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The Synthetic Dialect & Cybernetic Architectural Form:

Abstract:
Recently a significant philosophical split has appeared within the discipline of architecture. The split exists because the architectural profession is adopting a new digital framework, from which it can challenge the traditional cultural and technical pursuits of the discipline. This paper is about this split within the profession and about using it to develop challenging contemporary architectural forms that work to fill the 'gap.'

So where does the split come from? Our discipline and its associated discourses have over time been informed by the technologies used to construct it, design it, and mediate it, but also constrained by these things and our understandings of them. With this in mind, one can realize that it is the technologies of the time that in fact shape the philosophical positions and styles adopted by both individual designers and entire genres.

This gap isn't an easy thing to pin down. It takes on several forms all of which seem to stem from the same source, that being the influence of information constructs on space. If anything this paper aims to uncover the differences and similarities of these constructs, and use them to understand the digital genre that presently surrounds us.

Introduction to the Synthetic Dialect:

Peter Wilson cleverly has pointed out that in the 1920's when Le Corbusier wrote "... nobody today can deny the aesthetic which is disengaging itself from the creations of modern industry,"[1] that if the words 'modern industry,' are replaced with the words 'information technology,' one would have an incredibly accurate picture of our contemporary condition.[2] Things are moving at a highly accelerated pace. Technologies turn over at unprecedented speeds and the social impacts of these technologies; of new information systems, transportation systems and communication – documentation systems are leading an undeniable and rapid hybridisation of the urban environment,[3] the consequences of which, "of the new virtual reality of electronics, network computers and the ubiquitous language of television..." act to generate a "...de-presencing, an ephemeralising, a seeping transparency which has infected all things and all places."[4]

There is a new genre out there. It's digital and it's focusing on the relationship between information orders and spatial orders, and more often than not it is trying to meld the two into a synthetic space.

The root to understanding the synthetic comes with the realisation that information has a construct that is based upon a system of relative relationships between sometimes disparate pieces or bits of information. We witness the imposition of relative information orders onto space constantly. For example, think of how you arrange your office desk, think of how you order your diary, your hard disk, your note pad, your office. All of these things are divided into parts with different places for different types of information In such systems, tree-like frameworks emerge as natural[5] phenomena in part because information exists within a system of relative ordering, which although spatial, don't use space in the way that architectural ordering systems or "object" based orders do. This is because information loses its validity or meaning once it is removed from a relative environment; an environment where one piece of information can be weighted against something else. This obviously isn't the case with a geometrical or architectural order because object forms have the ability to stand within their own right as objects of beauty.

Information simply can't do that. This very simple example opens the door to understanding the current information environment and some of the cultural, spatial and architectural implications of information systems.

Most of the literature that best illustrates the consequences and changes that society faces, has been underpinned by urban design theory; city theory. Christopher Alexander in a 1965 essay called "The City is not a Tree" used the term artificial cities,[6] to describe a modern sterility and explained that such cities "lacked a level of complexity necessary to sustain a legitimate urbanity."[7] His effective comment through the paper ridiculed the contemporary city while at the same time unwittingly and unintentionally pushing the desire for a new unified aesthetic, the very one that modern cities were drifting toward. This paper clutches at the word 'artificial' and morphes it into a more positive, relevant and meaningful word, synthetic.[8]

Alexander brings a unique insight to the synthetic dialect. His realisation that spaces can be described within hierarchical, tree-like and or semi-lattice information structures introduces us to the idea that spatial systems are compatible with information systems. Both form similar structures and display common orders when (and only when) analysed and conceived of as hierarchical systems.

A Desire to Unify: Understanding the Synthetic
For a more contemporary notion of the synthetic and its links with uniform systems of planning, Ungers suggests that "modernity has failed... because it thinks in outdated and obsolete terms... this failure is not due to any lack of effort or opportunity, but to a misguided intellectual approach."[9]

His words as to what exactly the misguided approach entails follow the synthetic dialect along two paths, one philosophical and one technical. He goes on to say, "planners argued in terms of opposites, antagonisms, old versus new, traditional versus modern, progressive versus reactionary, rather in terms of supplementing, complementing and superimposing."[10] Philosophically, Ungers' words strike at the heart of issues that are fundamental to architectural thought and that are of particular relevance to the placement of the synthetic within the real. For example, does the synthetic really oppose the real? Or can the synthetic be superimposed onto the real?

Complementing form and supplementing it with newer systems, be they information systems or physical ones, places Ungers at the edge of understanding the role of information systems on city form and like Christopher Alexander, he criticises modernism for its simple 'either or' solutions. Ungers points out new trends within the contemporary city and talks about the "unified multimedia city," and the "unified conceptual city,"[11] and implies that these trends (while information based) have a manifestation that work to resolve the natural disparate nature of cities by complementing their existing forms with new information systems. As we step between the containers of architecture and urban design, it becomes obvious that a substantial proportion of the theory is common to each field; it overlaps and hence the struggles that cities must overcome in order to unify themselves are incredibly similar to the struggles of contemporary architecture.

An Emergent Split: Immaterial And Material Form
"Today's accusing lines, event horizons and field patterns demand a re-invention of mapping techniques, of syntax and of terminology used to describe the urban condition."[12]

The synthetic dialect at its roots looks to re-invent mapping techniques in order to demonstrate new spatial relationships, new possibilities and new cognitive forms. It also allows for the development and exploration of a syntax with new rules, new laws and grammars. New

typologies may be unwound with the synthetic. An example of one type of discovery that may run from this can be found in the work of Arakawa and Madeline Gins (fig1-3). Their project called, "Housing Complexity: Reversible Destiny Housing,"[13] suggests that form, when fragmented, super imposed and modified can give rise to a "super abundance"[14] of navigational and cognitive triggers that aid the viewer in creating a holistic picture of the environment that they are experiencing. "Residents read the universe as a world in terms of its carefully delineated structure. Numerous markers allow residents to get their bearings to a far greater degree than has ever before been possible."[15] The synthetic dialect is used by Arakawa and Gins to re-invent the experiential map. The complexity of the new map, leads to a super abundance of references, and relationships that can only be reasonably generated through the use of complex modeling environments that specialise in presenting, or representing a multiplicity of spaces at several levels. In this project it is interesting to note that both Arakawa and Gins have come to realize the nature of information and in doing so have tried to reflect upon it in built form. Like information, their buildings take the stance that "nothing will be allowed to stand on its own."[16]

The synthetic dialect, can be understood as a methodology. Roughly put, it is a practice that seeks to realise both the limitations and instant benefits that particular representations have upon the design process, bringing new insight, new understanding and new cognitive visions to space and form. It achieves this by emphasising the use of transparency, superimposition, fictitious views and what can best be described as profitable combinations or 'skips in navigation' that aid the designer's and the viewer's understanding of space. Going back to the reversible destiny housing example, these skips of navigation become cognitive phenomena, "residents continually use one part of the complex to assess and critique another... it will be possible to be exactly where one is simultaneously with being exactly somewhere else."[17] In this version of the synthetic, space is read through a constant comparison and assessment of forms.

Their project challenges a translation into built form, with strange results. "There will be parts of the kitchen or the living room that will reappear in the bedroom and in the bathroom. It may take a few hours to go from the living room to the kitchen. It may take several days to find everywhere in the house that the dining room is."[18] Synthetic dialects raise issues fundamental to architecture, for to model space within a synthetic framework one must pin the discussion within the reference frame of reality. What is real space? What is synthetic space? What is architectural space?

A Down Side to the Synthetic Dialect:

Perhaps this is the place where the formerly mentioned split[19] comes into its own, because while it is possible to think about the spatial implications of information systems, we still don't know if it is practical to build them.

Spaces aren't constructed in the same way that meaningful information structures are, although sometimes, it appears as though they are. The arguments and convictions such as those proposed by Alexander, on space, are not fully convincing because distinctions need to be made

between space and information. I do not question that spaces can be visualised or conceived of as being semi-lattices, but we need to remember that the resulting diagrams are relationships caused by the imposition of information based ordering systems onto space. Spaces aren't necessarily hierarchical, nor exclusive, nor recursive, as information structures tend to be; space is continuous.

On building spaces that follow recursive rules, similar to the 'field of centers' hypothesis Alexander developed, the Arakawa and Gins example begs a question. Could the housing complexity project, be built, and if it could would it be built as it appeared in computer generated design imagery, with walls slicing through furniture and space in a very impractical, uninhabitable way. Such information based, notions of space can quite easily negate the responsibilities that are usually associated with architectural space. I doubt very much that Alexander's examinations of London, if built, would result in the London we know today; by Alexander's own admission they are simple representations of extremely complicated forms.[20] Forms that are understood through information structures, that are composed on the back of particular questions. His London is informed only by the questions he asks of the spatial system.

Obviously some types of synthetic forms better serve the purpose of architecture only as representations. Experimentally one test that could be used to check Alexander's work would be to build the London his diagrams describe. If the new London matches the complexity of an existing London, the diagrams could be seen as being faithful representations. In the event of a negative result, it could be said that Alexander's idea to describe space within semi-lattice and or tree based information constructs then must be 'lossy.'[21] At a guess, I'd say his information constructs are exactly that, lossy, they aren't faithful representations of spatial constructs. So where is our new information based, digital genre going? Are we becoming slaves to analytical descriptions and visualisations or are we using technology to go physical?

The Matter Of Body And Mind:
"The attempt to trigger a new perception of space reopened a basic philosophical question."[22]

If the synthetic looks to exploit hidden and unseen relationships, transparent relationships and unapparent spaces, then it is a technique that rests upon the cusp of an 'architecture of the mind' and an 'architecture of the body'. Any project that seeks to exploit synthetic relationships to inform[23] space and generate form must realise both the characteristics of the synthetic and the real because it is only once both sets of characteristics are understood that limits may be pushed and new built typologies may emerge.

This isn't an easy task. Ungers happened upon an understanding of the limitations that modernistic theory brought to bear upon complex systems and tried to use them to resolve the aesthetic split that he saw emerging within city forms. He points out the either or mentality of modern thought and uses it (perhaps wrongfully) to illustrate the split as being a historical artifact, an artifact that needs to be fixed rather than turned into a vessel that gives birth to architectural forms that overcome the divide between information constructs and spatial ones. How we resolve and overcome this split is the real problem. It is a problem that in light of our current information based society holds particular relevance and importance. Complex digital spaces are now important to us. Let's for a moment delve more deeply into the ideas that drive our current understandings of spatial and informational systems, in particular looking at the work by the German philosopher Immanuel Kant. His work seeks to unveil the possibilities of form through understanding spatial cognition and narrative.

Kant describes space as a necessary representation that is of pure intuition. It stretches on for ever and is the equivalent of a medium that is understood by us in an instinctive way.[24] In this light space is continuous, so while we parcel it off into exclusive and contained packages, we understand that those packages actually contain a small portion of a universal space. Likewise,

objects within space are understood as separate and exclusive entities, that wrap or contain smaller portions of the same universal space. What this tells us is that we understand space by dividing it up in a principled way through the process of exclusion. Anyone using a CAD system today witnesses this idea constantly (and usually unknowingly), whenever they use boundary representations to express spatial form. Interestingly enough the boundary representations that Kant uses to describe spatial entities strike a great chord with the methods we use to sort information. When we bring meaning to pools of information, we carve it up and divide it into separate, like parts, thereby producing a relative framework. Hence the cognitive processes to sort informational and spatial constructs are much the same, both use exclusion as a means of definition. However despite this principled similarity, objects don't need a framework, (as information does) for us to understand them. We can appreciate objects independently, for what they physically are.

Why is all of this important to architecture? How do designers use Kantian or other philosophical frameworks to design things? Both of these questions are good questions to ask at this point.

We live and practice architecture within an information based global society, one that regardless of our stance, influences the ways in which we practice and think. Who would have thought that the earth was round, but who wouldn't have believed that it was without seeing a picture of it in its virtual, pictorial entirety? Our perceptions have undoubtedly been influenced by Kantian thoughts. Just think for a moment about the information structure of your hard disk and its exclusive,[25] tree-like, representations. Design issues are becoming increasingly virtual, but we are physical creatures, and while it is useful to understand how information constructs work with physical ones they actually induce a slip into our design processes.

Disappointingly few people distinguish the differences between information forms and physical ones. Architects, if they really want to crack the digital age especially need to understand that hierarchical information describe space but don't make it. A split has emerged.

Resolving the Split: Synthetic Dialects And Cybernetic Form
The synthetic dialect has thus far suggested two things. Firstly that there is a desire to overcome the disparate nature of complex systems with tools that aid in the ultimate unification of form. And secondly that it is the cultural aspects of information societies and the ever increasing importance of virtual forms, (cognitive and visual forms, that we use to critique contemporary spaces) that make the split and its associated issues important. What this paper hasn't yet done is suggest a strong means by which these current issues can be resolved.

As designers and thinkers we need to find a tool that gives us the ability to straddle these material and immaterial worlds. We need to recognise the split and address it if we wish to adopt the values and ideas of our contemporary information based societies and progress our architectural statements. It is at this point that I'd like to reintroduce an idea already touched upon by this paper, that we need a philosophical device that will help us for fill our desire to inform contemporary space. Modernism is just such a tool. Ungers would perhaps have us believe otherwise if he could, and his words, in this matter, have already been noted. However while I believe his argument to be quite interesting it would be foolish for one to throw modernism away entirely. Modernism is valuable to the discussion as well as being critical to the development of cybernetic architectural form. Why?

One of the fundamental tenants of modernism is the idea that built form has the ability to express greater spatial truths. We often witness this (and usually dismiss the idea of it) whenever critics talk about 'form following function,' because traditionally modernism hasn't really lived up its grand ideas. After all how can form really (and practically) follow function when the uses that are attributed to form constantly change? We all know that streets aren't just for driving on, sports stadiums aren't just for sporting in and offices aren't just for working in, so how can meaningful

forms be made to support these spaces and the activities they house? Functional modernism has thus far, perhaps unsuccessfully, attempted to use information constructs to produce logically functional spaces; the resulting forms made by these attempts, are typically far too simple to prove the modern hypothesis correct.[26]

We are of course now talking about the split that was written about in the previous few sections of this paper, a split governed by a difference in the informational structures and physical manifestations of form. It is here that the baggage of "function" masks an information construct.

There is a logical coming together of function and information based systems, because informational systems are the main means by which functions are imposed onto space. Both function and space are treated as isolated units that are exclusive in nature, and because of this they are lumped together, and sold as complete (whole) entities. Packages of function are placed within packages of space before being assessed by hierarchical diagrams that often illustrate the construction of a 'truthful' typology. In this light functional modernism hasn't a leg to stand on because spatial truths are, by and large, fraudulent; they are because spatial truths are activity lead and activities change through time. If the form follows function equation is to prove true, the form of a space must, logically also change with time. Form must be a function of time, but how?
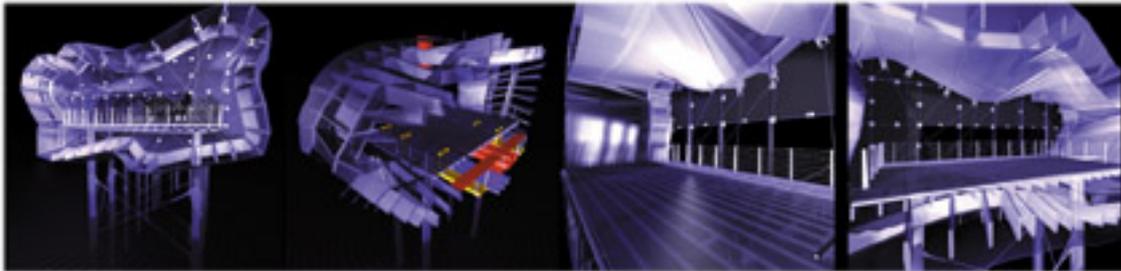
From left to right: (fig4,5,6,7) 'Idea Cloud.' An experimental dance theatre that is a programmable reactive form, by Tristan d'Estree Sterk. 1998. The system exposes the dancer and audience to a series of programmable, sensor based interfaces each affecting different regions of the space. (fig 7) The building envelope is a reactive skin that forms and reforms itself as though it were in dialogue with its surrounds. (fig 5) The exploded axonometric illustrates how the systems that support the performance space tie into the greater structure.

Cybernetic Form: Responsive Architecture

"I find it hard to look at a more central and more elemental cybernetic concept than stability ... stability occurs in an environment, and manages to absorb variations in that environment, at least to a certain degree."[27]

When we talk about form following function through time, we need to address the means by which we cause form to change. Let's look at a space to gain an insight on how cybernetic or reactive form might be understood and made, and let's use the example of a performance space to do this.

Performance spaces require several fundamental things, they require a place for the performance to occur, a place for the audience to observe, and a series of services to each space. One very simple, resourceful and interesting version of a performance space, (without any built infrastructure) is made by buskers.[28] Picture a busy pedestrian street, or mall. People are everywhere, walking backwards and forwards doing whatever people do, randomly, and somewhere in the crowd is a person who is about to give a street performance. When they start the performance, they usually stand up, sometimes on a prop and begin to yell, sing, or juggle. They do whatever it takes to get the attention of just one person. Once they have the attention of that one person, while still acting, they look for the attention of a second person, then a third and fourth until finally a small mass of people stand, roughly together, as a group within the space.

The performance proper then begins, and if it sufficiently interests passers, they stop, joining the crowd that currently stand between the performance edge and the rest of the street. A boundary has formed, but for it to maintain itself it needs to be stable.

The boundary while being a spatial construct has been informed directly by a process that is cybernetic. The performer, through a series of actions attracted a crowd, and in reacting to the performance, (by stopping and watching or applauding) the audience opens a dialogue with the performer, who reciprocates with another action to which the crowd also responds. Interestingly enough, this dialogue is nearly always used by the performer to control the space that they occupy. We call this space a stage, but in this case it's dynamically constructed from stuff other than built matter. Its edge is informed and driven by the actions and information constructs of the performer. This relationship is a cybernetic one, because it is constructed around a dynamically stable, cyclical relationship between the controlled and the controller.[29]

The performer knows that they don't require a 'built' stage, but that one can be made by using the actions of an audience. The stage very simply and intelligently responds to the needs of the performance, and as a dynamically stable system it can change its position in space, its boundary, its density and size, instantaneously with changes in function. Its great strength as a spatial construct is that it is directly informed by an informational system; the function of the performance. Cybernetic forms let informational and spatial systems co-exist to produce forms that are highly relevant and totally suited to dynamic functions.

Conclusion:
Distinctions between information based and spatial constructs need to be made, because our digital age relies upon tools that use these two constructs to produce built space. Unfortunately very few people actually understand exactly how the two fit together and even fewer realise that there is a fundamental mismatch between spatial and information systems as we currently (architecturally) understand them. Spaces don't necessarily match their corresponding hierarchical diagrams, perhaps because we've failed to realise that they are 'lossy' representations; that we unknowingly are filling in the blanks, so to speak.

How we resolve this lossy circumstance (the split), is for future work. Perhaps, the cleanest resolution isn't to fix it, but to re-conceptualise the relationship between information constructs and spatial ones. Cybernetic architectural forms do exactly that. They provide us with the opportunity to make an architecture that is totally responsive to information based and or action based spatial functions. Cybernetic form gives us a practical and realisable set of tools that let architectural form, follow function, dynamically.

A part of the problem that hierarchical information based constructs have when describing spaces is that they are produced on the back of questions. We then take the resulting answers and graphically represent them to fraudulently illustrate spatial truths. The strength of cybernetic form might just be the directness of its process. Questions result in immediate answers that cause spatial forms to respond.

Notes:

1. Wilson, P. "Eurolandschaft." in Middleton, Robin, ed. Architectural Associations | The Idea of the City. London: The Architectural Association, 1996. p.102.

2. Ibid. p.102.

3. Eisenman, P. "Architecture in a Mediated Environment." in Middleton, Robin, ed. Architectural Associations | The Idea of the City. London: The Architectural Association, 1996. p.56–62.

4. Both Peter Wilson and Peter Eisenman allude to this point, for a specific source see; Wilson, Peter. "Eurolandschaft." in Middleton, Robin, ed. Architectural Associations | The Idea of the City. London: The Architectural Association, 1996. p.102–104. (For more reading on this topic see; Hodges, Nicola, ed. World Wide Video. London: Art & Design Magazine, 1993.)

5. Any system that is composed of self contained exclusive entities, that sit recursively within a structure produces a hierarchical structure, known as a tree.

6. Alexander, C. "A City is Not a Tree." The Architectural Forum: 1965, Vol. 162. (April) p.58–62; (May) p.58-61. Reprinted in Jonathan Crary, et al. (eds.) Zone 1/2. Baltimore: Johns Hopkins University Press. p.129-149.

7. Pope, A. Ladders. New York: Princeton Architectural Press, 1996. p.87–87.

8. 'Synthetic,' is used here to imply that we aren't just talking about virtual things, but material things that are explicitly shaped by information.

9. Ungers, O.M. & Vieths, S. The Dialectic City. Milan: Skira editore, 1997. p.13-14.

10. Ibid. p.13.

11. Ibid. p.14.

12. Wilson, P. "Eurolandschaft." in Middleton, Robin, ed. Architectural Associations | The Idea of the City. London: The Architectural Association, 1996. p.104–105.

13. Arakawa + Madeline Gins, "Reversible Destiny City." Architects in Cyberspace, London: Architectural Design Magazine, 1995.

14. Arakawa and Madeline Gins, "Housing Complexity." Complexity, Architecture / Art / Philosophy. London: Academy Group, 1995. p.93.

15. Ibid. p.88.

16. Ibid. p.93.

16. Arakawa + Madeline Gins, "Reversible Destiny City." Architects in Cyberspace. London: Architectural Design Magazine, 1995. p.86-89.

17. Arakawa and Madeline Gins, "Housing Complexity." Complexity: Architecture / Art / Philosophy. London: Academy Group, 1995. p.90.

18. Ibid. p.92.

19. The 'split,' is caused by superimposing informational structures onto spatial ones; both are constructed differently and induce a 'split.'

20. Alexander, C. "A City is Not a Tree." in Jonathan Crary, et al. (eds.) Zone 1/2. Baltimore: Johns Hopkins University Press. p.149.

21. 'Lossy,' a word used largely by computer scientists to describe conversion processes that leak information. In the case of city representations, the loss occurs when converting the diagram back into the city.

22. Tschumi, B. Architecture and Disjunction. Cambridge: MIT Press, 1996 (third edition). p.40.

23. 'Inform,' used to describe a total design process, where space is influenced by informational processes or constructs.

24. Kant, I. Critique of Pure Reason. Trans. Guyer & Wood. Cambridge: Cambridge University Press, 1998. p.155-179.

25. 'Exclusive,' excluding all else; not inclusive. Files and directory structures are packaged into self-contained units.

26. As suggested by Christopher Alexander, and Oswald Ungers.

27. Glanville, R. "A Ship without a Rudder." in Glanville, R. & de Zeeuw, G. (eds) Problems of Excavating Cybernetics and Systems. BKS+, Southsea. 1995.

28. 'Buskers,' are otherwise known as street performers.

29. Glanville, R. "Sed Quis Custodient Ipsos Custodes?" in Heylighen, Rosseel, Demeyere (eds) Self-Steering and Cognition in Complex Systems. London: Gordon and Breach. 1990.