

Bikes Don't Break Legs - VisCom as an Emergent Phenomenon

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Abstract. Visual Communication Design lacks a compelling description of its own practices. In the past VisCom has attempted to redress this through reference to modernist or postmodernist design theories, each of which has assisted and impeded our aims in equal measure. In this paper I suggest a model of visual communication practice that describes our praxis in relation to existing social and scientific models; while refusing to deny the value of either systems of craft or semiology to the formation of diverse and successful communications.

Keywords: Conditions of applicability, Meaning and perception, Graphic Design, Graphic Communication, Visual Communication, Theory, Practice, Scientific and Social Theories.

1. Introduction: 'the conflict between essence and appearance'

'The objects in use by the new generation suffer from the fatal compromise between a supposedly "artistic" intention and the dictates of technical manufacture; from a feeble turning back to historic parallels; from the conflict between essence and appearance.' (Tschichold, 1928) [1]

If I turned up one day with a leg in plaster, and when asked how my leg came to be broken replied that, 'my bicycle broke it', I might be telling a socially sanctioned 'truth' as far as I knew it (a sign that would pass as a signification of an 'explanation'): but I would not actually be *explaining* anything. If I carried on, saying that I had hit the kerb, and crashed to the ground breaking my leg, I would be attempting to give a fuller accounting of the event: but still not possess anything approaching a full description, one that would allow me to draw conclusions for the future about the accident. If I could describe: the physical characteristics of the combined physical system that was 'me' riding the bike interacting with the road surface, the environmental conditions, possibly a consideration of the social system that supports safe bike use; at that point I might have a working description of my accident. Visual Communication is in the daily position of telling the 'truth' as far as it knows it about its practices. Occasionally it generates some compelling explanations; but in truth it only possesses weak descriptions of its activities. In this paper I will attempt to describe a model of design practice based on the scientific theory of Emergent Evolution (or Emergence).

Design (theory and practice) is replete with descriptions of this or that designer's practice, each description has a multitude of manifestos, and any number of 'designer's statements'. These texts have a common obsession with the eternal flow from *form* to **function** and back again; few of them try to tackle the question of what happens between a designer's initial spark of inspiration and the creation of a successful design artefact: I would venture that we even lack a convincing definition of success.

I must confess that in common with many other working designers in the field, I never spent much time considering how the act of design actually functioned. I was happy in the knowledge that it did. When I became an academic the issue took on a greater urgency: my job was now to guide design students in their task of becoming rounded and well informed designers and initially I was confident that the subject's understanding of its own functions would have moved on in the years between my being the student and my being the tutor. Driven by the combination of social pressure and technological change I had witnessed in industry how could the subject's understandings of its own practices have failed to advance? I was (and continue to be) quite surprised to discover that the internal epistemologies of the subject had moved on very little (if at all) in the intervening years. We find that the internal epistemologies of art and design still owe more to the culture of the apprenticeship and the art school than to any of the myriad writings of theorists in the cultural realms. I suspect that this is a statement that will cause immense annoyance to many teachers and practitioners in the VisCom (Visual Communications)¹ field and at the risk of annoying them even more I will attempt to explain this statement through this paper.

The art and design community has always been very good at turning out individuals whose practice can reflect on and inform the culture of others, while also reflecting on the applications of their own craft,² as they are received by a specific audience. Unfortunately while the subject is strongly informed about uncovering meaningful readings for, and then communicating with, a particular audience, we are poorly informed about the internal processes that lead us to generate this solution. To be blunt we lack an epistemology of design. We (the designers of the world) lack an explanation about how the decision we take now, effects the elements we already hold in play, let alone those which we might add next. We talk about each decision being 'fit for its purpose', but without having a definition of what 'fit' is. In truth I do not believe that we have a clear understanding of how our practice actually forms a working design.

¹ I will use the umbrella term Visual Communication, as opposed to Graphics, Graphic Communications, Graphic Design, Interactive Graphics, Illustration, etc.

² I will be talking about 'craft' quite a lot in this paper. In this context I mean craft to mean sets of culturally limited forms of praxis whose uses are acceptable within a particular area of making things; the term carries connotations of facility and guile. By opposition I will use the term Practice to talk about less historically or culturally bound approaches to making things.

This paper forms part of a current trend in investigating how design (as a mode of address) works. External readings of the functions of design as a system, if not common, are at least extant. Klaus Krippendorff – in his 2005 book *The Semantic Turn - a new foundation for design* – does sterling work in bridging the gap between the people who have been studying human thought and its artefacts: philosophers, linguists, sociologists and cyberneticians, and the people who create them. However his specific treatment of the Visual Communications Arts is lacks depth, being less than two pages long. Niklas Luhmann's *The Reality of the Mass Media* is much more pertinent, and Deleuze has shown us whole new ways in which communication can signify across many levels. Disturbingly for designers all of this attention is exterior to the subject area. Krippendorff (2005) explains why this can be dangerous:

'Sensing the opportunities that new technologies seem to promise, new scholarly disciplines like artificial intelligence, communication science, plus various hybrid professions, cognitive engineering and design management, as well as such technical specialities as computer interface design, have emerged and are blazing trails into territories previously claimed by designers. In this information-rich, fast-changing, and increasingly individualistic culture, contemporary design discourse is no longer compelling. Thus, industrial design finds itself at a critical turning point.'

(Krippendorff, 2005, Intro 3 para.1) [2]

He expands this further saying,

'Discourses can be enormously productive of new artifacts, run out of steam, or vegetate by merely reproducing themselves. Their artifacts vary greatly, from abstract theories to medical practices to rather concrete material arrangements. Discourse communities can grow in size or shrink. When below a critical threshold, discourses die, leaving artifacts behind that other discourses may appropriate, as archeology does with artifacts from extinct cultures.... Although discourses are organizationally autonomous, they respond to other discourses by redefining their identities and redrawing their boundaries. Within such boundaries, members of a discourse community know who they are and can feel to belong. The boundaries of discourses are more or less permeable, however. **A weak boundary invites colonization by other discourses.**'

(Krippendorff, 2005, p.25) [2] (My emphasis.)

There seems to be so little interest from within VisCom to form our boundaries and to own our own narrative.

It is worth laying out at this early point some of the issues I will not be discussing in this paper:

- I am specifically not saying that there is a singular measure of fitness, or that we can deterministically know the full nature of the end result by an analysis of the parts of a design.³
- I do not believe that there is a single über-formula that can usefully reduce the activity of design to a deterministic process: I will discuss why such an endeavour is unlikely to work later in this paper.
- I am not suggesting that the modernist mirage of a single language of design exists. VisCom is a culturally relativist activity from beginning to end, and until we have a global monoculture – from the pair of children in a São Paulo playground to the largest global social network (a truly vile thought) – we can never have a universal language of design.
- I am not suggesting that this model of practice replaces or subsumes any existing design movement. It simply works by presenting a model of how the culture that any such design movement represents works together with the technical underpinnings represented by craft.

I do however believe the science of Emergence offers us a good working model to explain how, from the viewpoint of the designer, the elements that make a successful design can seem, almost magically, to come together. In many ways this paper is intended to be both a declaration of defeat – we can never predetermine the nature of a visual communication – and a celebration that we can strive to understand our own own praxis; that we don't operate inside a black-box with a brief at one end and an artefact at the other.

That we can know 'fit' when we see 'fit' is part of the mystery of design, that we can demonstrably create artefacts, whenever we desire, that speak to an audience is quite remarkable.

2 Graphics and Emergence

Graphic Design or Illustration, Graphic or Visual Communication; the multiplication of names give some indication of the difficulty of defining the subject. There are so many internal political, pedagogic and semantic tensions at play – amongst a group of individuals who are very much aware of the power vested in defining the signs, and in assigning those signs values – that it is in no way surprising that it is very difficult to find a definitive definition of the subject. In fact it is remarkable how scarce any such definitions are. For example we have:

'Graphic design is not, in most cases, a thing-in-itself—it's a formal property, a rhetorical dimension, a communicative tissue of something else.' (Poyner, 2002, p.126) [3]

I'm not completely sure what this means, but I suspect I disagree. By contrast I rather like (for its beautiful disingenuous bluntness) Michael Bierut's definition: 'Graphic design is a way to make a statement. But it is—and always

³ Unlike Bertrand Russell who in 1927 stated that, 'We may say that this is the characteristic merit of analysis as practised in science: it enables us to arrive at a structure such that the properties of the complex can be inferred from those of the parts. And it enables us to arrive at laws which are permanent, not merely temporary and approximate. This is an ideal, only partially verified as yet; but the degree of verification is abundantly sufficient to justify science in constructing the world out of minute units.' (Russell, Bertrand, *Analysis of Matter*, 1927 (1992), Routledge, London.) [4] Truly a statement of it's time.

has been—also a way to make a living.' (Bierut, 2002, p.181) [5] But Bierut of Pentagram and AIGA is hardly the blue-collar toiler you might suppose from the nature of the quote.

Once it was easy to view visual communication as a simple bridge from on the one hand art and design to on the other commerce. There was a time when it would have been quite honest to talk of *Commercial Artists*. We are now in a transitional period: changes of technology have led to simplistic views of art in service of business losing validity. It is quite feasible for a designer to act as auteur, activist and commercial artist from the same workstation, during the same day. Künsters and King note the existence of this change:

'Mainstream audiences are often nonplussed by this kind of work (self directed and authorial), not understanding the point of graphic design that is not being used in the service of mass communication.' (Künsters and King, 2001, p.7)[6]

The form may 'look' like mass media and superficially speak to the same significance, the tools of delivery may likewise seem familiar, but the messages created today are more diverse than at any time in the subject's history. Following the slow eclipse of postmodernism, as a guiding star for visual communication designers, confusion reigns. Poyner's following statement on post-modern graphics reflects this perplexity:

'In postmodernism, modernism's hierarchical distinction between worthwhile 'high' culture and trashy 'low' culture collapse and the two become equal possibilities on a level field.' (Poyner, 2003, p.11) [7]

Though this statement speaks to a certain time and space, it recapitulates the design wars of the Twentieth Century. It ignores one of the key systemic intentions of visual communication, that of speaking to (or for) someone who is not the author of the communication. I may dislike *The Sun*, and like *The Guardian* so I cannot judge their value and modes of operation dispassionately, in design terms on a 'level field'. I am not the intended recipient of one system of significance (*The Sun*), but am very much the recipient of the other (a design academic, need I say more?). There is no level field; in both of the papers mentioned above we have successful attempts to use form (embodying relevant regimes of signs in artefacts) to speak to the values of a particular group (relevant regimes of signs):

'We call any specific formalization of expression a regime of signs, at least when the expression is linguistic. A regime of signs constitutes a semiotic system. But it appears difficult to analyze semiotic systems in themselves: there is always a form of content that is simultaneously inseparable from and independent of the form of expression, and the two forms pertain to assemblages that are not principally linguistic. ... it is impossible to attach any particular privilege to the form or regime of the "signifier". If we call the signifying semiotic system semiology, the semiology is only one regime of signs among others, and not the most important one.' (Deleuze and Guattari, 2004, p.124) [8]

It may seem a bit pedantic to take such exception to Poyner's statement, but the concept of 'playing field' is a valuable one to consider here. The regime of signs – be it Graphics or Illustration, or hang gliding –conducting the operation is not the arbiter of which possible readings might be made of a communication (the playing field); we cannot absolutely define the final reception of any VisCom job. Our role as designers is to deliberately speak with other's voices. This is not simply a matter of saying that modernism was wrong to say only singular reading were valid, but also of drawing attention to the weakness of postmodernism's assumption that there is nothing but singular readings. There will be readings that have greater currency than other reading, but only for durations and circumstances bounded by the discrete and partial nature of the culture doing the reading (and cultures can get amazingly discrete and partial with their readings). But within those readings, at that time those readings are 'real' (valid, appropriate). Road signage systems 'work' within credible definitions of work (they serve as navigation), books meet viable criteria for legibility.

'Maturana and Varela (1988:141-176) take human cognition as an operationally closed system that develops its own internal correlations (constructs its own worlds), preserving the ability to live in the face of recurrent perturbations from an otherwise unknowable outside. This would imply that artifacts, like colors, may have external causes but are conceptualized, constructed, and experienced by our own nervous system - without knowable correspondences to what could-exist without a human observer.' (Krippendorff, 2006, p.41)[2]

So, there will be times when form, and formal systems (classical typography or renaissance composition) have a strong validity and times when they have none at all. This selection process that delineates this validity is one that I will return to later in the paper.

'Furthermore, designers cannot completely evade the issue of form. It makes no sense to talk of graphic design that is purely conceptual: graphic ideas are visual ideas – ideas about word and image – and form is a vital element in their execution.' (Künsters and King, 2001, p.6)[6]

The potential range that the form of a message may take is now so plastic that form is no longer a limitation but a liberation. Technology currently allows designers a multitude of compatible conduits for any one job. And this transitional time requires a reassessment of our practices; we have lost the assurance offered by traditional craft, then lost the confidence gained through the liberation of craftlessness. In a spirit of clarity I offer this closing quote, which is about as close a working definition of Visual Communication as I can find:

'Graphic design is the practice of creating visual form using words and/or pictures for the purpose of communication. The communication must have meaning (otherwise it is not understandable), and it must create value (it must be worth something to somebody).' (Cavelli, 2003, p.76)[9]

3 Emergent Design.

'Networks predate complexity, from biology to society and technology. In many cases, large-scale, system-

level properties emerge from local (bottom-up) interactions among network components.' (Sol & Valverde, 2006, p.1) [10]

Emergence is a scientific theory that is closely connected with Chaos Theory and Complexity, it deals with systems that demonstrate novel properties that arise through the interactions of a multitude of lower level components.

If "complexity" is currently the buzzword of choice for our newly minted millennium — as many theorists proclaim — "emergence" seems to be the explication of the hour for how complexity has evolved. Complexity, it is said, is an emergent phenomenon. Emergence is what "self-organizing" processes produce. Emergence is the reason why there are hurricanes, and ecosystems, and complex organisms like humankind, not to mention traffic congestion and rock concerts. Indeed, the term is positively awe-inspiring. As physicist Doyne Farmer observed: "It's not magic...but it *feels* like magic." ' (Corning, 2002, p. 1) [11]

It is both a remarkably old and dangerously new idea. Corning, in his 2002 paper, cites sources that place its origins around 1874 as a direct response to Darwin's Theory of Evolution:

'...the term "emergent" was coined by the pioneer psychologist G. H. Lewes in his multi-volume *Problems of Life and Mind* (1874-1879). Like many post-Darwinian scientists of that period, Lewes viewed the evolution of the human mind as a formidable conundrum. ... (Lewis) argued that, certain phenomena in nature produce what he called "qualitative novelty" — material changes that cannot be expressed in simple quantitative terms; they are emergents rather than resultants. To quote Lewes:

"Every resultant is either a sum or a difference of the cooperant forces; their sum, when their directions are the same — their difference, when their directions are contrary. Further, every resultant is clearly traceable in its components, because these are homogeneous and commensurable... It is otherwise with emergents, when, instead of adding measurable motion to measurable motion, or things of one kind to other individuals of their kind, there is a co-operation of things of unlike kinds...The emergent is unlike its components in so far as these are incommensurable, and it cannot be reduced to their sum or their difference (p. 413)." ' (Corning, 2002, pp. 2-3) [11]

In many ways these seem to be extensions to ideas as old as Spinoza's Passions. Spinoza writes of ideas that work in *Composition* with our minds to extend our range of action, and others that *Decompose* with our minds to reduce our range of actions:

'There is no Good and Evil, but there is good and bad. ... The good is when a body directly compounds its relation with ours, and with all or part of its power, increases ours. For us, the bad is when a body decomposes our body's relation, although it still combines with our parts, but in way that do not correspond to our essence, as when a poison breaks down the blood.' (Deleuze, 1988 p.22) [12]

What Emergence and Spinoza's Passion have in common is the acknowledgement that all that we are (as creative agents) and all that we do (as creative agents) is form networks that in turn change our relations with the environment in which we operate. Corning gives us a definition of Emergence that starts to hint at why I see Visual Communications design (as well as many other social and technically innovative systems) as emergent:

I would propose that emergent phenomena be defined as a "subset" of the vast (and still expanding) universe of cooperative interactions that produce synergistic effects of various kinds, both in nature and in human societies. In this definition, emergence would be confined to those synergistic wholes that are composed of things of "unlike kind" (following Lewes's original definition). It would also be limited to "qualitative novelties" (after both Lewes and Lloyd Morgan) — i.e., unique synergistic effects that are generated by functional complementarities, or a combination of labor.' (Corning, 2002, p. 10) [11]

In other words combinations of 'things' form synergies all of the time (I suspect that this is a very modern reading of the Passions). A play of warm air in Texas may blow a strand of straw into the air; this is simple synergy. The same play of air, combined with warm wet air coming up from the Mexican Gulf, mixing with cool air from the prairies forms a tornado, and at that time *emergent* phenomena will have come into play, and a strand of straw blowing into the air is the last thing we have to worry about.

We see this in biology. If we could divorce all of the cells of your body, one from another; 'you' would be no longer be present you would lost *functional organisation*. If we could magically reconnect them all the body might again live. On one level this life would appear to be an emergent phenomena, but in fact emergence still has not occurred. At this stage our reintegrated body is a *functional organisation*, an evolved system of processes (e.g. respiration) directed by cybernetic function (e.g. feedback loops). At the point that we then integrate your revised body with all of the experiences and events of your life, 'you' appear. This 'you' is an emergent phenomena, a distinct person that is observably different from a twin or a sibling or a stranger in the street. The 'you' is composed of parts that '...when they are properly organized, they produce a type of synergy (emergent effects) that the parts alone cannot.' (Corning, 2002, p.11)[11]

But how does this relate to design? Using the following set of definitions (quoted by Corning) by Goldstein (1999) we can see that emergence has strong associations with the act of design:

"the arising of novel and coherent structures, patterns and properties during the process of self-organization in complex systems." The common characteristics are: (1) radical novelty (features not previously observed in the system); (2) coherence or correlation (meaning integrated wholes that maintain themselves over some period of time); (3) A global or macro "level" (i.e., there is some property of "wholeness"); (4) it is the product of a dynamical process (it evolves); and (5) it is "ostensive" — it can be perceived. For good measure, Goldstein throws in supervenience — downward causation. ' (Corning, 2002, p.7) [11]

Let me cast a design interpretation on these elements one by one:

1. Radical Novelty - Random associations of materiality, craft and sign, in themselves, could not possibly be seen as explanations for the design process (see below). Nor can any of the deterministic and systematic processes embedded in design theory explain the diversity of end products on their own.

2. Coherence or correlation - A good piece of design is persistent. It takes on a life of its own, it becomes a sign and thus part of the broader chain of signs in its own (and potentially other) semantic systems.

3. A global or macro "level" - To be recognised as an artefact (within whatever value of artefact that that culture recognises) it must have the property of 'wholeness'; that is it is recognised as a distinct whole, with distinct boundaries. We can perceive what 'is' the object in question and what is 'other'.

4. It is the product of a dynamical process – This definition is in and of itself an excellent definition of the design process. Design is tension of material, semantic and functional processes played out against itself. Design is by its nature dynamic.

5. Ostensive – We know it when we see it. A designed artefact is visible by comparison with the rest of the system. Whether we are looking at an alphanumeric glyph ('o' or 'ø' or 'Ω') or the humblest strand of cotton thread, we can perceive it, it is not part of the background, it is ostensive.

However the most significant of these emergent elements in design terms for me is 'downward causation'. This speaks to the role that a designed artefact has in redrawing the whole cultural environment (or chain of significance) that it exists in. Once a new artefact exists, and functions as a sign in some reading or another, it has changed the whole context (however slightly) of that *regime of signs*. This is one of the clear intentions and effects of the design process, we modify the world, or in the case of VisCom, the readings of the world.

4 Selection & Synthesis

If we examine the range of possible parameters that define a visual communications job we will notice that there are quite a lot of them even when contained by my (rather broad) classes below.

Traditionally there are (broadly) two schools of thought about how design functions (and I know that this is a generalisation): we have those people who believe design broadly functions through application of craft applying a common linguistic scheme, and those who believe that it functions through application of native talent generating a personal linguistic scheme. In truth most people would acknowledge that design works as a combination of these and other factors. But as simplistic as the functions above seem let's use them to play out a thought experiment looking at how design organised solely along one or other of these principles would work.

The idea that successful design is the end result of craft and universal readings is initially quite difficult to argue with. Work authored by a skilled craft designer is visibly more coherent and shows a more obvious degree of intentionality than work done by even a skilled amateur, and looks to a broad section of the population 'right'. However, craft cannot be the whole of the story. If that was all that there was, a singular design manual could be issued to every aspiring designer (a kind of Haynes manual of Graphic Design) and every job thereafter could be structured from within its pages, with all audiences benefiting. I cannot help think of Neurath, Tschichold or Muller-Brockmann. All were masters of their arts and determined to spread the good word of craft in the honest belief that through good design people could be liberated. Somehow this did not come to pass (in either design or social terms). Design incorporates too many diverse inputs to be handled in this mechanistically deterministic manner.

The conception of design executed by virtue of talent and personal *parole* is no less problematic. We are all familiar with the ideas of the bravura display of talent by an untrained (craftless?) designer. David Carson comes to mind. By his own confession, he lacks a formal craft base (and is proud of it). However, this kind of super-authoriality comes at a price. You want a talent to do a job, you get the sort of job that talent does. Lacking craft the talent cannot bend to the job, the job must bend to it. The presence of native talent cannot be the whole story either. If it was good visual communication would emerge naturally from every scale of society without any formal nurture (I would not suggest it is not present, just that it does not make itself apparent). It clearly does not. A wholly untutored talent is a rare thing, and when it does emerge it is rarely flexible enough to talk to a wide audience.

Clearly a functioning communication incorporates both craft and talent: it also clearly incorporates many other elements. I would suggest that a list of classes of contribution that feed into a job might include:

Craft Skills – These are organised systems (often of historical origin) defining allowable approaches to particular cultural and technical operations. By example, although there are potentially limitless ways of working with text, Typography forms a culturally significant set of allowable approaches; any text-based work outside this system only becomes typography when brought inside the system (by reference to typography for example). In formal design education these are the subject of high prominence.

Talent – Socially valid(ated) skills of biological origin, which are read as of being of a cultural or economic value and whose use and practice is rewarded. E.g. A child who shows early physical (or intellectual) prowess in a general area (running early) is often encouraged in a kindred field (sports), and receives social validation as a result. Talent often acts as a limiting factor in the application of craft skills. 'Whether a piece of work is artistically handled depends less on the nature of the work than on whether an artist has hold of the tools.' (Stanley, 1950, p.vii) [13]

Allowable Craft Devices – Not everything that is possibly envisaged within the total gamut of Craft Skills is allowable within the society of a craft. These restrictions are sometimes technical, but are more commonly cultural. E.g. Knitting scarves from human hair, painting over existing artwork in galleries, using text straight from the word processor in

Graphics. All of these are un-allowed craft devices. All could be used with justification but none could be used without it. Perhaps the most famous example in graphics would be Goudy's 1936 comment, 'Anyone who would letterspace black letter would steal sheep.' (Spiekermann, 2002, p. 7). [14] There may be good reasons for occasionally letterspacing black letter type, but Goudy's prohibition reflects this activities nature as an un-allowed craft device.

End User aims and desires – This is the most important of the concepts in VisCom, without fulfilling the requirements of this class, none of the others may succeed. Be it a complex inter-layered advertising communication or a simple ticket (if such a thing exists), if an artefact fails to mesh with that end-user's desire it fails. Many designs function quite clearly by speaking to the small internal voice calling 'me, me, me!' They speak to values that might be frowned on by Group Identification or Ambient Culture. Think of this as speaking to Hofstede's (1986, p.6) [15] *Individual* culture (though I am not sure that a single individual can be said to have a culture).

Group Identification Culture – We all have layers of cultures, this one represents the intimate culture that we closely identify with. So, you may be a Woman or British or from Leicestershire or from Loughborough or a Manchester United fan or a Muslim or Gay or any, or none of these. But the culture that you feel most distinctly sets you apart from the mass of culture around you is your Group Identification Culture. This loosely maps onto Hofstede's (1986) [15] *Collective* culture. This is a semiotic system that holds readings for signs that are distinct, rather than akin to, those held by broader culture, but of deep significance to the holder. E.g. Dress codes as signs that divide and signify social difference.

Ambient Culture – This layer of culture is the broadest, most attenuated form of culture that we identify with. Although this form of culture is so attenuated that most of the time it does register with us any more than air does, it represents a wonderful reservoir of common cultural forms for design to work with. This is the home of cliché, of the Union Jack (and the Union Jack mini-dress), of the broadest readings of semiotic signs. It conjures up pictures and associations with the scantiest of prompts.

Ergonomics – Quite simply how knowledge of human capabilities may inform the design of artefacts. The International Ergonomics Association (2000)⁴ defines Ergonomics as: 'Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system.'

Environmental Considerations – How the placement of the artefact affects the uses that the artefact may be used for and possibly offer alternate uses for the artefact beyond that envisaged by its designers. A movie ticket has a very special meaning that is entirely geographically linked (and which is beyond it's ergonomic functionality). In certain environments it may find alternate values as a note or a beer mat.

Technological Means – The nature and availability of the technology is a limiting factor in how communication between two parties can happen. 'Interaction (actual interaction between the sender and the receiver) is ruled out by the interposition of technology,...' (Luhmann, 2000, p.2) [16]. Access to technology is far from uniform (and I don't mean high technology, I mean any technology), so the technical means we have at our disposal to engage with a design brief clearly effects the form of the end artefact. '...the technology of dissemination plays the same kind of role as that played by the medium of money in the differentiation of the economy: it merely constitutes a medium which makes formation of forms possible.' (Luhmann, 2000, p.2) [16]⁵

Enumerating all of these different classes of the design process that composes⁶ the finished artefact, from out of the total number of possible elements, that define the fitness landscape that we operate in, raises some serious issues. If with think of all of the individual elements that are contained in any one of the aspects of a potential design, and then multiply this by all of the other elements in all of the other aspect you quickly become involved in what mathematicians call a *Combinatorial Explosion*.

Combinatorial Explosion is when the number of combinations of elements within a problem space grows beyond any reasonable brute force, trial and error method of dealing with it. Rheingold (1985) [17] explains it like this:

'The problem of the combinational explosion can be easily visualised as a tree structure. If the decisions needed to choose between different options are seen as the branches of a tree, then a simple two-decision example would yield two branches on the first move, four on the next, eight on the one after that. By the time you get to sixty-four moves, each with twice as many branches as the previous move, you won't be able to see the forest for the branches. If you increase the number of cases to be decided between from two to three, it gets even more snarled: After two moves on a triple-branching tree, there are nine branches (instead of four); after three moves there are twenty-seven (instead of eight), etc., *ad infinitum*.' Rheingold (1985) [17]

So, we can see that in a cultural system of interrelating potential design elements (*our design problem space* or *fitness landscape*) as large as that that I have outlined above, the chances of any given designer just 'happening' to arrive at a

⁴ Accessed at: http://www.iea.cc/browse.php?contID=what_is_ergonomics, on: 11/07/07

⁵ Luhmann also raises another potential class of contribution that I have not included as it has a somewhat historical relevance. He talks of 'assumptions concerning acceptability'. This concept speaks to the old 'push model' of media and communications. In the current (and future) fragmented range of possible media channels this is a less distinct category and can, I think thus be rolled into Technological Means. [18]

⁶ I use the term 'compose' in line with Spinoza and Deleuze's interpretation of Spinoza. For more on the applications of this concept see my paper. 'The Joyful Passion of Production.' Published in *The International Journal of Technology, Knowledge and Society*, by Common Ground [In Press].

working (let alone good) design solution is close to zero. As Dennet (2006) notes:

'All design work is *ultimately* a matter of trial and error, but a lot of it takes place "off line," in *representations* of decisions in the minds of people who consider them carefully before deciding for real on what they think will work best, given the limited information about the cruel world in which the designs must ultimately be tested.' (Dennet, 2006, p. 187) [19]

Let me offer a brief example:

If we imagine a very simple design job with the following potential elements:

1 Page

x Paper size (say a choice of 2)

x background colours (4)

x choice of type colour (4)

x choice of shade (10)

x choice of font (rather than allowing access to all the fonts in the world let's keep it to the OS agnostic 6 of Arial, Courier, Georgia, etc.)

x choice of type size (say 10 to 16pt = 10, 11, 12, 13, 14, 15, 16.) So that's 7.

= We have 13,440 potential combinations.

At a rate of one choice per second – and not allowing for sleep, food, trips to bathroom (and we've all had those kind of jobs) – we have three and three-quarters hours of continuous work, just to work out which elements we might use. This calculation only looks at one page and does not even allow for the cultural subtleties like small caps, differential shades for different letters, composition or artworking the job. Design carried out in this way would never happen.

A successfully completed complex design job is way beyond the possibility of chance. So we can essentially discard chance (or luck) from consideration as a source of successful design solutions.

However on a daily basis the visual communication design process clearly does work, played out against a multitude of cultures all across the globe. Somehow we are beating the odds, and doing so in a way that is so unlikely as to be almost unbelievable. This 'unlikeliness' is one of the classic hallmarks of an emergent system at play. The social scientist Luhmann coined a term for this dramatic (almost implausible) movement from a sea of possibilities to a functional and distinct system; he called it *Komplexitätsgefälle* or Complexity Differential.

Luhmann defines complexity in terms of a threshold that marks the difference between two types of systems: those in which each element can be related to every other element and those in which this is no longer the case. In information-theoretical terms, complexity designates a lack of information that prevents a system from completely observing itself or its environment. Complexity enforces selectivity, which in turn leads to a reduction of complexity via the formation of systems that are less complex than their environment. This reduction of complexity –Luhmann speaks of a complexity differential (*Komplexitätsgefälle*) between system and environment—is, essential. Without it, there would be nothing, no world consisting of discrete entities, but only undifferentiated chaos. The need of systems to maintain an asymmetrical, "simplifying" relationship to their environment can perhaps best be illustrated in the psychic system. A psyche that becomes too complex runs the risk of turning "pathological" in the sense that it will be unable to make decisions, perform simple tasks, or function in society. What we call "madness" is nothing more than the hyper-complexity if the psychic system that can no longer distinguish themselves from their environment.' (Eva M. Knodt's forward to Luhmann, 1984) [20]

And this for me is the key. Design must operate on some level that is more than 'inspiration', 'craft', or 'referencing culture'. If we ran through all of the combinations of elements available; 'those in which each element can be related to every other element', we would have a near infinite sea of junk. Conjugations and synthesis of elements that would make no sense (even if we accept the linguistic theorists idea that visual communication has some sort of internal grammar and syntax), and tiny islands of meaningful design. On one hand we have cultural chaos and on the other cultural systems, and the description of the pathway from one to the other is Emergence. See figure 1.

Luhmann speaks about how the recipient of a communication makes an act of selection from the available meanings;

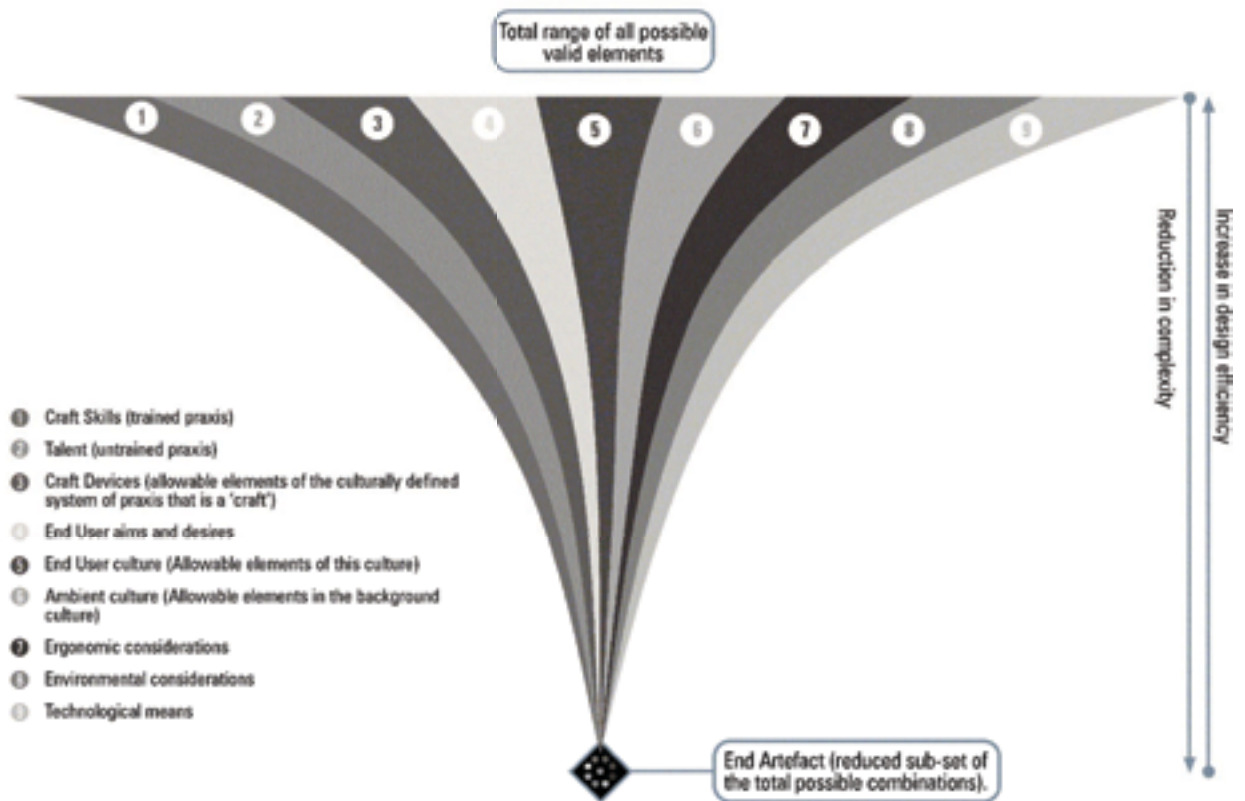
'If one begins with the concept of meaning, it is clear from the start that communication is always a selective occurrence. Meaning allows no other choice than to choose, Communication grasps *something* out of the actual referential horizon⁷ that in itself constitutes and leaves *other things* aside.' (Luhmann, 1984, p.140) [18]

But also talks clearly of the act(s) of selection that must be made by the person forming the communication:

'As far as information is concerned, alter (Luhmann's term for the originator of a communication) must view himself as part of the meaning world in which information is true or false, is relevant, repays utterance, and can be understood... In one respect he must interpret himself as part of what can be known about the world, for the information refers back to him (otherwise he could not apply it).' (Luhmann, 1984, p.141) [18]

⁷ The 'referential horizon' referred to by Luhmann is a nice way of combining the classes of design constituents above. They form a horizon that may hide a world of other possibilities, but we cannot see them to determine their relevance to the current job.

Figure 1. Complexity Differential in a design context.



It should be noted that when Luhmann refers to 'himself' he clearly means not a physical corpus, but a totality of corpus, mentality, social role and world-view, a Deleuzian *regime of signs*. We see selection (in a Darwinian sense) acts as the engine of his *Komplexitätsgefälle*, driving the reduction of the referential horizon until, arising as an emergent entity, we have a clearly defined artefact. Seemingly in defiance of all the laws of probability.

This selection however acts through the agency of a *fitness landscape*, a thought tool derived from mathematics, but used widely across sociology, biology, economics, etc. (The sciences that observe and comment on humanity), but not in the arts. And the *fitness landscape* itself selects for visible difference to the background landscape (high peaks in the landscape). Luhmann notes in *The Reality of the Mass Media*:

'The code of the system of the mass media is the distinction of information and non-information. The system can work with information. Information, then, is the positive value, the designatory value, with which the system describes the possibilities of its own operating. But in order to have the freedom of seeing something as information or not, there must also be a possibility of thinking that something is non-informative. Without such a reflexive value the system would be at the mercy of everything that comes its way; and that also means it would be unable to distinguish itself from the environment, to organize its reduction of complexity, its own selection.' (Luhmann, 2000, p.17) [16]

A *fitness landscape* (sometimes called a *probability space*) represents all possible combinations of a set of properties (in his 1995 paper *Technological Evolution and Adaptive Organizations* Kauffman cites such diverse possible examples as being Second World War fighters, chairs and peptides). Areas or ideas that are fit are represented as being high peaks, ideas that are unfit are low lying areas (and it must be noted that fitness is a contextually relative 'fitness'). The activity of selection carried out across this landscape is characterised as a search. '...biologists have pictured such adaptive evolution as a search across a space of genotypes for "fitness peaks" on rugged, multi-peaked, mountainous "fitness landscapes"' (Kauffman and Macready, 1995, p.1) [21]. A fitness landscape in which all elements connect equally with all other elements, where each reading is as valid or as valid as any other reading e.g. Luhmann's 'undifferentiated chaos', is described as a fitness landscape with one peak. 'Any other configuration is suboptimal and can walk to the global optimum by successively changing each part to its optimum state. Thus, the landscape is Fujiyama-like, with a single peak and smooth sides.' (Kauffman and Macready, 1995, p.7) [21]. A landscape that has lots of choice, i.e. in a state of reduced complexity, is defined as having many peaks. 'As K (the number of functional connections) increases from 0 (nothing connects) to N- 1 (every point connects with every other point) landscapes become increasingly rugged and multi-peaked, while the peaks become lower due to increasing levels of conflicting constraints,' (Kauffman and Macready, 1995, p.7) [21].

These observations would be of no more than (moderate) academic interest if they did no more than describe the design process (i.e. self-organisation via a drop in complexity through the action of selection based on a search). But while this theory cannot act predicatively or prescriptively (nor would I wish it to be), it can generate explanations of

certain cultural phenomena., for example, *cliché*. Cliché can be thought of representing low easily accessible peaks on a fitness landscape. The higher the peak on a fitness landscape the fitter it is, but equally the harder⁸ it is to scale, and more dead-ends will typically have had to be tried before the peak is reached (which is quite a nice summation of the act of trying to do something original in a design job). A cliché by contrast would represent a solution that can be reached easily, by everyone operating on this fitness landscape; a solution to be sure, but not a very fit. But more importantly, this acknowledges that this landscape only represents one possible reading of the fitness of its constituent parts. Should we expend the time and effort to change the contributing elements, the landscape changes and the cliché is no longer a cliché, but is now a witty reworking of an old idea. The iPod and its many imitators present a nice example of this effect in action. It is easier to ape, or make superficial rewritings of a given design solution than to innovate: Which also presents the danger of producing something so outlandish that no-one knows what it is. (See the Dennet quote below.)

The idea of emergent visual communication also explains the effect so often witnessed in mass communications of an a once fresh idea becoming the object the law of diminishing returns, in spite of the level of resources pumped into it. Initially when we have a high peak in the fitness landscape, the searcher who scaled it will have expended a considerable amount of effort to reach it, and presumably have reaped whatever the rewards that result from this effort (be it advertising revenue, increased web traffic or recognition for a new font). However, having committed to a particular solution (in the total fitness landscape), it becomes more difficult (in terms of effort) for the searcher to return to the low-lands of unfitness, search again and scale a new peak. So they will attempt refinement rather than innovation. We can see this effect in advertising campaigns where a once novel approach becomes stale, and requires increasingly excessive efforts to capture the fleeting imagination of the viewer. E.g. The Halifax Bank's 'Howard' series of adverts, by Delany Lund Knox and Warren. Adverts which have gone from the simple conceit of a bank manager so obsessed by his product that he starts to radiate with the sexual glamour of Tom Jones; to the grandiose product of a warped imagination equating being a high-rate saver with an 'Oklahoma' flavoured version of the U.S. Land Rush. Complete with a remodelled Mount Rushmore. Kaufmann and Macready suggest that this is to be expected as part of the nature of a rugged (many solution) fitness landscape.

'Thus, under random sampling with replacement, the expected waiting time for each improvement step increases by a constant factor after each improvement step. This implies that the mean rate of finding improvements should *slow down exponentially*..' (Kaufmann and Macready, 1995, p.8) [21]

In other words, if we are not careful we lock ourselves into a set of solutions, within a regime of signs, because it becomes too difficult for us to back up and re-evaluate from scratch.

Daniel Dennet gives us a viable mechanism to explain why only some of these potential novel combinations generated within a given fitness landscape can generate viable solutions; solutions that will resonate with the intended audience.

'The curiously paradoxical idea—something *invisible* that *looks like* a person (has a head, eyes, arms, and legs, perhaps wears a special helmet)—is different from other self-contradictory combinations. Consider the idea of a box that has no interior space to put things in, or a liquid that isn't wet. To put it crudely, these ideas are not interesting enough to be puzzling for very long. Some nonsense is more attention-grabbing than other nonsense. Why? Just because our memories are not indifferent to the *content* of what they store. Some things are more memorable than others, and some things are so interesting that they are well nigh unforgettable, and still others, such as the random string of words "volunteers trainer regardless court exercise" (pulled by me "at random" from the first newspaper story I could lay my hands on just now), could be remembered for more than a few seconds only if you either deliberately repeated it to yourself dozens of times or made up some interesting story that somehow made sense of these words in just this sequence.' (Dennet, 2006, pp.118-119) [19]

5 Conclusion

'... life is full of complex systems that have deterministic rules at the lowest levels, but whose large-scale conditions are intractable. The future states are indeterminate and a small variation in initial conditions causes a huge difference in the outcome.' (de Vries) [22]

There are tools in the world outside of the design/theory debate that allow us to see beyond our own limited readings of the nature of our accustomed regime of signs. Being of themselves different is no guarantee of anything at all, beyond the difference itself. This is often enough. Merely being different can sometimes allow us to look back and see elements of our own nature that would otherwise be hidden from us. In this paper I have tried to cast a different light on the practices of visual communication, beyond craft practices and beyond semiotic explanation, while in no way trying to invalidate them. They are manifestly true within certain circumstances, and this is perhaps the point: visual communications should no longer look for monolithic über-solutions. The designer needs to be aware that there are none, just singular design solutions operating within the fitness landscape. As Negri noted when contrasting Spinoza's Passions against dialectic thought: 'The falsity of the dialectic is that of a key that would open all doors, whilst [Spinoza's] ethics on the other hand is a key adequate to singularity.' (Negri, 2004, p.4) [23]

⁸ Harder in the sense of expenditure of time, energy and resource.

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