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A Grecian Paradigm Shift: The construction of a design theory

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Abstract

Design education has to change, because the discipline of design is changing. This paper deals with some of these changes and the reasons why they are deemed to be necessary, in order to move on to the more focused and more interesting aspects, namely: 1] 'design thinking' is a myth (as claimed by Donald Norman), and we need to ask ourselves if what we mean by 'design thinking' is an exclusive domain of the discipline; 2] if Norman's argument is valid, then it would follow that design as a stand-alone discipline is also a myth, since most of the efforts of design researchers and practitioners today cannot be accommodated within a domain-independent area, but are increasingly influenced by, and indeed motivated by, socio-technical concerns that need the inputs from a range of knowledge fields outside the scope of traditional design disciplines. This paper will therefore 3] present an argument for a theory of design knowing that explains the different uses of the terms 'design thinking' and 'design process', a change in focus that decentres the product and moves it to the periphery of design research, while constructing a framework for thought that contingently centres the focus of purposeful design action on the observer of contextual observations, i.e., a theory of design knowing that utilizes second order cybernetics and radical constructivism. Using the insights of Protagoras and Aristotle, this initial 'Grecian Turn' will be shown to lead to a re-appraisal of the fundamentals necessary to innovative design thinking.

Keywords:

Cybernetics, Constructivism, Conversation, Design Thinking

Introduction to a design change

Baynes and Roberts (Archer, Baynes and Roberts, 2005:52) remind their readers that "the imperatives of implementation do not necessarily coincide with the imperatives of fundamental or operational research", and that what they term as perennial questions still need to be asked and indeed focused on. What this means for design education, is that the very fundamental questions about the nature of design are more important than practical implementation, i.e., "the nature of design capacity ... development of design ability ... the phenomena involved [and] the relationship between [these aspects] and the continuing process of teaching, learning and individual development". According to Baynes and Roberts the professionalism and efficiency of the managerialist mindset of many university curriculum designers (following the tenets of their institution's rule book) create a serious misconception in teaching and learning, since teachers, practitioners and researchers are absolved from having to consider [these perennial questions] because they have become a 'given', i.e., it is assumed that the imperatives of implementation (practice) also coincide with the imperatives of fundamental or operational research (theory). They most emphatically do not, and this situation only provides a way out of teaching fundamental design thinking for those lecturers who are still caught in the Industrial Revolution's 'sitting with Nellie' syndrome (*watch what I do but don't ask me to explain*).

Apropos of this approach to teaching and learning, Boland and Collopy (2004:4) of the Weatherhead School of Management, Case Western Reserve University (focusing on 'design thinking' along the

lines of Stanford's d.school), argue against the prevailing management practice and education that relies too heavily on a 'decision attitude' that "portrays the manager as facing a set of alternative courses of action from which a choice must be made", as if from a manual of ideal forms that emphasises the difficulty of the choice, but underplays the making of distinctions, or the design of alternatives. On the other hand, "The design attitude toward problem solving ... assumes that it is difficult to design a good alternative ... [and] is concerned with finding the best answer possible, given the skills, time, and resources of the team" (Boland and Collopy, 2004:6). The *idea* of creating new alternatives (through asking Baynes and Roberts' perennial questions) is more important than the *ideal* of choosing among given 'alternatives'. As Conway (1968) also found, "Any organization that designs a system [defined more broadly here than just information systems] will inevitably produce a design whose structure is a copy of the organization's communication structure", or, any group that makes decisions based on ideal or pre-set and complete conditions (the imperatives of implementation), and that do not allow internal cognitive changes to take place (making decisions based on the power of emergence) can only produce a design solution (and design curriculum) that mirror's the group's disposition towards controlled determinism. This is first-order systems³¹ in action, and for many designers, teachers and administrators, still, much the safest way.

However, this ideologically based view has "the greatest potential for hindering progress in fundamental research and which has the effect of discouraging teachers from probing the nature of their own discipline" (Archer, Baynes and Roberts, 2005:53). To use design thinking as a probe to investigate the perennial questions and issues that are at the heart of design action, is to renew design education and design as both a 'making' discipline and as a politico-philosophical discourse, because design today is undoubtedly a social act as much as it is a reciprocal social conversation. Without this willingness to engage in a discourse with 'the other' (people, texts, objects and events) there can be no legitimate or sense-making probing of the nature of the discipline, and progress in the nature of design research can only be hindered, as Baynes and Roberts state. These perennial questions and issues need to be addresses by the curriculum, i.e., the nature of design's (inclusive, and therefore conceptual) capacity and its (consequent practical) ability to solve social problems, its awareness of the phenomena involved (systemic thinking and a systems worldview) in tackling what is recognised as the 'wicked' and complex problems facing all aspects of contemporary life, and above all, the networked relationships that must be investigated between all these designerly elements, in and of themselves, but also the relationships that must be formed between these and the ongoing processes of teaching, learning and research in design education, and as a result, the relationship between all of the aforementioned and the development of the individual student.

Baynes and Roberts (:53) suggest a broad framework that will place what has been variously described as design thinking, a designerly way of knowing, or just plain design knowledge, alongside the two main human disciplines of the sciences and the humanities, seeing that this elusive 'thing' called 'design' is "fundamental to all human beings"; its "core activity ... is intentional activity in and on the world"; and it is "as much concerned with making meaning as making things and, indeed recognise that to intentionally make things is also to make meaning". Does the design curriculum in any way emulate this type of agenda? And why would Donald Norman not only state that design education must change, but that design thinking, as a concept, is a myth?

³¹ Second-order systems, like second order cybernetics, uses feedback systems to intrinsically regulate and enrich the developing system, but never to control it.

Norman (2010) says that the myth of ‘design thinking’ is a relatively harmless one, although he does describe it as false and a nonsensical notion. I doubt very much if this myth is as harmless as Norman believes it to be, since, when he states that “never let facts stand in the way of utility”, I believe that he is obliquely referring to what Baynes and Roberts (above) refer to as the imperatives of implementation. What Norman objects to is the ‘accepted fact’ that the ‘designerly thought processes’ ascribed to ‘designers’ are somehow mystical powers of creativity not available to non-designers. Does creative thought only belong to designers, and are they somehow taught this special skill at design school via special courses that can teach students creative thinking? The ‘design’ answer is no, it cannot be done, unless you think that design is a discipline that by some miraculous means managed to access the realms of creative thought by some form of knowledge accretion. “What is design thinking? It means stepping back from the immediate issue and taking a broader look. It requires systems thinking ...” (Norman, 2010), an inclusive process that takes into account the ‘broad framework’ (Baynes and Roberts, above) provided by an always larger system within which the smaller system you are focusing on is nestled and is a part of. Norman does not deny (design) thinking per se, but denies a type of thinking that belongs exclusively to designers. To understand the problem being worked on, a designer must also understand the larger context within which that problem space has its being, and that is usually not the case. “It requires deep immersion into the topic, often involving observation and analysis” (Norman, 2010), while too much of design teaching and learning short-circuits this process and goes straight for the solution to a perceived problem, i.e., an argument is made for a design curriculum that relies too heavily on a ‘decision attitude’ that “portrays the ~~manager~~ designer as facing a set of alternative courses of action from which a choice must be made”, as if from a manual of ideal forms that emphasises the difficulty of the choice, but underplays the making of distinctions, or the design of alternatives. On the other hand, “The design attitude toward problem solving ... assumes that it is difficult to design a good alternative ... [and] is concerned with finding the best answer possible, given the skills, time, and resources of the team” (Boland and Collopy, 2004:6). In the light of this decision attitude, there can be no such thing as ‘design thinking’; a curriculum for design must focus instead on what Boland and Collopy call the ‘design attitude’ that looks for ways to research, investigate and uncover, these ‘good alternatives’.

It goes without saying, then, that if we accept this argument, we must also accept the fact that design cannot be a stand-alone discipline that is domain-independent, and acknowledge the fact that design is “as much concerned with making meaning as making things and, indeed recognise that to intentionally make things is also to make meaning” (Baynes and Roberts, above), and as such, design (as well as design education) acknowledges that, as a field of knowing, it is increasingly influenced, and indeed motivated, by socio-technical concerns that need the inputs from a range of knowledge fields normally thought to be outside the scope of traditional design disciplines. Seen against this background, we may well ask, what form does the thinking process of a design researcher have to assume in order to renew design as practice, as education, and as research?

A design argument

Design thinking and the design process must, of necessity, be seen as part of one process of making meaning, and as such ‘design thinking’ is part of the process of human observation, with the observer acknowledged as a dual subjective-objective participant. This means that the observer is not an ‘interested bystander’ that can report on the process objectively, as in a mainstream scientific experiment, but neither is the observer a fully committed subjective part of the problem space, with vested interests in a particular solution. The designer as the observer of the developing phenomena in any design context, and keeping in mind that this context is increasingly a socio-political as well as a

socio-technical one, is facilitator and participant at the same time, and must use ‘thinking methods’ that are peculiarly individual and communal, simultaneously. That, specifically, is the fitness-for-purpose of second-order cybernetics that must be taught to design students in the new curriculum, and it is brought about by a Grecian paradigm shift in thinking.

Argument one: a design methodology for future design development begins with the individual and ends with the group. If we do not forget that modern design is much more about the process than it is about the product, that means we can acknowledge the human element in the design thinking process, and so make sense of this statement: “It is ourselves ... that are the real purpose of designing. The biggest mistake is to take the product alone as the aim. It is always secondary” (Jones, 1988:224). Now we can start to ask questions such as, how do designers design (synonymous with, how do designers think?), and how do they know when designing becomes innovation? Anne Richards (2008) makes an important connection between the work of Elinor Gadon and Gerard de Zeeuw, in the sense that we have to pay attention to the relationship between the individual and the group, e.g., Gadon found through self-observation what many researchers believe to be the case: quality research is often driven by personal curiosity, with the focus on “a certain quality of mind and personality”, and, for good measure, Richards also found that this type of quality research “is not just about publishing for career advancement but for the social good”. Similarly, De Zeeuw speaks of acquiring a high quality experience within one such “social good”, which he describes as ‘stable collectives’, making a point, however, of warning that we have to focus on the difference between knowledge and experience: “people may have knowledge, while stable collectives are high quality experience”. As part of their social constructivist education my students learn to deal with the ramifications of systems theory, to enable them to observe a stable and sustainable ‘collective’ in the making, an emergent situation only made possible because of a co-design collaboration between a social group with specific needs, and the group of (student) designers who wish to create designs for a civil society: design for the ‘social good’. Both ‘personal knowledge’ and ‘group knowledge’ can be engendered at the same time, and the ‘design situation’ of the group dynamic provides the high quality experience, something that many professional designers cannot seem to observe while it is happening, bringing us to the point of realising that constructivism is only ‘radical’ in not allowing any set reality to be privileged above another.

The world that the designer has to deal with, be *concerned* with in Heidegger’s (1962:83 *ftn.* H. 57) terms,³² is a complex one, and we are not educating students for meaningful work once they enter this new world, according to Davis (2008). This author believes that design education treats the fact of complexity as a problem to be ‘designed away’ through positivistic reductionism, an old scientific treatment of anything that ‘lacks’ control. Davis deals head-on with the increasing distance between the real-world circumstances of design practice and what is being taught in our design schools, citing this (negative) relationship as ‘disorienting’. Design education, as I believe large sections of design practice still demonstrate, avoids the complex problem of the making of meaning in the first place, and the still greater problem of ‘designing’ that meaning into an artefact / system, in the second place. Not only is design as educational subject, and design as practice, a complex relational system instead of a straightforward how-to model of simplistic form-giving, but students can, very early on, learn to deal with design basics while becoming familiar with the expressive qualities of the complex and the applied (Davis, 2008). Students can learn how to deal with the group dynamic.

³² According to McKean (2001:86), when students of design study their subject / discipline in a ‘rigorous’ way, i.e., when they adopt “a concern with its formation”, this attitude, and I would add, this disposition towards their discipline and all that it could possible entail, “is a central [often undervalued] tool in the education of the designer”. What McKean is touching upon is a very sensitive subject for many designers: “Undertaking such study is often called research”.

“Yet”, as Foulger et al. (2008:29) state, “a sense of community does not magically happen” but needs the repeated and committed inputs from all the participants in this group, leading them to the work of Vygotsky and the notion of constructivism. Combined with elements from social life, the theoretical (constructivist) framework of Foulger et al. now take on the guise of ‘communal constructivism’, in the sense of focusing attention on the needs of the students themselves, their knowledge production for own use as well as creating a ‘knowledge’ resource for the benefit of the group as a whole. According to Foulger et al. (2008:29), the connectivist approach that they found Siemens using is added to this mix, for if we take into account the speed and volume of information available today, especially via the internet, individual learning, just to keep up with changes in any field, becomes quite problematic if not impossible, and vicarious learning through the group *connectivist* dynamic provides the high quality of experience that De Zeeuw (above) speaks of acquiring. It is important to my argument that Siemens focuses on the individual as both the source and the destination of the production of knowledge (“personal to network to organization”), since it is through these connections and networks that an individual can *learn how to think like a group* (above), whether the activity takes place on a small scale as in a classroom small group project, or on a much larger scale on organizational team work. It is also because of the cyclic nature of this feedback activity that ‘real’ knowledge can be produced. Although the Siemens quote (“personal to network to organization”) used by Foulger et al. (2008:29) may refer to personal knowledge, network knowledge and organizational knowledge production, I have to point out that we also need to remember, on the network and organizational level, it is still the individual (as the final ‘destination’ of the production of knowledge) who constitute those specific networks who double-act as both the depositories and disseminators of ‘real, *implicit*, knowledge’ – once explicitly recorded inside the network or organization this ‘recorded knowledge’ may become accessible to all, but as mere information.

Then, in re-thinking design education to focus on the benefits of socio-technical relationships, it means my approach to this situation is to not regard designed objects as of primary concern, but to begin with, as well as to observe, the smallest element in the design / artefact / social / world relationship: the individual and his / her interactions with all things external to the self. It also means that students may benefit from the insights of a study of phenomenology, and specifically the ontological phenomenology of Heidegger, which not only deals with the socio-technical relationship, but sheds light on the seeming dichotomy of the individual / group problem. It is a contemporary given that designing for the social good, while dealing with a formative interaction between the individual and the group, is a matter of complexity-in-action.

Back to basics

Argument two: we can pay attention to Protagoras, who suggested that complete objectivity and subjectivity cannot exist: “[the] capacity for attributing meaning comes exclusively from the individual brain - therefore it is not objective - but nothing about it is private or arbitrary - therefore it is not subjective” (Turner, 1994). To ask whether our observations are subjective or objective does not make as much sense as asking if the conclusions we draw (the distinctions we make and the design attitude we adopt) are fit-for-purpose (cf. the fitness-for-purpose of second-order cybernetics, above), and further, ask where does this approach lead us.

Being part of what is being observed, a systems-oriented and social constructivist researcher (educator) cannot but feel the need to ‘look through the eyes of others’, a state of being that Slamati (2009:1152) feels an educated person should be capable of, and the way to achieve this is to temper critical rationality with care, resulting in a compassionate rationality. To be critically rational is to be

scientifically ‘objective’, an approach to research and argumentation that is not only anti-constructivist but, making full use of first-order cybernetics which regards research as successful if full control can be gained over both the process and the outcomes. A design for a theory of meaning (Turner, 1994) cannot afford to be either subjective or objective, since neither really exists except as (false) constructions of mind; instead, the designer-researcher can use a paradoxical way of seeing (perception) that turns itself into a way of knowing (interpretation), and arrive at Protagoras’s fitness of a conceptual system. “Fitness is not a measure of correspondence to objective reality but rather a measure of success. By inference, fitness is a measure of capacity ... In principle, two unlike conceptual systems for attributing meaning could be equally fit” (Turner, 1994), making this Grecian turn one of the earliest examples of radical constructivism. In terms of design as practice and as education this means that a solution to a socially-based problem must answer this question: would the solution put forward fit the total environment (circumstances being investigated, people involved, expectations and constraints taken into account), and when using critical theory that demands rational thought, that process is transformed by a care for the ‘total environment’, for sustainability, for peoples’ well-being. An educated person, an educated student, should not only be capable of critical thinking which automatically implies some form of rationality, but through a systems-constructivist education the student can be made aware of the responsibility involved in design theory, research and practice, a responsibility towards those whose world, and in many cases, whose whole (total) environment we will be influencing and changing. The very tenets of rationality have to be transformed by the use to which it is put, and Slamet (2009:1149) uses Cohen’s argument that an educated person not only puts forward personal reasons that are real and authentic to that individual, meaning that these reasons are persuasive enough to base decisions and action on, but that an educated person uses a critical rationality, transformed by care, to put forward reasons that are at the same time ‘compelling’ to the other people involved in the discussion or dialogue.

A cybernetic design conversation that is both responsive and compelling to all the other people involved becomes a living systems design in its own right, and because it is participatory and socially constructive (of both the individual and the group) this conversation offers those who participate the possibility of a new outlook on the world, including the ‘conversational partners’, their observations and the roles that they play, leading to a renewed appreciation of the networked links between them, as active agents, and the subjects (and objects) they are discussing. However, for a cybernetic design conversation to work, and the results to be compelling and acceptable to others, the context within which the conversation takes place must be based on the living logic we find “not in the logic of knowledge and demonstration, but in the working logic of every day [social reality, i.e.], the logic of the structure of the living thing” (Maritain, 1939:52), i.e., the living and contextual logic that is to be found reflected in the cybernetic conversation. When this happens, when all the participants (designer(s) and users) equally contribute, the resulting “patterns of interference” that this inquiry engenders can be analysed as representing the logic of “what should become real” as opposed to the logic of description and explanation, or “what can become real” (Nelson, 2004:262-263; 265). We can further envisage Nelson’s *patterns of interference* as the only reliable theory of communication, akin to Luhmann’s (2002:156) *only communications can communicate*, in the sense that what is being inquired into, what is said (communicated) by the conversational partners are like waves of information that come together and collide, each wave offering up its information content, each wave ‘interfering’ with the other in such a way that new patterns emerge, as if the information content of both waves are re-arranging (re-designing) themselves to reveal what is desired, by the (starting) context that is itself developing into a new contextual reality, delivering up the logic of the living thing.

The cybernetic design conversation, driven as it were by the communications of the participants, develops in the direction of what is desired, i.e., it becomes a desire-based inquiry system (Nelson, 2004:263), meaning that this conversation allows us to focus on what is important, i.e., *what should become real* as opposed to what can become real, and further shifting the onus for making this decision from the individuals to the (design) conversational context. Only communications communicate, made possible by a new disposition towards something more, i.e., Simon's (2001:111) view that design is changing an existing situation into a preferred (desired) one, a state of affairs that can only be brought about by what is a very basic human need, the purposefulness of human knowing. To ensure the viability of a renewable theory of and for design knowing, this point is crucial: human knowing is an inherent trait of human communication, it is as individual as it is communal, and it needs (should desire) the invigorating effects of a cybernetic conversation to stimulate the new, something that cannot be achieved without a turning away from certainty that is derived from the ideal, towards the uncertainty of the idea itself, towards what is constantly incomplete.

The Grecian turn

Much has been written about Western logic and how the thoughts of the Greek philosophers influenced the way we think (i.e., argue) today, whether that influence is thought to be negative or positive. I do believe, however, that Aristotle has been misrepresented, and that we can use an interpretation of his work to design's advantage. In his work on ethics Aristotle (1971:40) does not rely on facts that are ideal and can be written down as laws to be consulted, but, rather, in terms of conversation (dialogue) and the topics being discussed, asks questions such as "what degree of accuracy is to be expected in any of them, in order that we may not unnecessarily complicate the facts by introducing side issues". This, I would argue, is a typical sentence (fragment) from Aristotle that is misunderstood. To Aristotle the 'fact' under discussion is not found in documents on ethics, law or science, because we have to interpret what he means by relating it to everything else, i.e., Aristotle (:29) asks whether it is better to argue *from* or *to* first principles, an approach we can compare to Boland and Collopy's reference (above) to the design attitude that assumes it is better to actively search for design alternatives than to simply choose from among a list of them to be found in some book of law. Should we find our own reasons that we argue towards, or should we use the guidelines for argumentation that are written down, decided for us?

Aristotle also said two other things that we can use, i.e., "when the sketch is well done, anyone can finish the picture", which points to the value of the incomplete idea over the complete ideal, and, even more telling, "We shall find that this applies to 'beginnings', which is our name for first principles; in them the fact is the beginning" (:33). We should not unnecessarily complicate 'the facts' by introducing side issues then means that we are these 'facts' as incomplete and sketchy new beginnings, and that we cannot expect any (previously determined) degree of accuracy that can guide our dialogues or conversations, that we cannot expect to rely on arguing *from* the first principles of law, because we have to find out, in the living context of the cybernetic (inclusive) conversation what these first principles are that can guide the developing conversation, from which base a decision must be made. We are the facts-of-new-beginnings, not facts as in proven (objective) facts that are set in stone, but mutable facts that are constantly evolving and (for the sake of justice and equity) improving all the time, allowing us to change existing situations into those preferred ones. We find the basis for making the 'right' decision in the cybernetic conversation, because this context is both individual and communal, a context that shows us what should be 'desired' instead of what can be done simply because we can. We find out what to argue *towards*, and in the process how to argue a case that is just, to all.

List of references

- Archer, B., Baynes, K. and Roberts, P. 2005. *A Framework for Design and Design Education: A reader containing papers from the 1970s and 80s*. Wellesbourne: DATA.
- Aristotle. 1971. *Ethics*. Translated from *Nicomachean Ethics* by J.A.K. Thomson (1953). Harmondsworth: Penguin.
- Boland, R.J. and Collopy, F. 2004. Design Matters for Management, in R. J. Boland and F. Collopy (eds.), *Managing As Designing* (pp. 3-18). Stanford: Stanford Business Books.
- Conway, M. E. (1968). How Do Committees Invent? *Datamation*, April 1968. <http://www.melconway.com/research/committees.html>
- Jones, J.C. (1988). Softecnic, in J. Thakara (ed.), *Design After Modernism: Beyond the Object*. London: Thames & Hudson.
- Luhmann, N. 2002. *Theories of Distinction: Redescribing the Descriptions of Modernity*. Translated from the German by J. O'Neil, E. Schreiber, K. Behnke & W. Whobrey. Edited by W. Rasch. Stanford: Stanford University Press.
- Maritain, J. 1939. *Art and Scholasticism*, J.F. Scanlan, translator. London: Sheed & Ward.
- Nelson, H. 2004. Bela H. Banathy: The Legacy of a Design Conversation. *Systems Research and Behavioural Science* 21(3):261-268.
- Norman, D. (2010). 25 June. Design Thinking: A Useful Myth. *Core 77*. http://www.core77.com/blog/columns/design_thinking_is_a_useful_myth_16790.asp
- Richards, A.R. (2008). The Art of Rhetoric as Self-Discipline: Interdisciplinarity, Inner Necessity, and the Construction of a Research Agenda. *Journal of Research Practice* 4(1), Article M2. <http://jrp.icaap.orh/index.php/jrp/article/view/115/104> .
- Simon. H.A. 2001. *The Sciences of the Artificial*. Cambridge (MASS): The MIT Press.
- Heidegger, M. (1962). *Being and Time*. Translated from the German by J. Macquarrie & E. Robinson. New York: Harper Collins.
- Foulger, T.S., Williams, M.K. and Wetzels, K. (2008). We Innovate: The Role of Collaboration in Exploring New Technologies. *International Journal of Teaching and learning in Higher Education* 20(1):28-38.
- Davis, M. (2008). Toto, I've got a feeling we're not in Kansas anymore, in Massaging Media 2, AIGA Design Educators Conference April 4-6, 2008, Boston. <http://www.massagingmedia.org/keynote-address-meredith-davis>
- Turner, M. (1994). *Design for a Theory of Meaning*. <http://markturner.org/design.html>
- Slamat, J. (2009). A pedagogy of compassionate rationality and its consequences for teacher education. *South African Journal of Higher Education* 23(6):1148-1160.