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# Building Research Across the Marketing-Psychology-Design Trilogy.

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The paper seeks to find links between concepts and research methods in Marketing, Psychology and Design using product differentiation as the central theme of the investigation. It focuses on the possibilities of cross-paradigm research and shows linking differentiation and perception is both original and lacking: "although many writers seem to imply that differentiation is based on customer perceptions, the connection between the intentions of the firm, and the subsequent perceptions of the customer is not well explained" (McGovern, 1987:5). Design in this context is the 'hub' that, by giving meaning to products, links aspects of marketing and psychology. One study currently being developed is used to illustrate the potential and challenges inherent in this kind of interdisciplinary research.

Initially, the paper is informed by literature from all three paradigms. The marketing perspective stresses the need to see products from the viewpoint of the consumer. Innovation and product differentiation are discussed, showing that incremental and style changes are frequently used in order to turn over sales. Design is almost not discussed in the marketing literature and although it is acknowledged that consumers have preferences in terms of product function, other deliverables such as styling, are largely absent. Before being a consumer, this human being is first an observer, an instrument of visualization, who can perceive novelty and spot design differences with greater or lesser ease. Subjectivity involved in issues of perception, be that perception of newness or of visible differences, leads to enquiry in the psychology paradigm. Studies of visual perception have traditionally been applied to two-dimensional images and other investigations and experimentation have extensively studied form features in isolation, testing how colour, shape, contour and other design elements are perceived. These elements are of course the design professional's raw materials. There is increasing awareness that design attempts to create interest, desire and even stronger emotions based on the product's outward appearance and these tools are essential in this process.

The specific case study to be presented uses visual perception to inform product differentiation choices, aimed at answering the question: How different is different? The model seeks to establish at what point observers begin to see a difference in designs, and compares the perception of difference with the actual geometric differences that exist between the objects. Designers making subtle changes, as opposed to radical innovations, run the risk of the product change not being evident or clearly noticed. The method used to undertake the research and the nature of the resulting data will be discussed. This includes experimental tests using 3D computer morphing animation techniques to determine degrees of differentiation, measured by Weber's Law of Just Noticeable Differences. The study shows creative use of a psychophysics theory to illuminate a business concept, using the language and tools familiar to design. In the conclusion, the paper comes full circle, discussing research on the product as seen by the consumer, showing possible links and areas where research in the three disciplines overlaps.

## **Building Research across the Marketing-Psychology-Design Trilogy**

### **Introduction**

Design research has been built on the method and contextual paradigms that have been the traditions of a range of other research areas. This situation creates particular issues and challenges for the researcher and the research community. This paper reports on a project that seeks to link concepts and research methods across two different disciplines in order to underpin design research. Concepts from the two disciplines of Marketing and Psychology are employed to inform a central theme which focuses on shape differentiation. The theoretical underpinning for the study is presented and then a description of the data collection method. These will show how considerable knowledge of both marketing theory and psychology methods were needed to successfully mount such an investigation and how elements, which would be concerns in the marketing paradigm, are not in design and vice versa. Although the subjects of the study are Denby teapots, the outcomes of the investigation – both findings and method – will have implications for designers concerned with form differentiation and marketing managers with a concern for product differentiation.

### **Underpinning theory**

A feature of industrial design in the twentieth century has been its move away from a production orientation towards addressing markets. Marketing perspectives stress the need to see products from the viewpoint of the consumer (Kotler, 1988).

Increasing segmentation and fragmentation of markets present the challenge of creating products which meet diverse needs and are perceived as being different from a burgeoning competition (Dickson and Ginter, 1987; Van Ruuij and Verhallen, 1994). The marketing concept of differentiation goes hand in hand with the idea of market segmentation. Each market grouping will have different needs and should be addressed with different offerings based on balances of the marketing mix. Many manufacturers have the additional problem of inflexible manufacturing processes which make frequent changes expensive. The process of innovation itself requires considerable skill, knowledge and tangible resources and is a risky strategy (Hollins and Hollins, 1991). As a result, many companies choose incremental product

innovation and use the other tools in the marketing mix and in particular price, to indicate difference from the competition. In a variety of areas of product design, small style changes are now often used to provide greater choice and thereby stimulate more frequent shopping trips. For the ceramics industry like other manufacturers, shape design is by far the most expensive area for change and they tend to exhaust innovation in other areas before biting this particular bullet.

Essential to the effectiveness of differentiation is the need for the consumer to both perceive differences and recognise that they are better – for them at least – than competing products. Downward price differentiation is effective in this respect but can have disastrous consequences for the manufacturer. The British ceramics industry has found that products, similar to their own, can be made by others at lower cost elsewhere in the world. Differentiation by design is seen as a preferred alternative and one which can add value to products. Design is almost not discussed in the marketing literature and although it is acknowledged that consumers have preferences in terms of product function other deliverables, such as form, colour and texture, are largely absent. However, differentiation is possible using just these design tools. Under these circumstances a good understanding of differentiating through design holds sounds potentially useful, but ideas of how and when consumers perceive difference are rudimentary.

*“although many writers seem to imply that differentiation is based on customer perceptions, the connection between the intentions of the firm, and the subsequent perceptions of the customer is not well explained” (McGovern, 1987:5)*

To study how consumers view shape differentiation is in marketing terms somewhat controversial. Marketing theorists whilst conceding that elements of design – including shape – do influence the consumer, have argued that consumers respond to the mix of marketing tools and not one aspect alone. In design terms however, shape is such a central topic it deserves full and frequent investigation. To see shape from the point of view of the consumer, requires an acceptance that the consumer is more than just a buyer and user of products but is also a human, an observer and an instrument of visualization, who can perceive novelty and spot design differences

with greater or lesser ease. Clearly there are degrees of novelty and business managers have argued:

*“it is the ‘perceived’ degree of novelty which matters; novelty is very much in the eye of the beholder.”* (Tidd, 2001:6)

Subjectivity involved in issues of perception, be that perception of newness or of visible differences, leads to enquiry in the psychology paradigm. Visual perception aids in relating the visual object to the visualized one. As a consolidated discipline, various branches sprang from the German Gestalt School. All of these tackling the study of human visual perception less as a speculative undertaking, more as a crucial demonstrative experiment.

In visual perception, studies concentrate on the two-dimensional representation of, normally, tailored images, created to prove or test a hypothesis. Some theorists are openly sceptical about the Gestalt laws of visual perception. They claim that because these psychologists were concerned with the projected form and developed their principles on organization using two-dimensional shapes, their understanding of form perception is somewhat skewed (Zusne, 1970; Gibson, 1950).

An offspring of the Gestalt School, Rudolf Arnheim takes his instruction on visual perception to the field of fine and applied arts, relating them to the making and visualizing of the creative work. Much of what had already been defined using fictitious, fabricated visual stimuli, is by him demonstrated on real images and objects. Describing form, he calls attention to the most adequate angle, the view in which the three-dimensional object is most explicit, less violated by the flat representation.

The specific investigation at hand builds on principles of visualization in a positivist approach. The ‘rules of visual grouping’ established by Max Wertheimer in the beginning of the 20<sup>th</sup> century, may be reduced to one, namely the Principle of Similarity.

*“the relative degree of similarity in a given perceptual pattern makes for a corresponding degree of connection or fusion. Units which resemble each other in shape, size, direction, colour, brightness, or location will be seen together.”* (Arnheim, 1968: 201)

This inherent tendency to group the visually similar supports the need for visible differentiation in product appearance, otherwise the plethora is seen as a mere handful: many designs producing a single, same effect.

Lengthy and detailed explanations of the Gestalt theory, its principles and experiments, have filled volumes written by more knowledgeable and skilled bodies. What is central and to be considered here is the possibility behind the concept: formal quantification, the precise and countable ways of relating form and perception.

This possibility is made clear and expanded upon by J. J. Gibson (1950). In describing a visual world different from the visual field, he leads psychologists into the more comparative and relational physical territory of psychophysics.

Psychophysics is the attempt to find the physics of the body. It consists of applying a physical stimulus to a subject, and then getting the subject's report of the psychological experience associated with that physical stimulus. Hundreds of experiments in psychophysics have shown that people can make very accurate proportional judgments about visual, auditory, and other sense stimuli.

It has been mentioned that studies of visual perception have traditionally been applied to projected images and other investigations and experimentation have extensively studied form features in isolation, testing how colour, shape, contour and other design elements are perceived. These elements are of course the design professional's raw materials. There is increasing awareness that design attempts to create interest, desire and even stronger emotions based on the product's outward appearance.

Aimed at sales, product differentiation is a strong weapon and designers are ready to comply but usually by making subtle changes, as opposed to radical innovations, there is always the risk of the product change not being evident or

clearly noticed. When a company launches a new, differentiated offer on the market, it will be compared to all the 'near substitutes' contemporarily available – this includes any of the products of that company itself. Accidentally or not, company products compete amongst themselves. It is around this notion, around the comparative visualization, that the research test is structured.

In the design literature, research investigating physical features of products fall into three different areas: product properties, the design activity and the observer. Objects are commonly categorized according to either visual or functional properties (Riggins, 1995). Studies have tried to understand specific qualities, such as proportion (Lee, 2002), geometry (Birkhoff, 1933) form (Conolly, 2003) or function (Guyer, 2003) and their contribution to perceptions of products. Such research considered properties separately, whereas the case study took a more holistic view of the product. Various attempts have been made at demystifying the intuitive process by which designers create. Attention has been given to the information (Chang, 2003), properties (Ding, 2001) and tools (Wiegers, 2002) necessary for optimal design results. What is seen depends, to a certain degree, on the observer who has been studied as a consumer/user (Kano, 1984), a human being (Maslow, 1962) and an instrument of visualization (Coughlan, 1999).

If the observer is considered as a generic instrument of visualization, how much of the differentiation in one design compared to the next is visually perceptible? What influence does composition and organization exert on perceptions of similarity and contrast? What design elements or features are responsible for the identification of alteration?

### **Research Method**

The specific case study uses visual perception to inform product differentiation choices, trying to answer the question: *How different is different?* The model seeks to establish at what point observers begin to see a difference in teapot shape designs, and compares the perception of difference with the actual dimensional differences that exist between the objects.

The investigation uses methods proposed for object analysis, visual analysis, visual perception and psychophysics. At first, generic object analysis seemed appropriate for the sought after comparative evaluation. However, the question of how to observe these objects and how to measure and express the thesis of the small differentiation between their designs soon arose. Methods proposed for visual analysis were investigated to clarify the first doubt, then visual perception and psychophysics as means of quantifying and qualifying visualizations were studied to illuminate the second. The constructed model puts forth an alternative method elaborating on physical properties of the objects investigated according to principles of visual perception and measured by psychophysics formulas.

Studies closely related to the present project have used computer 3D morphing techniques to determine recognition and preference of kettle shape designs (Lin, 2003) and Weber's Law of Just Noticeable Differences – JNDs – to quantify the change necessary in a stimulus to produce a noticeable variation in sensory experience (USD, 2003). Here, a merger is proposed: by using morphing tools, a form spectrum can be created of any type of product and a scale of visually perceptible differentiation can be established much in the way psychophysicists have done using JND.

Traditionally a design-led company, the UK based tableware manufacturer Denby Pottery Plc, displays real interest in shape development. In its contemporary ranges, there is a minute use of pattern decoration concentrating instead, more heavily, on glaze. This emphasis assists the investigation's analysis of issues of visual perception of form and shape. Teapots are seen in the industry as expressive pieces, iconic tableware items. They are used to this day as standard design-and-making exercises in decorative arts academies and for the establishment of a professional's kudos as a practitioner of high design (Julier, 1998). The 7 teapot shapes currently produced by Denby, simultaneously occupying the market place, compose the object of study.

A computer artefact was constructed to enable testing of the model. Three tasks were set in order to establish formal categories, measure degrees of visible physical difference and identify design features responsible for detection



of shape differentiation. Depending on the exact nature of the final model, a representative sample of observers will be chosen for a pilot run, thereby testing the model's validity and replicability. In any case, background, make-up, niche or class will not be a factor in selecting the testers. Since the aim, from the start, was to use human beings and their physiological benchmarking abilities, all eye-sight being equal, one man is as good as the next.

[Figure 1: Artefact Interface]

### **Issues – the challenge of design research**

The research described here raises issues which are the subject of considerable debate within the design and research communities. In investigating what these three fields have in common, some differences started to stand out. The semantics and technical jargon specific to each field, perhaps speak volumes. The marketing outlook stresses the artefact as *product*, the viewer as *consumer*. Psychology calls the artefact *stimulus*, the viewer is *observer*, *subject*, *instrument of visualization*. Design, picks and chooses, claims the artefact to be an object, which is product, viewed by the consumer as human being possessing wants, needs, desires. Maybe even trickier are the terms they all share but very distinctively define: form, shape, artefact, design, differentiated, to name a few.

How a single theme is viewed and prioritized also varies according to the area wherein lie the research and researcher. Psychology is not interested in man as consumer, therefore different from marketing. Marketing sees the product as holistically producing reactions, where psychology breaks down and isolates features in order to test. Design understands the product as a whole but recognizes individual elements in its composition. Marketing looks for reaction and preference, as does psychology, but the first values subjective reports and interaction in a consumer mind-frame, the latter sees the subject almost as a part of the experiment, the guinea pig.

There are challenges for both researcher and supervisor in the research presented here. One of the first research tasks many design doctoral students experience is to grasp a range of theories and concepts that belong in different academic disciplines.

Alongside this there is for many, the new area of research methods to master. These enquiries have to reach a high level quickly to allow for fundamental decisions to be made at this early stage in a doctoral programme. The fact that many design doctoral students have to begin these tasks from scratch may be an indictment of design education at under graduate and possibly post-graduate levels. Concern about the way in which students learn research methods has led to new university based programmes and now, the intervention of the UKs Research Boards.

Research supervisors are also challenged by the scope of design research. There are still relatively few UK academics who are qualified to supervise doctoral students. Those that can find they inevitably are working with students who are investigating topics outside their expertise. Co-supervising across subject disciplines becomes a necessity and also provides a unique opportunity to enrich the supervisors own knowledge.

The design researcher has the opportunity to select as appropriate, from a range of theoretical underpinnings and research methods. This potentially makes design research a rich and highly innovative field. However, for those who feel the need to do this, it also makes design research very difficult to define.

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