Locating Architectural Production

"We are never in a position to say what really is or what really happens, but we can only say what will be observed in any concrete individual case."

—Erwin Schrödinger, Nobel lecture, (12 December 1933)

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CRITICAL AND POST-CRITICAL THEORY IN ARCHITECTURAL RESEARCH

Architectural education and practice are engaged in a point of reflection on the relationship between theory and application, which can be viewed as the struggle to find truth and value in scientific, technological and cultural terms. Recent forays into philosophical discourse in the critical era of architectural theory, followed by post-critical humanistic reaction, reflects the current uncertainty of architectural trajectories seeking to embrace both the theoretical and practice. The Authors argue that a study of the space of production in architectural research holds prospects in clarifying the role of experimentation in theory and practice, integrating varieties of simulation, analysis and realization composing contemporary practice, and revealing a novel thread for philosophical investigation into architectural education.

Michael Polanyi coined the term post-critical as a reaction to the predominant mode of thought stretching from the Enlightenment until the present Modern movement, where truth is sought through a filler of objectivity. Post-criticality sought to introduce the human presence into the discussion, and in his seminal book Personal Knowledge, Polanyi notes that the post-critical position implies it is absurd to assume that our scientific investigations are not shaped by our personal knowledge and human interactions, and the standpoint of an actor is an intelligent commitment to the position.[1] Thomas Kuhn and Michael Polanyi both denied that the scientific method can mechanically lead to truth—that in fact all knowledge relies on human judgement.[2]

In architectural theory, Manfredi Tafuri, one of the early proponents of the critical position, "formulated an utterly distinctive conception of the architectural 'project', one which would at one and the same time propose a new architectural form, would do so on the plane of the entire urban entity in which it was to be located, and would, by inference, transform that entire event entity itself into something new."[3] We propose this can be seen as a working definition of 'modern', opposing a historical definition locating it at a specific time and place in the world. In the same article, George Baird contrasts the post-critical as based on instrumentality (projection, perform activity, and pragmatics), highlighting diagrams, the marketplace, popular culture and "relaxed and easy" theory as being the social concern of post-criticality.

Importantly, he recognizes the new project of architecture will devolve into the the simply pragmatic or decorative without a supporting body of the projective theory.

These post-critical practices are described by Mark Jarzombek as "shaped not by concepts like resistance and novelty, but by the need to solve pressing and large-scale communal, ethical, corporate, computational and global problems."[4] Modernism has been proposed to be defined not by a specific era in time, but by the condition of "rupture", where, importantly, there is with any rupture a backwards and a forwards condition.[5] Modernism is not a dry categorization of theories, but an exciting episode in time, where ideas are questioned and constructions are rethinking the built environment. It is simultaneously a new process and a demonstration of novel operations.

PROTO-MODERN AS A POINT OF EMERGENCE IN ARCHITECTURAL RESEARCH

It is important in our exploration of the place of production to situate the framework of discussion on the transition of the state of experimentation and discovery leading up the to scientific revolution, which opens up into what we call the "modern" period. The term proto-modern in relation to the history of science is an era (which we will see is located in relative time) in which proto-science is evolving. The idea was formed by Thomas Kuhn in his famous discussions with Karl Popper:

> "In any case, there are many fields—I shall call them proto-sciences—in which practice does generate testable conclusions but which nevertheless resemble philosophy and the arts rather than the establish sciences in their developmental patterns. I think, for example, of fields like chemistry and electricity before the mid-eighteenth century, of the study of heredity and phylogeny before the mid-nineteenth, or of many of the social sciences today. In these fields, too, though they satisfy Sir Karl [Popper]'s demarcation criterion, incessant criticism and continual striving for a fresh start are primary forces, and need to be. No more than in philosophy and the arts, however, do they result in clear-cut progress. I conclude, in short, that the proto-sciences, like the arts and philosophy, lack some element which, in the mature sciences, permits the more obvious forms of progress."[6]

We will use the term porto-modern in a similar way, denoting a condition 'prior to' modern embedding potential to evolve into the modern, but by no means does this evolution have a regular or rigorous vector. What is critical to our discussion is that in the proto-modern-science is indistinguishable from philosophy and art, and this therefore resembles the state of contemporary architectural affairs where tension between the objective and subjective are fragmenting the progression of theory. The *proto* is a "just before" state is the not refined or complex, and as in a prototype, embodies simultaneous potentiality of collapsing into a number of trajectories that serve to rupture the current state of affairs and afford a new trajectory. This collapsing can be embodied within the point of production through locating the physical space of where knowledge is formed.

Francis Bacon, in his seminal work Novum Organum Scientarium, set the stage in the early seventeenth century for the development of the scientific method by introducing processes of reduction and inductive reasoning as the foundation for experimental research as the philosophical underpinnings of what would become modern science. Bacon addressed the classes of instances of processes, which included:

> "Finally, class 27 of privileged instances: magical instances. That is my name for instances where the material or efficient cause is slight or small in comparison with the effect. An event of this kind, even if it is of a common sort, seems at first like a miracle—and sometimes it goes on seeming so even after careful thought. Nature hasn't given us a generous supply of these; but we'll see what emerges when nature's folds have been

shaken out and we have made discoveries of forms and processes and microstructures. If we did find a way of doing this, we would be able artificially to do quickly things that nature does in very round-about ways..."[7]

One of the primary "magical" instances was alchemy, and one of the goals of alchemy was to purify, mature and perfect certain objects, which typically were considered to be metals, but might also be thought of as individuals, or even theories.[8] While the alchemist could be seen as a illusionist, selfishly trying to profit from the transmutation of base metals into gold, more intensive study has evolved a more complex image of a player involved in the dedication of spirituality[9] to a philosopher searching for the betterment of the individual.[10]

Alchemy as proto-science is an important model to explore in relation to contemporary production based and material focused architectural theory. Much of the actual application of alchemy reflects a post-critical position, while at the same time falling to a critical actor. This duality is what the Authors propose; that we look for in a means to explore what is beyond both post-criticality, and critical architectural theory. Alchemy's location of operation contains ideas Baird explore as being post-critical: popular culture in the form of it's connection to traditional remedies, diagrams form of symbolic magic, the marketplace with its patrons and concerns of converting base metals to gold, the global arena where Alchemists traveled from city to city, and most importantly performative experimentation, where alchemists would perform, as if on stage, the tricks of their trade. What changed when alchemy evolved into science, was the place of study and the method of study.

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LOCATING THE SPACE OF PRODUCTION IN ARCHITECTURAL RESEARCH

By studying the relationship between architecture and philosophy within the fluctuations of historic structures allows us to identify the application of theoretical constructions through production—the space of constructive experimentation reflects the social activities of the actors. Architecture demands a public laboratory, as opposed to the separation of private and public reminiscent of the critical era. And yet the rational post-critical, with it's concerns of society and goals, solidifies a duality between theory and practice the critical tried, no matter how unsuccessfully, to combine.

Figure 1: Workplace: Design: Measure

The contemporary relationship between the academic faculty proper and the host of players within the production of knowledge, i.e. students, teaching and research assistants, lab technicians and so on, would not be unfamiliar to the actors in a laboratory during the scientific revolution. The single "gentlemen" natural philosopher engaged a host of laborers, technicians and other assistants to perform the experiments in the privacy of the laboratory, allowing the philosopher to concern himself with the engagement of society in the distribution of knowledge. The contrast to the mystical and occasionally bumbling image of the alchemist, who not only performs experiments in public, and therefore risks the failures associated with an era less sophisticated intellectually, but at the same time collapses theory and application. The alchemist as a model for contemporary architectural education can be seen as the manifestation of the act of experimenting, and not particularly the actor(s), as a demonstration of a hybrid of discovery and comprehension that befits study of a field that is a composite of theory and practice.

Laboratories are important in history as the site of modernity,[11] and yet the exact definition of what a laboratory is has eluded historians as well as scientists. The romantic conception of a chemistry lab conjured up when imagining scientific experimentation, but the contemporary lab in the university environment, which is distributed, global, virtual and integrated in it's trajectory, ranging from traditional single-room facilities through off-site computational clusters, from vast communication networks to massive globally shared machinery. The history of the Laboratory in the early Modern period, resembling more anatomical theaters and cabinets of curiosity than a modern chemistry lab, is a valuable point for architectural research in particular to study as it was a site of a new synthesis of manual and textual knowledge as alchemy and magic began to merge into the early Royal Society.[12]

The alchemy lab, along with it's contemporary sites of production in the monasteries and guilds, predates the scientific processes that formulated sites such as the Royal Society, where experimentation was conduced in methods that would be the precursor for the Scientific Method, but still operated within the domestic environment.[13] The study of the development of the workshop, division of labor, do-it-yourself processes, integrated scientific, philosophic and mystical concepts, as practices in these proto-modern sites of study, would seem familiar to three contemporary architectural researcher. Through a study of the location of production as the contemporary architectural research laboratory in educational institution, the Authors seek to link historic critical modes of thought with contemporary goals and processes to collapse the production into a synthesized product.

APPLIED ARCHITECTURAL RESEARCH

The Authors, as practitioners and educators, focused on developing a body of work spanning a wide range of projects integrating theory and application both in works that are built as part of their architectural firm as well as within the context of the university. Specific aspects of the work look beyond the current post-critical focus on pragmatism, progress and performance in an attempt to reengage critical thought as an integral mode of production, including a number of symposium, projects and workshops exploring architectural research and in particular the space of production. We have discovered, documented and used as a teaching and practice methodology various ways students, collaborators and contractors employ ad-hoc production spaces to produce indeterminate outputs that nonetheless are rooted both in conceptual as well as pragmatic foundations. Our goal has to explore and leverage this proto-modern bifurcation as a physical space of production that allows for discovery and invention in novel methods through physical realizations.

The Columbia Building Intelligence Project Think Tanks were a series of symposium convened to study the building industry, gathering an international group of architects, engineers, manufacturers theorists, academics, politicians,contractors and others involved in the realization

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Figure 2: Columbia Building Intelligence Program Think Tank Stuttgart

Figure 3: eXcursions

of the built environment. Through a series of seven think tanks assembled in Toronto, Tokyo, Stuttgart, London between 2010 and 2012, returning three times to New York, the Author developed a theme that resonated not only with the global conditions, but focused on the local contribution to the topics. Through a rigorous development of theme that simultaneously allowed for indeterminate engagement of the actors in engaging discussion, the Think Tanks developed in a manner reminiscent of the anatomical theater from Willem Swanenburgh (1581/1582–1612) The Anatomical Theatre in Leiden copperplate, where the building industry becomes the object of examination by the scientists, students and public alike.

Ten digital fabrication workshops spanning 2008–2014, each in a different city of international significance; the eXcursions Project, developed through the Author's laboratory at

Columbia University sought to study the space and process of computational production in conditions that were physically and culturally different to challenge the preconceptions of the space of production. The goal was to introduce culture and context into the process of making by teaming with a local university and connecting with manufacturers, consultants and venues to develop a project to be conceptualized within a short timeframe with indeterminant results but through rigorous processes.

During the project students are encouraged to completely embed within the future in order to experience a process that is simultaneously individual in learning and collaborative in progress. For instance, during the Tokyo eXcursion, the Authors worked with Professor Kengo Kuma of the University of Tokyo to develop a project of a "Digital Tea House", which combined advanced computational design and fabrication processes with traditional cultural concerns. The students not only studied the tea ceremony, but also learned about the art of craft and construction in Japan, developed methods of working based on context, weather, available resources, and other constraints, and ingrained themselves in the culture and traditions through interaction with their fellow Japanese students. At the end of the projects a Tea Master inaugurated the tea house through a ceremony, testing the design of the students and demonstrating it's effectiveness in realization. Here we see an analogy to the traveling Alchemist arriving at a locale, and then producing a demonstration of the theory through a materialization of making. Sometimes things do not proceed as expected, and some part of the process is a teaching method for students to teach other students. Knowledge is left at the site of production to develop and evolve independently at the end of the project.

The Authors have maintained an architectural practice (Atelier Architecture 64) while simultaneously teaching as university Professors. As typical with small contemporary firms, the projects range from installations to residential and small commercial. While the work has been evolving and developed into larger scale projects, the Authors find interest in smaller projects as explorations are available in a more experimental method. A current project is the Adenbrot Research Brewery in Brooklyn, where the Authors are working to develop a researched-based brewing center for a client who is a German chemist that wishes to return to his roots in brewing. For this project, a significant amount of work is involved in studying the process of brewing along with the space of brewing research, which can be at times extremely scientific and simultaneously an art.

During the Author's tenure at Columbia University as the Director of the Laboratory for Applied Building Science, a series of experiments were developed to test and demonstrate various methods of computational production within the academic environment. In order to assure the realization component, space and program were secured on the campus either a renovations to facilities, collaborative projects with other academic programs such at the School of Engineering, or as exhibitions during events and shows at the School of Architecture. The students involved in the projects were encouraged to participate in the process, and the nature of the location allows for a degree of experimental indeterminacy in the outcome of the process. Junior Faculty were encouraged to apply to the Lab to lead projects in order to develop a variety of processes not solely based on the Director's research vectors.

The Authors modeled this mode of production on the Royal Society in London, where experiments were undertaken by a host of Natural Philosophers, where each would develop a research agenda and proceed at a pace determined by the needs of the projects. Then at opportune times the work is "demonstrated" to the audience, who is encouraged to engage, critique and interact with the work. This combination of performative "art" along with research and architectural production fueled a high degree of interaction among the faculty and students, helping to produce a variety of new work.

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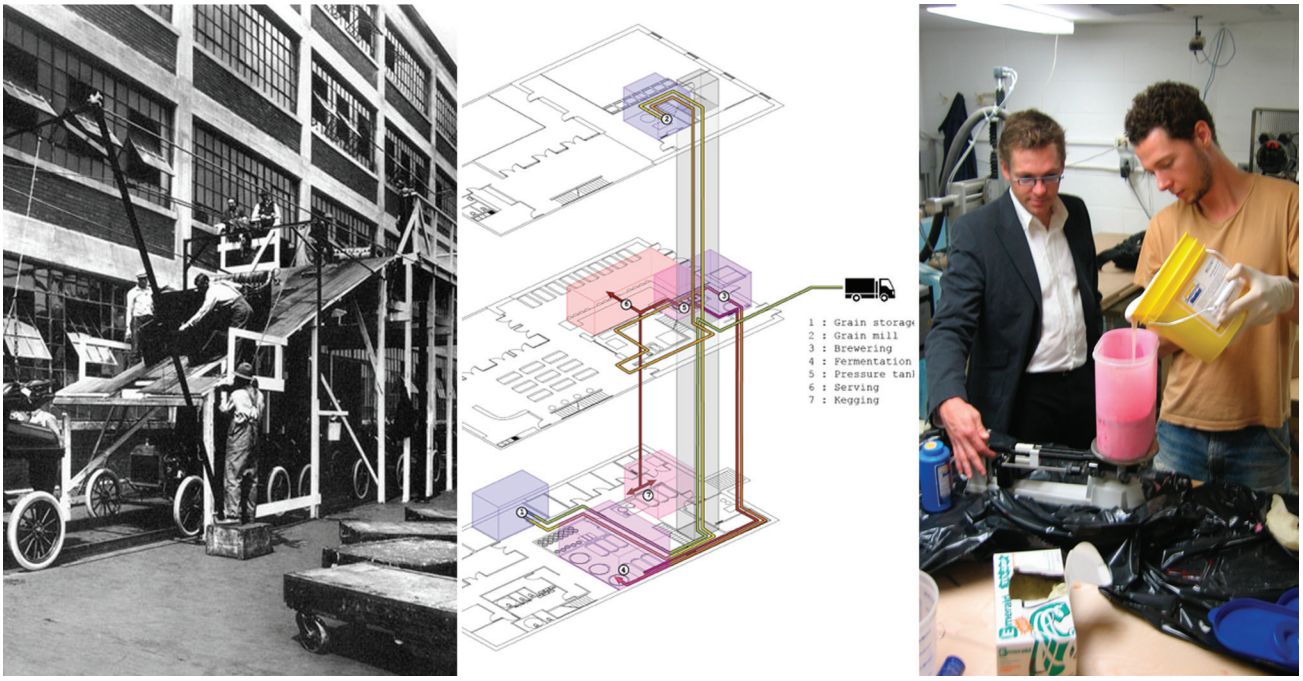

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Figure 4:Atelier Architecture 64 Adebrot Brewery

Figure 5:GSAPP Laboratory for Applied Building Science

PRODUCING A SPACE OF PRODUCTION

If the “space of production” shifts to the more virtual, as in the dependence on simulation in contemporary theories of biomimicry, architecture risks a return to the pre-modern condition of mystical creation. Architectural education in a realm of mystical production, will lose it’s open nature and retreat to the monastery roots. The space of work is a critical location for experimentation but also a necessary outlet for communication of theory and processes to the broader academic and practicing environment. This state of entanglement and the fact that “realization” collapses the theoretical and the practical once a project engages it’s surroundings. Some scientists, such as the eminent Isaac Newton, we have learned were simultaneously rationalists practicing alchemy as a proto-science, injecting a degree of indeterminacy into the logic of experimentation, producing a fertile ground for cross-pollination.

Work does not need to worry about being critical or projective if it exists in a foundational location of proto-criticality, where the process is in itself operating in a mode of duality that collapses simultaneously into a singularity through the realization of a built work. Production in the building industry, particularly that with scientific and technological emphasis, engages a physical manifestation during all points from the concept to product pipeline. This new topology of production, where order and chaos, logic and myth, intertwine to formulate a controlled system—often consistently on the verge of break-down—exemplifies the contemporary construction work-site, where global conditions, digital communication, automated factory floors, collision detecting computer models, fluid dynamics analysis, and global supply chains become the new alchemist's laboratory. Examining how alchemical philosophy evolved into the scientific method specifically at the site of production at the desktop, workshop and learned society, one can see the shift from privileged knowledge to codification for consumption. As architecture tends to produce a unique environment, the location of construction requires an enormous amount of control that, while potential in the construction industry, is often impossible, and can be considered undesirable in architectural research. Some often to feel that since research can control every aspect of the simulation, it can do so in the manifestation—due to the nature of the precision of our tools—but this hyper-control works counter to the physical reality of construction. Notice that this discussion does not include specific tools, and this is intentional. The tools we use change, be they software, machines, methods, stylistic guidelines or theories. What remains is our interest in exploration and our ability to learn from our successes and mistakes.

Location of production is a particularly fertile ground for study in architectural practice and education, as the focus of intellectual work has changed in this new age where criticality concentrates on communal ethical corporate computational and global problems.[15] The survey of contemporary practices find less emphasis on the individual and more on the team; grounded in essentially goal oriented projects. This method of production, while proposing to establish concerns for the environment and global conditions, is often driven by financial concerns, making difficult the process of experimentation due to see associated risk inherently involved in new forms of practice and production. Contemporary architectural education has renewed a concern for research as a mode of production. While a valid concern, we feel that one important aspect in research is the location of production, which plays both a pragmatic as well as a conceptual role in what is produced and how the process functions. One of the current trends is the incorporation of the architectural "laboratory" in the academic environment, because it is simultaneously a respected location of research in academia, but also it fits well within the university physical and political structure, which is oftentimes (and refreshingly) unusual for a place of architectural experimentation.[16]

A degree of indeterminism is necessary in contemporary thought on production of architectural condition, through the exploration of alternate means of developing causality through specificity, precision, chaos, chance or other stochastic parameters that allow for engagement in the physical world through affinity or contrast. The location of production is critical in the mechanical arts to this concept, which inhabits our space of creation through the attachment to uncertainties that arise from physical, biological or cultural parameters. The mathematical logic used in computational tools is ill-equipped to translate indeterminate conditions into first-order logic, while simultaneously denying concepts of incompleteness, uncertainly and change. There are a multitude of recurring conditions in the study of historic sociopolitical change that mirror our contemporary struggle with the dialectic between rational and irrational outcomes. The contemporary condition argues for simultaneous engagement of the physical world, both the computable and the unknown, with our simulated and physical tools to operate on our environment through demonstration of the line between the reasoned and the obscure.

ENDNOTES

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