Dead and/or Alive:
Architecture, Dis-Information, and Vitality

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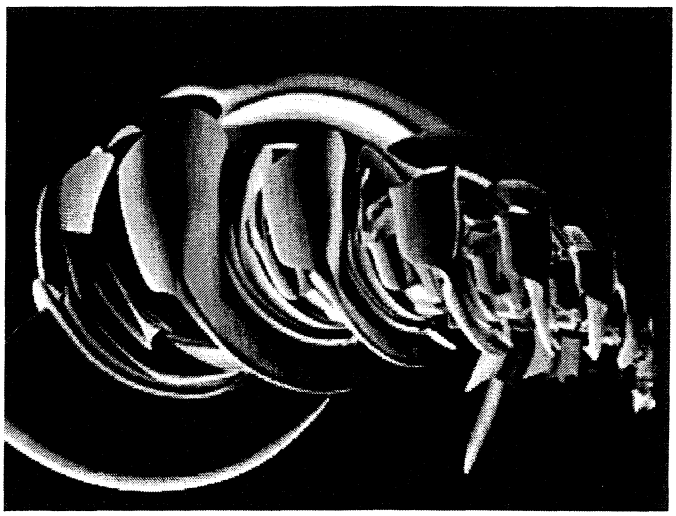
MOLECULES (MICROSTRUCTURES, DIGITIZATION, PRODUCTION)

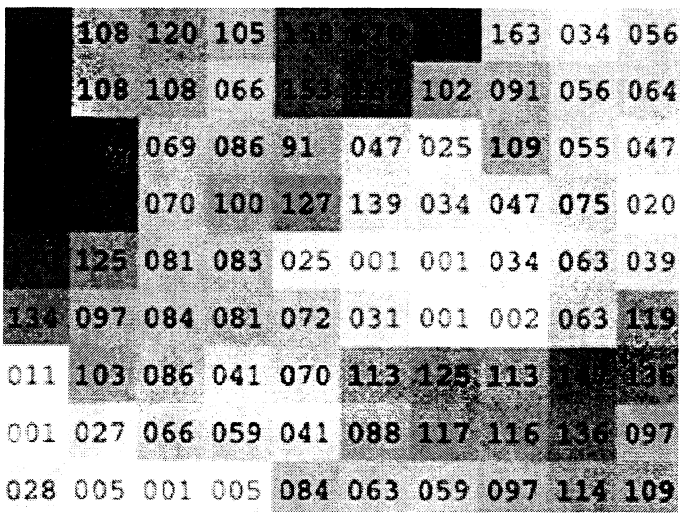
The digitization of architecture seems to have produced a new approach to the old problem of thinking about the organic analogy in architecture. This analogy is, by definition, an imperfect form of induction because it hinges on the indeterminacy of representations and their arrest of biological states. The subjects of the linguistic sciences and the life sciences have seen particular difficulty in approaching one another in architectural discourse. Recent developments in the digital practice of architecture have promoted the advanced return of an organic model as architects have begun to explore algorithmic processes, self-generating structural series, topologically driven membrane buildings, and animated forces that pressure and influence form. Amidst the interest, energy, and sensation that this important work has generated, the question of semiotics seems to have wavered, almost by definition, in significance.

At the same time, the life sciences, the physical sciences, and semiotics have formed strange but conceptually powerful bonds. These interdisciplinary exchanges could inform architectural discourse of strategies for the production of buildings that do not have to choose science at the risk of language nor language at the risk of science. They can problematize the inevitability of the "semiotic" building and the "organic" building from being dead and alive, respectively. Most notably, statistical mechanics cracked the limits of these disciplines by proposing an investigation into the microstructures and micro-states of objects, dead or alive. There is a semiotic stake in this investigation into the living because it ultimately targets the arrest of information that is present at the molecular level. Maybe I should have titled this essay 8 pages, 37 paragraphs, 357 lines, 4,032 words, 22,123 characters, and 4,010 spaces.

One of the most stunning philosophical assertions by statistical mechanics is the idea that the molecular level of an object carries the sets of internal information necessary for the life, or death, of that object. (This is a great lesson for architecture.) Further, the presence of information does not guarantee the viability or the vitality of that object.[1] This is to suggest that the presence of the components of an object may or may not lead to the presence of that object. There is such a fundamental difference between the item-



Karl Chu - Phylogon - Topological Generation



Bit-Mapped Skin - Tonal Units and Encoding

ization of an object and the actual configuration of that object that the odds of an object actually becoming present are so low that one could call it chance. Or one could call it the fragility of language, the arbitrariness of the sign, or the vagueness of representation. To architecturalize this scenario one could say that any number of architectural objects does not guarantee the configuration of a building.

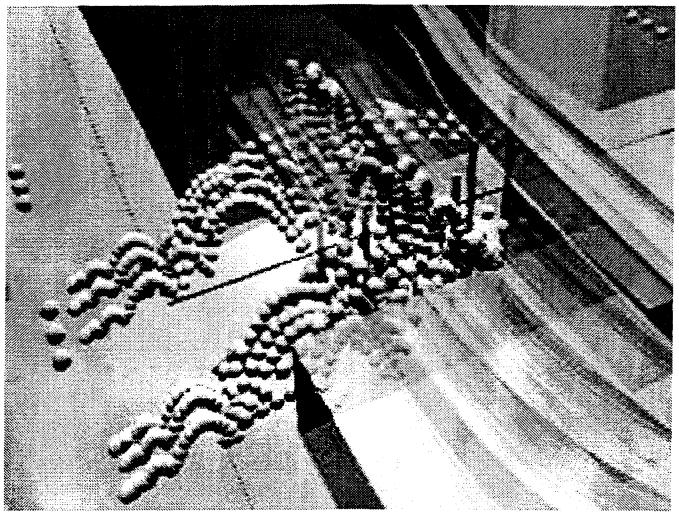
One could make the case that digital formats for the production of architecture – software – promote the possibility of this fragile coherence and strange incoherence between the object and the phenomena that constitute it. For the most part, the characteristics of a digital object are seen by design software as operationally discreet. A material is unrelated to the surface it materializes. Planes are upheld as extricable from the volumes that they comprise. Hue is independent of saturation. Channels of color are independent of the color itself. The color unit itself is, in turn, independent of its location on the map of other color units that resolve an image. The cultural rules that underwrite contracts between structure and skin, solid and void, and other architectural binaries are tested each time that one mis-uses one of the many functions of repetition.

Paradoxically, digitization places heterogeneous media into a homogeneous representational framework otherwise known as binary. In doing so, programming is forced to extract the micro-structural principles of difference that are specific to each media in order to translate those principles, aspect by aspect, into computable language. The atomization of media into discreet principles is manifest in the proliferation of menus, tool-bars, subdivided dialog boxes, and so on that display, in excess, a kind of meta-set of moves that the designer might make during the execution of both simple and complex constructions. These meta-sets often suggest both the limits and infiltrations of various media by evidencing the differences and similarities by which different disciplines handle different matters in different programs. Or, for that matter, similar matters in different programs. Is text encoded as vector-based (equation-based) geometries or is it resolved by a bitmap? If the text is bitmapped then is it text or is it merely the image of text (a text-ure) as approximated by a grid of pixels? If that text is vector-based then what is its status if it is imported into an architectural modeling program that is also founded on equation-based geometries? Or, what is the status of an image – a map of tonal units – when it is used to displace a meshed surface into the undulations of a three-dimensional form? Such cross-pollinations of media depend on two states of representation: the representation of the object and the representation of that representation in digital coding that cuts across media, discipline, object, and cultural rules to simply drive the machine. The critical value of the machine is that it produces both the representation of the object and the way of working on that object. All of this is delivered by a coding that hinges on the already-abstracted and repetitive nature of language.

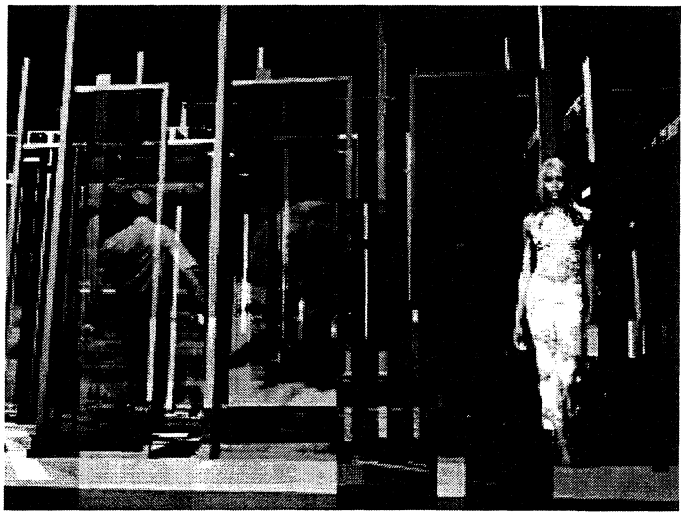
REPETITIVE STRESS (HISTORY, META-LANGUAGE, VAGUENESS)

The apparent mutual exclusion of the physical sciences and life sciences was radically questioned by the quantum physicist Erwin Schrodinger in an important set of lectures in 1943.[2] The lectures breached the representation-production question by suggesting that organic matter is driven by a kind of "code-script" that legislates the configuration of properties of an object in its present state as well as in the "permanence" of certain properties in future objects that it reproduces. He, like the theorists of hypertext and hypermedia, analogizes this condition with architectural terminology:

> *But the term code-script, is, of course, too narrow. The chromosome structures are at the same time instrumental in bringing about the development they foreshadow. They are law-code and executive power – or, to use another simile, they are architect's plans and builder's craft – in one. (Schrodinger,* What is Life? *p. 22)*



Greg Lynn - Modeling and Generating Contracted



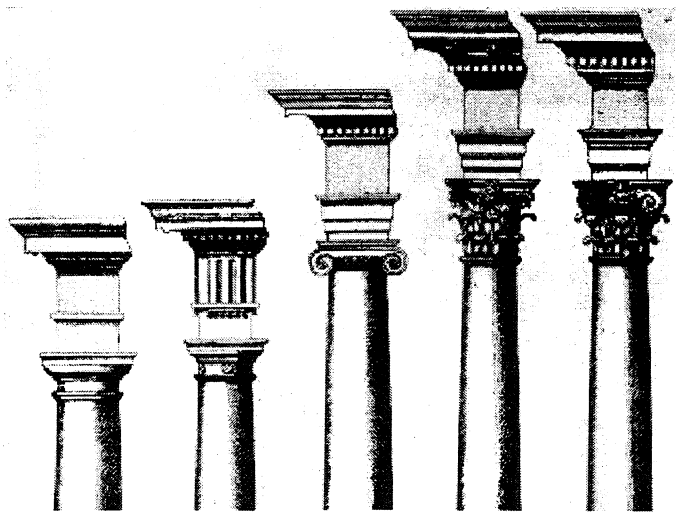
Jason Vigneri-Beane - Sterilized Figures

This suggests an internal logic that is, of course, a critical matter in the media driven processes of the digital project. The economy of the computer lies in its ability to perform simultaneously as a machine of representation and, more importantly, a machine of enunciation that contracts the modeling and the generation of an object into one process. (Some of the finest digital work has shrewdly implemented the work of algorithmic functions.) This contraction seems to intensify post-structural desires to deliver the object as a product of auto-writing. Input of parameters legislates output of forms by the processor, thereby relieving the architect of the *full* burdens of authorship. In the end, objects generated by processes of computation generally demonstrate an intense state of abstraction and repetition by producing topological shells and iterative structures that are defined by systems of points, lines, and planes. Charged with this abstracted meta-language of architecture, these structures have had to default on questions of figuration, reference, and, history. While they are able to sustain remarkable numbers of internal differentiations of micro-structure, the execution of radical semiotic and programmatic differences has proven elusive because, in the end, digital modeling is about the deployment of coordinates. This micro-structure of coordinates, in turn, functions analogously to pixels as the resolution of the image through repetition of color units in a bit-mapped grid. Rather than *being* the curved line it *resolves* the curved line. Resolution comes with excess - a series of segments stands in for a single curve - and at a loss - finite and discontinuous information stands in for a scalable and continuous object.

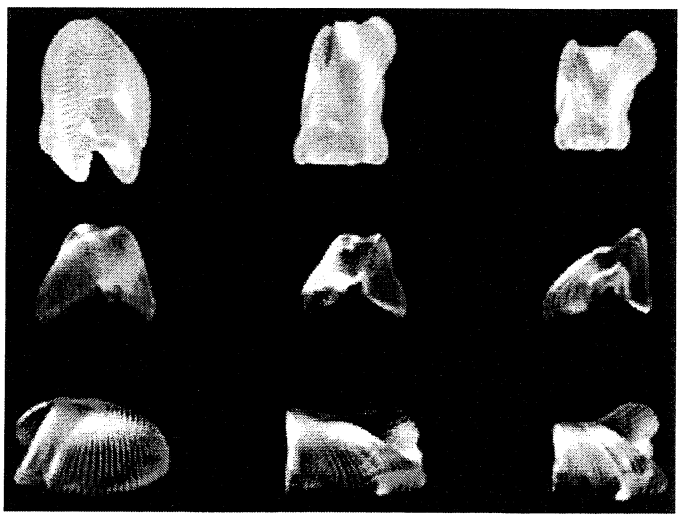
The logic of repetition is implicated again when a crucial point in Schrodinger's lectures proposes that one of the phenomena that differentiates inorganic matter from organic matter on the molecular level is that solids are structured by *periodic* crystals in the former and *aperiodic* crystals in the latter:

> *A small molecule might be considered the "germ of a solid." Starting from such a small solid germ, there seem to be two different ways of building up larger and larger associations. One is the comparatively dull way of repeating the same structure in three different directions again and again. That is the way followed in a growing crystal. Once the periodicity is established, there is no definite limit to the size of the aggregate. The other way is that of building up a more extended aggregate without the dull device of repetition. That is the case of the more and more complicated organic molecule in which every atom, and every group of atoms, plays an individual role, not entirely equivalent to that of many others (as is the case in the periodic structure.) We might quite properly call that an aperiodic crystal or solid and express our hypothesis by saying: We believe a gene – or perhaps the whole chromosome fibre – to be an aperiodic solid. (Schrodinger,* What is Life? *p. 60-61)*

This discussion suggests that there is a critical matter of the component and how that component is deployed. This is a matter of life, death, and the vitality of the digital object because the computer does not function without repetition. It is important to ask: without the repetition of what? The "what", we know, is both the coordinate and the string of binary digits that define the coordinate but the "what" rarely takes on figural tectonics that have a semiotic correlation in construction practices or gaming in architectural figures that are, as Schrodinger has characterized it, "not entirely equivalent."[3] This suggests that the repetition of units does not have to be merely a system of coordinate-points but could actually be a system of architectonic components that are significant of programs, histories, formalisms, technologies, and so on while still satisfying Schrodinger's criteria of similarity with differentiation. At the same time, and for all of this figuration, these components are still upheld in a state of play because, in the digital model, they are simultaneously concrete objects of signification and radically abstracted codes. Their constitutions are always one function away from declension to error and encryption because the computer, while technically omniscient, is, in the spirit of Samuel Beckett, culturally nascent. It performs operations masterfully without choosing to ask, "for what the cultural rules?"



Vignola - Canon of the Five Orders - Components



Greg Lynn - Embryonic Houses - Iterations

A is also 01000001, a is also 0110001, and the space between them is also 00100000.

The fundamental architectural act of (coded) repetition seems to be a function of the production economy of architecture. If it is, then perhaps there is another turn to the economy of architecture that is less strictly about the mass production of objects and the labor of physical assembly. Perhaps the accommodation of production is the necessary excuse for another strategy of production that has a stake in sustaining the meta-language of architecture. Or, as in the progeny of the cell for Schrodinger, perhaps there is a language of architecture that, although varied, mutated, and erratic, persists. Looking back on architecture, one finds a strange tradition of the instruction manual: The "*N*" Books of Architecture as an anticipation of the contemporary will to disseminate the principles of building in a set of canonical parameters that provide certain algorithms for the way one, anyone, produces a building. These parameters address both the construction of the component and the way in which the architect deploys that component. At the same time, they demonstrate a line of research into meta-linguistic variations on the architectural object as detailed by Tafuri's discussion of Serlio's "modulation" of type in *The Seven Books of Architecture*.[4] A contemporary version of this might be Greg Lynn's on-line *Build Your Own Embryonic House*. Relationships between the component and the system of deployment can spur strategies of repetition that are just as self-reflexive as they are programmatic in the sense that to *deploy* is also to *display*. Schrodinger again:

> *As we shall presently see, incredibly small groups of atoms, much too small to display exact statistical laws, do play a dominating role in the very orderly and lawful events within a living organism. They have control of the observable large-scale features which the organism acquires in the course of its development, they determine important characteristics of its functioning: and in all this very sharp and very strict biological laws are displayed. (Schrodinger,* What is Life? *p. 20)*

The etymological coincidence of display and deploy (*displicare*) suggests the routine architectural acts of exhibiting structures, materials, and formal devices. In the end, these exhibitions are meta-displays that the assembled object in question evidences the moves that constitute the architectural language: point/line, plane/volume, structure/skin, inside/outside, solid/void. However, these terms of architectural discourse are in constant states of crisis because the binary sets that they propose will always be undone by the seriality and multiplicity of the objects that they attempt to classify. The crisis of representation here suggests once more the fragile and indeterminate relation between the presence of information as a micro-state and the configuration of that information into something that is fleetingly meaningful, if not stable, as a macro-state. It also reminds us of the flaws of binary logic that characterize classically trained set-theory because it demonstrates that the notion of crisply defined categories on which classical set-theory and, by extension, language are founded can not accurately describe the world. In 1922 Bertrand Russell characterized the error as the inherent *vagueness* of language:

> *Vagueness and precision alike are characteristics that can only belong to a representation, of which language is an example. They have to do with the relation between a representation and that which it represents. Apart from representation, whether cognitive or mechanical, there can be no such thing as vagueness or precision; things are what they are and there is an end of it. (Russell,* Vagueness *p. 62)*

Set-theory is, of course, critical to the invention and success of the computer. One of the major, if not unwitting, contributors to the invention of the "logical design" of digital computing has also had a direct impact on the logic of digital modeling. George Boole's thinking appears by name in AutoDesSys's Form-Z as a way of combining basic modeling objects or "primitives" to produce more advanced compound three-dimensional geometries. While digitization owes so much to Boolean Algebra, Boolean sets have come under criticism by theorists of Fuzzy Logic.[5] This emergent branch of deviant logic advances by criticizing classically-trained set theory on its inability to provide for scenarios of nuanced or soft decision making. Problems of logic and investigations of vagueness drive the fuzzy theorist's project of relieving sets of the burden, or impossibility, of crisply defined classification in order to bring multiplicity and vitality to logical processes. Fuzzy logic would propose that there are no objects that are either X or not X. Rather, all objects have a greater or lesser degree of membership in the set of objects that can be classified as X or not X.

This understanding of logic, vagueness, and the need for sets that have dynamic membership ultimately fosters advances in artificial intelligence – the convergence of

computation and neural science – because it allows for input and output that is not about binary switching of yes-no, true-false, on-off, 1-0. Rather, it suggests, again, that to approach the performance of an organism in a digital framework, one must work with phenomena as micro-states that have relationships to categorized macro-states based on indeterminacies and iterations of information. The sets of architectural objects that assemble a building are also complicated in the way that the fuzzy theorist might suggest. They are sets of objects that are parts of a whole complex of states, relations, histories, performances, formalisms, and so on. One could not point to a building – an assemblage of architectonic sets – and say that one set of objects is form and another program, or one set is about material and another about history because there is a constant but errant infiltration of the properties of sets by other sets. It is possible that meaning is actually produced by this instance of infiltration, which should really be called the intersection (or multiplication, in Boolean algebra) of incidental sets.

GRAFTS (ENCRYPTION, RECOMBINATION, HYBRIDIZATION)

If, on the micro-level, architecture consists of sets of information such as materials, performances, aesthetics, economies, and logics then the question would be: what fragile arrangements and statistically probable mis-arrangements (or dissolutions of order) of micro-

states would be possible with information that is not contracted to an already-determined configuration? The breaking-down of objects into sets of information enables the recombination of that information. We should say that the issue is really about sets of sets of objects and sets of sets of information that support both the internal gaming of meta-language and the hybridization of multimedia in objects. Recombination could result in multiple macro-states that are generated by the same micro-states if we can deploy their significant figural objects in meta-linguistic ways.

Significant objects are already ciphers.[6] They are already entities that have been encoded with meaning. The principles of cryptography that have intensified relative to progress in digitization form part of this possible model for architecture. Cryptography, like digitization, depends on the arbitrariness of linguistic symbols as ciphers. It functions by capitalizing on the deliberate but fragile contract that the system of signs known as language has with the microstructure (alphabetic characters) that comprises it and the significations that it triggers. It refigures language through language's own notably figural microstructure. It is both information and dis-information. At the same time, and for all of its careful means of obscuring information, cryptography is about embedding meaning in a form that has been filtered through three mechanisms of abstraction that were first formalized by Alberti.[7] Translation, transposition and substitution of alphabetic characters give text a macro-state of legible form that delivers illegible content. (For example, input the phrase *this is text* into the German Enigma machine and it could output *vkqi ao uimp.*) After encryption, the resultant micro-state of text still contains all of the information or data that was present in the legible macro-state of the text before it was encrypted. The encrypted text is now a very different macro-state that contains the same information in its micro-state. If one can properly reconfigure the micro-state, or alphabetic characters, then one can render the text legible and *resolve* its meaning and its fulfillment of the cultural contract between units of language and meaningful statements. In order to understand encryption (and computation) one must understand the exchange of figural grammatical rules for abstract mathematical sequences.

Encryption upholds the combination of figuration and abstraction in an unlikely, but powerful, way: the presence of figuration is precisely what intensifies abstraction. And, in turn, the abstracted counter-relational deployment of letters intensifies individual figurations. (Geometrical arrangements take the place of grammatical arrangements.) These figures, no longer contracted to proper arrangements as words, form an open set of letters that are the precise, but opaque, manipulation of a precise and once-transparent, text. Although it is still significant if decrypted, this liberated microstructure is prepared for substantial exchanges with other microstructures to form other linguistic, or tectonic, tissues. Like the physicist Schrodinger, the horticulturist Garner employs the architectural language to relate the play of form and function produced by grafting plant tissues:

> *When stressing the two vital factors for success, compatibility and cambial contact – particularly the need to place cambiums in contact – the possible contribution made by transformation of adjacent living tissues should be recognized. This contribution comes only from living cells, once again underlying the value of good craftsmanship and the maintenance of life in stock and scion. Even though cells have ceased to divide they may be reactivated to serve particular purposes. (Garner,* The Grafter's Handbook, *p.65)*

. . . then . . .

> *It appears that living plant cells can change from one form to another in response to surroundings or stimuli, hormonal or physical. (Garner,* The Grafter's Handbook, *p.65)*

. . . and then . . .

> *Reversals of form and function, apparently not due to any recognized artificial cause, have been observed as, for example, when*

W'R QMGMAX; MTN JPX HBTW RMY JPX QMVJ CI J
K. JPXT JPX HBTW'R ACUTJXTMTAX YMR APMTWXI
JR JVCUFGXN PBL, RC JPMJ JPX SCBTJR CI PI
:CRXN, MTN PBR HTXXR RLCJX CTX MWMBTI
)TW AVBXN MGCUN JC FVBTW BT JPX MRJVCGCWXVI
MTN JPX RCCJPRMEXVR. MTN JPX HBTW RQMHI
K YBRX LXT CI FMFEGCT, YPCRCXDXV RPMGG VXI
MTN RPCY LX JPX BTJXVQVXJMJBCT JPXVXC:
XN YBJP RAMVGXJ, MTN PMDX M APMBT CI WC(
H, MTN RPMGG FX JPX JPBVN VUGXV BT J1
AMLX BT MGG JPX HBTW'R YBRX LXT; FUJ JP:

Substitution Cipher - Legible Form/Illegible Content

Bridge-Grafted Trees - Intersection of Sets

parts of white petals become green leaves or shoots become fruits and fruits become shoots. (Garner. The Grafter's Handbook, *p.65)*

A well-practiced method of blurring the limits between linguistic practices and life sciences could be said to be the art of grafting. Grafting breeches both the limits of biological and semiotic identity because it seeks to operate on named biological macro-states in such a way that depends on the infiltration of micro-states of those entities. In other words, it seeks to enhance the performance of the pear by constructing that pear out of pear-quince-pear union. Or it makes a more viable cucumber out of a cucumber-cucumber union.[8] Or, in some other words, the graft involves a hybridization of macro-states that hinges on the combination and recombination of the micro-states that legislate those macro-states. These combinations can be both internal to the set of objects under a single classification (cucumber-cucumber) and external to sets of multiple classifications (pear-quince-pear.)

The multiplicity of identities that results from grafting has resulted in rare instances of true hybridization – a kind of botanical multi-mediation that is more than an enhanced union. There are cases known as chimera that are produced when budding occurs on the joint of the root-stock and scion, the existing component and the added component of the union, respectively.[9] In this particular zone, a bud could be produced by the overlapping of different cellular tissues, each with their own code-script or micro-state of legislation. Chimera are interesting errors of identity because they show the mutability and heterogeneity of objects that are often repressed by the assumption that macro-states are fixed. There is a crisis of identity that is both biological and semiotic: what type of plant is this? This question conflates a genetic question and a linguistic question in a way that is critical (as crisis) to both botany and architecture: (What will the code-script that legislates the state of this plant/building produce?) + (What is the classification of this plant/building?) What is it that one plant with two tissues produces three flowers – yellow flowers, purple flowers and flowers that are an errant mixture of both colors. Or that a single plant must go by two different names in the same language of nomenclature? I mean to suggest architectural thinking here because it tends to allow buildings to prescribe the macro to the micro rather than allowing complexity and multiplicity to develop out of internally and externally errant systems. It is not, however, that this kind of development of grafting is imprecise, random, or casual. Errancy emerges out of precision or multiple precisions. Precise work on the micro-state of architectural information can not lead to states of singularity and determinacy. Like the cellular tissue of chimera, these states have component-sets of microstructure that, as sets, move in and out of relation with themselves and with other sets. They execute their own internal logic, at times, and they intersect with the logic of others, at times, to form a vital and *digital* architecture – a molecular hybrid of production and representation. Just as the botanist stresses the need for a complicated biological compatibility, the philosopher, Derrida, through the micro-structure of writing, confirms its etymological trajectory from the graft (*graphos.*)

All this is possible only in the gap that separates the text from itself and thus allows for scission and for the disarticulation of silent spacings (bars, hyphens, dashes, numerals, periods, quotation marks, blanks, etc.). The heterogeneity of different writings is writing itself, the graft. It is numerous from the first or it is not. *(Derrida,* Disseminations, *p.356)*

. . . and just before that, and to end this essay with the beginning of his . . .

That is how the thing is written. To write means to graft. It's the same word. The saying of the thing is restored to its being-grafted. The graft is not something that happens to the properness of the thing. There is no more any thing than there is any original text. (Derrida. Disseminations, *p.355)*

NOTES

[1]Ahmet Omurtag. "Chance, Risk, and the Amorality of Nature." New York under 17' of Water. IAS 2000 Summer Program in Architecture and Urban Design. Pratt Institute. 17 July 2000.

[2]Erwin Schrodinger. *What is Life? The Physical Aspect of the Living Cell,* Ed. Roger Penrose. (Cambridge: Cambridge UP, Canto, 1992) 3-20.

[3]Erwin Schrodinger. *What is Life? The Physical Aspect of the Living Cell,* Ed. Roger Penrose. (Cambridge: Cambridge UP, Canto, 1992) 60-61.

[4]Manfredo Tafuri. *Theories and History of Architecture.* Trans. Giorgio Verrecchia. (New York: Harper and Row, 1980) 114.

[5]Daniel McNeill and Paul Freiberger. *Fuzzy Logic: The Revolutionary Computer Technology That Is Changing Our World.* (New York: Touchstone, 1993) 23-44.

[6]George W. Smith. *Computers and the Human Language.* (New York: Oxford UP, 1991) 3.

[7]Simon Singh. *The Code Book: The Evolution of Secrecy from Mary Queen of Scots to Quantum Cryptography.* (New York: Doubleday, 1999) 45-46.

[8]R.J. Garner. *The Grafter's Handbook,* 5th ed. (London: Cassell, 1989) 135-136.

[9]R.J. Garner. *The Grafter's Handbook,* 5th ed. (London: Cassell, 1989) 288-289.

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