Architectural Appropriations in the Age of Networked Reproduction

Pasquale de Paola
Louisiana Tech University

William Willoughby
Louisiana Tech University

The premise behind this paper is to extend Walter Benjamin's twentieth Century examination of artwork and mechanical reproduction into a discussion about architecture and network practices today. Secondarily, this essay reassesses the postmodern predicament forecasted by Jean-Francoise Lyotard, Guy Debord and Henri Lefebvre. Lyotard distinguished the "postmodern era" as a time period when the status of knowledge has been altered through its acquisition, transmission, legitimization, and consumption in computerized societies.[1] Fredric Jameson pointed out that the observations of Debord and Lefebvre mark the birth of a postindustrial economy fueled by new social inclinations, characterized by spectacles and rapid, yet bureaucratically controlled, production and consumption.[2]

Within this complex framework of cultural and social change over the last 40 years we have witnessed increased access to spectacles at all scales, streamed through a global proliferation of personalized mobile devices. The ubiquitous distribution of media and digital devices follows the acceleration of technological innovation and information flows. Manuel Castells, in his seminal work *The Rise of the Network Society*, surmised that, due to the advancement of digital technologies that afford the flow of information, social and political structures have become disaggregate and have taken on greater flexibility and articulation. Globally distributed systems of human exchange (social, political, economic, geographic, journalistic, and aesthetic) have become rather complicated and fraught with upheaval, leading to reversals of power, legitimacy, social status, popular taste, and knowledge creation.[3] How can we untangle such a framework characterized by such heavily layered contradictions?

WHAT BENJAMIN OBSERVED THEN; WHAT WE OBSERVE NOW

When it comes to a better understanding of the concept of authenticity in machinic societies, it is important to look at the seminal work of Walter Benjamin. "Even the most perfect reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the place where it happens to be," wrote Walter Benjamin in the essay, "The Work of Art in the Age of Mechanical Reproduction."[4] Essentially, Benjamin argued that the

characteristics of authenticity couldn't be repeated by technical means. The original artwork exists independent of the copy. However, through appropriation by reproduction, some new quality overtakes the original, forming a new vantage from which to understand the particular work of art. Benjamin introduces the notion that an 'aura' surrounds an original work, whereas that particular aura is absent in a reproduction.[5]

Despite the diluting effect a reproduction has on its original, Benjamin writes that, "The uniqueness of a work of art is inseparable from its being imbedded in the fabric of tradition."[6] While the original artwork is separate from its reproduction, the reproduction advantages the artwork by endowing it with status as a solitary cult object. A distance is established between the artwork and its mechanical copies. Simultaneously, reproduction is a formula for emancipating "the work of art from its parasitical dependence on ritual."[7] In other words, instead of a pilgrimage to stand witness to the artwork, we can all own a copy of the original through mechanical means.

Whereas Walter Benjamin succeeded in analyzing the role of originality in the age of mechanization, today we live in an era overlaid by global networks distributing digital data to anyone with access anywhere at any time. Producing and distributing, uploading and downloading, possess a curious parity. The difference between the original posting and its status as 'viral' is only a matter of timing and the magnitude of its audience. In addition, anything that tends to 'go viral' on a network gets subjected to subsequent manipulation by other actors in the system (remixing, parody, and commentary). Distributed digitally, the viral item tends to gain a life of its own independent of the creator.[8]

No longer is it possible to distribute inviolable reproductions. Instead, once something is syndicated on a network server, it may be hacked and made into something else. Many creative works today have become like Marcel Duchamp's well known readymade *L.H.O.O.Q.* (1919) where he drew a moustache and Van Dyke on a reproduction of the Mona Lisa. Another layer can be added to a reproduction in the form of feedback and digression—we add our mark and, in a certain sense, make something other our own. So the reproduction, subjected to proliferation, dissolves into its constituent fragments—cut to pieces and ripe for pasting into new artworks. Paradoxically, since digital networks allow for the download of perfect copies, digital reproductions have become the agent of originality. Thus, the problem is ontological: are simulacra—understood as copies without an original—unique? And if they are, then is it possible to maintain authorship in an age of networked reproduction?

ON ORIGINALITY IN SOCIETIES THAT FLOW

> Every intention, interaction, motivation, every colour, every body, every action and reaction, every piece of physical reality and the thoughts that it engendered, every connection made, every nuanced moment of history and potentiality, every toothache and flagstone, every emotion and birth and banknote, every possible thing ever is woven into that limitless, sprawling web.
> —China Miéville[9]

Originality today is not tied to specific objects, but depends solely on the irreducibility of events. In other words, the 'eureka moment' that cannot happen twice defines originality. Archimedes proverbial cry of, "I have found it!" exults in the moment of discovery more than in the repeatable process or technique. So in the case of networks, we see the dissolution of discovery—from something monumental and authoritative—into something incremental and anonymous. In today's era of open source development, the term 'originality' is used less when speaking about objects. Instead, originality dwells in distinctive acts. In a quote that applies as much to architecture as it does 'substance,' Gottfried Leibniz wrote, "I maintain also that substances, whether material or immaterial, cannot be conceived in their bare essence without an activity, activity being of the essence of substance in general."[10] Most architects understand that a building is the final outcome of a set of operations—a sequence of activities, that, if arrayed systematically, inform the final substance of architecture.

In digital systems, originality is a transitory event instead of an inviolable object. The solitary work of art is replaced by algorithms that govern tools, economics, and our built environments. Our new sense of things is operational, not final. In today's network societies we copyright algorithms, software plug-ins, and applications—not the outcomes of their use.[11]

There is little division drawn between the script written, tested, and posted publicly on a network and the search engine that allows another script-savvy designer to search for it. The search engine accepts the typed parameters, parses out close matches, and ranks a series of websites that lead another actor on the network to select that script, revise it, and repurpose it. The clarity of authorship is blurred—the script, repurposed and modified, becomes an unacknowledged collaboration—a collective invention requiring little, if any, attribution.[12]

Digital scripts, once loosed onto networks enter a permanent state of drift; they are adapted, revised, and reenacted in new settings by new actors. Parametric functions can be adapted openly by agents with very little connection to each other. Like articulated joints in a body, the degrees of freedom offered by parametric definitions are left deliberately loose to allow for flexibility and adaption by other designers or other contexts. A parametric script, with its own encoded capacity for morphogenesis, may be adapted or incorporated in ways never conceived by its author. Powerful bits of parametric code, when adapted to new situations mutate in a generative and emergent manner.[13] In the free-range datascapes of the Internet, corporations, individuals, and social networks form a complex and neutral network online.

THE DETERRITORIALIZATION OF ARCHITECTURE

> There is no placement without replacement or at least without replaceability. And this does not exclude, on the contrary, the finite singularity that always comes to be carved there as what happens to or arrives at this replacement, to this placement as replacement.
> —Jacques Derrida[14]

The latest social forms characteristic of network culture are the new urban reality discussed by Kazys Varnelis.[15] The ubiquity and pervasive use of

telecommunication systems are compressed together into a new kind of space: an informational topology that, especially in architecture culture, is generating new discursive processes characterized by non-linear approaches to design. The practice of architecture is being deterritorialized, and the nature of that deterritorialization extends in two directions.

First, by distributing the intelligence of design across a network, processes and ideas can be published, shared openly, outsourced, crowdsourced, and crowdfunded globally. Jacques Derrida considered this approach in an essay titled, "Faxitexture."[16] Derrida's presentation at the *Anywhere* conference held in Yufuin, Japan in 1992, explored the transhumanence of today's world and the unsettledness or uncanniness of simulated and transgenic effects. Instead of a being-in-the-world characterized by authenticity—such as found in Heidegger's example of an Ancient Greek temple's fixedness to its place—Derrida presented a counterpoint: the ephemeral and mediated being of the tele-fax, or facsimile machine that transplants items into new contexts.[17] The title of Derrida's essay contains a double-cross," faXiteXture"— using both 'x's' as stand-in letters for original letters, yet simultaneously crossed out. In doing so, Derrida implied a loss of both authenticity and tectonics; the work of architecture becomes a facsimile. Derrida wrote of 'téléfacture' becoming a spatio-temporal 'différence' constructed in a recombinant virtual. While the architecture that Derrida spoke about did not exist fully in 1992 when he delivered this essay, this quality is evident everywhere in architecture today.[18] Where it might once have been possible to use the portmanteaus 'faxitexture' or 'téléfacture' to describe the process of designing buildings, the fax machine is a communication tool of yesteryear. Today, we might revise Derrida's terms with examples like 'scriptexture' to describe today's techniques that offer simulation and variability in design.

The second degree of deterritorialization derives from interdisciplinary and transdisciplinary approaches to design. Within a network of globally distributed information, tools, and actors, a single design can be worked on by various experts simultaneously and independent of any common geography. Furthermore, data from one discipline can be taken and applied to another. This process of transposition, like the act of bartering, results in the exchanging of traits between entities. This aspect of deterritorialization can be understood as an alien transference or 'abstract machine' that operates between distinctive actors.[19]

Without lines connecting nodes, without the presence of an abstract machine, there is no exchange. Nodes of disciplinary expertise within the global system cooperate and form around common problems. The rhizome formed through these crisscrossed connections is heterogeneous, indeterminate, fragmentary, and temporary.[20] While networks operate according to principles of distributed systems, how are these networks theoretically and practically organized? Or should these continuously reforming patterns of exchange be left to evolve unregulated and unrestricted?

Clearly, without distinct nodes there are no networks. Nodes constitute centers of expertise and information acting within a global network. When multiple actors exchange information in a system, the interplay of actors changes the resulting system entirely. Designers and experts today indulge in self-governing communities that share ostensibly open-source digital components. Also,

workshop-hosts travel itinerantly to centers of architectural learning and production, sharing new digital strategies and computational techniques with participants.[21] Algorithmic computer codes, scripts, and definitions are developed freely by multiple actors on the network—expanding the powers of production and giving architects and architectural students instruments that offer adaptability rather than standardization in design solutions. Generative scripts give a designer the ability to parametrically adjust a result to fit new situations.

POSTMODERN NETWORKS

> Along with the hegemony of computers comes a certain logic, and therefore a certain set of prescriptions determiningwhich statements are accepted as 'knowledge' statements.
> —Jean-François Lyotard [22]

Knowledge today is externalized in a flowing network of telecommunicating devices. Designers are swapping scripts throughout the globe—like adaptive attributes of an incomplete genome—that, when shared, can hybridize into new possibilities unforeseen by the original creator. These offspring of genetic algorithms are today roaming the globe and being shared between workshop attendees, network members, blog followers, and design studios.

It is difficult to pinpoint the beginnings of the information technology revolution, but its trajectory is clear: societies are moving from localized production to a total integration of computational systems in management, design, production, distribution, and construction. Within this integrated system, inputs can be sourced from anywhere and outputs can be situated everywhere.

Postmodernism was a reaction to the limits scientism imposed upon culturally dependent disciplines, including architecture. In the first inklings of postmodernism, culture and history were prioritized over functionalism's scientific grounding. In late twentieth-century postmodernism, we saw the re-conquest of cultural fields in an expansionary globalized context. But culture, as suggested by Marshall McLuhan, blends together in a synthetic and oracular relationship with telecommunicating systems and media. "Our entire society today lives by instrumentation, not by the unaided human senses," wrote McLuhan in 1966.[23]

Remarking on the August 1, 2012 loss of 440 million dollars in less than an hour by Knight Capital, Sean Gourley said that the Wall Street company should not have "released an algorithm out into the wild or onto the real world."[24] The trades were processed at speeds that profoundly outpaced the reactions of human traders. Today's computationally driven financial system transcends our human sense responses to the point of being incomparable. Sean Gourley's analogy can be extended to suggest that networks can be like ecosystems where algorithms interact. It is not so much the single algorithm, but instead the unexpected outcomes that can happen when multiple algorithms interact with active and emergent data sets. Is it possible to manage the potential for indeterminacy and obsolescence?

Digital networks, social networks, and digital copies of media traipsing throughout the Internet foment into an abundant froth of displaced fragments. We take recombinant digital fragments and generate something new from what's already

been done. If the sources from this fragmentary bricolage are dynamic agents, then the system becomes topological and shifting, amorphous and capable of systematic change, emergence, and transformation.

So today, postmodernism receives a new twist as it evolves out of an earlier formulation made from cultural and historical fragments—disinterred from their sources—and turns into a simulated ecosystem of active agents each with their own explicit histories and interactive processes. Instead of static fragments caught in permanent juxtaposition, these interactive components get recombined and are subject to morphogenetic change. Because of networks, the production of postmodernity is now a recursive process of the system. More than being genetic, the results of this new architecture are tropic expressions and behaviors that result from complex interactions within this digital ecosystem.

In 1995, networks expanded from exclusively governmental and academic uses to include commercial traffic—the beginning of the 'dot coms.' Internet traffic went from being routed through a central backbone to a meshed topological system of multiple 'Internet Service Providers.' Ultimately, this rhizomic development meant that access to data and digital services could reinforce postmodern proclivities, creating new opportunities and means of deconstructing cultures globally. The heterogeneity of the Web and social media have become proving grounds for radical cultural transferrings, deferrings, referrings, and errings.

The term 'meme,' once used only by anthropologists, referred entirely to transferrable cultural practices. Today, this word has entered our everyday lexicon and applies now to the viral spread of text overlaid images, silly drivel, cultural critique, and social parody created through meme generators. The same transpositions are happening in architecture culture.[25]

Digital wireless telecom has rapidly afforded new pathways for open source communities to connect and for the intercultural exchange of ideas. There has been a shift from a relatively static and regressive model of postmodernism—with pieces of the past combined as referents into incomplete compositions—to an emergent model with futurity and dynamic recombination as its aim. The analogy is apt: Today we have a vibrant ecology of protean agents interacting and intermingling as products of complex human systems operating in a growing global spread of digital agents. Genetic change, adaptation, and emergence are part of postmodern discourse today—due in large part to the array of global cultural exchange filtering through digital infrastructures and acting out creatively through our technologies.

NETWORKED APPROPRIATIONS: DESTABILIZING EFFECTS, ALGORITHMS, AND PHENOTYPIC EXPRESSIONS

We recognize that a method emerges for evaluating and analyzing morphogenesis in architecture. Architects are adopting techniques and tools derived from both biological systems and the mathematics of topological networks. If architecture can be likened to an "extended phenotype," existing as an emergent expression residing somewhere between its generative scripts and its interplay with context, then by determining the constituent rules that govern the genomics of architecture, we can explore how algorithms might adapt to the social and environmental conditions that infuse a work of architecture.[26]

Buildings are unlike biology insofar as buildings are relational environments for bodies. So, an architect must consider the interplay between an amalgamated algorithm and its effect closely—and in the larger sense, manage the fit between cybernetic inputs demanded by the generating algorithm and the corresponding data sets derived from the contextual conditions in which the algorithm plays out.

By first recognizing behaviors, and then breaking those behaviors down to a system of rules, we can then better understand the modalities inherent in architecture and insert new operations or 'abstract machines' to destabilize old and ineffective regimental practices. If left unchallenged, cybernetic rules become regimes. But networks, primarily understood as rhizomic structures, bypass the establishment of regimental systems and allow multiple agents to coerce, disrupt, and take part equally. In other words, the networked appropriation of codes, scripts, and definitions resists sliding backwards into the previous formula of postmodernism. Instead, because of the combining of rhizomic systems with interactive algorithms, diversity and differentiation is made inevitable as architects openly manipulate means and outcomes.

Without an absolute framework to order actions within telecommunication systems, we look to understand the ontology of networks and the philosophy that underpins network societies. Yet, there is a philosophical framework that explores emergence and contingence—such as exemplified by networks—having a distinct lineage with its own ethical implications. The work of Alain Badiou supposes the existence of a mathematical ontology, which formulates into an object-oriented philosophy. Objectification, taking precedence over subjectification, is a main point of Alain Badiou, Quentin Meillassoux, Levi Bryant, and Graham Harman—whose works have been described as Speculative Realism. These contemporary thinkers reject Kant's correlationalist philosophy including the tenets of transcendental idealism, and instead concentrate on an object-oriented philosophy. This implies the existence of an object-driven external reality existing independent of our intentions and explainable only by scientific and mathematical means.[27]

Maurice Merleau-Ponty wrote, "The world is wholly inside and I am wholly outside myself."[28] In a very real way, through our science and technology, we extend our being, externalize ourselves, and thereby redefine our external reality. In general, the speculative realists oppose Kant's conclusion in the *Critique of Practical Reason*, where he strove to connect, "The starry heavens above and the moral law within."[29] Kant elevated human moral intelligence to something infinitely coexistent with the actions of all other entities. For the speculative realist, if we untangle human privilege and inflated moral intent from measurable reality, then we might be able to better explain the theoretical and topological underpinning of complex systems.[30]

Technological systems—which serve as vehicles for human content—are not passive, but operate with their own agency. People interacting over digital networks form a composite social entity—a 'noosphere' that is not us individually, but a collective medium that we participate through.[31] Our technologies are machines with an agency independent of us, and humans are one class of objects among many.[32]

Furthermore, within the simulated ecology of digital systems we have a new medium for exchange and referencing in architecture. Ultimately a new and contingent form of appropriation is possible through networks that overcome crass copies and superficial repetition. We no longer simply quote each other's works. Instead, we rewrite each other's scripts, transform them, adapt them, or feed different sets of data through them to generate unintended results. Architecture has transitioned from a mimetic practice based on considerations of type into a recombinant genetic enterprise of experimental speciation.

Yet we have to wonder, does the presence of algorithms in daily activities invade our thoughts subconsciously, and act upon us subliminally? Do we see algorithms in nature because we rely on them and have been conditioned to their use via computers (suggestive spelling checkers, search engines, product recommendations, etc.)? A thoughtful person has to wonder if we are being made posthuman because of our tools. Will buildings, if reduced to a set of logic driven rules, lack whimsy and poetic license?

CONCLUSION

> If the concept of mechanization (in its various aspects of analytics, objectivity, abstractness, seriality, consequentiality) was the basis of the space model of the functionalist architecture in the 1920's, then the concept of information is and cannot but be the horizon for this stage of architectural research.
> —Antonino Saggio[33]

Because it will have many parents, it is unclear if tomorrow's architecture, derived from networks and algorithms, will be dispossessed of originality. But one thing is clear: it will be full of vitality and variation. Pieces generated by many will amalgamate into distinct algorithms parented from globally distributed places, which in combination, will synthesize into multiple compliant manifestations—each adjustable to a variety of contextual conditions. With designers developing "scripts worth spreading," architecture around the globe is in for exciting times.[34] The digitally distributed habits that lead to open-source architecture (such as architecture-specific social websites that pool together creative talents) are ambivalent to corporate secrecy and capitalistic branding.

Clearly, the abundance of tools and technologies today has consequences (injuries, inaccuracies, environmental degradation, etc.); and wherever those consequences constrain, they also offer liberties. Through computers we have externalized our inner mental processes and laid reason bare—reducing design to logical expressions that many times get applied arbitrarily. Algorithms are thoughts materialized and expressed with active consequences. This mathematization of human thought into algorithms mirrors science's mathematization of nature.

In general, the gambit for architects today is for a future where cybernetics meets genetics in a postmodern and posthuman world, "all watched over by machines of loving grace."[35] But in light of this, we raise the question: are we

jettisoning the historic and hard-won qualities of humanity for the possibility of a machinic human in a logic-driven and genetically modified ecosystem?

Today we are faced with the proposition of producing humanness through machines.[36] Nonetheless, do we really desire the conditional freedom of Richard Brautigan's visionary postmodern utopia of cybernetic meadows where humans and computer networks live in systematized harmony? Jean Baudrillard replied to a question about the totalizing power of simulation when he wrote, "All of our values are simulated. What is freedom? We have a choice between buying one car or buying another car? It's a simulation of freedom."[37] We are held captive by our own systems if we cannot effect change upon those systems.

Our essay seeks to understand both network practices and the redefinition of architectural design resulting from algorithmic processes. Ultimately, it is the combination of the two—the global network and contemplation on the spatiality of networks, as well as advancements over the last decade in parametric and algorithmic architecture—that this essay addresses. Further critique of network practices in architecture needs to happen. The digital experiments redefining the practice of architecture, as well as the expansion of distributed technologies in other sectors of our society, must be appraised further. Our techniques and the systems through which we use those techniques has established discipline-wide preferences for variability over permanence, differentiation over standardization, evolution over archetype, movement over stasis, global over local, digital processes over traditional approaches, and futurity over history—the impact of these biases must be assayed in the years to come.

In the meantime, we continue to develop a rich framework for speculation and experimentation where architecture may continue to explore future expression along a computational continuum that runs from discursive scripts that generate unprecedented forms all the way up to urban operating systems inferred from data derived from global contexts. Through the invention of new processes and the introduction of technologies that extend our abilities further, we may avoid a return to historical processes and past forms of architectural signification. Yet, when authorship loses its grip on the architectural profession—and when most architectural designs get produced from open source systems, parametric tools, and algorithmic scripts shared across networks—then will architecture, as we define it today, matter anyway? ◆

ENDNOTES

1. Jean-François Lyotard, *The Postmodern Condition: A Report on Knowledge* (Manchester, UK: Manchester University Press, 1984) 3-8.

2. Frederic Jameson, "Forward" in Jean-François Lyotard's *The Postmodern Condition: A Report on Knowledge* (Manchester, UK: Manchester University Press, 1984) vii.

3. Manuel Castells, *The Rise of Network Society* (Malden, MA: Blackwell, 2000) 399. Also see the documentary *PressPausePlay*, directed by David Dworsky and Victor Köhler, about networks and the democratization of various forms of creative arts and cultural production, www.press-pauseplay.com (last accessed 11/24/12). The film is posted online by the film's producers, House of Radon, at vimeo.com/34608191 (last accessed 11/24/12).

4 Walter Benjamin, *Illuminations*, translated by Harry Zohn (New York: Schocken Books, 1969) 220.

5. In regard to Benjamin's conception of 'aura' in artworks, Peter Bürger's book *Theory of the Avant-Garde* offers an important critique of Benjamin: the intent of the Dadaist artists, including Duchamp, was to achieve a "loss of aura" in art that was driven only in part by new technological means of production. Bürger's writing argues that some transformations—especially when to comes to art—result from complex causes and resist periodization. However, a new set of possibilities and forms of expression became available to artists by exploiting mechanical reproduction, with examples such as the montages of Picasso and the ready-mades of Duchamp. Clearly, as Bürger suggests, multiple forces converge in the evolution of art and architecture: social dialog, conscious meditation, as well as productive/technical means. It is not possible to simply divide one force and deem it superior to the others. However, 'aura' and a discussion of the unique versus the reproduced, is germane to our essay, and Benjamin addresses the dissolution of origin and authorship through his discussion of an artwork's "aura." See Peter Bürger, *Theory of the Avant-Garde* (Minneapolis, MN: University of Minnesota Press, 1984) 27-34.

6. Walter Benjamin, *Illuminations*, translated by Harry Zohn (New York: Schocken Books, 1969), 223.

7. Ibid, 224.

8. A recent example of viral content gaining a life of its own: An amateur film maker in California produced a derogatory film about Mohammed titled, "Innocence of Muslims," with a fake desert background, bad acting, and substandard sound quality. A person going by 'sam bacile' (identified later as Nakoula Basseley Nakoula) published an extended trailer on July 2, 2012. The posting was translated into Arabic on September 2, 2012. On September 11, 2012, the U.S. embassy in Cairo, Egypt was stormed by protesting mobs. In the following days, more protests erupted across the Muslim world lasting for well over a month.

9. China Miéville , *Perdido Street Station* (New York: Del Rey Books, 2000) 348.

10. Gottfried Leibniz, "New Essays of the Human Understanding (c. 1704)," from *Philosophical Writings* (London: J.M. Dent & Sons, 1973) 168.

11. L. William Zahner of A. Zahner Company, while speaking at Louisiana Tech University's School of Architecture on April 3, 2012—and answering questions in regard to Herzog & de Meuron's design of the de Young Museum—made clear that while the design-architects envisioned a material expression for cladding the building, Zahner's fabrication company owns the computer algorithm and digital fabrication process that produced the final result the architect's sought. Authorship of form/appearance and ownership of procedural means/material effect are distinct in this instance.

12. Social networks which connect likeminded people across the globe have emerged, like a social website created by Scott Davidson using NING, and organized around David Rutten's Grasshopper plug-in for Rhino (www.grasshopper3d.com). Other groups such as Bre Pettis and MakerBot Industries' Thingiverse community (www.thingiverse.com), the Instructables community (www.instructables.com) where you can "share what you make," Co-de-IT (Computational Design Italy; www.co-de-it.com) a studio hub for sharable codes, Ezio Blasetti's site algorithmicdesign.net (code.algorithmicdesign.net), Ronnie Parsons' and Gil Akos' site modeLab (modelab.nu), Andrew Payne of LIFT Architects (www.liftarchitects.com) and other sites like these offer a designer places where open source and do-it-yourself resources can be shared, learned, and collectively evolved by a globally distributed network of users.

13. For a good definition of 'morphogenesis' and its bottom-up implications on the ontology of form, see Manuel DeLanda's *Intensive Science and Virtual Philosophy* (New York: Continuum Books, 2002) 9-41. Also melded into this paragraph is an understanding gleaned from Mario Carpo's lecture delivered as part of the *Harvard GSD Symposia on Architecture*, "The Eclipse of Beauty: Parametric Beauty," held on March 9, 2011. See www.youtube.com/watch?v=0xN4LWPlwX8 (last accessed 11/24/12).

14. Jacques Derrida, "Faxitexture," translated by Laura Bourland, from *Anywhere,* edited by Cynthia Davidson (New York: Rizzoli, 1992) 24.

15. Discussed by Kazys Varnelis and others throughout *Networked Publics*, edited by Kazys Varnelis (Cambridge: MIT Press, 2008). Also look at his website, varnelis.net.

16. Jacques Derrida, "Faxitexture," translated by Laura Bourland, from *Anywhere,* edited by Cynthia Davidson (New York: Rizzoli, 1992) 18-33.

17. In regard to reference to Martin Heidegger, see, "The Origin of the Work of Art," from *Poetry, Language, Thought* (New York: Harper Colophon, 1975) 41-44.

18. Sanford Kwinter writes about the second 'Any' conference in "The Improbable Multiversity," from *Requiem for the City at the End of the Millennium* (New York: Actar D, 2010) 95-103. Kwinter summarizes this sense from the 1992 conference held in Kyushu, Japan when he writes, "I felt I had discovered the hydraulic world lying below the metrical and discrete one [. . .]. Japan's own complicated history, and the traumas and contradictions that this forces its designers and intellectuals to endure and struggle with today, is an unbroken litany of encounters between local and the traditional and with the global (external) and the modern [. . .] the unstable, creative chaos that is unfailingly produced through miscegenation." (Kwinter, 99).

19. We refer to the star-crossed transferring between script and function, and between social forces and their expression in matter. Clearly, our use of 'deterritorialization' and 'abstract machine' derives from the various works of Gilles Deleuze and Félix Guattari. Particularly useful in this section was Félix Guattari, "Regimes, Pathways, Subjects," from *Incorporations*, edited by Crary and Kwinter (New York: Zone Books, 1995) 16-37.

20. Gilles Deleuze and Félix Guattari, "Rhizome," from *On the Line* (New York: Semoitext(e), 1983) 1-65.

21. Without risking an incomplete list, it suffices to say that there are multiple groups and individuals around the globe offering workshops to universities, firms, and curious designers on such tools as Grasshopper, RhinoScript, Python, digital fabrication, Arduino, etc. ACADIA has hosted one-day intensive workshops introducing cutting-edge technologies to the curious for a number of years.

22. Jean-François Lyotard, *The Postmodern Condition: A Report on Knowledge* (Manchester, UK: Manchester University Press, 1984) 4.

23. Marshall McLuhan, "Decline of the Visual," from *Looking Closer 3: Classic Writings on Graphic Design* (New York: Allworth Press, 1999) 174.

24. "In Wall Street 2.0, Computers Are King," Sean Gourley in conversation with Scott Simon, *National Public Radio, Weekend Edition*, August 18, 2012; see www.npr.org/2012/08/18/159082822/in-wall-street-2-0-computers-are-king (last accessed 11/24/12).

25. This viral media includes many sites such as MemeCrunch (http://memecrunch.com). Some memes address architecture directly: GSD Memes on Facebook (www.facebook.com/pages/GSD-Memes/#!/pages/GSD-Memes/343075175737914?fref=ts), the UC-Berkeley Architecture+LOLCats on Tumblr (furrrocious-forms.tumblr.com/) and the Architecture Ryan Gosling page (architecturyangosling.tumblr.com/).

26. Richard Dawkins, *The Extended Phenotype* (Oxford: Oxford University Press, 1982). See in particular, Chapter 11, "The Genetical Evolution of Animal Artefacts," where Dawkins reframes our thinking of genes as base determinants for animal morphology and behavior to suggest that the survival of genes might be the result of phenotypic expressions that extend beyond the organism, such as to include artifacts like a mineral enclosure (caddis-fly larvae), a web (spider), or a dam (beaver). It is sensible to think that an organism's phenotypic behaviors retrain, or determine, gene expression in a ramified response to environmental conditions. So the genes for 'building behavior' imply a phenotypic expression that oversteps body-morphology to include particular environments. In other words, a gene's phenotype extends beyond the organism's bodily adaptations to determine behaviors for reshaping its niche. Extended phenotypic effects may play a greater part in natural selection and the control of genes than previously thought.

    So in scripting architecture, if we want to take ownership of a generative/emergent model, then we must consider the external data that gets fed into scripts as analogous to environmental inputs that impact the genetics that control phenotypic expression. This would include an understanding of limits as well as adaptive variation. So when data changes, the script's outward performance changes. With data harvested from contexts, then we must consider the performance of a phenotypic expression when revising our algorithms, and consider if the data sets we select lead to a superior degree of fitness. Interaction and exchange between algorithmic chains and their environmental inputs are the basic influence behind extended phenotypic expressions, which constitute the behavior of emergent systems that grow from simple interactions into complex interwoven ecologies.

27. See Alain Badiou, *Being and Event* (New York: Continuum Books, 2012) passim.

28. Maurice Merleau-Ponty, *Phenomenology of Perception* (London: Routledge & Keagan Paul, 1967) 406. The notion of a "phenomenological materialist" as a form of speculative materialism comes from Don Ihde and his book *Embodied Technics* (Copenhagen: Automatic Press/VIP, 2010) iii.

29. Immanuel Kant, *Critique of Practical Reason & Other Work on the Theory of Ethics*, translated by Thomas Kingsmill Abbott (London: Longmans Green & Co., 1879) 376-379.

30. See Quentin Miellassoux, *After Finitude: An Essay on the Necessity of Contingency* (New York: Continuum Books, 2009) passim.

31. For a full explanation of 'noosphere,' see Pierre Teilhard de Chardin, *The Future of Man*, translated by Norman Denny (New York: Harper & Row Publishers, 1964) 155-184.

32. See Levi R. Bryant, *The Democracy of Objects* (Ann Arbor, MI: Open Humanites Press, 2011) 22-24.

33. Antonino Saggio, "The Search for an Information Space," from *Game Set and Match II: On Computer Games, Advanced Geometries and Digital Technologies*, edited by Kas Oosterhuis and Lukas Feireiss (Rotterdam: Episode Publishers, 2006) 215.

34. An offhanded reference to the viral nature of TED videos and the organization's motto of, "ideas worth spreading."

35. A phrase taken from the title of a freely-distributed poem from 1967 by Richard Brautigan, who at the time, was poet-in-residence at the California Institute of Technology. See www.brautigan.net/machines.html#28 (last accessed 11/24/12).

36. Paraphrased from "Cyborg Anthropology," by Downey, Dumit, and Williams, in *The Cyborg Handbook*, edited by Chris Gray (New York: Routledge, 1995) 342.

37. Jean Baudrillard, "Questions for Jean Baudrillard: Continental Drift," an interview with Deborah Solomon, published in the *New York Times Magazine*, November 20, 2005; www.nytimes.com/2005/11/20/magazine/20wwln_q4.html (last accessed 11/24/12).