Interview with Terence Love

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This interview was undertaken as part of the International Online Basic Paradox Event in Bremen and Halle in 2002 and later published as Jonas, W., & Love, T. (2004). Interview with Terence Love. In W. Jonas (Ed.), Mind the Gap! On knowing and not-knowing in design. (pp. 149-163). Bremen: University of the Arts.

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Reductionism: Neurological findings provide the answer

Question 1) What was your personal path towards design/ theory?

Answer 1) I was informally trained as a designer from around five years. By 16, I was making designs for sailing, climbing and camping gear, and high performance motor cycles and had my own business and workshop. Around 1969, I studied the work of John Chris Jones and Nigel Cross via the late John Woollatt (an early member of the DRS). In 1971-75 at Lancaster University studying engineering design, my tutor for a time was Prof Michael French, a writer on design methods. It was an interesting and exciting place to be as there was an enthusiasm for new disciplines (e.g. engineering design, operations research, systems, behaviour in organisations, management research) with a strong arts curriculum and a radical political perspective: key aspects of a broad design education. I continued with a small design business, SEMSET, and in the late 70S worked in Advanced Engineering at Leyland Cars in Birmingham as a graduate engineer under the IMechE fast track registration programme.

This led me to a crisis in enthusiasm for existing engineering design processes. I was interested in how human issues can be best integrated with technical issues in engineering/product design processes. It seemed a significant design problem and one to which there . was no satisfactory answer in the design literature. I left Leyland, dropped out for a while, and put design research on the back burner. In the early eighties, I set up a consultancy and contractors business doing all sorts of interesting things alongside community development/community technology and alternative technology. I continued to work design research with John Woollatt. His interest was in the domain independent/ free design processes, and mine was in design optimisation, modelling design cognition, and exploring design tasks that involved a broad spread of human knowledge.

In 1991, I moved to Perth, Australia, and did a PhD at the Mechanical Engineering Department of the University of Western Australia on "Social, Environmental and Ethical Factors in Engineering Design Theory". From 1991 to the present, the broad focus has been on integrating human issues with technical issues in design activity, and in trying to

develop epistemologically coherent theory foundations for the field of design research. This latter has been difficult because it has led to the point where it has been necessary to challenge and go against many of the theories and concepts that I have previously felt were important, obvious or central to design research. My current research areas are national design infrastructure, affective aspects of design cognition, and improving the outcomes of computer-based information system design processes. My current design projects are in low-cost, climate sensitive, people-oriented housing, context specific information systems for small businesses, and support systems for designing nano-technology crystalline materials for new product areas.

Question 2) Please give a very short summary of your position regarding design "foundations".

Answer 2) I take the critical perspective that theory foundations of design research must be capable of doing the sorts of conceptual jobs required of theory foundations in all disciplines. In this, designing is seen as an activity that occurs in all disciplines and in most human endeavours. A key issue is epistemological, terminological and ontological consistency, and this includes consistency with well-developed concepts, theories and research findings in other disciplines. In researching in these areas, I've found it useful to clearly separate "internal human activities of designing" from "external activities involving designing". Terminologically, it seems simplest to use the term "designing" to refer to the "internal human activity of designing", and use "design process" to refer to the external activities that include "designing" and which are undertaken by individuals, perhaps in social groups, and perhaps supported by computer systems and other tools.

The above position is simple and straightforward but applying these principles has significant implications. Almost all of the existing core concepts and terminology relating to design theory and design research found in the literature do not stand up to critical analysis of their epistemological, ontological and terminological coherency. It suggests fundamental flaws in the current discourses of design theory and design research, and the foundations on which they are based. It suggests that there is likely to be a limit to the usefulness of theory derived on such epistemologically flawed concepts, theories and theory foundations (regardless of their current popularity in discourse). I suspect this potential lack of longterm value underpins some of the lack of enthusiasm of many designers for using the products of design research. I suggest it is necessary to start over in the design research field to redefine core concepts on epistemologically, ontologically and terminologically sounder foundations.

There are many candidates that might offer foundations for design theory. Under critical scrutiny, many of the more obvious ones turn out to be unsuitable. Unsatisfactory ones include: objects, design artefacts; properties of design artefacts; theory representations of the behaviour of design artefacts; social mediation processes; traditional rationalist cognitive science models; deterministic models of thinking, feeling, emoting or behaving; knowledge representations and knowledge management; emotional design cognition; and simple representations of affective cognition. Each of these areas has potential for contributing to an understanding of the forces and factors that impact on the success of design processes. None of them, however, provides the necessary ontological elements

for an epistemologically sufficient and coherent foundation that, in the limit, supports the concept development for research into, e.g. how designing occurs, and what makes it similar to, and different from, thinking and feeling. At this point in time, new findings about non-deterministic biological processes of human feelings, emotions, actions and imagogenic thoughts appear to offer the only satisfactory theory foundations for building design theory, and for undertaking design research.

Question 3) Do you see any relation between the path described above and your present view of design?

Answer 3) Of course. There are three reasons. First, the study of design activity is very broad, spanning most areas of human endeavour, and time has limited what it has been possible to look at. Second, my ways of looking at things and the areas I studied have been influenced by my experiences and by key figures in the early design research field such as John Chris Jones, Michael French, Nigel Cross, Christopher Alexander, John Woollett, and Bahaudin Naqshband, along with a large number of people in the practical social design and community development/community technology design fields. Third, the main features of design theory (the activity of designing, people's use of designed outcomes, and the physical/phonological attributes of objects) are in the physical realm, and as such, theories are interdependently shaped by this physicality. The connecting concept, between my personal development and present view of design activity/theory/research is the intersect between people and technology: "improving the way the people design the technology that supports improvements to the lives of themselves and others".

Question 4) What is your Utopia?

You criticize the common descriptive explanations of the design process (e.g. learning cycles, the "reflective practitioner") as too simplistic and superficial and not reliable/reproducible. You consider them useful-if at all -for teaching purposes in the form of simple heuristic methods, or for the use of management consultants.

So, what are you aiming at? At the one single solution for every problem? Optimal design? What are the criteria beyond personal or social intentionality: scientific truth, or God?

What is your design Utopia? Is it perfect human designers? Or design machines? Is it the mechanical genius?

Answer 4) Design Utopia? I view "designing" as an internal human activity involving thinking, feeling and moving. From this basis, design research, design theory and design methods can be regarded in almost all cases, as means of developing improved data collection techniques to support "designing". My design Utopia is of well-developed humans able to access data necessary to contribute appropriately to the design of the technology they use in their lives.

Question ^) Isn't it reductionism?

You suggest that neurology and physiology are much better suited to build true causal foundations for the productive part (designing) as well as for the receptive and interactive part (experiencing artefacts) of the process than present day approaches. You claim that these disciplines will provide answers to everything we might ever have been interested in.

Beside the tremendous claim of this approach: isn't it simply reductionist?

Answer 5) The idea of reductionism is relatively irrelevant here, and the suggestion implies the core issues above have not been engaged with. The proposals above move on from cognitive science and object-based design research perspectives and sidestep the problems that the post-modern analyses bring.

First, I am suggesting psycho-neuro-physiological research area offers a better basis for the theory **foundations** of design research and what is being used so far. I don't claim that it will provide answers to all questions of design research, or be a direct modelling tool for all design situations. It is obviously insufficient as a complete solution because it does not address a wide variety of issues in the social, cultural and technological realms. To repeat, its benefits are that it appears to be the best contender for the theory **foundations** for design research on which other higher level concepts can be developed in a more justifiable manner.

The reductionist claim results from a projection of the weaknesses of existing theory frames of design research. Recent research into the physiology of human cognito-affective-motor processes is resulting in non-deterministic theory models that apply directly to the realm of design research and design theory-building. Also, the reality appears to be that human beings are relatively mixed in their functioning: some aspects appear to be non-deterministic, and some appear to be modelled quite adequately by deterministic theory representations. Research findings appear to suggest that even in cases where human behaviour appears deterministic, the internal neurophysiological, cognito-affective-motor processes are not deterministic (and may not even be repeatable in the sense that two occurrences of the same behaviour may involve entirely different complexes of internal processes).

Key issues in all this are the roles of feeling and emotion, which recent evidence indicates are of a much greater physiological significance than imagogenic thinking processes. This raises a contradiction with many existing approaches to modelling affective aspects of designing. Epistemologically (and practically) it is inappropriate to model the underlying processes of these affective feeling and emotion phenomena in terms of: the properties of objects, theories and concepts, reported subjective experiences, observations of the subject all of which provide superficial indications but no direct evidence of the reality of the processes. Understanding the affective-cognition and motor processes that are the essence of a designer designing requires understanding the internal human physiological events. This understanding is not deterministic in that it doesn't prescribe a relationship between neuron and designed object. As humans we are far more sophisticated than that. Instead, understanding the physiology provides sound concept foundations for building more complex design theories because it avoids the need for design researchers to rely on "cargo cult" justifications for concepts and analyses.

Question 6) Which level is relevant?

There are various scientific disciplines dealing with these levels of the natural world, each constructing coherent language systems (theories) with causal relations within their respective domains and not always compatible with those of the others.

On what level should we as design theorists enter the scene and observe the interior machinery of the human guinea-pigs: the cellular, the molecular, the atomic, the subatomic, the quantum level? All this is far, far away from what we are interested in (namely designing).

And, supposed that neuro-physiology has reached the ultimate state you are imagining. What do you expect to see "on the screen" on the respective level?

Answer 6) I think I have addressed this issue above. Design activity extends across most human endeavours, and by implication theory making about designing and design processes must utilise theories appropriate to the phenomena being studied. In the 1990S, I wrote about this in terms of meta-theoretical approaches to design theory building. The suggestion above that design theories and analyses should be ontologically, epistemologically and terminologically coherent and appropriate, and align with well-developed concepts and theories from other disciplines, implies a far-reaching reworking of design theories and concepts. In parallel, my research is indicating that the most appropriate "atomic" or ontological starting point is in the realm of the human physiology of feelings, thoughts, emotions and movements.

Question 7) Do you believe in the "style neuron"?

If you are right the whole of human lives must have its representations in physiological states of the body. The human body would be a book that we have to learn to decipher in order to understand the social world.

One of the chapters of this book is supposed to be "design". Do you expect to locate something like the "web design region" in the brain or the "style neuron" or even the representation of an artefact?

Answer 7) No. A more sophisticated answer, however, is very much more complex. The human ability to recognise "style" attributes is unusual. Perhaps the most significant issue is that this human talent is extraordinarily fast and accurate. Clearly, it appears to use other than conventional perception, imagogenic memory, and the analytical brain processes used in more conventional tasks. A second significant issue is that style perception and projection depends on the complex of partial "hints" or echoes of prior perceptions (which may be in the realms of sound, motions and smells as well as sights). Understanding the physiological differences between the feelingthinking-motion responses to style cues and the responses to more prosaic situations would give a sounder basis for building theories about how designers and users utilise "style" attributes of de-signed products, systems, services and organisations. This is a major potential theme for design research. Alternative approaches, such as using the attributes or appearance of designed artefacts or cultural theories, to understand how people process styles are for a variety of epistemological reasons almost certain to result in ontologically and epistemologically flawed theories with poor utility and predictive power.

Question 8) Isn't it naive realism?

You sustain the illusion of coming closer to objective reality, to overcome the distortions of observation by examining more and more basic levels of processing.

But everything has to be observed. There are different observers. As Ranulph Glanville puts it: "Inside every white box there are two black boxes waiting to come out." Which means, that there is always the possibility of a different observation made by a different observer, which turns the white box opaque again, or, which creates two new black boxes: the new observer and the content as observed by the new observer. If we are lucky we will achieve consensus as to the content of the black box. And if the observing community adheres to some kind of theory, even scientifically "true" statements may appear.

You seem to promote a kind of naive realism?

Answer 8) In the physiological limit, where human agency in action is actualised, the recursive white box/black box analysis appears fundamentally flawed. The recursion results from an attempt to prove truth in the interpretation of subjective perception. A different reality is to view the value in theories as their utility. This utility is found in:

- Coherence with a broad range of other theories that have utility
- The ability of a theory to be subjected to theory manipulation tools that provide useful insights via projection
- The ability of theories to have appropriate attributes that enable them to be manipulated in ways that result in simpler more abstract models
- Direct correspondence with physicality of phenomena.

In activities such as designing that are actualised within individual humans, then the recursion comes to a halt in the physiological phenomena people do actually perceive, think, feel, emote and act.

Question 9) A new kind of opaque surface will show up.

You neglect the incompatibilities/causality splits between different observations/descriptive languages/ theories.

And even more: you neglect the causality splits between different autopoietic systems/domains of the living world, namely: the organic, the conscious, and the social/cultural sphere.

Actually, you create a new and complex and puzzling colourful surface (of MRT-images, for example) instead of the one (of phenomenal observations) you think you have removed.

How to interpret this new surface?

Answer 9) Reading your comments and question, you appear to be tilting at a problem that is not there. I suspect that you are: a) assuming determinism and confusing biological

representation with biological determinism; b) assuming psychoneuro-physiological models are being proposed as a direct replacement for other forms of design theories; c) assuming that traditional external observation approaches to modelling human activity used in cognitive science and psychology are best for theorising about internal functioning in designing.

To recap, the approaches I have suggested are not deterministic. The proposed role for psycho-neuro-physiological understanding is to provide a more sound ontological and epistemological basis for deriving more philosophically valid theories in the realms such as (to use your words) autopoietic systems/ domains of the living world, and the organic, the conscious, and the social/cultural spheres.

The world has recently moved on in terms of research and theory making approaches in a very significant way. For at least five thousand years prior to the present, humans have tried to make sense out of internal processes by attempting to conceptualise about internal human processes by observing external behaviour and through subjective perceptions. This has resulted in general and loosely defined concepts such as "knowledge", "thinking", "love", and "reflection". These concepts have been invented because they were the best we could do with the observations and understanding that have been possible through these prior observational approaches. We have been inventing concepts in the blind hope of being able to model (and by implication try to understand) what really happens inside individual humans when they perceive, feel, and think prior to emoting and acting.

Recent physiological research is providing direct information about what actually happens inside humans, and the findings do not align well with the speculated processes implied by concepts such as "knowledge", "love" etc. The implication is that these earlier concepts are becoming redundant or at least their definitions need revisiting. It also suggests there is an opportunity to build improved theories in relation to designing, design processes (and in autopoietic systems/domains of die living world: the organic, the conscious, and the social/cultural spheres etc). I am suggesting that now is the time to start undertaking this task, rather than attempting to fix a fundamentally flawed discourse of design theory by stretching and reinterpreting theories based on external observations of humans that are increasingly being challenged as a result of increased insights into the ways humans actually function and into the biological basis for their ethological responses.

Question 10) Falling out of the frying pan into the fire?

If you are right we finally had a "theory of everything" (TOE), because designing seems to be one of the most advanced cognitive and social abilities of human beings. Your model would include a theory of social interaction, of organizations, of societies, of producing art and science, of good and evil, etc.

All this "simply" by means of examining brain processes. This is not bad! In this escape from the monsters showing up when reflecting the mysterious human ability of designing you run into a new paradox:

The models derived from your approach should be able to act like humans: emotional, surprising, irrational, faulty, egoistic, ... i.e. they are so detailed and "realistic" that they become incomprehensible and undescribable again. They would be new black boxes. We would have to accept their autonomy and start to examine them by means of those simplistic and superficial tools as "learning cycles" and the concept of the "reflective practitioner"...(see above).

Answer 10) I've read this several times over. I'm unable to find a clear question it appears that all of it is a rhetoric attack. The main criticisms I have answered earlier. The logic I have suggested is flawed. I'm sure, however, there remain ever more paradoxes. Hopefully, resolving them as they appear will continue to move forward design theory, design research and our understanding of ourselves.