

GREG LYNN'S EMBRYOLOGICAL HOUSE PROJECT: THE "TECHNOLOGY" AND METAPHORS OF METORSMOF ARCHITECTURE

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Abstract

This paper offers a close reading of one architectural text engaged in "knowledge transfer": the use of evolutionary biology discourse as an explanatory account and authority claim supporting Greg Lynn's Embryological House Project (2000). This essay addresses the twin conference themes of knowledge transfer and the potential threat posed to the specificity of architectural techniques. By offering a detailed reading, this paper argues that information transfer is not an innocuous activity, but involves the critical transformation of source material. This paper argues that technology transfer should acknowledge the workings of an ever-present technology, the "technology of architecture". This term designates the set of techniques governing the reworking of material from domains exterior to architecture, into material pliable for architecture. In this paper architecture's evolutionary theory borrowings, provides an exemplary instance of information transfer marked by displacement, not straightforward transmission.

1 Paper

Once again architecture, in search of its lost object, is contaminated by this model fever. Christopher Alexander is already a precursor, and models can now be seen everywhere. They become the architectural avant-garde, bringing a kind of scientific guarantee given the tool of mathematics (which through science in its own domain become techniques when applied elsewhere – a phenomenon little understood by those who believe in a sort of osmosis whereby architecture, through the application of mathematical models, can itself become a science.)

Diana I. Agrest, "The Misfortunes of Theory" (1974)

Knowledge has become an economic phenomenon. As one economist, Dominique Foray argues, since the 1970s, new economic formations have emerged: knowledge-based economies, defined by the proportion of "knowledge-intensive jobs". (Foray, ix). Foray observes that, "science and technology tend to be central to the new sectors tending to give momentum to the upward growth of the economy", and that these realignments "are reflected in an ever-

increasing proliferation of jobs in the production, processing, and transfer of knowledge and information.” (Foray, ix-x) Over the last fifteen years, architecture’s engagement with the disciplines of science and technology parallels this broader historical transformation of post-industrial societies. The economic calibration of knowledge, its “economic characteristics”, and status as a “good” and the financial valuation of knowledge transfer and reproduction, are not addressed by this paper. However, I wanted to mark the origins of the term “knowledge transfer” in the discipline of economics, because this paper is concerned with one architectural case of “knowledge transfer” and the complexities attending this move, where the economic term “transfer” becomes somewhat inadequate to the task of describing the reformation of scientific claims within the discipline of architecture. This paper investigates one architectural transformation of evolutionary theory and argues that the reformulation and rewriting of material extraneous to architecture involves another technology, the “technology of architecture”.

Greg Lynn’s Embryological House Project (2000), is one of a number of widely circulated contemporary projects that mark architecture’s intersection with the specialised discourses of biology (AD 26-35). The text accompanying the publication of this project forms a central document for this paper. The presence of two specialist disciplines, biology and architecture, and the intriguing question of their intersection is staged in an impressive seamless movement in the opening paragraphs. After a series of digital renderings of his design, with intriguing captions such as embryo and egg, captions seeming to signpost the place of biology in this project, Lynn’s text opens with architectural claims about new, contemporary modes of production and aesthetics:

The Embryologic Houses can be described as a strategy for the invention of domestic space that engages contemporary issues of brand identity and variation, customisation and continuity, flexible manufacturing and assembly and, most importantly, an unapologetic investment in the contemporary beauty and voluptuous aesthetics of undulating surfaces rendered vividly in iridescent and opalescent colours. (Lynn, AD, 31)

This detour from biology via traditional architectural concerns marks the interface of two discourses, and the project of reworking one via the other. The point of intersection begins to be clarified in the next sentence “The Embryologic Houses employ a rigorous system of geometrical limits that liberate models of endless variations.” (Lynn, AD, 31) Addressing brand identity and variation allows “recognition and novelty” and “design innovation and experimentation.” (Lynn, AD, 31) All of the implications of this form of production, which Mario Carpo terms “non-standard seriality”, “mass producing a series in which all items are different” will not really concern us here, but of interest is the deployment of economic terms from late capitalist modes of production to form the links between discourses. (Carpo 99) The final part of Lynn’s first paragraph provides the next linkage in the chain. The chain has so far moved from economies of production/consumption, to an aesthetic claim, to design techniques, back to avant-garde aesthetic terms (innovation and experimentation) and finally a larger picture emerges in this last sentence:

In addition to both design innovation and experimentation, many of the variations in the Embryologic houses come from an adaptation to contingencies of lifestyle, site, climate, construction methods, materials, spatial effects, functional needs and special aesthetic affects. (Lynn, AD, 31)

The word “adaptation” is possibly drawn from biological discourse and this connection seems more substantiated by the next paragraph which begins, “There is no ideal or original Embryologic house. Everyone is perfect in its mutations.” Moreover the “formal perfection derives from “a combination of the unique, intricate variations of each instance and the continuous similarity of its relatives.” And then after indicating that the variation occurs in the relationship between the generic envelope and a fixed collection of elements, Lynn delivers his final sentence of the second paragraph and makes a larger historical claim, “This marks a shift from a modernist, mechanical technique to a more vital, evolving, biological model of embryological design and construction.” (Lynn, AD, 31) Here borrowings from the discourse of biology are marshalled to produce a new internal history of architecture. This is one of the strategic effects of citing biological discourse. It shapes a certain mode of contemporary architecture as a more naturalistic mode of production. The place of a new economic formation, “mass customisation”, is eclipsed by the realignment of the new “biological” mode within a longer architectural history premised on a binary formulation: of older mechanistic versus new biological paradigms.

The appearance of words normally exterior to the discipline of architecture - adaptation, mutation, relatives (and of course embryology) - all of which are biological terms raises the

intriguing issue of the strategic effect of these citations in an architectural discourse. The first three terms in particular are closely associated with evolutionary theory. The next part of my essay involves a close analysis of the disciplinary outlines of evolutionary theory in order to investigate the status and meaning of the scientific discipline's particular terms when they are displaced into architecture.

Evolutionary theory seeks to account for a particular kind of biological change: variation, the ways in which variations in organisms give rise to new species, the ways in which those variations are transmitted over generations, the mechanisms of heredity, how these variations are "selected", that is survive, the belief that some of these variations may be beneficial, and that there is a correlation between variation, adaptability and survival, demonstrating that adaptation ensures greater survival. (Jablonka and Lamb) The field is vast, specialised and complex, and most importantly, full of disagreement, hesitations, qualifications and uncertainty. These contests mark the place of evolutionary theory as a social discipline, comprised of competing or different accounts. Some of these disagreements can be recounted by exploring the complexity of terms such as mutability and variation, two of Lynn's key terms.

Evolution is in one sense a biological version of history. It seeks to account for change. Transformation, difference and the persistence of certain transformations, their triumph, is viewed, and noted. Evolution relies on a model of temporality, like history, to understand and judge its material. It operates with a notion of inheritance, the traits transmitted from generation to generation. These qualities and their persistence can only be known retrospectively. Only by looking back can scientists decide which traits and behaviours have been transmitted and selected over time. There are many debates as to whether this is a slow process that is gradual (very, very gradual) or whether there can be rapid genomic restructuring. (Jablonka and Lamb 70-71) (And it is not clear to me what rapid might be in terms of evolutionary time). Moreover what constitutes the targets of selection – genes or individuals, groups or species - has been debated, most adamantly by Richard Dawkins and Stephen Jay Gould. (Jablonka and Lamb 38) Moreover, it is possible that the evolutionary process may be entirely random and any historical model premised on causality and determinism might fail due to the operations of contingency. In other words, individual agents (at the level of individuals, groups or species) may play no part in the persistence and reproduction of survivable traits.

Variation is complex and entails several possible mechanisms. Heritable variation occurs through genetic mutation and also sexual reproduction. Mutation, with which Greg Lynn is concerned, refers to changes in DNA sequences. However the reasons for these changes are variable, caused by internal imperfections in the copying process, or by other internal activities, or by external causes. However, mutation is not considered to be a primary factor in variation. Mutation rates are deemed to be low, because lineages with good heredity needed faithful transmission dependant upon accurate copies of genes.

The second form of variation, one that Lynn does not address, although it is considered to be the primary cause of difference, is sexual reproduction. Sexual reproduction produces enormous variation and is the most obvious source of genetic variation. Offspring are never equally mixed and equally weighted clones of their parental material. The importance of sexual reproduction as the most obvious source of variation was skewed early in the last century when a number of theorists, such as Hugo de Vries and William Bateson had argued that evolution occurred in big leaps. For de Vries "the driving force in evolution was mutation, a process that suddenly and without cause irreversibly changed the germ plasm (a part of the chromosomal material set aside for eggs, etc, whatever gives rise to the next generation). Mutation "produced a new type of organism in a single step." (Jablonka and Lamb 23) This thesis remains highly controversial. Mutations are new genetic variants but in evolutionary terms, their importance is always measured within a longer time span. Will the mutation survive into the next generation and will it be selected?

I have spent some time outlining some of the major disagreements in evolutionary theory in order to establish the ways in which major terms and theories remain under contest in this expert discipline. These quite different investigations of key terms introduce a number of levels of complexity in the problem of accounting for cause and effect in evolutionary change. Terms that I had assumed were stable, become much more complex due to the range of possible explanations. These disagreements are not noted in Lynn's discourse, and through this omission, key terms destabilised in evolutionary theory become much more stable and certain when deployed in an architectural setting. Later in the paper I will address the issues generated by this transformation; the problem of how we should read such specialised technical terms when they are radically disjoined from their former expert domain.

In part I have given such a long account of the outline of the discipline of evolutionary theory because I am interested in marking the radical incommensurability of parts of evolutionary discourse with architectural modes of production. I note this disjunction in order to later address the problem of how we should read the architectural use of evolutionary theory when architecture cannot fulfil some of the key criteria of evolutionary discourse. Two dissonant architectural areas stand out for attention because of their strident deviation from the original scientific discourse. One is the limited definition of evolutionary variation in architecture and how variation operates (Lynn's focus on mutation not sexual reproduction), and the other domain entails the difficulty of imagining how the evolutionary selection mechanism would operate in architecture.

Since computer software simulation programs do not have the biological capability to breed and reproduce, it is understandable that Lynn would focus on mutation rather than sexual reproduction. Mutation however, creates new variations in genes, within one reproductive cycle. It offers a shorter time span. Mutation engages directly with the problem of iteration as a copying process, since mutation is a differential process in copying material. However, as I noted above, in current evolutionary theory, mutation rates in lineages that survive are deemed to be low. So whilst mutation occurs it is disjoined from evolutionary success.

Another problem occurs when evaluating variation in architecture due to the production cycle of design. Evolutionary history, imagined here through the mechanism of selection across generations, is the only way of measuring transmission and survival of variations (no matter their source). Variations need to be heritable across generations. Even if we take the time between human generations to be sixteen years, it is in no way equitable to the temporal dimension of computer iterations. Perhaps we're talking about fruit flies or e.coli bacteria with shorter time spans. I'm presuming because of the title of the project "embryological" and its morphology that we're referring at the very least to a mammalian embryo. The non-correlation of evolutionary time and design or production time remains problematic in this discourse.

Even setting the issue of temporality aside, another problem persists: the selection mechanism. Evolutionary history is a form of history written for victors. There may be many contingent factors that ensure the survivability of certain traits over others. Success in this endeavour can only be known and judged after the fact, never in the midst of the event and given that selection operates as a mechanism outside and above individuals, it may never be able to be harnessed and determined by them, and certainly not in their lifetimes, since it must be transmitted and evaluated across generations. In other words, any architect or generation would have to leave the evaluation of their work to a historical process. Only the long span of time confers success and legitimacy on the project's claims to adaptability and mutation as a form of success. Otherwise any architectural project could just be a mutation that has no benefit or success in evolutionary terms. It could just be one mutation amongst many.

I have noted three effects in this operation of "knowledge transfer" of evolutionary theory into architectural discourse: the production of a new internal history of architecture, the selected deployment of terms associated with a scientific discipline to produce new modes of description of architectural production and the production of a certain stability around terms that are unstable and contested in their original scientific domain. Moreover, I have suggested that a radical incommensurability prevents us from using evolutionary theory to evaluate current modes of architecture in evolutionary terms.

Attempting to read architecture's use of evolutionary theory as extensions of a scientific, technically expert discourse has produced a certain number of difficulties. Architectural design and production is not an extension of evolutionary theory but a distinct discipline. Even when architecture shares similar techniques with scientific fields – such as data modelling techniques used to model flows of weather data or the mapping of molecular energy landscapes, techniques which have been discerned in Greg Lynn's processes, the displacement from original fields of use, generates intriguing differences. (Lenoir and Alt 347) My concern is these differences and the status of these distinctions.

I will confine my discussion, for the sake of brevity to the function of language in marking these differences. I have focussed on the discontinuity of meaning in the appearance of terms generated by one discourse when deployed in another. If the terms of evolutionary theory which erupt in architecture do not achieve the complexity of expert, technical scientific discourse what are the reading conditions that govern our understanding of these words in architecture? I will argue that these terms function metaphorically.

Susan Sontag, in the opening paragraph of her book *Aids and its Metaphors*, quotes Aristotle's work *Poetics* to offer a succinct definition of metaphor, "Metaphor consists in giving the thing a name that belongs to something else. (Sontag, 1988, 5). This definition denotes the ways in which metaphors trade in the traffic between resemblance and difference. Aristotle's use of the term occurred in a text on literature, but Sontag's book reminds us of the migration of metaphor from a specialised tool of literature and its studies of figurative language, into a form of analysis of ordinary language and technical languages, occurring within many disciplinary domains in the twentieth century. The role of metaphor as a component of non-literary language was inaugurated by the work of early twentieth-century linguists such as Roman Jakobson in his study of folktales. In the later twentieth century linguists and anthropologists increasingly focussed on the role of metaphors in so called ordinary language (Lakoff and Johnson, 1980,) Apart from Sontag's study of metaphors in certain medical conceptualisations of illness such as cancer and AIDS, a number of philosophers of science have studied the role of metaphors in conceptualising science, in particular biological discourses (Kay, Jacobus, Keller, Shuttleworth, Keller, Tuana). These studies examine metaphor in order to understand the ideological function of knowledge formation. But they also suggest the ways in which shifts in a discipline's knowledge domain are given shape by new metaphors.

Aristotle's attractively brief description of the figurative function of metaphor should be supplemented by the definition it has acquired since the later 1970s. In their study *More Than Cool Reason* George Lakoff and Mark Johnson observe, "a metaphor is not a linguistic expression, it is a mapping from one conceptual domain to another (Lakoff and Johnson, 1989, 203). This account usefully describes the appearance of terms from evolutionary theory in the discourse of architecture. A metaphor generated from the importation across disciplinary borders, provides a shorthand way of grasping a relationship between apparently dissimilar discourses or practices. Deploying metaphors is a compressed, shorthand mode of communication, and a way of producing a new proximity between geographically and conceptually distant material.

The work of analogies in the traffic between architecture and other disciplines has been investigated by architectural historians and theorists over the last twenty years. A number of writers have investigated architecture's distinctive use of material from fields exterior to itself, most particularly, the relationship between philosophy and architecture. (Ingraham, 1988, 1991; Speaks; Wigley). The studies by Ingraham and Wigley attempted to examine how architecture functions metaphorically for other disciplines. Ingraham argued that architecture operated by force of its metaphoric status in culture, apparently designating the proper forms of inhabiting space (Ingraham, 1991) and Wigley examined the functioning of architectural terms such as foundation within philosophy, a discourse in which architecture was mobilised to ground philosophy's authority claims.

A more recent architectural study, Adrian Forty's *Words and Buildings*, presents a detailed analysis of both language and scientific metaphors within the history of architecture. Forty traces the emergence of certain metaphors within architecture and sometimes evaluates the historical success of particular metaphors. His definition of metaphor concurs with that offered by Lakoff and Johnson, the "characteristic of an effective metaphor is that it borrows an image from one schema of ideas and applies it to another, previously unrelated schema." (Forty, 100) Perhaps most importantly for the argument I am making here he notes that "metaphors are never more than partial descriptions of the phenomena they seek to describe ... indeed were they to succeed in total reproduction they would cease to be metaphors which subsist through likeness drawn between inherently unlike things." (Forty 84) Once material has left its original disciplinary field (such as evolutionary biology), there is always the possibility that it will start to operate as a metaphor, a point of resemblance and as a substitute for the discourse it has left behind. In fact this is precisely Ingraham and Wigley's argument about the metaphorical status, and power of architecture in culture and in philosophy.

Architecture, of course, is not unique in transforming material extraneous to its discipline into metaphors. However architecture provides a spatial formation and realisation of these alignments. It gives evolutionary theory a spatial imaginary, and one that is distinct from, although proximate to, the uptake of evolutionary theory into economic and managerial business models of late capitalism, a project externalised by the founding of the *Journal of Evolutionary Economics* in 1991. The discipline of architecture's capacity for spatial realisation marks the distinctive work of architecture in moments of knowledge transfer, as particular disciplinary domains are reformulated in crossing the border into architecture.

In response to the very interesting initial proposition offered by this conference in its call for papers, as to whether knowledge transfer “threatens the consistency and specificity of architectural techniques” I would argue that there is always an ever present technology of architecture that converts material into spatial realisations, and realigns external material into forms of knowledge interior to the discipline of architecture. These operations could be usefully described as a “technology” of architecture, reworking Michel Foucault’s famous observations on the “technology of sex” as a set of techniques. (Foucault, 90) I borrow this term from Foucault to use it strategically as he does, in order to disrupt normative definitions of technology as inventions and techniques. Foucault deploys the term technology outside its usual domains in order to denaturalise one phenomenon: sex. He mobilises “technology” to designate the systematic techniques organising a field of knowledge, even one which appears biological and thus natural. He redefines the etymology of technology in order to denaturalise knowledge formation and to argue that intellectual domains are determined by structural rules and techniques determining what counts as knowledge and what questions can be asked at a given historical moment. A discipline is not necessarily marked by the sum off its internal knowledge but by its operations, “The ‘economy’ of discourses-their intrinsic technology, the necessities of their operation, the tactics they employ, the effects of power which underlie them and which they transmit-this, and not a system of representations, is what determines the essential features of what they have to say.” (Foucault 68-69) For Foucault, technology is a useful term to visualise the apparatus that organises knowledge formation and insistently mark the nexus of knowledge and power.

The strange mutations of scientific discourses when rewritten in architecture, of course marks architecture’s inside; a terrain where external ideas are not merely imported but formulate new internal histories and theories in architecture, where the technology of architecture realigns material into its own disciplinary formations. Older architectural terms and questions are both continued and discontinued in this formation. Evolutionary theory offers a model for investigating notions of generation without a human operator (autogenesis), the rearticulation of temporal rupture as a mode of innovation (an avant-garde investment in the new) and the use of evolutionary theory as a model of history to establish legitimation via the historical validation of adaptation, selection and survival. Biology offers an ecological model of the environment imagined in network and information terms. The “organism” or embryo offers a source for form generation. This “Nature” would almost naturalise the workings of ideology, producing a transparent and readable nature, different to that posited by one philosopher of science who describes the “mystifying and recalcitrant chaos of higher level organisms”. (Keller, 1995, 81) Architectural processes are modes of projection, of transference as well as transfer. As methods they inscribe the force of human editing, selection and rewriting of material. These social operations form a discourse, ensuring that its tactics and modes of legitimation are all too human, even if its surface may appear otherwise.

If the terms of evolutionary theory are evacuated of their technical complexity when deployed in Lynn’s architectural articulation, this does not make them uninteresting or useless. Analogy can mark the place of a complex process of creative appropriation. Analogies may well be the starting point for a process of creative generation. They image a new relationship between apparently dissonant material. They visualise an idea or operation and make it known in the first place so that it can be further investigated and provide the primary point of creative work. The difference between technical expert uses of evolutionary theory and their more analogous use in architecture might be better understood through the difference between the claims of creative usage and authority claims.

In denoting the difference between creative and authority claims, few contemporary architectural commentators are as scrupulous as John Frazer, in his book *An Evolutionary Architecture*. Early in the text, he distinguishes between a scientific hypothesis and a design hypothesis and he insists on the nature of inspiration. (Frazer 12) Even a distinguished and careful critic such as Mario Carpo, in a recent essay theorising Lynn and Bernard Cache’s use of software simulated designs to form a variable set, a “non-standard series”, slips effortlessly into a problematic analogy, remarking on an “algorithmically defined fixed genera and endlessly morphing species”. (Carpo 106) And for all of the reasons I’ve argued above, this evolutionary analogy, whilst striking, does not bear the weight of close scrutiny, since architectural production fails to fulfil the criteria of evolutionary theory. However as a metaphor, an applied borrowing from one conceptual schema onto another conceptual schema, it denotes the production of a new relationship to produce different knowledge within our discipline; in Carpo’s example, to rewrite models of authorship and aesthetic criteria. Moreover metaphors have rhetorical force because they function figuratively; they offer a striking image, a visualisation of an idea, and

their effect can be ascertained by comparing the differences between an abstract formulation “mass producing a series in which all items are different” and the fixed genera/ endlessly morphing species metaphor deployed by Carpo. I can remember the latter phrase and visualise it, but not the former.

The slide between creative analogies and authority claims lies at the centre of our discipline. Deterministic and authoritative accounts of design, rather than acknowledgements of creative appropriations prevail in architecture. The remarkable appropriation of contradictory or contested and difficult theoretical material into compressed syntheses and useable models is an extraordinarily creative process, but by no means is it logical or inevitable. It evades scientific authority claims but makes the claim of creative authority. I do not see this as problematic, unless we fail to make the distinction.

A larger project might further extend the symbolic significance of evolutionary theory in contemporary architecture in order to investigate the historical conditions surrounding this kind of “knowledge transfer”. Michelle Le Doeuff in a study of imagery in philosophical discourse argues that the “meaning conveyed by images works both for and against the system which deploys them.” (Le Doeuff 3) Functioning as points of tension and sometimes contradiction, images can ‘sustain something which the system itself cannot itself justify, but which is nevertheless needed for its proper working.’ (Le Doeuff 3) As an architectural historian I would speculate that the use of evolutionary biology metaphors not only demarcates an outside to architecture but alludes to a larger exterior context, one that supports our work but is invisible in our naturalised presentations of evolution: the various alignments of evolutionary theory and science and knowledge within the complex political and social formations of post-industrial capitalism. This is a subject for another paper.

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