even consumed. However, in Sennett’s response to Arendt, the craftsman is under-stood as somewhere in-between the animal labors and the homo faber: a baker can be a craftsman, whom Arendt would consider as “laborer” since the baker serves consumption, just like a carpenter, whom Ar- endt would consider as “worker” since the carpenter produces long-lasting objects for the world. Sennett’s image of the craftsman emphasizes the ability to gain expertise built upon a certain repetition in practice, a skill that can be developed over time. In addition, craftsmen reflect (as part of an ethical attitude) upon their work, which elevates craftsmanship towards the realm of contemplation. For Sennett, this is a matter of “good” versus “bad” craft, of skilled versus unskilled work, of the craftsman who does not settle in his tech-niques, but instead seeks to constantly innovate and experiment. Even if these aspects show in Arendt’s image of the homo faber, she remains concerned with respect to “work” because of the rapid developments in technology and the sciences. This is where Sennett presents the ever-striving and evolving craftsman as a correc-tion of Arendt’s stagnant and conservative homo faber. He opens his book with a brief meeting with Arendt (he has been her student in Chicago) on a street in the Upper West Side of Manhat-tan in 1962, just after the Cuban Missile Crisis. Sen-nett writes: “She wanted me to draw the right lesson: people who make things usually don’t understand what they are doing.” The crisis confirmed Arendt’s convic-tion that making (by extension, science) should be a topic of public debate.

Arendt states in The Human Condition that a human be-ing only knows what he makes himself. In the wake of modern scientific and technologic development, this is not true anymore, hence the need for public reflection. Sennett’s craftsman includes scientists and engineers, while Arendt restricts the realm of work for Arendt. Her concern is not applicable to the homo faber per se (as Sennett seems to suggest), but focuses instead
on the scientist investigating the smallest details and the largest outlooks. Arendt stresses the importance of public reflection against this type of modern professionism and instrumental thinking, which gained an autonomous status in society.11 Even though Sennett argues that reflection should be part of the skills of the craftsman, he has to admit: “the passion to race drives science; those in the grip of this competitive obsession easily lose sight of the value and purpose of what they are doing. They are not thinking in craftsman-time, the slow time that enables reflection.”12 In this light, Sennett offers only a slightly nuanced reading of the craftsman’s ability to fulfill his public role, arguably even more pessimistic about the vitality of public life. Arendt urges the public to reflect upon the work of the homo faber based on her strict division between the different realms of vita activa. Yet who should reflect publicly upon the work, if not the craftsmen, engineers, or scientists themselves? According to Arendt, they cannot withdraw from the public world, but on the contrary, homo faber needs to appear in public and take responsibility for his product, as the scientists and engineers must for their missiles. For this, homo faber needs to present his attempts in a language that is commonly understood. Work today requires the initiative to appear in public, to reflect, and to be open for public scrutiny.

LABOR, WORK, AND ARCHITECTURE

Both in Arendt’s reflections upon the homo faber and in Sennett’s presentation of the craftsman, the ability to involve the public in their work is a crucial aspect of their capacities. Nevertheless, it is particularly this aspect that homo faber and the craftsman often lack. As Kenneth Frampton argues in “Status of Man and Status of his Objects,”13 where he takes Arendt’s division between “labor” and “work” to differentiate between two “schools” focused on what or how, this is also true in the field of architecture. Frampton refers particularly to France, where the what was taught on Ecole des Beaux-Arts, and the ‘how’ on the Ecole Polytechnique. The latter has had a growing impact upon architecture, exemplified by the process of construction and usage on the design of buildings, yet bears the danger of object-oriented processes of design and building is lost. This limited role of the architect is reduced to product ideas rather than designs, and designs rather than buildings, while the one-ness of idea, design, and building, the consistency between the idea as a “product” and the constructed building as a product is lost. This limited role of architect as producer of shiny images is certainly at odds with Arendt’s image of the homo faber and his responsibility regarding intervention in the world-in-common. Frampton concludes in 1979: “whether architecture, [...] will ever be able to return to the representation of collective value is a monumental task. At all events its representative role would have to be contingent on the establishment of a public realm in the political sense.”14

THE PUBLIC AGENCY OF THE ARCHITECT

In Frampton there is an echo of Saramago. The division between the what and how caused a loss of architectural craftsmanship, in which both aspects are in balance. Yet this loss affected also the world, not only by a demise of the representation of collective values, but also by the deterioration of actual public spaces and urban structures. When craftsmanship as object-oriented processes of design and building is replaced by efficiency and profit, it changes the very character of the built environment. Detailed façades become flat, buildings become standard commodities; the streetscape a series of unrelated icons. The loss of craftsmanship affects the city, which means the spaces-of-appearance that offer a community commonality, orientation, and remembrances. But Frampton goes beyond the question of good buildings or good urban spaces by addressing public representation. For architecture, the public is not only the (ethical) horizon of each assignment, but the reference for craftsmanship and imagination itself. Building upon Arendt, this perspective requires resistance against fragmentation and instrumentalization, against the reduction of work to labor. Architecture cannot be conflated with economic interest and reproductive elements, since architecture deals with diversity, with a particular situation, which is shaped through time by human interventions. Bound to place and time, there is no “generic” architecture or “neutral” space.

According to Arendt “particular questions must receive particular answers.”15 Each site and each assignment offers these particular questions that cannot be answered through a pre-scripted series of operations or universal solutions. Design requires interpretation of the different, and the characteristic of each situation, program, and ambitions at stake. It requires the attitude of work as well as the ability of reflection, which is evoked through the skills, experiences, and (tact) knowledge of the architectural craftsman. Yet to design means also to position oneself (and the proposal) in the world, open for political judgment. The inherent “subjectivism” of craft needs to be carefully exploited, as well as publicly presented, explained, and defended. Architectural craftsmanship is rooted in design expertise, yet the public challenges this expertise. This is where architectural craftsmanship differs from that of the artist, the baker, the carpenter, or the product-designer. While for the latter the craftsman needs to appear in public to take responsibility for his product, as urged by Sennett, to present the project and discuss its potential outcomes, this is not sufficient for the architect. Because of their responsibility for the world, the public needs to appear in the process of design itself, at its various steps of initiatives, imagination, and decision-making.

DESIGN AS JUDGMENT

Architectural design is a complicated process of taking initiatives, developing ideas, imagining possible futures, and presenting drawings all the way to detail, material, and construction. It is through such processes of design that the “world” is created. Some of these activities go beyond Arendt’s category of “work” and rather belong to “action.” Intervention in the world requires not only imagination, but also to make this imagination public: debate, action, and re-action. Since the 1970s architects have dealt with the question of public engagement and developed processes of participation, particularly in projects of urban restructuring. Today, this perspective has been broadened to empower neighborhoods and to provide spatial agency.16 Sennett alluded to this collective perspective in his second reflection upon the working life of the human being after The Craftsman, simply called Together.17 Yet the broadening of design activities which require public debate can be challenged with Arendt’s reflection upon political judgment. Politics, Arendt states, is not a realm of “truth,” but of validity and persuasion. Political judgment is bound to a certain community. One judges “as a member of this community and not as a member of a supersensible world.”18 To judge, one needs to take other perspectives, which are present in the commonly-shared world into account by thinking one’s own position from the place of others. One needs to leave behind the categories of work (and of labor), the economic interest and the “how” in order to meet each other as free and equal peers in public. This ability to rethink one’s own position from the standpoint of others urges the importance of imagination. This process of re-positioning oneself offers judgment its communicative ability, which belongs to the realm of “action” to think and speak from different positions. This means that
judgment is not to be confused with the average of all positions postulated, nor with a technical or econom-
ical process, but that it requires the judge to be involved. To judge starts with acknowledging the different view-
points, and the capacity to imagine these viewpoints. It needs a space to reflect, think, approach differences, and to decide based on reasonable expertise.

Architectural design is judging the materials at hand. But since it deals with the world, it is by definition po-
litical. It bears responsibility to the commonness of the world, to the inhabitants of today, tomorrow, and even for the world of yesterday. Architecture contributes to the public literally through the shaping of urban struc-
tures and public spaces, but also to the public realm, since it interacts with the world, its present, past, and future. Architectural design means to take a range of perspectives into account: not only of the person-
al preferences of the designer, the client, and other stakeholders, but also the world as it is common to us through the actions of predecessors, and as it will be for (a sensible) future community. The architect thought as homo faber and as public agent requires the capacity for reasonable judgment, that is, to replace one’s own perspective with multiple perspectives of other stake-
holders. After thinking from different positions, the architect needs to judge not by a simple technocratic balancing of perspectives, but based upon his exper-
tise and skills as architect, which is fueled through his architectural knowledge of the world gained over time through study and analysis, experiences and training. It is through this appearance of the public, in the process of design itself that the design can also be made public and the architect can appear in public. It is this part of the design-process that makes the designs accessible to the public, so that it can become part of the public discussion.28

Architectural craftsmanship requires the attitude of the homo faber, Sennett’s capacity to critically think and reflect, as well as the ability to ‘judge.’ This cer-
tainly means that architects need the skills of design and the capacity of imagination, but also the ability to speak and write, and the willingness to communicate openly about their proposals. Architectural interven-
tion in the world—which by definition shapes the pub-
lic space—is balancing between stakeholders and the public the world as it is gained from the past and the

ENDNOTES
3. In this sentence as well as further in this article, I use the male pronoun, but of course “the craftsman” and “the architect” are not limited to the male gender.98
6. Ibid., 147.
7. Cf. Paul Heinegg, “Towards an Ethical Technique: Reforming Archi-
tecture’s Critical Call through Hannah Arendt,” in: The Plan Journal, 1 (1) 2016: 19; doi: 10.15274/tpj.2016.01.01.03
9. Ibid., 82.
10. Ibid., 174.
11. It can be argued, as Leen De Cauwer and Michel Dehaine do, that in the public, in between the private and public realm, the sacred realm could be distinguished the temples and the sanctuary. They stretch this sacred realm to all “other plac-
es” like the theater, the stadium, religious places and the gymnastics. Leen De Cauwer and Michel Dehaine, “The Space of Play. Towards a General Theory of Heoritopopo,” in: Michel Dehaine and Leen De Cauwer (eds.), Venetianes and the City, Public Space in a Postmodern Society (London: Routledge, 2008), 95. Although this perspective opens up the opportunity to offer the field of arts, culture, and education a proper space in society, Arendt sticks to the binary reading. In The Human Condition, Arendt consciously reads the arts as part of the activity of work, although she admits that it bridges towards action, as she also much more thor-
oughly discusses the phenomenon of “culture” as something that connects the realms of arts and action. Regarding education, Arendt urges it as an apolitical mat-
13. Ibid., 207.
14. Ibid., 152.
15. Ibid., 186.
17. Ibid., 1.
21. Kenneth Frampton has published this article several times. The First time it was published as “Labour, Work & Architectures,” in Charles Jencks and George Sansakis (eds.), Meaning in Architecture: Barnes-Barden and Rockfeather (The Cres-
23. Ibid., 60
26. Richard Sennett, Together The Rituals, Pleasures & Politics of Coop-
28. Ibid., 67.
TOWARD AN ECOLGY OF ARCHITECTURAL CRAFT

PHOEBE CRISMAN

ABSTRACT

Craft—making something skillfully—is experiencing a resurgence in architecture and more broadly across industrialized cultures. The words “craft,” “artisanal,” and “maker” seem to be everywhere: craft beer, artisanal bakeries, and maker spaces. Craft thrived throughout the turn of the twentieth century in the Arts and Crafts response to rapid industrialization, and again in the 1960s as an act of resistance to growing consumption and the military-industrial complex. The “material turn” in cultural theory and recent bestelling books bestow a renewed value on physical processes in an increasingly abstract world. The 2007 reprint of Pye’s classic work of 1968, The Nature and Art of Workmanship, Sennett’s The Craftsman (2009), and Crawford’s Shop Class as Soulcraft (2009), and The World Beyond Your Head (2012) all lament the lack of connection to the material world and propose possible redemption, or at least reconciliation, through craft. Yet two seemingly divergent conceptions of craft—handcraft and digital craft—struggle for legitimacy and furious debates ensue. What if we thought about these different concepts of craft and understand ecology, with a resilient relationship between continuity and change? Not a dichotomous division or this will kill that, but an ongoing adaptation to fluid relationships between a diversity of processes of making (both by hand and digital) and their larger effects in the world? Architectural craft, like all craft, is a process and set of relationships within a complex system and its surrounding context. Systems thinking can facilitate an evolving, hybrid approach to craft, allowing us to reconsider what craft means in the process of design, drawing, and making. Developing a deep and diverse material curiosity and appreciation of the knowledge embedded in objects is a first step. An ecological understanding of architectural craft might help us to find creative and humanizing ways to shift the visual and economically driven architectural paradigm to a more connected and sustainable one.

THE RESURRECTION OF CRAFT

The concept of craft—making something skillfully—is experiencing a resurgence in architecture and more broadly across industrialized cultures. The words craft, artisanal, and maker seem to be everywhere: craft coffee, artisanal bakeries, and maker spaces. Why the popularity? What do these terms mean? How do they relate to craft in architecture? Objects preceded by craft or artisan, such as artisanal bread, bicycles, and beer, refer to their making by an artisan or skilled craftsperson who typically works by hand. For instance, craft beer refers to a non-mechanized method of producing beer in relatively small amounts by independent, small breweries. The Oxford English Dictionary’s first definition of the verb “craft” is to “make or construct skillfully.” The English etymology of craft can be traced back to the Old English, “strength” or “skill,” which is related to the Dutch kracht, German Kraft, and Swedish Kraft. Craft, understood as skilled work, thrived around the turn of the twentieth century in the Arts and Crafts response to rapid industrialization and craft theorists Glenn Adamson has argued that our modern conception of craft was invented at this time as an “other” to industrial production. Again, in the 1960s, craft became an act of resistance to growing cultural consumption and the military-industrial complex. What might craft mean for the discipline and practice of architecture today? This essay critiques current dichotomous debates about craft and proposes a more ecological way of understanding architectural craft—the ecosystem of craft—that embraces a resilient relationship between continuity and change, issues of risk, speed, materiality, systems thinking, social responsibility, and the digital/hand divide are discussed. Ultimately, rethinking craft in this way could lead to more sustainable practices in architecture.

CURIOUSITY, SKILL, AND TIME

The word craft is used in at least three ways in contemporary architectural discourse:

1. the architectural design itself can be well crafted, essentially a good design (i.e., the architect designed her craft in the museum design).
2. craft can refer to the making and quality of the architectural drawings and models that are representations of, or instructions for, a building that will be made by others (i.e., the studio instructor expected a high level of craft in the student’s drawings); and
3. the level of detail or care exercised in the construction of the building itself (i.e., the craft of the carpenter was evident in the beautiful cabinetry).

Within this range of usage, each shares the idea of a process done or a thing made skillfully and with great care. This understanding does not exclude analogue or digital processes, and aligns with sociologist Richard Sennett’s inclusive definition of craftsmanship as “an enduring, basic human impulse, the desire to do a job well for its own sake.” He discusses several qualities exhibited by the craftsman: “to be curious about, to investigate, and to learn from ambiguity.” As a person becomes more proficient in her craft, there is “a constant interplay between tacit knowledge and self-conscious awareness, the tacit knowledge serving as an anchor, the explicit awareness serving as critique and corrective.” Along with great skill, care, and a curious and reflective mindset, all craft requires a significant amount of time and focus; yet both seem to be in short supply, in culture broadly, and within the practice of architecture. For instance, there is an expectation that architectural craft can be practiced faster and in a more dispersed fashion. “Fast-track construction”—the project delivery approach that starts construction before the design is complete—is an example of this tendency. The time required to achieve the craft of the architect is undervalued in the typical business model that expects fast and predictable performance in the process of design and construction. There is often little time for the exploration and ambiguity found in Sennett’s definition of craft. Perhaps craft and design are very different concepts?

THE ‘WORKMANSHIP OF RISK’

Designers of all sorts, architects included, often contemplate the place of craft in our work and how it might differ from design. In his seminal work of 1948, The Nature and Art of Workmanship, David Pye offered the most concise explanation: “Design proposes. Workmanship disposes.” He used the words workmanship and craftsmanship interchangeably. However, Pye distinguished between “the workmanship of risk” and “the workmanship of certainty.” This distinction is embedded in his definition of craftsmanship as “simply workmanship using any kind of technique or apparatus, in which the quality of the result is not predetermined, but depends on the judgment, dexterity and care which the maker exercises as he works. The essential idea is that the quality of the result is continually at risk during the process of making.” This approach is opposed to the intended uniformity of mass-production or even types of handcraft that seek a consistent and repeatable outcome. What does a “workmanship of risk” mean for architects today? Or, on a foundational level, what is the role of craft and craftsmanship in architecture and how does it differ from other design and making practices?

The ever-increasing popularity of architects and architecture professors setting up methods and organizational models to literally build the projects they design, sometimes called “design build,” is often an act of resistance to the construction industry’s desire and legal requirement for certainty. In this way, architects are able to directly work with materials and keep the design process open throughout the building process, or even allow these processes to become one. This approach is not always respected in the architecture profession or academy. For example, many question why architecture students need to know how to physically build things if the architect’s role is to create drawings and specifications for the builder without a true understanding of how those images and words might be literally manifest.

UNDERVALUED CRAFT

Political philosopher and motorcycle mechanic Matthew Crawford has examined how and why craft (i.e., skilled manual labor) is undervalued in contemporary
In architectural education, however, the design is important: ‘knowing that,’ as opposed to ‘knowing based on a certain view about what kind of knowledge,’ he discussed how culture broadly. In his book, S

While some-
abstract world. The material turn focuses on matter, and exercising a high level of personal skill, however, must be a constant awareness, throughout the craft process, of how individual efforts affect others and the physical world of which one is a part. In his later book, The World Beyond Your Head, Crawford builds on this insight, laments the lack of connection to the material world, and then proposes possible redemption, or at least reconnection, through craft.

Crawford isn’t the only humanist extolling the virtues of the physical world and our human agency within it. The “material turn” in the humanities bestows a re- newfound value on physical processes in an increasingly abstract world. The material turn focuses on matter, or the agency of artistic material itself. While some-
described as a shift from mind to body, from words to things, and from culture to nature, this is a problematic framing in hierarchical binaries that the material turn actively seeks to dismantle. The material turn can be understood as embracing other turns—the "performative turn" emphasizes the doing rather than the products and outcomes (e.g., the making of the artwork rather than the painting itself as an artifact). If performance is a bodily practice that produces meaning, then the "art world" is certainly performative. The "affirmative turn" focuses on visceral forces and bodily aspects, other than the conscious knowing, of artists and viewers. For instance, how are we affected by a building? Of course, architecture has always been rooted in the material world and these insights from beyond the design disciplines can seem somewhat self-evident.

Yet within architecture two seemingly divergent con-
ceptions of craft—handcraft and digital craft—struggle for legitimacy, and sometimes heated debates ensue. Too much contemporary discourse on craft, architectural or otherwise, extends this opposition through the following arguments: either to attack handcraft as slow, outdated, and nostalgic activity resistant to change, or to defend against this criticism—to argue for digital craft as a superior replacement or a se-
rious threat to handcraft, or to reinforce distinctions between what we label crafts or fine arts. Each argu-
ment has serious flaws. The defense of handcraft often fails to acknowledge the new creative opportunities of parametric design and digital fabrication. Advocates for only digital technology, parametricism, and rapid prototyping typically exclude considerations of mate-
rial environmental impact, resource use, and the eco-

Architectural craft is overdue for another transforma-
tion informed by the interdisciplinary science of ecol-
ogy, which examines the interactions of organisms and objects to one another and to their physical surround-
ings or environment through time. Ecological thinking produced the concept of ecosystems as a way to under-
stand and model these interdependent relationships as complex and dynamic systems. Thinking about the craft of architecture in an ecological way would also al-
low us to understand architectural craft practices as an integral part of a dynamic ecosystem of relationships with present and future ramifications. Then we could fully acknowledge and evaluate the tools and materials that we use in our craft: where they came from, how we use them, and their effect after we send them away. For example, building architectural models by using a hot wire machine to cut (i.e., combust) styrene re-
leases dangerous gas that endangers human health in the studio. Menstruous mountains of blue polystyrene scraps and discarded models cannot be recycled and never decompose in landfills. Horrendous heaps of platter paper, though theoretically able to be recycled, are evidence of excessive and often mindless mate-
rial consumption. Low cost and convenience would not outweigh these serious concerns if we thought about our actions as part of an ecology that included material lifecycle and human and environmental health. In ad-
tion to basic materials, the long-term effects of our tools, machines, and associated supplies—computers, laser cutters, plotters, copiers, and toner—are part of the architectural craft ecosystem. Of what toxic or lim-
ited raw materials are they composed? What are the human and environmental costs of material extraction, product life cycle, and planned obsolescence? Further, there is a similar set of tool and material questions in the construction of the building itself and its perfor-
mance throughout its lifespan and beyond.

Our design decisions directly lead to craft decisions that have enormous impact. The types of analysis that convey meaning most quickly and directly than archi-
tecture, the interpretive openness of architecture is its true strength and beauty. Printed work has not killed the edifice, but it has certainly transformed the way we see, make, and communicate about architecture.

Borrowing an ecological understanding is not new. Nearly fifty years ago, anthropologist Gregory Bateson explored the idea that consciousness, or the mind, is like an ecosystem. In Steps to an Ecology of Mind, he explored how ideas evolve, flourish, or become ex-
tinct, much like the flora and fauna of an ecosystem. He discussed how "science can give us something of a chart" to help us understand how ideas interact with one another and help us shape social systems. By adopting an ecological mindset to examine how craft practices operate within their unique ecosystems, we can more thoughtfully and effectively determine our own actions within the system. Rather than beginning with a preconceived, internally generated design inten-
tion or craft process, we can be more curious and open to the complexities of the ecosystem of which our work is an interwoven part. In reflecting on the ecology of ideas, Bateson emphasized that we would "do well to hold back our eagerness to control that world which we so imperfectly understand ... Rather, our studies could be inspired by a more ancient, but today less honored, motive: a curiosity about the world of which we are a part. The rewards of such work are not power, but beauty." Certainly developing a critical curiosity about the materials and processes of our craft is a first step. By questioning conventions through the atten-
tion and time required for a craftsmanship of risk, we gain a deeper knowledge of the interconnectedness of materials and actions both now and projected into the
future. In this way, craft and sustainability often share the same ecology of mind. Today, practitioners of many crafts including architecture are more consciously re-thinking and re-inventing their work within ecological paradigms that intertwine ethical, economic, environ-
mental, and aesthetic goals.

An ecological approach to craft can connect us with the uncontrollable complexity of our ever-changing world. Particular ways of making allow varying degrees of understanding and openness to transformation and change. In a short essay on architectural craft, archi-
tect Robin Sjoholm reflected on the difference between sketching and CAD. “Computer-aided design gives us the unquestioned ability to design and draw with preci-
sion—but with this comes an obsession with control. Of course order and control are necessary, yet within the real world of making we must also embrace toler-
ance, fluid, and the unpredictable. Indeed these are es-

tential to the idea of thinking through sketching, to the movement from a vague visual idea to something more refined.” The slowness and skill required in this non-
linear process brings to mind differences between the production of artifacts and the growth of organisms. In

thinking and re-inventing their work within ecological


15. For more on systems thinking, see Donatella Maria, *Thinking in Systems*. A Primer (Gates Foundation, 2008).


17. For more on systems thinking, see Donatella Maria, *Thinking in Systems*. A Primer (Gates Foundation, 2008).


24. For more on systems thinking, see Donatella Maria, *Thinking in Systems*. A Primer (Gates Foundation, 2008).


27. Fry (1999), 20.


MAKING AND THE MEANS OF
(aka: the specific generic)

RESTORING PRESENCE: VALUING THE BUILDING CRAFT OF NON-WESTERN KNOWLEDGE SYSTEMS
JOSE GALARZA

CRAFTSMANSHIP VS. CRAFTINESS: THE GREEK POLYKATOIKIA AS “ADEQUATE ARCHITECTURE”
RICHARD WODITSCH, MARK KAMMERBAUER

RESTORING PRESENCE: VALUING THE BUILDING CRAFT OF NON-WESTERN KNOWLEDGE SYSTEMS

JOSE GALARZA

ABSTRACT

The term craft in Western thought carries its own specific perception of nature and building materials. These in turn are grounded in the dualist epistemology of body-mind divide that completely erodes the role of belief systems in making and explaining the world. Instead the science-based view assumes that we operate as subjective beings in an objective, fully knowable world that exists around us as a separate entity. Accordingly, the environment serves for our harvest, which we in turn manipulate to execute our creative will. The modern mind sees the earth as its inheritance, with the freedom and capability to conquer nature. This view of the world limits the question of craft as oscillating between a decision of whether the hand or the machine.

The modern architecture movement is steeped in these assumptions, as the prophets of the movement have evangelized for these activities across the world, and converts to Western modernity everywhere have internalized these assumptions. They are convinced that building solutions are “a matter of universal knowledge unrestrained by national borders.”

Beginning with the Deutscher Werkbund, established in 1907 and later an influence for the Bauhaus school of design, modernists imagined traditional craft as needing to be commodified, and to that end best leveraged through mechanization and branding. Craft in these terms becomes synonymous with a job, no longer an expression of one’s relationship to cosmology, but a means to put food on the table. The natural environment, again, is simply a resource. Now post-colonial thought, however, forces us to recognize the devastating consequences imposed by this mode of operating in non-Western societies across the globe. More than 250 years of modern education, governance, and economic restructuring—be it in the name of naked exploitation or a benevolent civilizing project—have eroded alternative epistemologies, the ethnosphere, and degraded our ecosystems. Our greatest challenge today is to overcome the colonial assumption that the knowledge system of Cartesian superseded and invalidated all other non-conforming value systems. By looking at examples of non-Western knowledge systems, specifically animistic ones that have informed building craft, I ask the following questions: Is it possible to approach building craft from a place that is symmetric, where we meet all cultures on an equal footing? Can we create opportunities to legitimize and nurture different types of knowledge? Can these types of knowledge not only co-exist with modernity, but further provide mutual benefit as a diverse set of solutions to the ensuing problems that will confront us as a species?

THE CONQUEST OF NATURE – ISE SHRINE AND RECONSTRUCTION

In 1953, the Ise Grand Shrine went through its 59th reconstruction. Ise is a Shinto shrine dedicated to the worship of Amaterasu-Omikami, “Heaven-Illuminating Goddess,” or goddess of the sun. Located in the Mie Prefecture of Japan near the ocean, in a forest of cedars and boulders, it is a traditional heavy-timber assembly made of hinoki, the indigenous aromatic and rot-resistant cypress well-known throughout the island nation. A highly coveted softwood in ancient times, it is easy to work by hand, similar to Alaskan yellow cedar, and it welcomes manipulation from the attuned carpenter. Cypress is thought to be sacred throughout the whaling and salmon cultures of the Pacific Ocean, and its use in this manner extends the divinity of the tree and nature to architecture. The term “reconstruction” is apt here, because Ise has been built, taken

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Mark Kemmerbauer holds degrees in architecture and urban studies. He worked in architecture and urban planning and design in the USA, Germany, and the Netherlands. His held teaching and research positions at the Technische Universität München, the Nuremberg Institute of Technology, the University of Queensland, and the Lund University Centre for Sustainability Studies. His doctoral research on disaster recovery in New Orleans’s Lower Ninth Ward was published by VDG Weimar.
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“spirits” (including mountains, rivers, lightning, wind, waves, trees, and stones), as having presence of the sort that modern people will typically only ascribe to each other. The location of these kami were marked by human-made artifacts called honden, in which in some cases were nothing more than a cord of rope slung between trees or looped around an exposed boulder (Figure 1). These early pre-architectural spatial indicators eventually evolved to become more sophisticated, small, shelter-like structures suggesting inhabitation. By the seventh century CE, with the influence of Buddhist architecture, Shinto achieved its most architecturally significant expression through the shrines at Ise. The shrine’s continually renewed existence helped to preserve the state of the buildings themselves, but more importantly, perpetuated the memory of building craft and re-instilled Shinto’s animistic worldview. Consider, for example, that aside from the numerous highly trained construction workers and architects, several hundred thousand untrained devotees converge from all over the country to this day to perform ritualized tasks, like moving logs or spreading white pebbles. Broadly speaking, sengu, death, and renewal mirrors well the cultural survival of the Japanese people in continuity over an astounding number of generations.

The 59th reconstruction of Ise was significant because it occurred only a year after the end of American “Occupation and Reconstruction,” from 1945-52 (Figure 2). When contrasted with sengu, the American notion of “reconstruction” reveals the West’s colonial epistemology through the shrines at Ise. The architecturally significant expression of the buildings themselves, but more importantly, perpetuated the memory of building craft and re-instilled Shinto’s animistic worldview. Consider, for example, that aside from the numerous highly trained construction workers and architects, several hundred thousand untrained devotees converge from all over the country to this day to perform ritualized tasks, like moving logs or spreading white pebbles. Broadly speaking, sengu, death, and renewal mirrors well the cultural survival of the Japanese people in continuity over an astounding number of generations.

Behind this battle for the Japanese spirit was fear of the people’s religious devotion to the emperor, which brought with it the baggage of his former nationalistic and militaristic enterprises. While it is true that Shinto had for many years played a role in legitimizing the imperial institution, the more sinister subtext here is the desire to homogenize the people of Japan in a way more conforming to Western epistemology. Within this context, the meaning of “tradition” becomes tenuous. For the success of a colonizing project relies on re-describing living culture in the past tense. One way to achieve this is through the establishment of foreign exchanges wherein Westerners, likely seeing themselves as well-meaning, would visit the country and knowingly or unwittingly spread the narrative of the industrial age as the inevitable future. With respect to architecture, the history of sites like Ise were and still are characterized as being applicable to the present day only in stylistic terms. Aesthetics replaced spiritual belief, and tradition became sanitized as sentimentally old-fashioned.

Traveling on a Rockefeller-sponsored grant, Walter Gropius, the father and most significant purveyor of modern architectural pedagogy, toured through Japan for three months during this post-reconstruction time period and soon after published those reflections. His writing recognizes the negative symptoms caused by industrialization, but remains blind to the systemic root causes. “Everywhere the impact of the machine age had created so much confusion that the disadvantages of the conversion were much more in evidence than the advantages.” Still, he extols that, in spite of significant cultural imperatives, “[J]apan’s] handicrafts are losing their foothold in our modern world and eventually must be replaced by industrial methods and tools.” One could add to that a narrow instrumental rationality as a way of viewing the world.

In the 1950s, Japan was seen as a developing country. Bureaucrats and Gropius-like visionaries abstracted
craftsmen according to their economic potential. Here, the "vast army of craftsmen who ... produce the entire housing for Japan must find methods of increasing their production by gradually increasing the use of machines." Gropius’s reductive attitude towards mechanizing what he calls "handcraft" aimed to maintain the aesthetic beauty of Japanese work while omitting the spiritual necessity of Shinto. He recognized its connection to nature and facility in "persuading" it, but nevertheless constrained the human/nature relationship to a subject/object paradigm. He did not recognize the narrowness of the mind-body duality of Cartesian thinking to replicate the kind of sensitive building craft, which he and other subsequent architects have so much admired in the animistic tradition of Japan. A subject/object framework flattened the techniques that require communicative interaction with non-uniform materials like wood. Techniques, for example, that use hand planes to dimension and achieve a particular soft sheen on unpainted timber frames, as found in Ise, are antithetical to industrial standardization and cannot be reproduced with machines. Gropius advocated for a "common denominator of form" that could integrate Japanese architecture into the global agenda of Western modernity. As if predicting Kenneth Frampton’s critical regionalist discourse, his search for a culturally stylized universal modernism failed to recognize the irreducibility of craft grounded in indigenous epistemologies.

Writing nearly a decade later in direct response to Gropius's pruning of Japanese animistic craft culture in order to accommodate it into a universal modernist aesthetic and logic, the Japanese architect Kenzo Tange came to question the German-US master with polite consternation. Tange was one of the most active voices in the debate between tradition and modernity. His critique indicates that such formalist and style-driven observations of Shinto architecture were lacking in appreciation for the specificity and necessity of Japanese animistic spirituality. He says:

Gropius ... went to Ise and was moved by the harmony with nature that he found there. Later, he revisited the Parthenon. While admiring both these outstanding architectural achievements, he posed this question: What are the deep shadows hanging over Ise as against the limitless radiance of the Parthenon? This question springs from his intuitive feeling as an architect, but it raises a problem touching upon the essence of Japanese culture as compared to Western culture, namely the contrast between an animistic attitude of willing adaptation to and absorption in nature and a heroic attitude of seeking to breast and conquer it.

In addition to the Shinto appreciation of shadow as a manifestation of the sun’s presence, rituals happening alongside the construction of Ise acknowledge the disturbance of natural environments when a tree is felled or the soil excavated, all supporting Tange’s claim that every undertaking has the potential to be sacred, and further, that there is an expression of gratitude to the material world and its energies, as opposed to a gratitude for the authority to convene over it.

Tange sought to gain clarity on the effect of traditional Japanese culture not to be dogmatic, but rather so he could purposefully gain agency over these influences that he saw all around him and as part of himself, and so that he could be sober in how to enact contemporary approaches. With that in mind, his most well-known outcomes toe the line to reinforce an animistic worldview, relying more heavily on built forms to be symbolically referential. Like Tange’s design for the Greater East Asia Co-Prosperity Sphere Memorial, in 1942, where the plan organization and visual gestures are clearly intended to evoke the Ise Shrine and yet subvert the original image of the reclusive sanctuary by siting the memorial monumentally among the general public, and using modern materials and building methods. This effort proved that the allure of the untraditional was, despite Tange’s lucidity, too powerful not to engage.

COMMUNICATIVE SUBJECTS – THE IMPULSE TO ANIMATE ARCHITECTURE

In Japan, the post WWII-reconstruction architectural movement shows the effects of accelerated modernization on seemingly all of its non-Western students, who appear as eager participants. Tange is just one example. Kazuo Shinohara’s work is also a case in point. Similarly, he bridges modern and traditional practice, forming what is now widely described as the "Shino..."
The essence of the organic earth, as building material and as a dark body in which to submerge, are emphasized. Shinohara describes the latter as a “chthonic” motif, giving allusion to the authority of ancient Greek myth as a vehicle to assert something spiritual. The floor is not an abstract plane on which to lay a repetitive, nominal, industrialized material; rather, it is an extension of a real and particular elemental. It is the character of the earth that we know from the natural world, and it has an opening where one descends into a literal and figurative underworld.

Before the House of Earth Floor, Shinohara was known for deriving his designs by abstracting traditional spatial arrangements. But here he departs in a way that is based on a more “aggressively emotional intuition.” It suggests a deeper grounding for architecture than allowed by functionalist and formalist formulaic, and that he is “deeply concerned with self-orientation and identity, almost as a kind of personal salvation.” It is as if he is taking on the role of a pioneer charged with restoring Japanese national identity in the post-industrial age.

The earthen floor motif reappears again a decade later in the Tanikawa House, 1972-74, but otherwise he is unable to embrace these “dark passions” more fully. At the practical level, he suggests that this is in part due to his inability to guarantee the quality of work when using non-uniform materials, but ideologically he appears just as stunted. The earth in this instance provides relief. It becomes for him a communicative space above.14 (Figure 3)

Today, the Chilean architect Smiljan Radic finds great influence in Shinohara’s houses, appreciating what he describes as their “formal dissonance.” Characteristic of Radic’s own work is the use of bold, elemental, organic objects, positioned in assemblies where typically a more uniform industrialized architectural element would appear. In Mestizo Restaurant, 2007, he describes stabilizing a deep series of concrete beams, painted in black, with large, raw granite boulders weighing between seven and twelve tons each. These appear as rock outcroppings and serve as the primary structural columns for the entire building. According to the architect, they “are the support, not only in terms of forces but also in terms of imagination — they form the memory one has of landscape.” He goes on to say:

Looking back, there are two issues that make this project quite different from conventional projects. On one hand, the complex solution of using non-industrial materials to manage seismic forces in a public building, and on the other, the fact that the actual construction process was directed and executed by the project authors themselves.23

Radic sees importance in both the memory that his building reflects from the natural landscape, as well as his manual engagement with setting the stone. The latter is an intellectual exercise to solve how to fit an irregular object into a rational assembly. It also presents the unique opportunity to engage in a communicative relationship with an impressive hunk of nature, the undressed boulders. Here he comes close to an animistic craftsman. But there is more! In a separate interview, he relates the boulders with human-likeness, admitting that he was inspired to arrive at this solution after happening upon an illustration of caryatids by Jacques-François Blondel (Figure 4). The ascription of personhood is significant.

The suggestion is not that Radic is aware of any of this; more likely he is acting on subliminal impulses. Like Shinohara, he explains these in rationalistic terms. Both of these projects betray the desire to remove abstraction from the equation. Earth and stone are not generic materials we find in every project; instead, they appear as rock outcroppings and serve as the primary structural columns for the entire building. According to the architect, they “are the support, not only in terms of forces but also in terms of imagination — they form the memory one has of landscape.” He goes on to say:

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The essence of the organic earth, as building material and as a dark body in which to submerge, are emphasized. Shinohara calls these impulses the “irrational spirit of man.” He notes:

In this house the entire ground floor, except for the bathroom — that is, living and dining spaces, kitchen, and study — has an earthen floor. In addition, an underground bedroom beneath the garden can be reached by a staircase from the earthen-floor space above.14 (Figure 3)

So why have animistic approaches to building craft not been more widely acknowledged and legitimized with in the present-day architectural discourse? Returning momentarily to the evangelization of machine culture at the turn of the twentieth century, Gropius serves a trope of a much larger attitude that has come of Western science. From its myth and superstition. Western science is enshrined as enlightened, while all other models of interacting with the world are dismissed as charming or decadent traditions and aesthetic. In architecture, this role is performed by formalism and valorization of the modern movement.

All of this begs a more essential question: does economic growth also necessitate the assimilation of cultural forces but also in terms of imagination — they form the memory one has of landscape.”23 It is as if he is taking on the role of a pioneer charged with restoring Japanese national identity in the post-industrial age.24 25

But it is important to distinguish between growth and development. In “Towards the Decolonization of the Mind,” Stephen A. Margin notes that his criticism of development discourse has:

nothing to say against longer life-spans, healthier children, more and better-quality food and clothing, sturdier and more ample shelter, better amenities. Nor is any criticism leveled against the luxuries that people buy when their incomes grow enough to permit discretionary purchases.26

These quality of life features in Margin’s view are descriptions of growth. He and his cohort are instead taking issue with development and modernization as belonging to a system of knowledge production that has been embedded within it strong colonial tendencies, which achieves the said growth through a process of coloniza-

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The ecological degradation, psychological disorientation, collective amnesia, and alienation into an existential desert of the soul the world over are all results of this benevolence.

Generally explained, the modern project intends to distill “nature into its material properties alone, uncontaminated by symbolic meanings or social relations, [such that] modernists have been freed to manipulate it in ways unthinkable in pre-modern contexts.”

However, a number of political economists, anthropologists, and social philosophers have argued over the last twenty years that perhaps we have, in fact, never been modern; that in spite of modernist detachment, the personal life of even the most ardent modernist is colonized by symbolic meanings or social relations, and this liberation is thus constrained, and this liberation and value in work. The result in the professional domain is that we become instrumental automatons.

The important observation is not which belief system is correct, but rather, as Wade Davis describes, ‘the way of the gods,” was coined in the nineteenth century to identify it as a religion distinct from Buddhism.

Whether or not a society sees nature through the lens of personhood or instead as just a resource for production, the important observation is not which belief system is correct, but rather, as Wade Davis describes, it is “how that belief system mediates the interface between nature and culture towards profoundly different consequences for the ecological footprint.”

Davis is saying what we all know—that for all its benefits, a key feature of modernity has been its devastatingly negative impact on the natural environment, along with the erosion of those traditions that gave life meaning or purpose. This is not an argument for the appropriation of indigenous culture through New Age spiritualism, but a questioning of how we overcome the myopic tendency to view, for example, sustainability through strictly mechanistic and performative measures – or for that matter how we evaluate the success of our built works all together.

ENDNOTES

2. A term coined by Wade Davis in his book Wayfinders, as the sum total of all thoughts and beliefs, ideas and emotions, myths and inspirations brought into being by the human imagination.
3. In the fifth and sixth centuries C.E., a site based in the Yamato region established a military and political hegemony that came to dominate the Japanese mainland. The ruling family at the Yamato court (later referred to as the imperial family) claimed direct descent from the sun goddess, Amaterasu Omikami, and the rigid essence of that clan grew along with the rising political structure.
4. A gesture before the completion of the Hōkan-ji, a shrine that commemorates the history of Japan compiled in 1720 C.E., the royal court initiated a practice of regularlyढ़ा विद्युत (or Not Knowing) the World,”endoza (1955): 9–21, 79–80; here: 9.
5. The word “Shinto,” which can be translated as “the way of the gods,” was coined in the nineteenth century to identify it as a religion distinct from Buddhism.
13. See Schöler’s essay “In Praise of Shikoku” for a job of contrasting the association of Aghor’s Western culture as a symbol of progress against the Japanese association of shadow and subtlety as expressions of the appreciation of transience and impermanence.
14. A massive gabled roof set perpendicular to the main axis dominated the design, and the entrance was placed in the center under the eaves of this imposing structure.
15. The indigenous people of Haida Gwaii have, for example, through activism begun to reassert control over their natural resources, and developed business models that prioritize environmental influences, influenced by their traditional animistic spirituality alongside profitability. This is one such operation that is an umbrella for native-owned logging and fishery businesses.


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CRAFTSMANSHIP VS. CRAFTINESS: THE GREEK POLYKATOIKIA AS “ADEQUATE” ARCHITECTURE

ABSTRACT

Traditional craftsmanship and modern mass production span a field of tension that is also reflected in the built environment. We discuss the polykatoikia as an example of how the dualism of architectural “craftsmanship” and “craftiness” result in a mass product with the potential for sustained adaptability in and of the Greek city. The polykatoikia is a building type that originates in the concept of the “Maison Dom-Ino” and was adapted to the Greek context. It emerged as a response to the immense housing demand in Greece following both World Wars and massive waves of migration and displacement. Based on a private market-oriented real estate development mechanism (“antiparochi”) and due to absent urban planning, the polykatoikia led to a fundamental transformation of the Attic landscape. Despite its mass-produced character, it displays a remarkable capacity for user adaptation and appropriation. Yet this comes at a price: only five percent of all polykatoikias are designed by architects, and the overwhelming majority is built by literally “crafty” developers who aim to maximize efficiency and profitability.

INTRODUCTION

The concept of “craft” can be understood as possessing a “dual” character, spanning the intention of those who produce work to those who produce “good” work on the one hand, and material execution on the other. It is also an example of how creative disciplines, such as art, architecture, and design, can be defined as good if it is created according to a set of principles established within a particular discipline or art. Questions of “good architecture” are still being asked today. In the contemporary architectural discourse, relating to the architect as author. We test this approach by analyzing a contemporary example: the Greek polykatoikia, an ambiguous type of modern architecture.

“CRAFT” AS AN ARCHITECTURAL CONCEPT

The history of architecture theory indicates how the shift of material execution away from manual labor and handicraft towards mechanical, industrial mass production coincided with ideologically informed debates on craft within the production of architectural space. Reflecting the discourse on the relationship between ethics and craft within the field of architecture at that time, William Morris and the Arts and Crafts movement in the UK sought to overcome the perceived detrimental impact of modernization and industrialization on building traditions by envisioning a comprehensive form of “artist-craftsmanship.” This integration coincided with early attempts at implementing standards and forms of type and establishing control over procedures and materials. However, the Arts and Crafts movement failed to realize this form of “artist-craftsmanship” and industrial mass production. German developments such as the Werkbund, the Kunstgewerbeschule in Weimar, and the Bauhaus adopted certain aspects of the work of their British predecessors. It should be pointed out that the relationship between the Arts and Crafts movement and the German schools was problematic. In the briefest of terms, it appears as if ideological aims of the British pioneers were subdued, while new technologies were embraced, in order to design and create industrially produced items that offered functionality and beauty at a low cost. Assumptions and generalizations regarding society or the “masses” and their presumed uniform form needs were supported by a theoretical interest in standards and types as instruments of control.

The difficulty in the usage of the term “good,” as it is employed by Kruft in this context, is pointed out by Hahn. Rather than based on individual or societal perceptions of what is considered good, or understandings of “good work,” Kruft seems to relate his understanding of “good” to the application of predetermined rules and regulations, applicable to both craft as articulation of intention and as manual execution in the production of architectural space. Accordingly, architecture is defined as good if it is created according to a set of principles established within a particular discipline or art. Questions of “good architecture” are still being asked in the contemporary architectural discourse, relating to the architect as designer. Hahn emphasizes that good is a moral term, indicating whether human actions correspond to ethical requirements that govern everyday life. From this perspective, the experiences that humans make in their use of architecture can be qualified as good. This points towards a greater dilemma: the modern disconnect between systematic knowledge based on experimentation, and pragmatic knowledge generated by the everyday experiences of human interaction.

Against this background, we offset the concept of craft with the notion of craftsmanship in order to understand examples of architecture that can be considered, under these circumstances, as bad. The adjective crafty is defined as cunning, artful, yet also wily. The Old English crafty and the German word kraftig, meaning strong, possess the same root. Craftiness can also be substituted with the words deceitful, devious, and tricky—clearly indicating negative, immoral connotations. Interestingly, scholars of Greek architecture point to the relevance of craftsmanship as an aspect of Greek culture, applied to tactics employed by individuals or groups, including “women, the weak and politically oppressed.” This observation at first seems in contradiction, for example, the polykatoikia (literally: multi-residence). This Greek building type does not seem to reflect any notion of craft, but rather craftiness. It is considered a Greek translation of the “Maison Dom-Ino,” and its creator Le Corbusier exerted a palpable influence at the CIAM in Athens, where young Greek architects were strongly impressed by his ideas. Indeed, Athens became the city where the polykatoikia mutated into the dominant element of urban development. However, this urban bricolage differs very much from Le Corbusier’s mass produced vision of the city, while both seem to be devoid of the individual handcrafting of the architect as author.

The polykatoikia represents an amazing success story that has contributed to a fundamental transformation of Greek cities. It is understood as a Greek translation of the CIAM’s “Maison Dom-Ino,” and its creator Le Corbusier exerted a palpable influence at the CIAM in Athens, where young Greek architects were strongly impressed by his ideas. Indeed, Athens became the city where the polykatoikia mutated into the dominant element of urban development. However, this urban bricolage differs very much from Le Corbusier’s mass produced vision of the city, while both seem to be devoid of the individual handcrafting of the architect as author.

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of Le Corbusier’s “Maison Dom-ino.” Originally a residential building type, it eventually became a mixed-use structure and an inseparable part of the everyday lives of the Greek people. Architect Kyriazis Biris (1907-1990) was the first to use the term polykatoikia for this building type. Specific geographical, historic and societal circumstances led to its rise. In the interwar period and after World War II, Greece experienced a massive construction boom. Against a background of absent institutional planning and related authorities, massive waves of urban-rural migration, and an influx of refugees of Greek cultural identity from Asia Minor, market forces took on the initiative in addressing the massive waves of urban-rural migration, and an influx of refugees of Greek cultural identity from Asia Minor, market forces took on the initiative in addressing the incredible nationwide demand for housing.

Based on the socio-demographic background of the client, the polykatoikia can be distinguished according to three categories: low-income, middle class, and luxurious. The low-income polykatoikia was intended for individuals and families with relatively simple needs, such as a job on the construction site to earn money and a roof above their heads. Correspondingly, it comprised simple materials and was built without the involvement of architects, and by contractors or small firms that employed unskilled construction workers. The middle class polykatoikia involved architects to a limited degree. The luxurious category of the polykatoikia reflects architectural design and can be found in neighborhoods of the upper classes, such as in the central and peripheral areas of Athens.

**SPATIAL AND SOCIAL PARAMETERS OF THE POLYKATOIKIA**

The polykatoikia comprises different parameters that express its spatial and social dimensions, including the column grid, the means of accessing the interior units and apartments, the floor heights, the stoa, the flat roof, the socio-economic hierarchy, and certain public and private functions. Differences reflect the original designation of the polykatoikia according to socio-economic categories and the related involvement of architects. These differences echo distinctions between anonymous and authored architecture. The resulting impression of continuous, almost endless homogeneity that dominates Greek streetscapes lined with polykatoikias is contrasted by the diversity of uses that begin on the ground floor and continue throughout the building interior.

Every polykatoikia consists of a prefabricated, reinforced concrete frame with load-bearing columns, a central core, and floor slabs that enable freedom of use and placement of partition walls. The ideal polykatoikia features columns that are set back from the slab perimeter, disconnecting the façade from the interior. However, this ideal isn’t always attained, particularly in the low-income polykatoikia. On the ground floor, the middle class and luxury polykatoikia may have an area for a porter, equipped with anything from furniture to elaborate marble-clad structures. The staircase of a low-income polykatoikia may not even feature a landing, and corridors tend to be dark and lack spatial quality. The luxury polykatoikia offers more affluent residents a vestibule or entrance area in front of their apartments. Floor heights can also differ in relation to the particular category and can be identified according to the quality of construction, material selection (e.g. marble), and dimensions.

Residents either rent or own their apartments. Middle class or luxury polykatoikia apartments can further include a small room for a domestic servant or maid. Spaces such as kitchens tend to be small, with low functionality or access to daylight—the latter merely provided by a small light well resembling a shaft. By no means does it offer the amenities of an interior courtyard. The light wells are legally considered public spaces and hence remain unbuilt. Rooftops, originally common areas, often feature structures erected without a permit. While the original social structure of the polykatoikia reflected a socio-economic homogeneity of its residents, over time this homogeneity was replaced by a vertical hierarchy. In other words, the more affluent residents lived on top, and the less affluent on the floors below.

The stoa is a prominent feature of many polykatoikias. It is an interface between the exterior public space of the city and the interior private space of the building, a three-dimensional threshold that draws the city into the building. This invitation is reflected in the many
can be described as polykatoikia and the termination of their function as public-private interface. The transitions between the domains of public and private aren’t clean cut or strict, but rather incremental and step-by-step, reflected within the functional differentiation of the building interior. This can be retraced from the sidewalk to the stoa, up the staircase, into the corridors and beyond within the individual units and their multiple uses—residential or commercial—and across the balconies into the streetscape. The building type enables the creation of a balance between the public and private domains that allows for small-scale, gradual functional changes, reflecting adaptation and appropriation by the users.

**CONCLUSION**

The low-income polykatoikia in particular is an example of an architectural type—or, in the terms of Qua-tremere de Quincy, an idea that serves as a rule for model application, rather than an image to be copied—that is created without the input of architects. While the outcome of craft is not inevitable (craftsmanship can fail), in the case of the polykatoikia this outcome reflects a starting lack of control, almost antithetical to the concept of a craft, as it is defined. It is the work of crafty developers, exploiting every square centimeter of the polykatoikia in order to gain profit, under the tacit agreement of institutions. Against this background, the polykatoikia indeed addressed certain needs “adequately.”

Despite its craftiness—related to craft—the polykatoikia did indeed address certain needs “adequately.”

### ENDNOTES

PLASTER RECAST: AUGMENTED REALITY AS MEDIUM FOR CRAFT-FOCUSED PEDAGOGY

JOSHUA BARD, FRANCESCA TORELLO

The ambition of the app is to weave a compelling narrative between the embodied experience of visitors and the wealth of backstory not currently accessible to the visitor experience, while addressing a number of relevant themes in contemporary design, such as the exploration of architectural space made possible by 3D models and by virtual reality; the question of seriality/authenticity applied to architecture in the Museum; and the impact of tools, materials, and craftsmanship on the qualitative makeup of the built environment.

PLASTER CASTS COLLECTIONS: UNREADABLE RELICS?

Until the turn of the twentieth century, public and private art museums, especially in the United States, acquired large collections of plaster casts. Visitors could explore physical, three-dimensional reproductions of portions of buildings and sculpture, at times of monumental size and imposing presence, in other cases proportionate to the scale of the visitor or the setting of the display. The wealth of backstory not currently accessible to the visitor experience, while addressing a number of relevant themes in contemporary design, such as the exploration of architectural space made possible by 3D models and by virtual reality; the question of seriality/authenticity applied to architecture in the Museum; and the impact of tools, materials, and craftsmanship on the qualitative makeup of the built environment.

ABSTRACT

Until the turn of the twentieth century, public and private art museums, especially in the United States, acquired large collections of plaster casts to present visitors with physical, three-dimensional reproductions of portions of buildings and sculpture. These pieces represent disparate geographic locations and historical time periods, but are uniformly cast in plaster, down to their tiniest, most intricate details, including the imperfections and the patina of their original materials. Understanding these collections required a great deal of historical knowledge and a clear sense of the craft of plaster casting and the meaning and value of copies. Visitors would have to recreate, in the space of the museum hall, a “mental image” of the complete buildings and their settings. The way this process worked makes this kind of collection a precedent of contemporary virtual reality and begins to address the role of three-dimensionality in experiencing, teaching, and exhibiting architecture.

The legibility of such amazing craft objects is now limited by the fact that both architects and the general public generally lack knowledge of the original buildings the casts originated from, as well as their historical context. To incorporate plaster cast collections back into our educational and cultural context, we have developed an augmented reality app, which uses positional tracking to provide context-aware information on top of a live camera view of the plaster collection. The layered media content includes virtual scans of the cast, CAD models of the original buildings, and primary archival documents. In the fall of 2017 the app will be tested with the public in Pittsburgh’s Carnegie Museum of Art, which boasts the world’s third largest cast, CAD models of the original buildings, and primary archival documents. In the fall of 2017 the app will be tested with the public in Pittsburgh’s Carnegie Museum of Art, which boasts the world’s third largest plaster cast collection of architecture elements.

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sive and scarce original works of art and archaeological fragments were considered almost impossible to obtain, especially this side of the Atlantic. Casts, instead, allowed curators to create a complete and thus pedagogically more useful collection; even a provincial museum with limited funding could present to its public the complete span of art history. Plaster casting techniques allowed suppliers to reproduce the original pieces in multiple copies from an original molding—an economic solution much appreciated by the young American museums. The cast pieces represented disparate geographic locations and historical time periods, but were uniformly cast in plaster. [Figure 2] This helped form in the visitor the impression of a continuum in the development of the arts, through the artfully achieved homogeneity of material and plaster-casting craftsmanship. Plaster pieces also had the advantage of offering to the observer an experience close to the viewing of the original piece, as they allowed reproduction of the tiniest, most intricate details, including the imperfections and the patina of the original materials [Figures 3 and 4].

Plaster casts started to be retired from exhibition halls and were later sold or dispersed at the turn of the century, when the larger financial resources of American museums, coinciding with struggling European collectors, put the purchase of originals within reach; additionally, curators and museum directors campaigned in favor of displaying original artwork only. Plaster casts by then and still exist, although they are often a portion of a formerly much more substantial collection. Many have been moved or loaned by the museums that originally housed them to educational institutions, where they are sometimes employed for teaching purposes. The value judgment privileging authenticity over seri- ousness weighs heavily on these objects, while their read- ability and the appreciation for their exceptional crafts- manship is often lost in their new contexts.

PITTSBURGH’S HALL OF ARCHITECTURE: PEDAGOGY THROUGH CRAFT

The Hall of Architecture of the Carnegie Museum of Art in Pittsburgh, a collection of plaster casts of architectural pieces, is still exhibited today. Despite a change of layout, it is still housed in the grand exhibition space expressly added to the original museum building by the Pittsburgh firm Alden and Harlow [Figure 5]. Financed by Andrew Carnegie and assembled under the supervision of John W. Beatty, Director of the Department of Fine Arts at what was then the Carnegie Institute, the Hall opened to the public in 1907. Intentionally created with architectural pieces and fragments, while most of its contemporary plaster collections focused on sculpture, the Pittsburgh casts collection was assembled very quickly, for the most part between 1905 and 1906, ahead of a ceremonial redecoration of the Carnegie Institute, where the major elements of the new display were expected to be in place. As such, it offers a fascinating and precise snapshot of the taste of early twentieth-century American elites and their ar- chitects. The longevity of the Pittsburgh collection is in part explained by its focus on architecture. Spared by the “battle of the casts” that raged in Boston and at the Metropolitan Museum of Art in New York starting at turn of the century, the provincial collection re- mained untouched. The casts of architectural elements were much more difficult to replace with originals. To- day, it is the third largest collection of its kind in the world, following the much more famous collections at the Cast Courts of the Victoria and Albert Museum in London, and the galerie des moulages at the Cité de l’Architecture et du Patrimoine, in Paris.

The importance of the Hall of Architecture, and part of our interest for it, comes precisely from its focus on architecture. Plaster casts of architecture are not complete copies of originals, as is the case for statu- ary. They are copies of pieces, fragments, or portions of buildings. As such, they require a very interesting mental process in which the visitor, looking at an archi- tectural fragment in the museum gallery, has to con- jure up and mentally visualize the entire building, which cannot be present in the gallery space. This process makes historic collections of plaster casts of archite-
In addition to this, architectural casts have traditionally addressed the role of three-dimensionality in experiencing, teaching, and exhibiting architecture, which is again central to the contemporary debate due to the possibilities afforded in this sense by spatial applications, from 3D modeling to GIS.

It is also interesting to note the multiple intended audiences for plaster cast collections, which included the general public, laborers, students, design professionals, and cultural critics. The breadth reach of these collections underscores the reality that craft is not simply an application of technological acumen or an expression of individual talent; rather, craft develops as a cultural expression that is nurtured by institutions, organizations, and through the dissemination of knowledge.

The history of the collections of plaster casts, and particularly the well-preserved archives of the Hall of Architecture in Pittsburgh, show that the excellence of the craft of plaster-casting achieved at the end of the nineteenth and early twentieth centuries originated from a large and rich cultural context, in which plaster casts played various roles and had many different audiences. Craftsmen, surveyors, architects, and students, as well as the elites who would come to enjoy the final product of that skilled labor in their homes, along with the public that could enjoy it in public exhibitions, all shared, at different levels, an understanding of the cultural cross-references implied in the pieces and of the mental processes these objects required. The effectiveness of the casts as a pedagogical tool was based on this shared understanding of what they represented and how they functioned, as well as on the appreciation for the material competence, practical techniques, and artistic skills required in the making of them. There is a strong parallel to be explored with the pedagogical possibilities of digital models and virtual reality. These also require interactivity from the side of the observer, and their skilled production is at the same time a necessary premise of their effectiveness, and a form of highly developed and refined craft that can be appreciated in and of itself.

Historic plaster casts are now unique. The museums that own these pieces are starting to conceive of them as art objects in their own right, in part in consideration of the fact that they sometimes represent originals that do not exist anymore, or originals that have been subject, over time, to more damage than the copy. The realization that the craftsmanship that produced these objects is increasingly scarce, almost disappearing, and that the height of the craft recorded in the pieces we still have is rarely matched by contemporary production intensifies the effort to preserve them. Nevertheless, the appreciation of these pieces will remain limited to the specialists of the craft, and their understanding to the few who can still follow the complex network of connections that these objects embed, unless we are able to provide a tool to re-educate the expected audiences of these objects, and recreate at least in part the wider, richer context in which they were created. The stunning craftsmanship displayed by plaster cast collections does not convey to the contemporary visitor the same set of associations and allusions. Thus the legibility of such amazing objects is now limited, and most of their pedagogical value remains unfulfilled. Augmented reality tools provide a unique vantage point from which we can re-educate audiences regarding plaster casts. Renewed appreciation for and shared imagination about plaster casts could be fertile soil to cultivate a rich cultural sense of craft.

AUGMENTED REALITY - DIGITAL AND HYBRID CRAFT

To incorporate plaster cast collections back into our educational and cultural context, we have developed an augmented reality app called Plaster ReCast that uses positional tracking to provide location-aware information in the space of the collection. The app runs a full screen, live camera view of the plaster collection while in use, so visitors remain visually connected to an experience of beholding in the gallery (Figure 6). When a cast is captured in the camera’s field of view, layers of rich media content are overlaid on top of the camera feed, including virtual scans of the cast, explorable CAD models of the original buildings, and primary archival documents. Understanding plaster cast collections requires a great deal of historical knowledge steeped in the classical tradition, and a clear sense of the craft of plaster casting and of the meaning and value of copies. Visitors would have to recreate, in the space of the museum hall, a “mental image” of the complete buildings and their settings. Every one of the plaster objects would conjure up a world, and an entire network of names,
stories, and visual associations. By bringing together the disparate geographic, historical, and architectural precedent associated with a cast, the app mimics the process in which this information was mentally conjured up by the visitor of the turn of the century (Figures 7, 8, 9, and 10).

In the fall of 2017 the app will be tested with visitors in the Hall of Architecture of Pittsburgh’s Carnegie Museum of Art, at which point our team expects to gain valuable user feedback from surveys conducted by the museum. Our hope is that the app enhances the interplay between the virtual dimensions of the cast collections—its didactic connections to history, geography, and archeology—and the physical experience of these highly crafted artifacts in spatial juxtaposition to each other.

Rather than focusing directly on the craft-based labor tied to the construction of the buildings represented in the cast collection (e.g., stone carving) this project focuses on the secondary craft: the plaster-casting techniques as applied to three-dimensional representation for the purposes of architectural education. A great deal of skill was required to produce the plaster casts in the Hall of Architecture, yet the casts’ status as replicas complicates the perception of their value in connection with the human skill necessary for their production. Because copying is an accepted component of the plaster casts themselves, the problem space of representational craft is less burdened with questions of authorship and authenticity. Virtual 3D scans of the casts, produced using photogrammetry, as well as CAD models that digitally represent the building in its entirety, share a similarly interesting relationship to the original as physically absent artifact in the collection (Figures 11 and 12).

Just as the Hall of Architecture embodies a historical tension between original artifacts and copies, contemporary architectural education must negotiate the relationship between virtual and physical modes of design and construction. Early debates, coinciding with the advent of computer-aided design tools in architecture and construction. Even with the inclusion of digital-craft into normative architectural practice, there is still a risk of construing digital and physical design media as pure binary opposites. Creative expression is either digital or physical, virtual or real. However, recent developments in design computing, specifically reality computing and real-time sensing, suggest that mature expressions of digital technologies will become increasingly hybrid in nature. Indeed, contemporary craft can be a fully synthetic thing, equally relevant in the physical and digital domains. The synthetic possibility of contemporary craft is in part due to technological affordances. Unlike traditional CAD modeling, with its geometrically idealized forms, reality capture is becoming an increasingly common technique to register the physical world in all of its intricacies, imperfections, and patina. Real-time sensing can also seamlessly position physical bodies in virtual spaces, and conversely can also register digital representations and information in physical spaces. In addition to technological affordance, there is also a situational interplay between human skill and the limits of artificial intelligence that currently favors humans and machines collaborating together in high-skill domains. Although many low-skill tasks in manufacturing, commerce, and information systems have been automated, it is still true that skilled humans working together with smart machines can outperform either working alone; hybrid workflows are often more effective.

Reality capture technologies used in augmented reality settings can enable hybrid forms of physical-digital craft, but also support a deeper cultural understanding of historical crafts. Legibility of the casts as artifacts, and appreciation for the craft that originated them, seem to have been lost over time. In the case of the Plaster ReCast app, 3D scanning is used to allow architects, and more importantly to the embodied thinking encapsulated in these acts of hand production. Educators wondered about the implications as architects ceased to draw and model with their hands, and building construction became increasingly mechanized. As digital media matured, many architects and theorists of the 1990s argued for a more inclusive definition of craft incorporating digital design techniques, in addition to the more traditional hand-based practices. Malcolm McCullough’s Abstracting Craft is an exemplar of this movement. McCullough argues: “If previously it was usual to assume that computation would only worsen the hand-mind splits engendered by industrialism, now we might reconsider this problem. We might observe how software usage is restoring some respect for mastery (in design).” After carving out a positive space in architectural discourse, the qualitative makeup of digital-craft has emerged in the following decades of experimentation and technological development to the point where it is now common in architectural circles to associate craft with many computational design domains such as digital fabrication, parametric modeling, and algorithmic patterning. Clearly, human skill can be expressed in architectural design and construction through digital and physical means.

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low museum visitors to explore the plaster collection in all of its detail and imperfections. Many of the casts are either too large or located too high for direct visual inspection but can be brought close to the viewer on low for algorithmic transformation of the human input

to information on each piece, making up for the loss of reading of the physical objects in the museum space.

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APPLICATIONS OF HYBRID CRAFT

As part of the authors’ ongoing research and teaching at the Carnegie Mellon University School of Architecture’s Robotics Lab, our team developed a robotic
technique for designing and fabricating plaster running molds. Rudimentary running molds are a historic technique for creating decorative plaster elements that traditionally

sketch new patterns and get real-time feedback in the plastering bench where the running molds are being produced. Using a motion tracked stylus, designers can sketch new patterns and get real-time feedback projected with a shaded preview of what the rendered plaster will look like. Parametric modeling tools allow for algorithmic transformation of the human input through patterns, scaling, and morphing. The design space of the plastering technique can be explored using physical gesture in the very space of fabrication.

Once a design is refined and finalized, the robot is automatically programmed to follow behind and generate the physical running mold. Using this robotic technique, a new geometric space of plaster forms opens up to the designer that would have been nearly impossible to produce by hand.

ENDNOTES


4. For the history of the collection and the interwoven of the architecture community in its creation see Francesca Tomasello, “Establishing architecture. plaster casts in Pittsburgh between instruction and professional debate,” Southwestern College Art Conference (1985), expanded in a forthcoming publication.

5. Alan Walters, Exhibiting Contradictions, 49.


7. “We are a rude and noisy and obtrusive people, but place one generation of us under the influence of the past, let us see something grand and beautiful, told by our hands . . . and perhaps we shall find the sweeter flower of humility break through our pride, and diffuse its gracious influence over us.” “Museums as a Means of Instruction,” in Appleton’s Journal, 175 January 1870, cited in Walters, Exhibiting Contradictions, 17 and note 14.

8. The name changed to Carnegie Institute of Technology in 1912 and Carnegie Mel-

University Press, 1989), 63.

5. Alan Walters, Exhibiting Contradictions, 11.


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University Press, 1989), 63.
CRAFT AS PROCESS AND PERFORMANCE OF RESISTANCE? - ROTOR, WIM DELVOYE AND “DECONSTRUCTING” ARCHITECTURE

CHARLOTT GREUB

ABSTRACT

This article interrogates the radicalization of creative practices in relation to post-industrial conditions and discusses the strategy of appropriation by analyzing two artistic interventions as case studies. First, I will introduce the Belgian architects’ collective Rotor based in Brussels, and Wim Delvoye, a conceptual artist from Belgium working in Brighton, UK. Two art interventions—Delvoye’s Cement Truck / a tool of the building industry and Rotor’s exhibition Usua/Usures, presented at the Belgium Pavilion at the 2010 Venice Bien­ nale—will be analyzed and discussed with reference to statements and other works by the same authors in order to explore the nature of critical practice when associated with craft as a process and performance of resistance.

CRAFT PROCESSES HAVE A SOCIAL FOOTPRINT

Craft, understood as the art of making or fabrication, has a constituency and an economic basis, and hence a social presence. Therefore, everyone involved in the production processes and in the making processes have a social footprint. When we think about tooling, for example, we cannot think about it in a vacuum, but rather in terms of access to tools, transfer of knowledge, and production processes, which allow us to theorize craft in political terms. When we focus our attention on the production processes of artworks, buildings, and commodities within the current regime of global production and consumption, this paper offers a contribution to broadening our understanding of contemporary art and architecture.

“Craft” in art and architecture has been underwritten by a historically inherited morality since the Arts and Crafts movement of the nineteenth century that emerged against the backdrop of the first industrial revolution. Even in today’s globalized economy, these questions of sustainability and responsibility have not been transcended. Instead they are ever more urgent. The historic discussion of craft contains already a criticism of the social and ecological footprint of human production. For example, in mid-nineteenth century, John Ruskin asked in On the Aesthetic Principle in Art and Architecture, therefore, the potential for resistance against these forces. Yet unlike Ruskin and his nineteenth-century follower William Morris, in this text, the notion of craft will be employed as a frame to analyze, exhibit, and rethink architectural commodities in a throwaway consumer culture. It will also shed light on the politics of capitalization of public property during the global financial crisis of 2008/09, and the commodification of artworks in the contemporary art market.

CRAFT AS A PROCESS OF RESISTANCE: ROTOR AND DELVOYE

Craft, in the sense of processes, tools, and techniques of making, is at the core of architecture and other creative practices producing cultural objects. Craft is organized around material experience and practices, or to say it with the words of the design historian Glenn Adamson: “it is a way of doing things, it is also multiple: an amalgamation of interrelated core principles, material, skill, technique which are put into relation with one another through the overarching idea of ‘craft’. For this discussion it is, however, important to include the way Adamson continues his thought in Thinking through Craft: ‘It is important to look at craft, as an approach, an attitude, or a habit of action and in this sense craft only exists in motion.’ The work of the Belgian architects’ collective Rotor displays a valuable understanding of the designer’s role in society, the material world, and the environment. Through their work, Rotor raises the question: how can the design profession reinvent its discourse around responsibility? Hence, the work of Rotor explores the notion of wear, that is, materials, objects, and building structures in relation to use. Use is not to be conflated with program or function, but rather the social aspect of occupation and inhabitation of architecture during the life-span of a building, which allows Rotor to approach critical questions of reusability and sustainability. Rotor focuses on modernist and contemporary buildings slated for demolition in order to reuse their material components for radical redesign. This obsession with the worn-out and wearing out of architecture is intended to question the standard approach of demolishing to create a tabula rasa situation for new projects, not only to save materials (and energy) from the landfill, but also to introduce a social point of view, to keep the qualities that are already there, to improve on the existing, and to remember the people and events that took place. Material re-use encourages one to consider buildings as repositories, not just of the materials, but also of knowledge and past practices of crafting. These past practices are also given as raw material—in this case, of knowledge—that might find new applications and contribute to new value systems.

Rotor’s design approach addresses reusability and sustainability as part of a political project. It formulates a critique of throwaway consumer culture and highlights how outsourcing productivity and supply chains conceal labor conditions, resulting in depolit­ ization of both working conditions and environmental costs. To counter this, Rotor developed guidelines, protocols, and regulatory work for the reclama­tion of reusable materials and the integration of “waste” into the current building process. Transgressing the dis­ ciplinary limits of architecture, they research, design and exhibit work in response to industrial production, consumption, and waste fabrication. Rotor’s national survey of existing second-hand building material dealers in 2013 showed the lack of firms working with large scale industrial materials of the twentieth century, out of which Rotor/DC (Deconstruction/Consulting) in Brus­ sel developed as independent wing of Rotor’s design activity. In 2015, Rotor distilled a value system for off-site reuse: a model of legal and practical guidelines for the reclamation of reusable materials from public
bodies in Belgium. In cooperation with a lawyer, they are also working on policies to re-introduce salvaged building material into the construction process of buildings within the European market. Here, the client is the European Union in Brussels because waste legislation, rules on public tendering, and product norms are subject to EU policy. Rotor hopes to disseminate and redesign the material economy and its underlying (legal and processual) conditions which could be understood as a form of political craft.

Wim Delvoye, on the other hand, addresses the social footprint of production and craft in his artwork through the theme of outsourcing of everyday commodities. In addition, he questions the cyclicality of consumption and the organization of capitalist economy around loss and wastage. The work that brought him wider attention focused on bodily functions; since 1997, he has been working on a series of machines called Closaca that manufacture artificial excrement. A mechanical system uses enzymes to transform real food into synthetic faeces, artificial "shit," which was sold in limited editions. This elaborate, complex construction is more than a pun on the art system; Delvoye intended it to be read as a commentary on capitalist economy organized around consumption, loss, and wastage. The Closaca machine wants to be more than a digestive tube without a body. "It is the universal anus to be read as a commentary on capitalist economy."

German art critic Birgit Sonna identifies German art critic Birgit Sonna identifies: the most tube without a body. "It is the universal anus to be read as a commentary on capitalist economy."

As a relatively young office, the work of Rotor represents a new kind of emerging practice in architecture, in which various disciplines are combined: from research and exhibition making to material studies and re-use strategies. Rotor is interested in material flows in industry and construction, particularly in relation to resources, waste, use, and re-use which challenge historical conceptualizations of craft. They deconstruct buildings into elements (construction, materials) and re-assemble them in new ways. This is an approach about material and knowledge of past practices of crafting buildings and interiors. They aim for both new applications and new value systems around materials and assemblages. Rotor undermines the typical professional divisions of responsibilities between clients, contractors, workers, designers, users, and other stakeholders.

This distinct interdisciplinary approach of Rotor— which can be described as deconstruction, relocation and assemblage—has been at the center of their exhibition Usus/Usures for the Belgian Pavilion at the Venice Biennale in 2010. At the international architecture exhibition, they displayed mundane materials and products salvaged from Belgian social housing projects as abstract art. The selection and framing of used materials and architectural elements of a social housing complex is neither a purely aesthetic nor neutral act, but points to the social problematic of disappearing low-income housing in Belgium and other Western countries. Usus/Usures was entirely made from salvaged building components that are usually overlooked and treated as waste (deconstruction), such as carpet, stairs, railings, etc., exhibiting them in a denaturalized way (assemblage) in the Belgian Pavilion at the Venice Biennale (relocation). Unlike common architectural practice, where thinking about material and making means the design of new objects, description through specifications, and ordering through product catalogs, with Usus/Usures there is an entirely different process in place: thinking of materials as something physical and tangible to be identified, transported from one place to another, and then re-framed. A red carpet, for example, was taken from one social housing block (relocation) and mounted to the wall of the exhibition as floor plan of this apartment (assemblage). The red industrial carpet, already depreciated as waste, becomes a kind of manual of use, a diagram of wear created by the occupant representing the processes of habit and inhabitation. Instead of being a deficiency, the traces of wear lead to reflections on use, users, and construction practices through the new context of the art exhibition. In a similar fashion, an extracted banal industrial staircase shown in the Belgian Pavilion could be read as a map of human movements walking up and down this stair. These works create an understanding of the human body as a performative tool that leaves distinct material traces of everyday human activity. The building components were exhibited in an isolated manner as to draw closer attention to their own intrinsic qualities, despite—or perhaps exactly because of—their anonymous and ordinary appearance. Though minimalist in its appearance, the exhibition Usus/Usures resulted from Rotor’s extended research into and analysis of the use and wear of buildings and building materials.

Rotor underscores the fact that sustainability cannot fully be defined in a scientific way; it is also a political matter, because it emerges from a multifaceted process with many contributors. The stakes for architecture are aesthetic, economic, environmental, and social. Rotor’s intention for Usus/Usures was to bring the subject of materiality into the arena of the Venice Biennale opposing the glorification of ‘the New’ that is implicit in this kind of exhibition format. They intended the subject of wear to draw attention to the reaction of buildings to long-time use, and more, to challenge architects to anticipate this process. Looking at buildings through the lens of wear leads to reflections on use, users, and construction practices. Rotor encourages the public to change their attitude towards building materials, but also in a more general sense, towards all objects around us. Wear is largely a taboo topic in architectural circles because it contrasts fundamentally with the value of puration, but also with the construction cycles which become shorter and shorter: "In the 20th century, under the combined influence of increased real-estate pressure, an obsession for speed in demolition, the availability of power-machines and explosives and fiscal constructions had encouraged accelerated building obsolescence."

Parallel to the exhibition Usus / Usures, the collective produced a catalog How Things Stand, which brings together perspectives from different professional fields and disciplines on the theme of “wear.” Instead of understanding it as a defect, Rotor reframes it as informative for their practice: wear is approached not as a problem in itself, a testimony to an error of design to be avoided at all costs, but as an inevitable and potentially creative process. In the chapter titled “Wear Makes us Act,” Rotor divided a collection of images of everyday situations of the built environment [of wear] with 28 theses exploring materials in relation to the social aspect of use. Rotor discusses the opposition between pragmatically engaging with materials in an object of study, as a tool, in one hand, and as a resource for the Venice exhibition on the other—engaging in a critical discourse on architecture. In the catalog, Rotor presents alternative readings of material structures and objects to challenge established architectural discourses on novelty, perfection, and pristine finishes versus wear, use and users, acting and performance, all the way to reading material traces as an additional layer of information, and hence as added value instead of consumption, thereby questioning the social and ecological consequences of current conventions and value systems.

Rotor’s work displays a different understanding of the architect’s role in the material world. To consider craft is not only to be interested in techniques of making, but it is also to understand “things”—be they chairs, buildings, or entire cities—as socially constructed and situ-
ased artifacts. This approach demands the viewer to ask: how have they been produced, and who has made them? What kind of knowledge and information do they display? What does their making and the materials employed tell us about the users and uses they have been employed for? Materials are essential to this inquiry; their role in crafting buildings and the environment is not less significant than that of architects and designers. Materials demand attention not only in an aesthetic sense, but also in a cultural, social, and environmental sense. Rotor understands materials as the trace of social relationships. Materials and their traces, from source to processing to use, hold economic, social, and political information, especially with regard to power, class, race, and gender. Seen from Rotor’s discursive frame, the practices of craft and architecture operate in a comparable arena shaped by material and social relations. This relationality means that materials and material practices—such as craft and construction—are connected to different parts of society. For example, we usually assume that gypsum board used as wall and ceiling finish is a universally standardized and neutral material, but as Rotor reminds us, gypsum today is primarily a byproduct of energy production. In order to protect the environment from sulfur dioxide produced by coal- and oil-firing, which contributes to acid rain, it has become common practice to wash out the harmful gas with calcium oxide to form gypsum. In a similar vein, Maarten Gielen, one of the founding members of Rotor, considers the monument for the textile laborers of his hometown of Aalst, Belgium. Flemish Catholic priest Adolf Daens in Aalst, Belgium. Daens (1839–1907) became known for his socio-political involvement and as pioneer for the emancipation of the working class, especially the textile laborers of his hometown of Aalst who suffered from inhuma� productive practices in the late nineteenth century. Gielen points out, however, that the flooring around the statue of Daens from the mid-twentieth century is not the local blue limestone, but rather a similar-looking material made in Vietnam and notori-eously produced under exploitative circumstances. The result is a heroic statue celebrating the workers’ emancipation of Aalst standing on a sea of stones that are very questionable. If this sculpture had been created by a contemporary artist, it would be considered controversial, if not cynical. Yet, when architects are involved in similar practices and material choices, the audience tends not to see it.

CASE STUDY 2: ROTOR BOMEL CULTURAL CENTER – A BUILDING ASSEMBLAGE

Another example of how to make this reframing of material practice productive within the frame of architecture is Rotor’s Bomel Cultural Center in Namur, Belgium. Again they identify building parts and materials for reuse, relocation, and assemblage, and re-integrate re-used objects and worn-out materials into their design strategy. Yet the work with reused materials and building elements is more than just recycling, that is, an economic and ecological functional assemblage. In this work, Rotor employs a strategy where building parts and interior objects are interpreted through partial integration into several sometimes conflicting layers of narratives. The Bomel Cultural Center is an adaptive re-use of a former slaughterhouse built in the 1940s in an underprivileged neighborhood of Namur, which was renovated and transformed into a cultural center in 2014. Rotor was asked to provide equipment and interior design, but also to reflect upon how this place would be used and operated. The former interior of the slaughterhouse had been lost in the newly finished renovation, leaving little historical context as reference. Given the white box situation of a generic, abstract designed space, Rotor decided to add a number of new narratives to the building in the form of a “building assemblage.” For example, they reused decommissioned interiors acquired from financial institutions as a new functional interior for the Bomel Cultural Center and as part of a permanent exhibition. They translocated and re-used a cappuccino bar from a former CEO’s office of the headquarters of the BNP/Paribas Bank in Paris, France. Of course, this was not just a neutral or opportunistic move of acquiring parts of a random interior to serve a cultural center, but rather the former state bank BNP/Paribas, which had been transformed into a private institution in 1987, and was saved in the global financial crisis of 2008/09 by the state, with public money. Rotor wanted to point to the fact that European taxpayers helped save this private financial institution, and hence also that the people using the Bomel Cultural Center in Namur had already “paid” for the former CEO’s cappuccino bar, at least indirectly. Rotor’s strategy of reuse, relocation, and assemblage is a critical voice against the context of public support for lopsided private financial institutions, which leads to austerity politics in the public realms of education, culture, and public housing. In addition, this intervention has to be read as a critical comment on the disparity of the built environment and current practices of heritage preservation. Rather than pure conservation and renovation, Rotor’s engagement with heritage and culture, and public housing moves in an entirely different direction: “Looking at a building as an assemblage of elements that can be dismantled andreassembled again, possibly into totally new configurations forces us to reassess our understanding of architectural heritage.”

CASE STUDY 3: WIM DELVOYE CEMENT TRUCK I (1990-99) – DE-CONTEXTUALIZATION OF FORMS AND CONCEPTS

Today we live in a globalized economy in which affluent societies with expensive labor structures outsource almost any form of production. Displacement, circulation, and fragmentation of production processes have
become part of the global consumer economy. One side effect of the new regime of labor is its separation from craft. Interchangeable hands provide the work at the cheapest cost, instead of the native skilled craftsmen who embody local knowledge, skill, tradition, and personal relation. The global economic regime of outsourcing has transformed any form of autonomous workmanship and personalized craft into an exception.

The Belgian-born artist Wim Delvoye thematizes these postindustrial economic conditions in his artistic work. His piece Cement Truck (1990–99) is a full-scale model of a generic cement truck carved out of Indonesian teak wood, in seventeenth-century Flemish Baroque style by Indonesian wood carvers. In other words, the artistic object comprises a late twentieth century instrument of transportation, construction, and power, created in a sixteenth-century European stylistic aesthetic, and using contemporary Southeast Asian materials, labor, and craftsmanship. The result is what Henri Lefebvre calls “de-familiarizing the familiar:” 92 the artistic object undermines the reality of outsourcing that makes the global economy “go round.” Delvoye’s Cement Truck I exhibits highly skilled outsourced labor whose meticulousness draws attention to itself. An important aspect of the work is the refined level of anonymous, outsourced skills integrated into the authorship of the artist himself. In a review, Glenn Adamson notes that “Delvoye began self-consciously ‘exploiting’ woodcarvers as human tools within his own practice. They were a way of reflecting on his own implication in global production.” 93 The artwork represents an act of triple appropriation: first the industrial form (a Nisan cement truck), second the “local” décor (material, skills of the woodcarvers), and third the actual act of outsourced labor (tools). 94 The French art historian Bernard Marcade argues that Delvoye’s work can be interpreted as an homage to the modernist tradition of ready-mades, as they had been employed previously by artists such as Marcel Duchamp and Andy Warhol, because the artist turned “found objects” into an integral part of the artistic process.

Delvoye himself questions the reduction of the resulting objects into the legacy of this well-known strategy of ready-mades, because as he confirms, “They are so crafty.” 95 In the past, the ready-made was an industrial or as-found object that was turned into an artwork through the process of selection, authorship (declaration or signature by the artist), and exhibition in the art world context of a gallery or museum. Yet with Delvoye, the problem is more complex: Cement Truck I highlights the act of artistic appropriation of the craftwork of others (in this case replicating the modes of production of consumer goods) as a critical tool. In addition, Delvoye refers to the fact that Cement Truck I was executed with cabinetmaking techniques Indonesians had originally learned from seventeenth-century Dutch colonists (since Indonesia was a long-time colony of the Netherlands). While these craft skills today are no longer part of the homeland’s cabinetmaking tradition, the memory is retained and embodied in the former colony. Delvoye’s truck is informed by his fascination with the migration of ideas, skills, objects, materials, and functions. This exhibited process of de-contextualization and re-contextualization of skills and crafting techniques deconstructs normative binaries: who is the originator and who is the appropriator? What constitutes an original and what a copy? The obvious functionality of the truck interpenetrates with the useless decoration of the wood carved object as a piece of furniture. And we can no longer separate traditional handcraft from contemporary machinery/fabrication executed by robots. This undermines the traditional dialectics of unique work versus mass production, and of popular and vernacular culture versus high culture at the heart of the international art world.

Delvoye’s references remain simple and identifiable: they belong to the most mundane parts of everyday life. In other works the artist has employed ironing boards, gas canisters, shovels, saws, lorries, cement mixers, etc., turning contemporary economic logic on its head by deliberately aligning his art work with the objectification of the world. The worldliness and complicity of the object is foregrounded. As Marcade explains about Delvoye:

By transforming a shovel into an escutcheon, by tattooing the skin of a pig, by transfiguring a cement mixer into a piece of Baroque furniture, the artist is not only producing a provocative work of art. These objects have obvious socio-cognitive implications. The shovel with heraldic designs forces an aristocratic coat of arms to cohabit with a workman’s tool. These gestures create a space for meaning; they materialized the unimagined aspects of forms and functions exhausted through their usage and questioning the commodification of artworks in a globalized context. 96

Despite the diversity of objects, the artist always seems to follow similar strategies. He removes decorative layers from their normal medium (artwork, craft) and reuses them elsewhere—“inappropriately.” Generally, Delvoye chooses technical instruments, tools, or machines, where the act of decoration (enameling, tattooing, radiography, carving, and laser cutting) seems out of place. Yet this friction between the layers of surface and form, between ordinary, useful, functional, and generic, versus art, decoration, and craft respectively are exactly what Delvoye uses as the artistic strategies of assemblage, relocation, and deconstruction. Delvoye’s Cement Truck I is an uncomfortable work of art that raises problematic questions not only about the art world today, but more generally about outsourcing and the current global economy (and its colonial past), because it upsets and undermines the process of its own making.

CONCLUSION

Both Rotor and Delvoye use craft, technique, material, process, and the spaces of the art world (museum, galleries, Biennale) as realms for political commentary that are critical of the current global economic regime. Not only do their distinct yet comparable approaches entail urgent questions of sustainability, re-use, and appropriation, they also imply a need for a different view on history and the historical production. They recharge the critical aspect of craft (as already present in early industrialization with the English Arts and Crafts movement) and expand it to the problem of re-use: the re-use of materials and of furniture (as previously in the Rotor project), but also the re-use of ideas, the re-use of knowledge, of archives and memory. They deconstruct existing value systems in art and architecture and open rooms for craft as a process and performance of resistance.

ENDNOTES

1. John Ruskin, Untae this Lat, London & Toronto: J.M. Dent & Sons, 1921: 26. “I have said balances of justice, meaning, in the term justice, to include affection, such affection as are most strong in another: the affection of power, power to dispose and operate, and all their kind interests, ultimately depend on these.”


4. Ibid.


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AN EXPANDED ROLE FOR CRAFT IN THE SOCIALLY ENGAGED SPATIAL PRACTICES OF THEASTER GATES AND ASSEMBLE

ABSTRACT

Questions of social justice and the role that architects play in supporting the power structures of inequity are increasingly prevalent within the realms of spatial practice. At the macro level, one can readily identify within the profession a desire for “impact,” and a sense that our work adds value and dignity to people’s lives. At a more granular level, a better understanding of the methodologies and perspectives that contribute to the success of socially engaged design practices and architecture is needed. How can we foster authentic engagement with the communities we serve? How can we reappropriate existing objects, buildings, and infrastructures (physical, social, or otherwise) towards the ends of economic empowerment and individual agency? What new modes of architectural practice are possible? This paper seeks to consider these questions by highlighting an expansion of the territory of craft in the work of two socially driven practices: Theaster Gates’s Rebuild Foundation in Chicago; and Assemble, a design collective working in the United Kingdom.

If the late nineteenth-century Arts and Crafts movement can be understood as a reaction against the devaluing of human dignity through industrialized production, the ways that these contemporary practitioners seek to leverage new notions of craft in support of community revitalization can be viewed through a similar lens. By positioning memory, identity, and place at the core of their work, Theaster Gates and the members of Assemble recast the objects, makers, and traditions of craft in support of new goals: engagement, empowerment, and economic redevelopment. Their work posits a new direction in socially engaged architectural practice, where the intersection of craft, design, place, and community leads to ethical revitalization of communities and individual agency for those most in need.

A CHANCE ENCOUNTER

“... said Irma Dixon, a long-time resident of Greater Grand Crossing, located in South Side, Chicago. The neighborhood—which has suffered from chronic disinvestment and lack of equity for decades—is the epicenter for the socially engaged cultural and economic redevelopment activities of Theaster Gates and the Rebuild Foundation. Mrs. Dixon lives next door to Gates’s first artistic rehabilitation effort (The Archive House), which, along with a collection of other buildings on the block, constitute the ongoing Dorchester Projects [Figure 1]. On a sunny, Sunday afternoon in July, I was called out by Mrs. Dixon as an interloper in the neighborhood. After we were introduced, her role as gatekeeper quickly turned to that of proud community booster and enthusiastic tour guide. As we cruised the neighborhood, I learned of the potent histories and potential futures for Grand Crossing, and how “Mr. Gates” and his partners were working to catalyze the latent human, architectural, and cultural resources in the community through an expansion of craft practices.

INTRODUCTION

The work of Rebuild and other socially driven spatial practices challenges us to consider questions of social justice and the role that architects play in supporting the power structures of inequity. How can we foster authentic engagement with the communities we serve? How can we reappropriate existing objects, buildings, and infrastructures (physical, social, or otherwise) towards the ends of economic empowerment and individual agency? What new modes of architectural practice are possible? Theaster Gates’s Rebuild Foundation in Chicago, and Assemble, a design collective working in the United Kingdom, have garnered critical acclaim in recent years for their efforts to empower...
underserved communities through art, architecture, craft, and design. Through a survey of literature, news articles, interviews, lectures, projects, and visits to select works, this paper documents and theorizes the processes and outcomes of these two prominent socially engaged spatial practices with an eye for understanding and expanding perspectives on the nature of craft and architectural praxis.

Socially engaged practices engage in participatory, community-focused art, design, and architectural projects with a focus on inclusiveness and social interaction. Artist and urban planner Theaster Gates has made art and craft central in his efforts to realize culturally-driven revitalization in South Side, Chicago. Established by Gates in 2010, the non-profit Rebuild Foundation has developed into a multifaceted organization that engages communities, buildings, and objects towards the goals of ethical redevelopment and empowerment of local citizens. Working with what he terms a “constellation” of willing partners, Gates and his team are implementing an ambitious revitalization effort in Chicago and several other cities. Rebuild is working to stitch neighborhoods back together through community arts programs, establishment of new cultural amenities, provision of affordable housing, artist-in-residence programs, and by fostering startup businesses. In late 2016, Rebuild launched Dorchester Industries, which partners neighborhood residents with master craftspersons to provide workforce training and engender individual agency. The pilot program focused on traditional crafts such as masonry, millwork, carpentry, and pottery and resulted in some 2,000+ pieces that were sold at a benefit auction (Figure 2).

Gates’s efforts in Chicago (and increasingly in other communities throughout the US) are supported by a multivalent network of financial mechanisms. Rebuild operates as a non-profit and is supported through a combination of local resources and national partnerships, including government grants, corporate partnerships, and philanthropic foundations. From the earliest days, Gates’s own artistic endeavors have been at the financial core of his efforts to revitalize his South Side community. His artworks are highly sought-after and have been exhibited internationally, including a recent solo installation at the National Gallery of Art in Washington, DC. When it came time to raise millions of dollars to restore the Stony Island State Saving Bank, Gates transformed the idea of bank bonds and developed a limited edition series of Art Bonds, created from marble slabs pulled from the bank, which were sold to collectors worldwide. Gates has also leveraged institutional support from the University of Chicago (a few blocks from Dorchester), where he is a professor, the Director of Arts + Public Life, and lead of Place Lab, an outreach center that has received large grants from the Knight Foundation and others to support research and deployment of new community revitalization methodologies in multiple cities across the country.

In the United Kingdom, the design collective Assemble has leveraged new directions in craft and an ethos of DIY making in support of community-engaged projects since 2010. The team comprises 18 members and operates as an interdisciplinary practice, pursuing both commissioned and self-initiated projects to realize spaces that enable “independence; self-authorship, creativity, and difference.” Central to their way of working is development of solutions beyond the narrow definition of architecture, including self-build projects, new business enterprises, organizing events, curating exhibitions, and the making of furniture. This “what’s needed for the job” approach is most notable in their work with residents of Granby Four Streets in Liverpool, for which they were awarded the prestigious Turner Prize in 2015. Assemble used the award and associated exhibit to establish the Granby Workshop, which creates experimental home goods crafted by members of the community from repurposed and reclaimed materials (Figure 3). In addition to being used in the renovation of the neighborhood houses, these craft objects form the backbone of a social enterprise that creates new economies and supports individual agency through the development of new skills, particularly for youth in the area.

The work in Liverpool was spearheaded by the Granby Four Streets Community Land Trust (CLT), which had received a £500,000 interest-free development loan from a private social investor. This financial boost enabled the hiring of Assemble, who helped the residents of Granby craft and document a detailed vision and implementation strategy for their community. The investment and the visioning documents helped the CLT secure essential support and rights to property from the Liverpool City Council. Following their early success and investments, the ongoing work has been supported by a number of grants from both governmental...
and private sources,9 and the Granby Workshop, under the guidance of members of Assemble, continues to produce innovative, experimental, craft-based products that are sold internationally in support of local revitalization. As a firm, Assemble operates as a collective with members contributing to those projects for which they have an interest. Design fees are split between those members of the firm who contribute to a particular project, with a small percentage given over to operations and a large portion saved for the development of self-directed projects. For most members, work as part of the collective is further supplemented by employment in academia or other venues.

To further understand both the processes and outcomes of Rebuild and Assemble, it is important to position their work within the spectrum of traditional versus expanded notions of craft based on considerations of the objects, makers, and processes of craft.

Engaging and empowering the communities with whom they work is a core value of both Assemble and Rebuild. The first step, as experienced on my recent visit to Grand Crossing, is acknowledging and overcoming the understandable skepticism and distrust that have accrued in under-resourced neighborhoods. It is important to immerse oneself and work from a shared set of values. Rebuild and Assemble employ a variety of strategies beyond traditional craft principles to foster participation, transparency, and authenticity, including shared making, collective learning, and leveraging of extant resources, and the development of individual capacities. “The work is for many, with many, and, ultimately, by many.”4 For socially engaged practices, inclusivity of “the many” is essential to both the processes and outcomes of community revitalization, and it includes both long-term members of the community and outsiders with an interest and drive to contribute. Strategies that support multiple entry points and encourage diverse participation lead to better, more equitable outcomes (Figure 5). Chief among those employed by Theaster Gates and Rebuild is the idea of collapsing the distinction between maker and viewer.5 Writing in The Craftsman, Richard Sennett suggests that in traditional craft practices, “making is thinking.”6 In considering the work of Rebuild, and in the breaking down of boundaries between makers and users, we see a more expansive view for craft: making is engaging. Whether they are local laypersons from the neighborhood or practitioners from beyond united by a shared mission, the experience of creative making leads to interdependence amongst the participants, and this shared participation begets deeper and sustained engagement.

If engagement is an end arising from processes of craft and making, then collective learning and leveraging can be considered as means. When the community vision reaches “across identities, roles, practices, disciplines, generations, and locales,”7 new avenues for knowledge transfer are opened through a learn-by-doing approach that privileges DIY experimentation over traditional, more rarified apprenticeship models of craft. Gates acknowledges this when he notes that “experience is the teacher; exposure is the lab.”8 The members of Assemble place collective learning and mutual support at the core of their practice. It informs their interdependent and flat organizational hierarchy as well as their office, which invites collaborative exploration through interconnected spaces for research, design, fabrication, and public programs. In their work, Assemble apply a “professional amateur” approach, allowing them to assimilate new ideas and counter the top-down, done to, not with, urban renewal strategies which have contributed to the destruction of the cultural fabric of under-resourced neighborhoods and fueled distrust amongst residents.

In Liverpool, England, Assemble combined their skills with the creative placemaking efforts of the residents of Granby, leveraging existing resources and knowledge to effect change that feels authentic to both people and place. Before the arrival of Assemble, residents had already started to reclaim their neighborhood by repurposing the domestic skills available to them: painting and gardening. Boarded-up windows became colorful murals and announced the importance of beauty in the midst of blight. The tradition of the English garden was extended into the urban fabric through expansive planting and food-growing efforts, restoring a sense of social value to the streets. These reimagined domestic practices have also served to ground the ongoing restoration efforts of Assemble, whose proposals feel like an evolving continuum as opposed to something new and foreign. Expanding craft into a collective endeavor...
or has led to the restoration of houses, the design of shared communal amenities, and the development of place-specific processes and products that are helping to restore cultural and economic value to the residents of Grandby (Figure 6).

Ultimately, the goal of most socially engaged practitioners is the development of individual agency and community resiliency. Rebuild and Assemble are working to achieve this end through a strategic broadening of the traditional domain of spatial practice. The challenges to prosperity in underserved communities extend beyond the mere construction of new buildings into realms of identity, education, politics, history, memory, and culture. By applying expanded methodologies to the development of cultural programs, institutional platforms, social enterprises, and workforce training, the groups are helping to build human capacity in Chicago and Liverpool. The Granby Workshop offers members of the community—especially younger residents—the opportunity to design, develop, and fabricate reimagined versions of ordinary housewares. In addition to skills training and the income generated from the sale of the objects, the workshop serves a larger role as “a place where things are learnt through making; as well as physical craft, it is a space for social, imaginative and political making.” Simultaneously, with the launch of Dorchester Industries, Rebuild and Assemble highlight several approaches to transform the existing found resources, be they human, social, or constructed, into something that offers new life to the community. Theaster Gates suggests that citizens “be an alchemist in your community. In new hands, there is renewed possibility for the discarded and overlooked.” Alchemy has historically been considered a protoscientific approach to material culture. Many objects, from everyday artifacts to cultural artifacts, are diverse (Figure 7): glass slides from the art history department at the local university, vinyl records, volumes from a closed architecture bookstore, Ebony and Jet magazines, even tables made from local ash trees killed by insect infestation. That many of these represent important touchstones in African-American history and culture allows Gates to bring a dimension of critical social commentary to both his artistic and community building practices. The embedded cultural and historical identities associated with these objects distinguishes this alchemical approach from the practice of upcycling, which relies more on trendy pastiche and perceptions of style. By specifically searching for and appropriating resources that resonate with people and place, and by applying the craft sensibilities he learned as a potter, Gates reframes and recombines these objects towards new narrative ends. This same repurposing approach is also applied to buildings, and increasingly, entire neighborhoods. This increase in scale allows new opportunities to rethink long-held institutional and societal typologies.
At the Stony Island Arts Bank, the very notion of “bank” is recast from a repository for money to a repository for culture. The transformation of a vacant building from a symbol of blight to one of community amenity highlights the power of reappropriation and alchemical thinking to engender new value in members of a community (Figure 8). Authenticity is a product of time and specificity, and developing objects, buildings, and programs out of the existing fabric allows members of a community to feel they have a voice in the change taking place around them. This externalizing of the metrics of success and value beyond the object to people and place marks an important difference between expanded notions of craft and the more internally-focused metrics that typify more traditional craft pursuits.

The process of recontextualization can be a powerful tool for developing new perspectives arising from the intersection of context, framing, and narrative. The intentional reframing of traditional notions of “house” has been an important thread in Assemble and Re-build’s social practices. When Theaster Gates names buildings Archive House, Black Cinema House, and Listening House, he is deliberately upending our understanding of building typologies and using symbolism to drive new forms of engagement with those objects and their contents. These recontextualized structures can now participate in the revitalization of a place. By “announcing itself as an amenity,” a house can add new touchstones to a community’s sense of self-worth and cultural identity. Assemble pursues similar ideas of typological symbolism in Granby, though towards different ends, when they recast a roofless brick house as a glass-enclosed winter garden (Figure 9). Here, transforming a derelict residence into a greenhouse deliberately references the urban gardening efforts that helped residents first begin to reclaim their neighborhood. The house and garden are deliberately reframed as symbols, signaling a desire to make “permanent the stuff that the local residents were doing on the streets for so many years.”

Both practitioners are intentionally flipping traditional architectural typologies on end to drive new types of engagement. In Granby, the typical arrangement of house in a garden is flipped in favor of a garden in a house. Back in Dorchester, a building goes from one type of consumption [neighborhood candy store] to a new type of consumption [cultural center]. Both practices use questions of identity to guide their efforts, with Gates drawing specifically on African-American cultural memory and identity, and Assemble focusing more on collective historical memory of place.

The belief that creatively acting upon objects and buildings can have symbolic, transformative effects positions Gates and other socially engaged practices in the realm of critical conservation. Critical conservation traces its roots to the work of Italian art historian Cesare Brandi’s 1963 work, the Theory of Restoration, in which he argued for an alternative to historic preservation practices focused only on rigorous restoration of art and architecture. As a movement, critical conservation offers an alternative to narrowly-defined modes of preservation that “presume the permanence of architecture and use top-down regulation to reinforce existing power structures.” It seeks to address issues of [inequity in the built environment by considering these questions through the lenses of context, identity, and culture. In his exhibit at the National Gallery of Art entitled The Minor Arts, Gates “reorients the world around us, placing invisible labor, forgotten stories, and overlooked craft at its center.” Reimagining the slate roof of a decommissioned church or the gym floors from closed neighborhood schools as works of art brings forgotten narratives to the forefront, highlighting marginalized communities and giving them a voice (Figure 10). In Dorchester, the creative reuse of buildings and repurposing of found materials results in architecture that resonates in an in-between state—neither restored nor demolished, but rather, adaptively repaired. These new cultural institutions take on meaning for residents by simultaneously celebrating past grandeur, acknowledging recent blight, and offering new opportunities for positive impact in the future. Writing in 12 Ballads for Huguenot House, Gates summarizes his position: “If the monument has the right to live by virtue of its title as a monument, then I will engage the
beauty, and art.”

in the architectural and urban works that constitute the Dorchester projects. By elevating humble materials and processes to the level of monument, he is specifically calling on us to challenge our understanding of these objects and places and consider the role of racial and communal identity and agency in our built environment.

CRAFT AS PRAXIS — EVOLVING PROCESSES, RE-THINKING OUTCOMES, PRACTICE FUTURES

In considering the role of expanded craft methodologies in the work of Assemble and Rebuild, a number of interdependent themes emerge that posit new directions in architectural practice. These include the integration of new architectural processes—including embedding diverse voices, identify and leverage existing resources, and think beyond the building to processes as the “contents,” new types of economies (social, cultural, or political, and neighborhood empowerment and individual agency. Furthermore, the expanded scope of these practitioners also highlights the need to reconsider the organizational and financial hierarchies that govern our work as architects.

The need to be embedded in the communities with which they work is an essential modus operandi for the members of Assemble and for Theaster Gates and the Rebuild Foundation. Time spent on the ground living, working, and laboring alongside members of a local community identifies a group of designers who are more interested in collaboration than dictation. In addition, more time spent immersed in a place affords a deeper and more nuanced understanding of the dynamics at play, resulting in outcomes that are more aligned to the long-term needs of the community. And though both Gates and Assemble are now increasingly active in a variety of communities, their desire to bring together diverse voices, identify and leverage existing resources, and think beyond the building to processes and systems allows them to operate with the same level of effectiveness in other locations. And regardless of whether they are working in their home community or in one further afield, a belief in the power of working incrementally has proven successful for both practices.

Thinking about the revitalization of place as a series of smaller, incremental, and opportunistic interventions over time positions this mode of working in direct contrast to the top-down, move everyone out, demolish and rebuild strategies of urban renewal which have failed under-resourced communities time and again. A measured approach to revitalization allows residents to remain and grow in place, helping to counter tendencies towards gentrification. Incrementality also privileges different ideas and diverse voices in the process of rebuilding, resulting in a collective process grounded by individual participation. The compelling narratives that emerge from these community practice methodologies have likely also contributed to the success of both Theaster Gates and the members of Assemble in the international art world.

The development of expansive processes that privilege inclusiveness and collaboration requires another key role observed in the work of Rebuild and Assemble: that of the architect as curator. And not just curator of objects but of people, skillsets, disciplines, ideas, businesses, programs, and policies (Figure 11). While the role of the architect has always included notions of curation, it is typically deployed towards the end of a project as a means to gather support around the architect’s singular vision. In contrast, for socially engaged practices, curation is applied early as a tool of empowerment designed to diversify the visioning for a project amongst many contributors. Implicit in this approach to curation is the need to embrace something that is typically anathema to design and construction: ambiguity. In their guide to ethical redevelopment, Gates and his team refers to this as the “indeterminate,” suggesting that you “believe in your project but resist believing there is only one path to achieve it.”

Assemble, the sharing of authority in a project is about trust, and the belief that a truly collaborative process means no one group can possess total control over the outcome.29 This sharing of responsibility actually makes for an architectural practice that is more reactive to the needs of a project.30 A reconsideration of the processes of architectural practice must also include a rethinking of the possible outcomes for these new approaches. In the Granby Workshop and the mission of Dorchester Industries, we can identify an essential role for platforms. When Gates avers “don’t just create the thing, create the thing that makes the thing,”26 he is calling out the power of platforms to open new horizons for architects to have impact beyond just the design of a building. Approaching community revitalization in this way allows architects to engage in problem-definition as well as problem-solving, increasing the scope of design thinking into the realms of economies, governance, and policy. And though they are trained as artists, designers, and architects, by curating a collaborative team with diverse skills and knowledge, these practitioners are able to compensate for their own particular blind spots and venture into territories traditionally deemphasized.

The ultimate outcome for spatial practices pursuing socially driven work is to effect ethical change that helps revitalize and dignify people and places, to facilitate change that leverages existing resources towards the recreation of social, cultural, and economic value for the neighborhood and individual agency for its current residents. The hardest part of this work is rectifying the challenge is not just to renovate a few houses but to create the mechanisms that will facilitate sustained economic redevelopment. In Granby, this has meant the development of products, training programs, communal activities, and even a publication that helped the residents lobby the local government for the right sort of investment and ownership in the neighborhood.

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Many of the ideas articulated here run counter to the entrenched systems of liability, procurement, client services, financing, and project delivery that shape nearly every aspect of our profession. For willing practitioners, the ability to embrace both the ambiguities and possibilities inherent to this work means an expanded field of potential clients and innovative new architectural outcomes beyond the more normative development-driven models. A portfolio with more diverse project types has also traditionally offered resistance to the inevitable boom-bust cycles of the economy, suggesting that this work can satisfy a designer’s desire both for impact and for income. Practitioners face numerous challenges when taking on socially engaged community-driven work, especially in terms of financial compensation and organizational structure. Theaster Gates makes a living as an artist and university professor, and the projects of Rebuild and Dorchester Industries are supported by a combination of external grant funding, institutional and corporate partnerships (including Gates’s employer, the University of Chicago), and private donations. Assemble is organized as a collective with a flat hierarchy, where members contribute to projects on an as-needed basis. The firm’s operating model is designed to support their desire for both commissioned and self-directed projects. Design fees are used to pay those members who contribute to a particular project, (2) support basic operations, and (3) as capital to develop self-directed works. While this attempt to codify a financial and organizational structure offers a good start, many members contribute to projects on an as-needed basis. The work of Gates and Assemble are compelling when viewed through the lenses of personal narrative, art, craft, and design. But as they and others expand their practices into territories of cultural programming, social equity, urban planning, economic development, job training, and public policy, new methods of evaluation are required. These metrics can be qualitative, focused on perceptions of empowerment, agency, and other social and behavioral questions. There are also opportunities to invoke quantitative assessments that measure changes in income, employment, land value, crime statistics, and other health and economic outcomes. Regardless of the assessment instrument, it is essential that success not be defined in terms of the outputs of a project, but rather the “impacts those outputs create.”

Finally, it is important to consider the particular contexts of our example practices in relation to the strategies that they have deployed. Both Granby and Dorchester are underserved areas marked by disinvestment and vacancy, well beyond the margins of real estate development and market-driven capitalization. As the crisis of affordability in cities becomes more acute, it is likely that the expanded strategies and futures identified here will need to be further evolved in order to meet the needs of places shaped by intense real estate speculation and development as opposed to blight and distress.

A CALL TO ACTION

We might begin a reconsideration of the fundamentals of architectural praxis by taking a page from our two protagonists. Let us expand our thinking about what constitutes the core of architecture to include the complex processes, players, and systems which govern our work. We can advocate for, and apply our creative faculties towards, the reconsideration of outdated procurement models that privilege simplistic, top-down solutions to challenges better served by incremental solutions derived from collaborative engagement. This cultivation of an expanded domain of architecture would bring with it new clients with increased scope and fees. As a profession, we should be working to redesign our contracts so that they balance the need for risk management with the creative possibilities inherent in more fluid and collaborative team structures. Less fear of liability would mean more room for architects to expand their practices in new directions, taking on non-traditional clients, projects, and challenges outside of just buildings. Given mounting environmental calamities, and the fact that these changes disproportionately affect those whom we purport to serve as socially engaged practitioners, we should be applying systems-level design thinking to the large-scale, upstream processes that yield our building materials and drive labor practices in the construction industry. This would help return architects to the forefront as gatekeepers for our built environment, as opposed to increasingly marginalized generalists competing for fees with specialized consultants. And finally, if we are truly interested in fashioning new architectural futures and addressing the structures that contribute to inequality in our built environment, spatial practitioners must actively pursue seats at the tables of governmental, institutional, and economic power. This will help to realign the profession of architecture from a reactive position focused on creating answers to more proactive one focused on asking the right questions at the highest levels.

The work of Rebuild, Assemble, and others who pursue socially engaged spatial practices offers a guide for architects seeking a renewed sense of their own agency and new ways of addressing equity and justice in the built environment. Given the challenges we face, there could not be a more critical mission for architecture. And as Mrs. Dixon noted, the resources are already there. *
This essay examines three recent buildings to demonstrate how reliance on craftsmanship, modern materials, and poor detailing lends itself to failure, regardless of style. Each case study in twenty-first century architecture represents a different stylistic paradigm. Frank Gehry’s 2004 Stata Center is a recent attempt to reconcile deconstructivist monumentality with post-modern historicism. Moshe Safdie’s 2006 Jepson Center is a rare abstract white neo-modernist building in the historic city of Savannah that emphasizes the formal arrangement of geometric volumes within a confined urban plan. The final case studied is by local architects in Savannah: the 2015 Turner Prize-winning Oblique Escobar Castrillon (ed.), “Introduction,” no. 1 (2016): 4–5.

Patrick Haughey

ABSTRACT

In S, M, L, XL, Rem Koolhaas gives credit to the technologically advanced and speculative: how Assemble’s Granby Four Streets won 2015 Turner Prize, Culturing Culture, November 27, 2016, accessed December 30, 2017, http://www.turnerprize.co.uk/blog/posters...

Caulked: Details, Style, and the Aesthetics of Impermanence in 21st-Century Design

Patrick Haughey

CAULKA: DETAILS, STYLE, AND THE AESTHETICS OF IMPERMANENCE IN 21ST-CENTURY DESIGN

Patrick Haughey

A CRISIS OF CRAFT, FROM RUSKIN TO FRAMPTON
calculate only the co-operation of inferior men, to think for them, to indicate for them such expressions of your thoughts as the weakest capacity can comprehend and the feeblest hand can execute.17 In this sense the craftsman is weak. On the other, Ruskin insists in The Seven Lamps of Architecture that the result of good craft and honest materials is the soul of architecture. In the 'Lamp of Truth' he writes: 'Touching the false representation of a material is... utterly base and inadmissible.'18 What he wrote in his description of 'Workmanly Admission' has direct bearing on this essay:

'[Workmanly Admission], of course, though right within certain limits, is wholly uncritical, being as easily satisfied with worst as with the best building, so that the miter be laid smoothly... and every building whose excellence consents merely of the proportion of the masses is to be considered nothing more than architectural degeneracy or a rhyming exercise.'

Following John Ruskin is William Morris. While the devout Christian Ruskin was critical of industrial modernity and crusaded for a nostalgic return to a moral Gothic style as a form of politics, his influence on Morris formulated a more pragmatic and socialist response. Morris focused not just on the evils of industrialization, but on the value and pleasure of work. He also insisted that finely crafted and well-made objects would last but on the value and pleasure of work. He also insisted that finely crafted and well-made objects would last. For Morris, handmade objects could only be worthwhile if they were made by people who were willing to pay the "fair" or "just" price of the labor needed to create work of lasting value. Therefore, if people could improve their taste, they would choose to pay the just price on one long-lasting piece of furniture or object rather than on a cheap, replaceable piece of furniture.11

A few decades later, this idea of price and work as craft was largely abandoned, and the mass production of materials was no longer seriously questioned, as those materials were new embedded in the origin myth of modernism. As J.M. Richards writes in An Introduction to Modern Architecture (1940): "Much of the uneffectiveness of modern architecture is due to new materials that have become available during the last half century."19 And Frank Lloyd Wright believed that any fault in architecture is not from the use of materials, but from the designer.20 In the postwar area, this inability to escape mass production has become a curse. Kenneth Frampton, in his polemic essay on Critical Regionalism, insists: "Modern building is now so universally conditioned by optimized technology that the possibility of creating significant urban form is now limited."21 Frampton was referring to capitalist production systems and land use, yet also to the standard kit of parts with which architecture is now built.22

The three case studies in this essay prove Wright's critique as well as Frampton's first point through the use of the standardized universal caulking detail combined with modern construction. However, by proving the first point, they will also disprove his last. All three architectures are radically different in style, form, and urban setting. They have repeated the mistakes of Morris and Ruskin, who also believed style was an antidote to the curse of industrial modernity. Frank Gehry's Stata Center is a collage of deconstructivist fragments in a vast collection of modern buildings on the MIT campus that is, in many ways, an intra-urban enclave between the cities of Cambridge and Boston. Moshe Safdie's modernist Joggan Center, and the neo-traditionalist Cay Building, are both confined by the Ogilvethorpe plan and restricted zoning laws of Savannah, Georgia. While all three are different in style and urban setting, they are all failing due to a shared universal technique of construction that replaced detail and craft: caulk.

CAULK: A BRIEF HISTORY

The word caulk itself is ancient, and in its myriad translations is about sealing gaps, such waterproofing a boat. Biblical Noah "caulked" his with bitumen. Pliny referred to calcur when describing the technique for applying cement in the rinses. A medieval craftsman known as a "cauker" drove oxen into the gaps in a ship and then finished the waterproofing with hot pitch.23 The advantage of this system is that, while this process had to be repeated periodically, its ability to expand allowed the planks to swell and shrink with moisture and temperature. Most caulking systems used for buildings in the past decades are still widely used today. The history of silicon can be traced to the French chemist Berzilius, who is the last author inscribed on the facade of Labrouste's masterpiece, Bibliothèque S. Genevieve. In 1824, Berzilius first discovered silicon when he reduced potassium fluorosilicate with potassium. Reacting this with chlorine created a volatile compound known as tetrochlorosilane. In 1863, Frie-del and Craft synthesized the first silicon compound tetraethylsilane. In 1871, Ladenburg discovered that diethylidihexylsilane, when reacted to a mild acid, created an oil that could withstand high temperatures. During the early twentieth century, Kipping began to develop a system to prepare a number of silanes that yielded large polymer molecules. In the 1940s, Hyde of Dow Corning demonstrated silicon's thermal stability and resilience to electricity, while Rechow of General Electric invented a method to produce it using methyl-chlorine. Most contemporary silicone is a category of synthetic polymers connected with oxygen bonds with organic methyl groups along the chain, known as poly methylsiloxanes (PDMS). In the 1950s, polychlorinated biphenyls (PCBs) were introduced into building materi-al such as elastic sealants, caulk, grouts, and paints, as well as flame retardants in coatings of acoustic ceil-ing tiles.

We now know that the airborne decay of PCBs has an adverse effect not only on the environment, but on the health of children, pregnant women, and the elderly. Although most countries banned the use of these in the 1970s and 80s, their structural stability ensures they will persist for decades, particularly in the interiors of buildings.24 It is weak-ened the ability of architecture to remain resilient, it can also damage older buildings restored to meet con-temporary building codes.25 The residual process used to make caulk out of its organic compounds, regardless if the sealant is silicone or the cheaper polyurethane, leaks out as it deteriorates, damaging and staining tile, wood and glass. What is more, in the hours after it is applied it emits three toxic compounds: ketene, alco-hol, and ester.26 Polyurethane sealants became common for facade construction and window applications in the 1950s and 1960s with the curtain wall.27 The chemical durability and flexibility of silicone and polyurethane sealant compounds is why it is used in aerospace, medical, and construction industries. Yet most applica-tions, despite the durability of silicone caulking, par-ticularly in buildings, use polyurethane-based caulk, as is half the price of silicone-based sealants. While it is easy, cheap, flexible, and waterproof when applied, polyurethane sealant begins to fail due to sunlight and weather only five years after application. Silicone seal-ants are less likely to deteriorate under sunlight, and under ideal conditions can last more than a decade. Yet both types of sealant begin to lose flexibility quickly, which impacts the penetration of water. Instead, "while sealant products are, typically, resilient to weathering, they are significantly less durable if inadequately considered in design."28 All sealants used on "[m]ulti-story concrete structures and to a lesser degree steel structures shorten elasticity due to the application of loads."29 Concrete shrinks as it cures, stretching the sealant and forcing it to crack, no matter the form of the caulk inserted into the joint, while steel bonds. The most common form of sealant failure is structural, due to heat in the summer, as well as movement of weather only the materials.30 The form, width, and depth of the joint can also matter, depending on the application.31 When was the last time an architect actually designed the caulk joint? Therefore, both types of caulk deteriorate not only due to exposure to variable weather, but also because of the very materials that contemporary archi-tecture so proudly uses.

To examine the impact of the use of the caulk joint, three distinctly different architectures, all built in the recent past, were chosen for this essay. Despite their bold styles and the presence of two well-known architects, all three buildings are fail- ing for precisely the same reason: poor design craft.

FORM AND FAILURE AT FRANK GEHRY'S 2004 MIT RAY AND MARIA STAITE CENTER

How does a $300 million building, designed by one of the great architects of our time, become incomprehensible and dangerous? To understand how a prominent architect like Frank Gehry was hired to design the 2004 MIT Ray and Maria Stata Center, it is important to return to 1945, with the arrival of Eisenhower's science advis-er Killian as the president of MIT. Killian had a bold vision for the institute after the war. He insisted that science and engineering be united with humanities, archi-tecture, and social sciences.32 An ardent Unitarian, Killian believed that the life of the mind must also be
sustained by the life of the spirit. He relocated the architecture school from across the river and invited the Finnish modernist Alvar Aalto to teach in what had been a Beaux-Arts architecture program, influenced by the architect of the new 1912 campus, William Bosworth. Unlike at Harvard, where the arrival of Walter Gropius merely changed the classical architecture program, Killian believed that the architecture of the new campus should support the unifying mission of the institute. Following Aalto, Eero Saarinen, I.M. Pei, Fumihiko Maki, Charles Correa, and Steven Holl were all invited to add to the campus in order to fulfill Killian’s evolving vision.

Given Frank Gehry’s success with the Guggenheim Museum Bilbao, it was perhaps inevitable that the architect would be added to the collection. Then-president Charles Vest, despite the invitation of twenty architects, wanted a Gehry. The design for the Stata Center was a collaged vision of Gehry’s signature style, with bent brick towers and metal clad volumes meant to signify the merging of cultures and technology (Figure 2). Gehry claimed the building “reflected the culture of the people inside it.” Its spatial complexity was celebrated as an apt metaphor for the twenty-first century. Yet swiftly after its construction, problems began to show. Vest retired in 2007, and MIT sued the architect, who had been paid $15 million, as well as the construction company Skanska. MIT specifically cited “design and construction failures” on the Stata Center project that resulted in “masonry cracking” and “poor drainage” at the outdoor amphitheater, “persistent leaks,” “sliding ice and snow from the building,” and “mold growth.” Skanska referred to design issues, claiming the architect ignored many of their suggestions. The architect responded in an interview with the New York Times: “A building goes together with seven billion pieces of connective tissue. The chances of it getting done ever without something colliding or some misstep are small ... I think the issues are fairly minor.” However, according to former Boston University President John Silber: “Gehry thinks of himself as an artist, as a sculptor. But the trouble is you don’t live in a sculpture and users have to live in this building.” Regardless of Silber’s opinion, this essay does not discuss the merits of architecture as art, but rather the craft of building. Since the beginning of the Stata Center’s construction, when I was a student at MIT, I have been documenting its deterioration due to weather and flawed construction. Despite the critical acclaim it received for its ingenuity, the building is a prime example of the reliance on sealant to fill in for the failure of design. Entrances often have to be closed due to snow loads and ice in the winter. The drainage system on the inhabitable roof is not only angled improperly, it is clogged with vegetation and mold. Furniture on the difficult-to-access terraces is rusting.
and lead to visible cracks on painted walls and ceilings of interior fit poorly over the twisting steel structure plastering that create the ever-changing experience find without a guide or repeated trips. Drywall and the and classrooms and labs that are nearly impossible to Center is also a baffling building to traverse, with stair- equipment (Figure 3a). While many critics celebrate danger the safety of both students and million-dollar Negligent exterior design has led to leaks that en- 76 77 Figure 5b: View of the Jepson Center from Telfair Square. Photo by the author. structural issues that are unmasked by the reliance on caulk. TWO ARCHITECTURES, ONE HISTORIC CITY: MOSHE SAFDIE’S JEPSON CENTER AND THE CAY BUILDING IN SAVANNAH A brief review of the Oglethorpe Plan that governs his- toric Savannah is necessary to understand the mass- ing of both the Jepson Center and the Cay Building. In 1733, Governor General Oglethorpe arrived on a high bluff on what is now the Savannah River with 113 peo- ple and a ship full of slaves and marines from Charles- ton. Over the next few years, a town was carved out of a forest adjacent to a Creek village, laid out on a grid and divided into wards. Each ward was itself divided into tything lots for landholders and trust lots for civic use and the Trustees (Figure 5a).

Little of Savannah’s architecture survives from the nineteenth century or earlier. What has been saved is carefully curated for Savannah’s bustling heritage tourist community. However, the plan of the wards and lots is largely intact, if now paved over and redesigned in the past decades into Savannah’s famous squares. The Moshe Safdie Jepson Center and the Cay Building are both recent insertions into the original four wards. Despite stylistic differences, both were accepted based on their formal arrangement within the plan. These two architectures demonstrate that, despite highly re- strictive historic and aesthetic zoning, formal arrange- ments are largely irrelevant in the absence of proper design and use of materials.

Throughout the late 1990s, the Telfair foundation be- gan acquiring property for a new museum, acquiring most of the land on the southeast tything lot of one of the original four wards (Figure 5b). St. James ward was laid out in 1733. In 1883, Mary Telfair, the last heir of a prominent Savannah family, including the former colonial governor and slave owner, transformed the 1819 house into the Telfair Academy of Arts and Sci- ences. The square was then renamed Telfair Square. The northwest tything held, among other things, a stone quarry as well as apartment housing, some of which dated back to the late nineteenth century. In its original configuration, it held small residential houses followed by slave quarters and housing for segregated black residents. The new property was made possible by a sizable donation from local residents Alice and Robert Jepson, Jr. 2, 3 The architect chosen after a long search process was Moshe Safdie, who worked with the local firm Hansen Architects. Safdie visited Savan- nah a number of times, sitting in the square reading the popular fiction novel Midnight in the Garden of Good and Evil. He watched the sun rise and set over the fu- ture site. Yet his initial design was rejected for being too tall, according to the Historic Savannah Foundation and Historic Review Board, and therefore not scaled to the square. The height had to match the tall buildings on the east tything lots, despite the existence of majestic taller buildings on this square in the past.

The height limit in Savannah’s historical district began with the 1948 demolition of a warehouse adjacent to City Hall on River Street for a new hotel and apartment complex. In the crucial meeting, a member of the His- toric Savannah Foundation (which supported the new building), insisted that no new buildings should exceed the height of the cornice on Witcover’s 1904 City Hall, in order that its prominent dome remained visible. The hotel, now a Hyatt, was then bent in half over River Street, creating a dark and still unhappy space. This was an arbitrary decision, since five towers, dating from 1908 to 1922 and exceeding ten stories, existed one block south in Johnson Square. Three of which had been subsequently demolished, while two remain to- day. Yet the new height limit has had devastating con- sequences throughout the Historic District to this day, forcing everything from new hotels to massive park- ing garages to spread outward, demolishing what little survives of the historic building fabric of the original wards. Subsequent zoning laws have restricted new designs to the height of adjacent buildings, regardless of whether taller buildings had previously existed. The strict building codes that now govern historic Savan- nah also enforce the aesthetics of the building. The Je- pson Center was the first building approved that was exempt from the latter part of the new codes.

No square was arguably more devastated than Telfair Square. Prior to the purchase of the last relatively intact southeast tything lot for the Jepson Center, the square was already irrevocably transformed. In 1980, two trust lots on the east side of the square, and a tything lot to the southeast of Telfair Square were cleared in or- der to make room for the Juliette Gordon Low office...
buildings that would house about 1,000 employees of the U.S. Army Corps of Engineers, Internal Revenue Service, Social Security, and nine other federal agencies—offices that had been located all over Savannah. If it were not for the height limit, the 173,000-square-foot complex by Hugh Jacobsen could have taken up far less space. Despite some hesitation from the Historic Savannah Foundation, they agreed with the demolition of two late nineteenth century commercial buildings on the site: the 1869 majestic Holmly Building, by prominent local architect Alfred Eichberg, and the 1899 Union Society Building by Boston Architect William Preston, both of which were tall buildings. The design also called for the removal of the 1821 Samuel Bryant House bounded by Oglethorpe, Barnard, Whitaker, and State Streets (122-124 Oglethorpe Avenue), a Federal Style red-brick structure with three stories on a basement, one of the last of its kind in Savannah.

Safdie, in reaction to the Historic Review Board, extended the new Jepson Center to Oglethorpe Street to match the height of the Low building. This also required the demolition of historic buildings to the north. In 2006, the Jepson Center was finally finished. The essence of the Safdie design was bold white volume with light slashing through the space, at an angle on the two Barnard Street corners (Figure 6). It was celebrated when it first opened, not only for its bold and bright design, but also for the new modern exhibitions on art and music. Despite its popularity, and its presence as the only real example of modern avant-gardism in the Historic District, the building has not fared well. The thin, porous paneling made of Portuguese limestone that hangs on the steel structure is not only falling off, but it is also stained from exposure to the humid climate and failing caulk joints (Figure 7a). The sealants on the roof deck have also failed, causing water to run down behind the panels. The massive caulked joints for the multi-story glass façade have been infected with mold since they face north and never get direct sunlight (Figure 7b). The diagonal slash pointing towards the square is impossible to clean at a higher elevation (Figure 7c). The forced bridging of the lane has awkwardly split the internal organization of the collection and created more surface area to fail, as the stone cladding gives way to cheap panels. Finally, the design celebrates what looks like a corner entrance on the corner of Barnard and Oglethorpe; however, a sign has to direct visitors around to the entrance on the square (Figure 6). After $25 million, and just more than ten years after Savannah’s various agencies barely permitted a modern building in the Historic District, it is already failing in the difficult coastal climate, not because of its celebrated modern formalism, but because of a combination of arbitrary urban decisions, poor material choices, negligent execution, and reliance on caulk for all of its weather proofing and attachments.

In 1954, despite its most profitable year ever, the city of Savannah demolished the graceful 1872 City Market building for a parking garage. During the 1990s, as the 50-year lease began to expire, the city commissioned a number of studies that proved that returning the market to the square would bring economic benefits. Instead, from 2006 to 2010, they decided to bury the parking garage at a cost of $25 million. In the rush to complete the square, and without significant oversight, the hasty hole swiftly went over budget and damaged the historic fabric that remained on the northern tything and northeast trust lots. The city was sued for $15 million, bringing the total cost of the buried garage to about $3,000 per resident of Chatham County, not including interest on the bonds. The south tything lots and the northwest trust lot on Ellis Square were cleared for parking lots in the 1960s, providing an opportunity for a new building (Figure 8b). For this building, caulk is not only used as a sealant, but also to disguise its modern construction with historic details. Yet the use of ornament does little to improve the façade aesthetic. The Cay Building was completed in 2010 by the architecture firm of Smallwoods, Reynolds, Stewart and Stewart, along with local firm Sotile and Sotile, in what has been described as a “neo-Palladian palazzo style.” In contrast to Safdie’s Jepson Center, the Cay Building was allowed to exceed the height limit due to the requirements of the Federal Government as well as the Review Board’s approval of its neo-traditional design, with the belief that the façade aesthetic was more in keeping with Savannah’s character. However, the Cay Building is a steel structure, with cast concrete neo-Palladian elements and thin bricks attached with hangers and caulked in place. (Figure 8b) For this building, caulk is not only used as a sealant, but also to disguise its modern construction with historic details. Yet the use of ornament does little to improve the building’s economic or environmental performance, as the sun hits the façade most of the day. Not only does this building not match anything in the city that could be offered as a precedent, it costs taxpayers money with the expense of hiring façade consultants, and the maintenance of its already deteriorating details. Despite its recent construction and traditionalist cladding, it is failing for the same reasons as the Jepson.
This world so full of war and woe.
It is most to see—to know
RESISTANCE
DETAILS MATTER: TOWARDS AN ARCHITECTURE OF
(Figures 9a and b).
Center and Low Building, one square to the north: the
the constraints of capitalist production. Perhaps there
be more expensive, but dangerous.
three cases above demonstrate that the reliance on
(Frampton) but without attention to detail will fail. The
built with “universally conditioned optimal technology”
Aalto buildings at MIT, for example—almost everything
for longevity, and ultimately resilience. Craft is not just
unwillingness to confront this dilemma in skill and ma-
ture. The caulked flush joint for aesthetic smoothness
and weather-resistance, and the ability to glue parts
to a building for stylistic cues, is expensive to main-
tain and, ultimately, destined for failure. Better details
are needed to preserve our resources and ensure that
new construction can stand the test of time. This es-
say is dedicated to the idea that future architects, de-
velopers, planners, and builders must think carefully
about their responsibility to build with longevity and
resilience, given our precarious future in a resource-
constrained world. *

ENDNOTES
1. As quoted in “Exploring the Unmaterial World,” Wired (June 1, 2008). https://
www.wired.com/0806/06/koolhaas-02. I tended the article begins with the idea that
for Koolhaas the enemy is mortar and brick. Since next brick today is in a thin glued
veneer, perhaps has a point.
2. “Because of a tight budget, many of the building materials are cheap, and
some haven’t worn well.” As quoted in “Why is Rem Koolhaas the World’s Most
archdaily.com/626658/why-rem-koolhaas-the-worlds-most-controversial-
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koolhaas/2017-07-31. Of course, as a historian, this is arguably the biggest
inconsistency in the test of time—the above-mentioned Saarinen and
which brings us back to Morris and paying just price
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is important to note that the complexity of capitalism and design was not without
criticism, so much that it was ignored. See Frailly Scott, “A Vital Bearing on Social-
ism,” in: M. Architecture or Techno-Space: Politics after Modernism (Cambridge,
MA: MIT Press, 2007), 21, where she notes that “Capitalism influenced only the
’syle of the machines.”
15. See also Kenneth Frampton, Studies in Technic Culture: The Politics of Con-
Frampton here has abandoned his critique of capitalism in an attempt to rescue
architecture through its details.
17. As quoted in “Exploring the Unmaterial World,” Wired (June 1, 2008). https://
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20. Ernest Weekley, “English ‘Ca(u)lk,’ French ‘Calfater.’” T
he Modern Language
Journal of the History of
80
81
16. Ernest Weekley, “English ‘Ca(u)lk,’ French ‘Calfater.’” T
he Modern Language

32. As quoted in Ibid.
33. John-Silber is an interview for the Boston Globe, as quoted in Ibid.
34. The research for the remainder of the article was originally completed by the author as well as architecture and historic preservation students with help of Luciana Spracher, the Director of the Savannah Municipal Archives, for a May 2016 exhibition for my SCAD architectural history course, Interpreting and Documenting the Built Environment. Sources for the text came from primary sources found at the Savannah Municipal Archives as well as Robin Williams, buildings of Savannah, Society of Architectural Historians Buildings of the United States series (Charlottesville: University of Virginia Press, 2016). I was a co-author of this volume.
37. This research was conducted by my students in spring of 2016 and displayed in a public exhibition, “Savannah Squares: Lost and Found,” SCAD Architectural History Exhibition with the Savannah Municipal Archives, May 25, 2016, Cluskey Vaults, Savannah.
38. Robin Williams (ed.) (2016). 63-65. Local firm Sotile and Sotile consulted on the Cay façade and in the firms most engaged in aesthetic and historical consulting for the Municipal Planning Commission of Savannah. The firm was not only the architect of the 2016 SCAD Museum, pictured in Figure 1, partner Christian Sotile was also the Dean of the School of Building Arts at SCAD, and my boss, from Fall 2011 to Spring 2017. I was a co-author of the aforementioned book, however, my research was outside the historic district.
39. The Review Board and the city has never required an archaeological review of any site in the historic district and therefore tends to make its decisions not on historical significance but rather on aesthetic character in keeping with the development goals of the city. Savannah is one of the few historic cities that has no archaeological ordinance, thus hundreds of tons of debris are excavated every year and dumped down river without analysis. The Historic Review Board has only ever had a few professionals capable of making such decisions, including for a period the former director of SCAD’s preservation department, Jodie Beidler, and Robin Williams who is also the chair of SCAD’s architectural history department where I have taught since 2011. For this reason, Dr. Williams, who has studied Savannah for nearly two decades, disagrees with my assessment on the Cay Building and Ellis Square, as well as the nature of Savannah’s preoccupation with historicism and the height limit.
41. Tafuri (1976), 149.
Ashish Mohite is a researcher and doctoral candidate at Aalto University. His research topic revolves around the notion of craft in digital fabrication processes. Before starting his doctoral studies, he has worked, taught, and exhibited in India and Europe.

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THE MAKING OF UNDESIGNABLE TEXTURAL EFFECTS

ASHISH MOHITE, MARIJA KOCHNEVA, TONI KOTNIK

ABSTRACT

The present paper describes a series of experiments directed towards devising methodology on utilizing a 3D printer as a generative tool in design process. A method to manipulate G-code, an interface between digital parametric design and digital manufacturing, was developed in order to instigate emergence of textual patterning directly produced by the fabrication process. The fundamental approach of the research is formed by such principles of ‘digital craft’ as continuity between design and production through translation of algorithmic logic from stage to stage, integral involvement of an architect in all aspects of actualization, and an element of ‘risk,’ for the ability to modify production parameters converts a space of making into one of discovery that is resistant to totalizing control.

In order to achieve surface texturization, a manufacturing machine to act as a "making hand" in the design process. The significance of this research for architecture lies in its potential to make texture based on controlled variation into an object of design.

1. INTRODUCTION AND BACKGROUND

The discursive space of this research is formed by theories and concepts associated with the traditional notion of craft, and its contemporary reformulation into digital craft. Some elements of traditional craft, such as integral involvement of the maker/designer in all stages of design and production processes, are directly applicable to digital craft. Others are more open for interpretation, as illustrated by the profusion of definitions of digital craft with emphases on different aspects. The more relevant to this research is a definition coined by Branko Kolaric:

In design and production processes driven by digital technologies – digital making – craft is understood as a set of deliberate actions based on continuous, iterative experimentations, errors, and modifications that lead to innovative, unexpected and unpredictable outcomes, discovered in the intertwined processes of conception and production.

His stress lies in the premise that craft is inseparable from glitch, error, and unexpected results. This line of thought is an evolution of the idea of workmanship of risk developed by David Pye in relation to traditional craftsmanship, and it is roughly defined as "workmanship using any kind of technique or apparatus, in which the quality of the result is not pre-determined, but depends on the judgement, dexterity and care which the maker exercises as he works." Kolaric focuses on the generative potential of the risk factor to transform the space of making into one of discovery, whereas for Pye, while being a catalyst for experimentation, risk can lead to loss in quality and a disjunction between intention and execution. They are in accord, however, in arguing for a disciplined command of the craftsman over his craft. It can be argued that proficient judgement, and the dexterity developed by continuous and meticulous training in tools, techniques, and materials of traditional craft—namely, the mastery of the trade—is relevant to digital craft as well. In view of the relative novelty of CAM tools, we find ourselves in an exciting time of discovery and exploration just as we are realizing the importance of skill and control. The generative power and danger of an unwanted outcome, resulting in loss of material and time, is tangible. The medium through which an idea gets translated is a combination of digital geometry, machining parameters, and material properties. Drawing from Pye’s contentions, it could be argued that in order to exercise control over this complex set of interdependencies, digital craft has to be a regulated workmanship in which the intention is very clearly defined, the process is rigorously designed, and the outcome falls within a specified range. In this framework, the digital craftsman is an expert in CAD, CAM, and by extension, in certain material behaviors, structural systems, spatial configurations, and mechanical systems.

According to Fabio Gramazio and Matthias Kohler, "we are no longer designing the form that will ultimately be produced, but the design process itself." There is a readily available opportunity and instrumentality to design fabrication in rapid prototyping. By virtue of a continuity of algorithmic logic from CAD to CAM, with clear affordances and constraints, we convert geometric models into machining instructions, and converse, we base those models on machining variables. In Abstracting Craft, Malcolm McCuillogh suggests that this feedback loop between conception and execution allows for a seamless flow of controllable information: "Design prototypes become design specifications, then process models, then machine instructions." The above quote from Gramazio and Kohler implies that designing the design process is a prerequisite in the context of digital materiality, which is determined by digital logic and material logic reciprocally informing each other. If the process is fully controlled until the final stage, when fabrication machine processes material through an organizational algorithm, then that space truly becomes a locus of discovery and risk.

Compared to traditional craft, this general outline of digital craft therefore indicates a continuity of authorship: expertise in tools, techniques, and materials; continuity between design and production through translation of algorithmic logic from stage to stage; and an element of “risk.” The ability to model the production process converts the space of making into a rigorous space of discovery in which algorithmic logic and material logic communicate.

While different scales are at stake in different contexts of digital craft, this inquiry at this stage is concerned with surface scale and variation emerging at this level without affecting structure or form. Focusing on one level of resolution as a space of discovery allows us to limit the number of active variables and therefore control the process more effectively. Pye’s firm stance that creation and manipulation of texture is a "chief reason for continuing the workmanship of risk as a productive undertaking." provides a reinforcement of this seemingly reductive strategy. He saw texture as a manifestation of diversity, a system of progressive revelation of the object to an observer on approach. The short-range formal elements of texture are outside the control of design and in the space of convergence of material and digital logics, which makes texture a suitable problem for digital craft. Making texture has not always been a focus for digital technology, perhaps because existing technologies and materials did not allow architects to become masters of surface heterogeneities and claim texture in their design apparatus. With advent of CAM, it has become possible not only to design and produce textural patterns, but, through iterative processes, to achieve control over the overall textural effect and allow for local, predetermined variation to emerge.

The research presented in this paper strives to address a twofold issue: the first objective is to create textural patterning as a volatile outcome of digital fabrication, and the second is to uncover mechanisms of control that could be practiced by makers in order to utilize the full potential of existing and developing software and hardware as constitutive artifacts in design process.
with a set of constraining points as formwork led to rough irregularities like wrinkling, creasing, bulges—non-linear processual traces. MATSYS created a 3D-patterned surface that was a result of precise calibration of a limited set of design and production parameters juxtaposed onto the self-organization of two material systems. At the same time, physical forces were treated both as bounding and as constructing. Similar to Fisac’s work, P-Wall is irregular on the surface scale, and only the larger pattern is predetermined. Imperfection is allowed within the limits of the surface range of effectiveness. Formwork is outlined by a script that tested a set of points within a field to determine a pattern of constraint points based on the distance between them. The minimum and maximum distances were defined by the physical properties of plastic and flexible formwork, allowing gravity and surface tension to have a pronounced influence. These examples illustrate the generative potential of fabrication process manipulation in terms of the emergence of surface-scale effects. What usually is treated as a ‘glitch’ is instead seen as an outcome of interaction between material logic and machine logic during an iterative process of making. The ambition of this work is to further the understanding of these effects: what causes them, which parameters are involved, and what mechanisms of control can be utilized.

2. METHOD

The methodology of our research is experimental; a series of experiments were carried out aiming to produce controlled yet undetermined surface texturization by manipulating the G-code of a generic FFM printer. The desired outcome is a series of sets of slightly different instances, each set belonging to a specific category of effect. In order to determine whether each instance falls within regulated workmanship, or, in other words, if the risk aspect is generative and has not crossed variation was achieved through angle increase (Figure 2.1.2). Usually, stringing and looping are considered undesirable and erroneous; however, it was observed that these effects were systematic, and therefore controllable, as well as generative in terms of surface topology. Centering experimentation on G-code allowed us to keep attention on the interface between software and hardware; in addition, designing a performative G-code affords a number of potential iterations and is therefore capable of producing the continuous variation required to create a substantial range of effects. Addition and subtraction of matter to and from the surface are seen as textual deformations; a particular set of adjusted parameters, such as speed of deposition and tool path, in conjunction with gravity, are treated as the fabrication model, and undetermined surface variation that occurs spontaneously is embraced as the emergence of processual and material traces of craft.

2.1. RIBS

The interest in effects produced by stringing, which began to be perceptible in set 1.1, was further explored by extruding ribs 5 mm outwards in G-code. In these experiments, the number of ribs was 4, 12, and 18, and the angles were 30°, 60°, 120°, and 180°. Significant variation was achieved through angle increase (Figures 4.5, 6, 7). While the outcome was largely controlled, the 180° model (Figure 7) approached the limit of controlled variation in that it started to exceed the effective range of texture. It happened because each printing layer of the cylinder was rotated in relation to

2.1.1 Extruded Ribs

This set represents programming of the speed of deposition with disabled retraction. In G-code, lower and upper cylinder bases were subdivided into segments, the end points of corresponding segments were connected, and then the top base was rotated around the z-axis. At the points located on connecting curves, the printer was set to print with a speed of 400 mm/min, whereas the regular speed is 800 mm/min. A slower speed translates into a higher flow rate, so more material was deposited. Sequential densification of slower deposition points was employed, resulting in a ribbed pattern (Figures 1, 2, 3). At a certain point, between 12 and 24 ribs, clear boundaries between thicker and thinner surfaces were blurred and the printer started to fill the in-between space with fine filaments, producing minute variation throughout (Figure 3).

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2. MODEL SET 1. ACCUMULATING MASS THROUGH RIBBING

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the previous one, while ribs are perpendicular to each layer. When rotation, and therefore displacement, became too severe, each following layer of rib slightly shifted and lost support from below, causing a falling of matter downwards. Due to this push towards the untenable, the model's surface could no longer be determined as singular and continuous. In the model with 120° between lower and upper bases (Figure 6) there was still a ribbed surface, where ribs were additionally connected to the surface by strings; in the model with 180° (Figure 7), ribs gave out their regularity and linearity. That, combined with less than parallel strings, produced a dense space of webbed matter all around the surface of the cylinder.

2.1.3 INTERSECTING EXTRUDED RIBS

Further experimentation involved programming of intersecting extruded ribs as an attempt to see what kind of difference might result from the addition of geometrical complexity. The orientation of ribs clearly played a significant role, and juxtaposing a model with 1-directional ribs (Figure 6) against a model with 2-directional ribs (Figure 9) showed that opposite directionality of stringing filaments induced their merging in the center, which produced a branching superstructure. At this point, one more parameter was taken into consideration, namely the printing tool path (Figure 10). All preceding models were produced with default tool paths that amounted to printing the rib and cylinder surface continuously, while ribs were treated as secondary geometry and the printer “returned” to them. Adjustment of the tool path consisted in a topological split of geometry in G-script, so that one layer of the cylinder was printed first and then ribs were continuously printed in the same layer (Figure 10). The space between the ribs was filled with fine, candy floss-like directional filaments.

2.1 MODEL SET 2. SHEDDING MASS THROUGH RIBBING

In model set 1, the speed of deposition was decreased for ribs, while the surface of the cylinder itself was printed with regular speed. In the following cases (Figures 11, 12, 13, 14), speed of deposition for the ribs (Figure 9) showed that opposite directionality of stringing filaments induced their merging in the center, which produced a branching superstructure. At this point, one more parameter was taken into consideration, namely the printing tool path (Figure 10). All preceding models were produced with default tool paths that amounted to printing the rib and cylinder surface continuously, while ribs were treated as secondary geometry and the printer “returned” to them. Adjustment of the tool path consisted in a topological split of geometry in G-script, so that one layer of the cylinder was printed first and then ribs were continuously printed in the same layer (Figure 10). The space between the ribs was filled with fine, candy floss-like directional filaments.

2.2 MODEL SET 3. SHEDDING AND ACCUMULATING MASS THROUGH TESSELLATION

This set was based on the same principle as the previous sets, and a global effect of tessellation was attained by adjusting the speed of material deposition. All cylinders were offset inwards with a default value of 0.6 mm in G-code. For all the models, speed of deposition for the cylinder surface was 1600 mm/min, and speed for the indent areas was 1600 mm/min. Retraction range was reduced further to 0.6 to -0.6, the printer deposited less material and started retracting it as it moved to the next point, and therefore stringing occurred again (Figure 17). When the offset of the inner surface was increased to 2 mm and retraction was set to produce minimal stringing, indents turned into spaces bounded by linear filaments (Figure 18). An increase in layer height from default 0.2 mm to 0.5 mm led to a fibrous effect (Figure 19). We experimented further with the tool path adjustment in this set, and when instead of a regular arch-like tool path for the indent area it was programmed to be sinuous, a frilly effect emerged (Figure 20).

3. RESULTS

The experiments described in this paper lie within the scope of the practice of digital craft: the models are reproducible in terms of global effect and unique in terms of local variation, the process of design and production is seamless and controlled, and there is evident risk to discover or spoil through the translation into material object. Through design of machining instruction, a 3D model would typically produce a part with an indented surface that is smooth and visually appealing. However, in digital craft, the challenge lies in translating this concept into a physical object that retains the intended aesthetic. The experiments in this paper demonstrate how the orientation and arrangement of ribs, as well as the speed of deposition, can significantly impact the final outcome. By adjusting these parameters, the digital craft practitioner can create objects that are not only functional but also visually striking, pushing the boundaries of traditional manufacturing techniques.

areas remained at 400 mm/min, whereas the cylinder surface was printed at 1600 mm/min. As retraction was still disabled, material continued to pour, filling the space between the ribs with porous, semi-directional matter. The action of thinning of the cylinder's surface resulted in ribs becoming more pronounced as structural elements.
printer becomes a generative design component. Research is beginning to accumulate data on the interdependencies between specific parameters, their manipulation, and the resulting textural deformations. A clearer understanding is gained regarding the moment when manipulation of G-code leads to structural failure; for example, it occurs if the amount of deposited material exceeds layer height, or when the retraction range is too small. The first experiment with the tool path demonstrates that a topologically discrete geometry in G-code is translated into an indiscrete printed model, and the topological difference is translated through a change in 3D textural effect.

Geometric parameters—for instance, the number of ribs, the angle between lower and upper cylinder bases, the amount of extrusion or offset, and fabrication parameters such as speed of deposition, retraction, tool path, and layer height—inform each other. This research tries to meticulously design a system of relationships and then embody it materially, with the resulting material object bearing traces or effects of the process of making. Effects which occur include: stringing, webbing, porosity, frilling, fibrousness, knotting, nodosity, and others. We think it is important to study how to make these effects, because it brings us closer to claiming texture into the architect’s design apparatus. The techniques presented here are more than a traditional surface patterning or panelling tool, for it is based on controlled continuous variation, it is a 3D articulation even though it occurs on a small scale, and the effects produced cannot be designed; they are a by-product of the process.

If this research were translated to the scale of architecture, it could be integrated into the currently developing process of 3D printing concrete walls. It could also be employed in the manufacturing of façade panels out of a range of materials. It is a relatively simple and inexpensive way to produce an additional layer of definition in a building. At this time, however, the study is in its early stages, and in order to develop it into a comprehensive method, research will continue to focus on the shedding and accumulation of matter through techniques of tessellation, weaving, and bundling. Simultaneously, the experiments presented in this paper (and further ones) will be reproduced using different printers and materials in order to carry out a detailed study on the role of material composition and behavior.

**ENDNOTES**

INTRODUCTION
Computers provide ways for architects to design and work faster. At the click of a button, lines can be drawn and copied throughout a design. Parametric software automates these processes even faster, through code-based design. Digital fabrication techniques provide opportunities for digitally designed models to be produced with advanced precision and speed, completely removing the human hand from the process of making. These advancements have changed the architectural mode of working and thinking. However, architectural computer programs have not yet embraced the complexity of softer materials, such as fabrics. Fabrics are not at that commonly used in architecture, because they are a weaker material, they can flutter or flap in the wind, they do not fully protect against harsh sunlight, they are easily torn or damaged, and they can be deformed by stretching or ruffling. These qualities are typically undesirable and less predictable; in this case, however, these projects were undertaken specifically to explore such qualities as light penetration, movement from wind, and tactility. Since these qualities the computer cannot easily represent, working physically with the material by hand is necessary. In this paper, I will analyze the working method used for the design of three architectural installation projects. This method does not reject technology, but involves computer modeling for more rigid portions of the design. Concurrently, working physically with the materials by hand-crafting small scale models and full-scale mockups facilitates a deeper understanding and appreciation for unpredictable material effects. The relationship between the computer and the physical craft is a continual process in development involving a feedback loop between the digital and hand-crafted modes of working.

PROCESS
Fabric for architectural use is not new. Gottfried Semper, in his Four Elements of Architecture, defines the building enclosure or skin as textile. He describes lightweight woven materials as the most basic way to enclose or divide spaces. Semper saw this used in traditional building methods where the skin was made of simple flat woven wickerwork, and he noted that historically, Germans hung carpets to divide space. Other early fabric structures, such as large circus tents, were designed from knowledge, experience, and trial and error. This mode of designing is similar to the craftsman guilds in the Middle Ages, where knowledge was passed down from generation to generation. This knowledge and understanding relied more on material agency and experience.

Modern architecture became more preoccupied with the open plan, lightness, and transparency. It lead the way to the 1960s, where membrane structures emerged from a fascination with new vinylon and nylon synthetic fabrics. Advancements in engineering technology resulted in increased exploration into membrane skins for architectural use. In the 1960s, Japanese manufacturers and engineers began to study the mathematics and science of tensile membranes. Their work with these materials explored different novel forms and qualities of the new lightweight materials, leading to the development of advanced computer programs which can analyze tensile strength and other properties of these materials.

These programs are complex to use and are accessible to larger companies and engineering firms, but when working on small architectural installation projects, it is less necessary to use such refined advanced computational analysis. These smaller projects lack the same level of complexity, as they are made with “off the shelf” materials, each of which has different desired qualities. Working by hand offers the ability to explore these aspects and learn from the responses. Also, installation pieces are presented in an art/architectural context, so this type of craft and working is part of the intention. The more accessible programs, such as the Kangaroo plug-in for Grasshopper, have the ability to represent stretching with springs, but it is only a prediction and may not be a clear representation of the unique characteristics of the real material. The SpanDEX used in the current projects is “off the shelf,” and various brands present different thicknesses, elasticity, stretch in direction, and strength in tension. The aim was not so much push structural boundaries, but rather to explore the design possibilities and physical qualities of these specific materials.

Textiles require a structure to support them and hold them in place. The structural parts of the design do not have as many unpredictable qualities; they are rigid, and can be quickly modeled and designed in computer programs such as Rhino. It is with the introduction of Spandex where physical models are required to understand the project’s design. The soft tactility and unpredictable qualities of different degrees of elasticity in the fabric materials are not as well represented by the computer. Using NURBS modeling in Rhino for ruled and double curved surfaces can stand in for a prediction of the formal qualities of fabric surfaces. With the Grasshopper plug-in for Kangaroo, physics can predict some results of forces such as gravity or the effects of wind on materials. Ultimately, working outside the computer, directly hands-on with the physical materials, results in a variety of unanticipated outcomes. Working by hand with these materials is quicker and more reliable for understanding the expected results. Smaller scale models are built as studies of form and appearance, and to understand how the different fabrics react under natural forces.

Scale models have long been important in architectural craft and design, able to represent and convey ideas. Models have been historically used in different ways. Filippo Brunelleschi used models as a tool to show craftsmen how to build his designs. Physical models can also be used as form experimentation, such as the bubble and string models of Frei Otto, whose models were used to design optimization of material, looking at minimal surfaces. Antonio Gaudì used a similar experiment process by hanging chains and weights to scientifically test the designs for the perfect curves of arches, which when turned upside down, form catenary arches. These types of models address optimization.

Models are also part of craft and making in architectural design. They allow architects to make design
decisions in a physical way, working with their hands and materials. As digital design becomes more ubiquitous, the physical model is less common, or becomes a digital output through laser cutters and 3D printers. Traditional techniques such as cutting pieces by hand and sewing were used on all the projects. This type of work can only be done by hand, and is a learned skill set and craft. This set of projects is a case study for how craft can be integrated into, and with, digital design practices in architecture.

1. Sparks, Nuit Blanche, Toronto, 2016

The project: Sparks creates a small interior space surrounded by a cluster of fabric and structure modules. The structure was based on a three-axis grid, rotated at a 45-degree angle. It was made of 90-degree angled PVC joints and PVC pipes. Spandex fabric was attached in between the structure, meeting only at the endpoints of each six-foot by six-foot module. It was stretched tight over the modules, creating a pulled hyperbolic shape. As the event took place overnight, the structure was illuminated with colored lights from the inside. These lights contrasted the sterile plain white fabric seen during the daytime (Figures 1 and 2). The light itself was diffracted through the fabric and offered visual warmth and softness around the structure, while the physical softness could be felt when the fabric was touched. To access the small interior space, a Spandex opening was pushed out of the way to crawl inside, enforcing the tactile experience.

The process:
The design of Sparks began with the structural module. The structure was based on a grid and modeled in Rhinoceros, by copying and pasting modules at their connection points, a series of grids were developed. Several methods of attaching fabric to these modules were studied through small scale physical models. This move to working physically allowed for the fabric to shape to the structure naturally. Also, it allowed me to play with various connections quickly, and explore possibilities of design without having a necessary goal in mind. At ¼”=1, the different formal design qualities could be investigated through the models. The fabric was sewn together to create a covering over the module, completely hiding the structure. Several shapes and differently sized pieces of fabric were stitched together to compare the different forms of the stretched fabric. Lights were added to these models to study the luminary effects of the material as it diffused through the fabric, comparing different types of light bulbs from multiple sources and LED strips to see which could create the desired effects of diffusion. This is the model working as an experiment, whereby possibilities and results were explored at a smaller scale. Through these models a base understanding was developed of how light penetrated the fabric, and how it stretched and felt (Figure 3).

The formal qualities of the fabric and how it stretched in these scale models defined the shape of the modules for the final design. The curvature from the stretched fabric was measured, and brought back into the computer by modeling it in Rhino. At this point it visually represented how the surfaces of the fabric would appear, but it did not illustrate the luminous and tactile qualities that were understood from the physical models. At this point the NURBS modeling was only needed to represent the form.

From this Rhino model, estimations for the total amount of materials needed for final construction were made by multiplying the information from the scale models, and used to make the final templates for production of the pieces. Before the final design was to begin construction, a full-scale mockup of one module was made to test the material’s abilities and the process of assembly. Each module utilized six PVC pipes which were connected in the center with a specifically manufactured four-way joint, and eight pieces of fabric were cut into triangles and sewn together with a zigzag stitch to allow for stretching. A zipper was added to one edge to allow access to the structure and to place lighting inside. In small scale models, the structure was fitted through the hole with the zipper, and then moved into position. The Spandex modules were connected to pull the fabric over the structure as it was manipulated into place. The full-scale mockup used the same proportions of material scaled up, but the amount of force needed to pull the fabric over the structure was too much to do easily by hand. The structural pipes had to be shortened by three inches on each module, allowing the fabric to be pulled around it. The qualities of the Spandex fabric and forces were nonlinear; what worked on small scale models didn’t necessarily work at full scale. The full-scale mockup was necessary to learn through failures, and build an understanding of the material and how it worked. Masons of the past have often learned through these types of failures; for example, the builders at
Beauvais Cathedral during the Middle Ages in France continually pushed the limits of their design and faced building collapses along the way, learning each time what worked and what did not. Failures do not need to send you back to the drawing board, but they do offer opportunities for spontaneous on-site problem-solving. This is why the connection between designing and making in craftsmanship is so important: to allow for flexibility of design and making through these types of exploratory projects.

2. Sail Boxes, Boston Day of Play 2015

The project.

Sail Boxes is a play structure made of simple box structural grids with fabric pieces embedded within. The grid was made of bamboo, and jointed together with PVC fittings. This allowed for the necessary quick assembly, and also the rounded corners provided safe and smooth edges for children to touch or bump into.

The structure was made of bamboo, and jointed together with PVC fittings. This allowed for the necessary quick assembly, and also the rounded corners provided safe and smooth edges for children to touch or bump into. The final design used a trapezoidal piece of fabric, attached at different corners of the box, to produce a hyperbolic form. The long edge of the trapezoidal Spandex fabric was attached across the diagonal of the box, with the other three connections following the edges of the box. Spandex works great to produce these types of forms because it stretches and relaxes into shape. The twist in the fabric creates a hyperbolic surface, generating its own spatial quality and breaking the rigor of the boxes. Working with the study models showed that multiple pieces of fabric could also be added to one box using this same method (Figure 3). The models allowed for quick and freeform ways to test material placement, density, and colors. The physical models also helped to test the level of tension desired in the fabric. Unlike in the previous project Sparks, the fabric was left looser, allowing it to ruffle and have more flexibility for play. The importance of tactility was a major part of the exploration through models, as well as the understanding how the fabric would act under a variety of conditions.

The process:

The structure was designed in Rhino—a simple series of boxes in two different sizes: nine large boxes and eight small boxes that could be assembled together in various ways to create a dynamic form. Many iterations of different proportions, heights, and organizations were studied in Rhino. Ultimately, no planned order was designed, only the desired number of large boxes and smaller boxes. This allowed for the design process of the crafts(wo)man to make final design organizational decisions on-site.

Study models at 1/8”=1’ scale looked at the relationships of the fabric in a box structure. These were made with various methods of attaching fabric to the structure. The computer models of the hyperbolic forms of fabric appeared rigid, and did not represent the drooping or ruffling of the actual fabric from the scale models. In an attempt to predict the final possible outcome of the hanging fabric, Grasshopper with Kangaroo was used to give the mesh a spring length and allowing gravity to pull on it. This was a better prediction of the loose fabric to have more natural hang. It did not express other possible forces, such as wind, or the malleability under the pressure of children’s hands, nor did it provide an understanding of the tactility and softness of the fabric. This computer-generated prediction was only successful for the basic formal qualities of the design, and fell short in these other desired qualities.

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The structure was made of bamboo, which is a natural material and therefore not perfectly straight, and with fabric also responded to the wind, billowing like a flag or sail. Sunlight penetrated through the fabric, so as not to create dark spaces inside, but rather small spaces from overlapping fabric that were bright with color (Figure 4).

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The structure was made of bamboo, which is a natural material and therefore not perfectly straight, and with
variability. Small bends and knots in the bamboo allowed for an irregularity and imprecision in the boxes. The connecting of the ends through PVC joints was difficult due to these factors, and a process of sanding and refining each end of the bamboo ends to fit into the joint properly was completed by hand during the construction of the full-scale mockup. Joinery is detail-oriented craft, and connecting the bamboo with PVC required patience and attention to detail and craft. When working with natural materials, it is necessary to respond to the material and work flexibly through the making and construction process. Digital models are too precise and do not allow for the nuances of the materiality.

In the completed project, the uneven structure and the soft hanging fabrics created an overall unique and handmade crafted appearance. The final arrangement of boxes and fabric was assembled and arranged on-site with a team of assistants. The Rhino model was used as a prediction and to provide an estimate of the site with a team of assistants. The Rhino visualizations of possible aggregations of tensegrity models for Purple. 2016. Image by the author.

The structural module was integrated with the fabric and physical models were studied before the computer was introduced, because it would be faster and easier to develop an understanding of the forces and strengths of materiality from the processes of making and building. Base tensegrity models from Buckminster Fuller and artist Kenneth Snelson were used as starting points for the designs. It was important to evaluate how the fabric could replace the tensile cables in the typical modules, and to make sure the tension members were pulled as tightly as possible, pushing the fabric to its extremes, to resist an uneven distribution of forces. Several types of tensegrity models were studied, with a variety of numbers of struts and different shapes and sizes of fabric. Ultimately, achieving a design that was a stable structure, had good proportion of materials, and offered easy construction were desirable characteristics. The six-strut module appeared to be randomly connected into clusters based on the rule set from the Rhino computer-generated model, and final decisions were made on-site during construction. Working within a set of rules is reminiscent of how craft guilds passed down knowledge and worked with materials. Here, the rule system may be designed in the computer, based on the physical materiality studied in models, but it is adapted to the process of full-scale construction through the learned expertise of the maker. This design was the last pre-planned of the three case studies; how high each cluster was hung, how many clusters were made, and their exact forms were determined on-site during the final making of the installation. All this was deter-

The process:

The structural module was integrated with the fabric and physical models were studied before the computer was introduced, because it would be faster and easier to develop an understanding of the forces and strengths of materiality from the processes of making and building. Base tensegrity models from Buckminster Fuller and artist Kenneth Snelson were used as starting points for the designs. It was important to evaluate how the fabric could replace the tensile cables in the typical modules, and to make sure the tension members were pulled as tightly as possible, pushing the fabric to its extremes, to resist an uneven distribution of forces. Several types of tensegrity models were studied, with a variety of numbers of struts and different shapes and sizes of fabric. Ultimately, achieving a design that was a stable structure, had good proportion of materials, and offered easy construction were desirable characteristics (Figure 7).

Using Rhino, the tensile fabric was modeled with NURBS surfaces mimicking the hyperbolic shapes and curvature from stretched fabric in the scale models. The computer was used here to multiply the modules into clusters, without wasting material and time, using a Python script to automate some of the aggregation of the modules. Results of different types of clustered forms were examined for their aesthetic characteristics. The six-strut module appeared to be randomly clustered due to its multiple-sided icosahedron shape, which meant it could be clustered together like clouds, whereas other models clustered in more predictable ways (Figure 8).

The full-scale mockups at this point were necessary to test the limits and tensile strength of the fabric, and how tightly the fabric could be pulled to hold the modules together. Similar to Sparks, the tension of the fabric had to be designed so that it could stretch enough during the assembly process, but also tight enough to work as a tensile member in the tensengy structural system. These studies were done through of series of procedural models, each time reducing the size of the fabric until it resulted in an optimum condition. This was a slow process, like carving or chiseling a piece of wood until it fits just right. Through this repetitive model-making, a quick assembly technique was also developed. This came out of a process of learning through trial and error and understanding what worked best.

The final design resulted in 45 modules that were connected into clusters based on the rule set from the Rhino script. This resulted in a different pattern than the computer-generated model, and final decisions were made on-site during construction. Working within a set of rules is reminiscent of how craft guilds passed down knowledge and worked with materials. Here, the rule system may be designed in the computer, based on the physical materiality studied in models, but it is adapted to the process of full-scale construction through the learned expertise of the maker. This design was the last pre-planned of the three case studies; how high each cluster was hung, how many clusters were made, and their exact forms were determined on-site during the final making of the installation. All this was deter-

Figure 7: Scale study models for Purple of different tensegrity modules. 2016. Image by the author.

Figure 6: Purple installation, Echo Art Fair Buffalo New York 2016. Photo by the author.
mined by a rule set that was followed, but allowed for design and craft to continue through the final construction.

CONCLUSION

Each of the three projects discussed developed from the process of making, and explored the capabilities of working with Spandex fabric. Each project took on a slightly different process, as they learned from one another, and as the crafts(wo)man and designer learned from the material’s response. The shifting between digital and physical models also came at different points in the design, depending on the demands for each project. The small scale models and mockups dealt with working in parts and pieces of the designs, while digital models could provide full predictions and imagery of the designs. Like craftsmen who learn and get to know their material, and understand its way of working, the models gave the material agency over the design as they encouraged the unpredictability of the material to play a role in the design process. The small-scale models and full scale mockups were inherently craft-like, because they were not necessarily technical, but were detail- and material-oriented. These details, such as the tactile and phenomenological qualities of fabric, were difficult to understand through digital models and were best studied through physical models. The computer played an integral part in design for its ability to quickly make and provide a prediction of possibilities. Each project used the computer for different parts of the design, and for different needs. Since the development of each project moved fluidly between digital and physical, different decisions were made throughout the process. Finally the work references the processes of the crafts(wo)man, who allows the material to define its shape, giving the project material agency. Craft in this work also does not separate design and making, but emphasizes that design is continuous through the making process as one learns and responds through the projects. This back and forth between the computer and hand-making is a large part of that continuous feedback loop and problem-solving process. In addition to the unexpected outcomes of the final design based on rule sets, rather than finalized plans, the projects allowed for deviation, with the crafts(wo)man leaving her mark on the designs. These projects are not a rejection of technology in lieu of craft; computed designs played an integral role in the design work. It is the understanding of the limits of both modes of working, and the learned knowledge of material qualities, that cannot be reflected in the computer. The flexibility of designing with material agency in craft is integral to this design process when working with unique materials such as Spandex fabrics.

ENDNOTES


Deadline: June 1, 2018

Requirements:

Abstract [350 words]
Short CV

Dialectic VII invites reflection on the challenges of training architects for global citizenship. In recent decades, design programs in affluent and globally dominant cultures, from Japan to United States, Belgium to Dubai have developed traveling studios that place students face to face with global others. Some of these efforts reproduce the priorities of professional practice for innovation, efficiency, and market viability. Others, including design-build programs in poor communities, or emphasize affective experience and tactical approaches. Still others are represented as simple cultural exposure by which design students collect experiences towards open-ended results. Some of these educational forays aim to educate future designers as global citizens rather than mere passive corporate cogs within the international marketplace. However, the idea of global citizenship is complicated by the fact that the globe is a profoundly anti-democratic space, one in which international architects are some of the few granted mobility and voice. Is the very idea of “global citizenship” then an oxymoron?

Just as thorny aspect of this pedagogic ambition is the need for decolonizing architectural pedagogy. Despite absorption of women, color, and queer voices, desire to reach out to the destitute, non-moderns, and difference, the studio culture still brings everything back to Western and capitalist modes of governance and being in the world. Decolonization of education is a wide ranging ethical project spanning numerous disciplines, with the goal of recovering power for different ways of knowing and being, discredited by the universalist truth claims of Western system of knowledge. In our discipline, history of world architecture is one domain that is attempting to relieve architectural pedagogy from Euro-US centric frameworks of imagining architecture. This highly myopic and narrow imagination is sustained by the myth of the neutral expert—that despite being thoroughly debunked by postcolonial critiques of development—persists in our field with a stubborn tenacity. To bring this project to architecture requires that we take a hard look at architectural pedagogy’s placement within Cartesian epistemology. What of the claff Descartes put between mind, matter, and spirit that made the world inert and an abstract proposition, and hence available for exploitation? What of the inability of sustainability efforts and green architecture to unshackle themselves from the foundational framework responsible for the near destruction of the planet? This may require more than the deployment of feminist, race, and queer theory (all also squarely Cartesian). This may mean pushing these philosophical accomplishments further and open them to the wisdom of non-anthropocentric, in fact cosmiccentric epistemologies of indigenous and folk cultures, so thoroughly discredited by dominant scientific thinking. What would architectural pedagogy and praxis look like if they became porous to perspectives based on systems of knowledge that have no place in current corporate design culture? What would its products and value system look like if it created a dialogue between Cartesian feminism, race, and queer theory and their non-Cartesian practices? How do we inculcate an ethos of lateral learning in our curricula without reducing the dominated cultural knowledge to our preexisting frameworks? How can “citizen” architects exploit these openings towards more equitable and sustainable futures? Does this make the idea of “global citizenship” viable or does it still remain an untenable ideal?

In Dialectic VII, we seek submissions that address both global citizenship training and the types of architec-
tural practices it might ultimately promote. We want to better understand what happens when design practitioners and students are thrust from the comfortable realm of expertise into a space of compromise, accountability and ethics. What architectural practices already exist outside simple cost/wage structures? What practices are already open to lateral learning? What sustainability efforts successfully unshackle themselves from the technological rationality responsible for the planet’s global problems? How do ritual, reciprocity, volunteerism, prayer, bribery, nepotism, sacrifice, generosity, and other extra-capitalist practices infiltreate the supposedly neutral territories of architectural knowledge? As architects move from one global location to another, what productive lessons are learned from the differently modern peoples they encounter? Can one learn to be a global citizen without leaving one’s “home” country? What role might architectural “practices without practice,” such as public history, preservation, curatorial work, discourse, and research play in broadening our horizons beyond capitalist vision of architecture? In considering these questions, we invite scholars to allow careful observation of lived phenomenon to drive analysis.

Dialectic VII invites articles, field notes, reports, maps, and image essays on architectural citizenship and its entanglement with the decolonization of architectural pedagogy and practice. The editors value critical statements and model practices. We hope to include instructive case studies and exciting examples of professional practice. Possible contributions may also include mapping of ongoing debates across the world, and reviews of books, journals, exhibitions, and new media. Please send abstracts of 350 words and short CVs to Shundana Yusaf shundana@arch.utah.edu; Anna Goodman good7@pdx.edu; Ole W. Fischer fischer@arch.utah.edu; and B.D. Wortham-Galvin b.d.worthamgalvin@pdx.edu by June 1, 2018. Accepted authors will be notified by June 15th. Photo essays with six to eight images and full papers of 2,500-3,500 words must be submitted by August 15, 2018, (including visual material, endnotes, and permissions for illustrations) to undergo an external peer review process. This issue of Dialectic is expected to be out in print by fall 2019.

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