

## PEIRCEAN ABDUCTION, SIGNS & DESIGN TRANSFER

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### ABSTRACT

We take abduction to be the central ‘logical’ and social “mechanism” of knowledge generation in general, applicable to everyday life, design, and the sciences. In our designerly methodological terms, we speak of ANALYSIS (the inductive phase), PROJECTION (the abductive phase) and SYNTHESIS (the deductive phase). We suppose that projection is enabled by abduction, and that understanding the abductive mechanisms in design PROJECTION is essential for the development of genuine designerly concepts of research. We hypothesize that transfer and transferability are relevant concepts and that establishing their relation to abduction is necessary. We set up quasi-experiments to examine design transfer. Based on the results of the experiments and following Shank (1996, 2001), we relate Peircean semiotics to his logical theory: his classes of signs are also classes of abduction. Firstly, we subscribe to Peirce’s semiotic – a sign is in a triadic relation among object, interpretant and sign itself. Then we formulate the hypothesis that transfer is a sign generation process in Peircean terms. There is a sign relation between the existing services and the new concepts created as a result of transfer. Finally, we draw implications from the discussions for design research and design pedagogy.

*Keywords: Abduction, Transfer, Projection*

### 1 INTRODUCTION

We have been investigating the concept of transferability in Design (Author 2005, 2008). We argue that deducing from general principles and theories as well as inducing from existing designs only create a variation of the past; therefore, are insufficient to support design projection. We contend that existing artefacts are sources of design knowledge and propose that transfer is a creative way to capitalize it. We hypothesize that when studying existing designs for projection, we take knowledge piecemeal from one context to another context to create something new. This taking is what we call transfer. Three different types of transfer are proposed - Local, Regional and Long-Distance. It is assumed that in Local Transfer, knowledge is taken within *same* domain; in Regional, across *similar* domains; and in Long-Distance, across *different* domains. In our first study, two designers (K&J) collected and analyzed mobile phones (local), mobile objects (regional) and avant-garde objects (long-distance) and used them to conceive new mobile communication devices. In the second study, two design students (T&I) collected and analyzed mobile internet services (local), non-internet based services (regional) and performing art practices (long-distance) and used these to conceive new mobile internet services. We followed the basic technique of Grounded Theory to analyze the research results. Comparative coding, memoing, conceptualizing and concurrent literature review were performed as the core concepts were constructed. The studies showed that transfer was productive although piecemeal. Both formal and contextual elements were transferable, including physical and sensual form, function and feature, character, and context of use. Besides, Regional Transfer was the most productive.

Underlining the studies on transferability is the desire to understand and to establish research concepts and methods that are appropriate to and supportive of design projection. We might all agree that the ability to project into the future and to imagine the not-yet-existing is a key to designing. There is research, such as ‘Design Thinking’, aiming at understanding design projection so to improve designing. Our aim is however different. Design projection is so important that we endeavour to make it a form of design research. How might design projection be (qualified as) research is our concern. What are the fundamental concepts that underpin design projection? How might its process and methods be? What form its knowledge takes? We want to address all these questions. We hypothesize that transferability is a relevant concept. We use ‘transferability’ to describe the quality of knowledge generation and application in design projection and it is meant to be different from generalisability. Transferability implies

recognition of contextual differences and the demands on specific knowledge application. It also implies an incomplete use and change of knowledge during the transfer. We also believe that transfer is a promising method and new design concept is a form of knowledge. Initially, transfer was taken to be analogy and metaphor making. However, we come to see that abduction is what enables analogy and metaphor and thus is more fundamental. In this paper, we focus on Peircean abduction to illuminate the method of transfer. We use his system to think, to talk and to further develop transfer as a research method. This articulation serves as an anchor for our further examination. Although we are still developing the transfer method and should not be over confident about its value; based on what we have learned so far, we will draw some actual and potential implications for design research and pedagogy.

## 2 ABDUCTION & SIGNS

Like March (1984) and Roozenburg (1993), we (Authors 2008) consider abduction to be the central ‘logical’ and social “mechanism” of knowledge generation in general, applicable to everyday life, design, and the sciences. In our designerly methodological terms, we speak of ANALYSIS (the inductive phase), PROJECTION (the abductive phase) and SYNTHESIS (the deductive phase). As the experiments on service design transfer came to an end and we needed to make sense of the results, we went deep into Peircean abduction and came across ‘a family of abductive reasoning’ (Shank & Cunningham 1996) (Shank 2001). Like others, Shank & Cunningham maintain that any aspect of Peirce’s work, in this case semiotic, can be attributed to be concerned with his logical theory. They demonstrate that Peirce’s ten classes of signs are much related to his ideas on logics. As conceived by Peirce, logic goes beyond symbolic logic and is a formal science of truth of presentation (Zeman 1977) and is therefore a (normative) theory of inquiry. Its analytical tools are deduction, induction and abduction. Logical reasoning manipulates signs to further our understanding and knowledge (Kruijf 1998). According to Shank, the six classes of signs - Open Iconic Tone/Token/Type, Open Indexical Token/Type, and Open Symbolic Type are not only classes of signs but are also various ways/forms of abduction. Shank & Cunningham have thereby named the various forms of abduction as Hunch, Omen, Metaphor, Clue/Symptom, Pattern and Explanation, see Table 1.

	Icon	Index	Symbol
Tone	Hunch		
Token	Omen	Clue/Symptom	
Type	Metaphor	Pattern	Explanation

Table 1 Shanks interpretation of Peircean signs

	Icon	Index	Symbol
Tone	Hunch		
Token	Form	Clue, Symptom, Omen	
Type	Metaphor	Scenario	Principle

Table 2 Designerly interpretation of Peircean signs

Briefly, icon, index and symbols describe the relation between the sign and its (dynamical) object. Icon resembles its object. It demonstrates the qualities of its object, and functions as a presentation of the relevant properties of the object. Index has a direct existential connection to its object. Index demonstrates the influence of its object, and functions as a referential identification of the object. Symbol is a rule (or law) that ‘will’ determine its interpretant. It will be interpreted to be a reference to its object. Among these three, only icons tell us about the nature of the objects. Tone (qualisign), Token (sinsign) and Type (legisign) describe the relation between the sign and its ‘ground’. A tone is a quality which acts as a sign. A token is actual existing thing or event that acts as a sign. A type is a law that acts a sign.

Shank’s classification of signs/abductions is very illuminating. However, understandably, as he is a social scientist, his interpretations are made for the social sciences. For him, all the signs/abductions are about understanding and explaining phenomena. His interpretation of the three Iconic signs points to the future. But he interprets the Indexical signs to be concerned with the present and the past. According to him, Clue points to something happened in the past and Symptom points to something happening in the present. Pattern is creating a coherent picture of Clues (present and past). Finally, he takes the Symbolic

Type as about explaining. As Roozenburg (1993) sees it, design is not concerned with explanatory abduction but rather with innovative abduction - with the future and with creating new rules. Therefore Shank's interpretation is not entirely appropriate for our purpose and we must therefore interpret Peirce in a more designerly way, see Table 2.

Hunch, Form and Metaphor are results of perceiving<sup>1</sup> the resemblance of properties between the sign and its object. Hunch is a possibility of possible resemblance. Form is a possible resemblance. Metaphor is 'the power of a schematic method of representation, a generative rule for producing concrete signs which exhibit qualitatively the form of icon proper which have many qualitative variations.' (Ransdell 1997a). Clue, Symptom, Omen and Scenario are results of perceiving what the sign indicates. A sign that indicates phenomenon happening in the past is a Clue, in the present, a Symptom and in the future an Omen. A sign that indicates relations between phenomena is a scenario. Principle is a result of observing a rule or law that will be so interpreted as a sign.

### 3 ABDUCTION & SIGNS & TRANSFER

Taking our classification of signs/abductions, we see design transfer in new light. First of all, we subscribe to Peirce's semiotic – a sign is in a triadic relation among object, interpretant and sign itself. A sign 'is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant or the first sign. The sign stands for something, its object' (Peirce 1931-50: 2.228). Therefore, firstly, we formulate the hypothesis that transfer is a sign generation process in Peircean terms. There is a sign relation between the existing products and services and the new concepts created as a result of transfer, see Fig. 1.

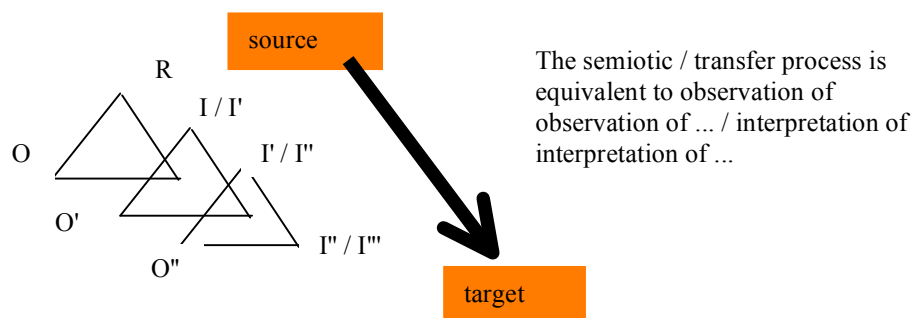


Figure 1 Transfer as a sign generating process in Peircean terms (O=Object, R=Representant, I=Interpretant)

According to the Peirce's scholar Joseph Ransdell (1997b), all the Peircean signs should be considered as aspects of signs. 'When we identify some signs as being iconic, for example, this only mean that the iconicity of the sign happens to be of peculiar importance to us for some reason or other implicit in the situation and purpose of that analysis, with no implication to the effect that its therefore non-symbolic or non-indexical. These categories of signs serve semantical analysis only'. Every sign likely has all iconic, indexical and symbolic aspects. To translate this to design, we might say that every existing service or product, when used as sign for creating something new, also has these three aspects. We suggest that the iconic aspect of product or service is its form and its material<sup>2</sup>. Its indexical aspect is its context or purpose or consequences, and its symbolic aspect is the underling principle of the design.

When a product or a service is interpreted as an icon, its properties are transferred as Hunch, Form or Metaphor. For example, the designers might have a Hunch that something about a foldable cell phone

<sup>1</sup> Interpretation for Peirce is observation and perception.

<sup>2</sup> See the service design descriptors in the paper 'Service Design Descriptors: A Step toward Rigorous Discourse' submitted to this conference.

might be transferred. Unless and until it is transferred, it remains just a Hunch. However, when the designers transfer the foldable feature to another cell phone, then it is a Form. It is a Metaphor when K&I transfer the smelly property of a garbage can to an electronic device. The device will sting when its memory is full. We find that in Local Transfer, when properties are transferred, they resemble so much like the source that, one might consider it as a copy. In Regional Transfer and Long-Distance, the results are more novel and interesting. This observation is in line with the general belief in the creative power of employing metaphor. When the product or service functions as an index, it points to its purpose, context or consequences. For example, a pistol points to its dangerous context (Scenario) for which K&I create a defensive feature in a cell phone. Designed artefacts, especially good ones, reveal much about human conditions that we might address. In Regional Transfer and in Long-Distance Transfer, the purpose or context point to new opportunities that are exploited by the designers. We however do not see the transfer of consequences in the experiments and this requires further investigation. The product or service functions as a symbol when its principle is revealed to us. We do not see principle being transferred in the experiments; however, it is an area that will also require further examination. Peirce semiotics provides us a systematic way to interpret the results from the quasi-experiments. More importantly, it points out gaps to fill and suggests path to follow. Based on what we have learned, we might now refine the transfer method to deal with question such as what might be information communication product and services (ICPS) for the elderly? To approach this question, we might follow these procedures:

1. Collect existing ICPS for elderly. But since Local Transfer is not productive, so we should only take existing ICPS as the baseline. Transfer results should not be the same as the existing PS.
2. Collect existing ICPS for people who are similar to elderly. For example, people who have much spare time or who have poor eyesight, etc. Regional resources contain the most interesting elements that must be analyzed in terms of form, materials, context, consequences and underlying principles.
3. Transfer these elements to create new ICPS for elderly.

#### **4 CONCLUSIONS**

As we are still developing design transfer, we should not overdraw conclusions from our studies; however, we would like point out its actual and potential implications. In design practice, the practical wisdom will say that we might first analyze the function or the purpose of the design before we might begin to design. It is commonly held that design sequence starts from Analysis → Projection → Synthesis. Boland (2004), referring to Weick (1969) and Simon (1996), regards this as the "rational man economic theory" and suggests a meaningful alternative: Projection → Analysis → Synthesis, which he labels "Karl Weick's sensemaking manager". According to Weick, all six possible combinations of Analysis / Projection / Synthesis sequences can be observed in management practice. The standard sequence is not the only one possible. In a similar vein, Chow (2005) maintains that projection does not necessarily follow analysis. She also argues that design process which begins with observing and analyzing user needs is more suitable for design projects which final products are relatively determined. For innovative projects which products are highly undetermined, design process beginning with projection is more appropriate. Our studies on transfer show that projection can be exercised without any defined purposes and it thus conforms to this line of thinking. The design worlds have been focusing on user study, design ethnography and the like for the past ten years. These practices are of course necessary and useful but they have overshadowed the unique and wonderful projective design competence without which nothing new can be created. As we have said in the Introduction, to understand and to employ deliberately projection cannot be neglected any more. Besides, it is well known that metaphor and analogy making are important thinking skills in design. We might see them as manipulation of iconic signs. Furthermore, our study shows that besides manipulating iconic signs, indexical sign is also powerful a tool that deserve more attention.

In design pedagogy, there has been the tradition of showing students precedents. We suggest that this practice is in sync with our notion of transfer. However, we contend that it will be more helpful if the precedents are from the same, similar and different domains. Besides analysing the precedents, students can be taught to transfer these deliberately. Student might analyze the formal and material properties of the product or service as well as its context and consequences and underlying principle. They might then transfer the various properties to different contexts.

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