THE LANGUAGES OF DESIGN

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ABSTRACT
The word “design” comes from French, where it means to designate, indicate, describe, denote or choose. In English its meaning has broadened and become more specific, applying to virtually any process for developing something new. However, each field of design has developed its own words for details of the process and often uses the same words to mean subtly different things. This paper explores differences in meanings within engineering and industrial design, discussing functional, visual, human interaction and some other specific areas like anti-design and CAD. It aims to show how the differences of meaning can be a barrier to understanding, making it more difficult to work together to find the best design compromises. The conclusion is that design language differences are coming together through a common thread.

Keywords: Language, communication, teamwork.

1 INTRODUCTION

There appear to be many languages of design. The word itself is also the root of the English word ‘designate’ meaning to define and determine. Thus to design is to define something and to designate so it can be determined as an entity and take on a life of its own. This could be the same as the embodiment of design: ideas need to be embodied in order to become products.

Historically, how things have been determined and defined has changed, particularly when groups of users become isolated. This led to a drawing apart of different areas of design, an example of which is the recent dispute at the Design Museum in London about the purpose of their short-term exhibitions. James Dyson resigned from the Museum’s governing body because he felt that an exhibition about Constance Spry, a flower-arranger, was not the sort of design he wished to support. He wanted to show how products develop from ideas to production – including prototyping and validating – dealing with functional and engineering issues. The dispute was about what was construed as design. Was it flower-arranging? Or was it engineering? The two camps had different answers.

In this paper we look at some of the different meanings that words, used in a design context, can have in just one language. English is flexible and continually evolving, but this becomes a barrier to understanding. Design involves discussing considerable amounts of information and verbal shorthand arises where a few words, phrases, or acronyms, take on a specialized meaning. In a fragmented field, evolution happens independently and differences become a barrier to understanding. (This echoes Colin Ledsome’s paper [1].) In the same way, the United States and Britain have drawn apart, with different meanings to their (same) language.

2 DESIGN

The word *design* takes on different meanings depending on who uses it. Here are a few different ways people have expressed their concept of design.

> *Design* is the area of human experience, skill and knowledge that reflects man's concern with the appreciation and adaptation of his surroundings in the light of his material and spiritual needs. In particular, it relates with configuration, composition, meaning, value and purpose in man made phenomena.
>
> Ken Baynes
>
> *Industrial design* is an activity, which leads to the manufacture of a product generally using the mass production techniques of industry. It commonly involves the process of sketching, drawing, model and prototype making and specification for the product concerned. The interface or relationship between the product and the final user is of prime concern to the industrial designer.
>
> Ben Austen, 1974
>
> *Design* encompasses those activities, which lead to the complete description of a product, project, process, or system to satisfy a market need (including the design of a system which may itself manufacture another product). It includes the management of those activities, and the necessary instructions for realisation, maintenance and use. ..... Engineering includes those design activities where functional safety, reliability, quality, efficiency, and economy must be assured, no matter how they are realised.
>
> Attaining Competence in Engineering Design, Design Council, 1991

This leads us consider the biggest division in design, between the functional considerations of engineering and the human interface emphasis of product design.

3 THE LANGUAGES OF ENGINEERING DESIGN

There are many recognised forms of engineering; civil, mechanical, electrical, and chemical are the main organisational divisions. Even then the language is not logical. Civil engineering is confined to the construction industry. Chemical engineering covers a wider range, generally labelled *processing*, but including everything from petrochemicals to bakery. Electrical engineering has a specific role. Mechanical engineers often have an integrating role, except in construction. The Engineering Council, EC-UK, recognises 36 institutions, but there are many more who don't sit at high table. Each has its own terminology, which may mean they use the same words to mean different things; some even mean things to other designers. Here a simple example:

> *Toggle:* For a clothing designer, or a sailor, a toggle is a bar on the end of short cord, which is passed through a loop to fasten two cords together. In buildings, toggle fasteners use a pair of sprung bars attached to a nut on a bolt, which is pushed through a drilled hole to open in a hollow space. These are used in cavity walls to attach shelves or for load bearing purposes. These meanings are related. To a mechanical engineer, a toggle mechanism is a pair of hinged bars, with a total length slightly longer than the gap they bridge. Pressure on the hinge point produces a high load forcing the outer ends apart. This is used to operate a press, a locking mechanism, or similar device. It is widely used in the building trade to close tongue and groove joints. Electrical engineers use toggle switches to give a positive switch between two states, usually off and on. Computer interfaces often have a screen button to *toggle* through various states.

Over the last 50 years, new insights into the nature of design, many triggered by the need to specify the requirements for degree content, have shown the central importance of design to engineering practice.

Figure 1 shows a structure of engineering that was developed by Hall in 1994. His purpose was to deal with the differences between teaching mathematics to engineering students and teaching it to maths and science students, but it produces an overview of the position of design. Crucial to this is its central position: *design* acts as the link between the human-based ideas, ethics and aesthetics and the reality of changing the natural world to man-made through manufacturing. [2-4]

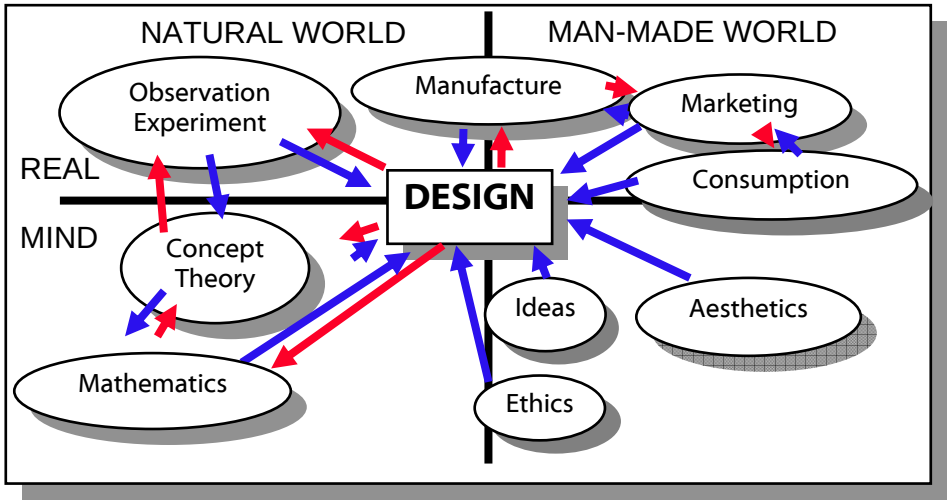

Figure 1: The structure of engineering (After Hall, [2])

4 THE LANGUAGES OF INDUSTRIAL DESIGN

4.1 Visual languages

For many designers, an emphasis on visuals sets them apart. The design requirements relate to how a design appears rather than how it functions.

Those related to performing arts and artistic impressions are one area. These include theatre, film and special effects; exhibition design and packaging design. Essential here is how the designed object appears: there may be an emphasis on one-off rather than on multiple manufacture, and sales are not of the designed 'item' itself but of the effect it produces. Design is the means to the end, getting people to purchase film tickets, exhibition visits etc. Design is defined by the effect.

Bob Gill's book *Graphic design as a second language* was one inspiration for this paper. [5] There are more graphic designers than any other non-engineering design discipline [6]. Our culture is paper-based. If it isn't paper-based it is screen-based. Graphic designers have a repertoire of visual skills including typography, use of line, use of colour, weight etc. These communicate. Graphic designers use visual skills to produce emotional effects. Design is a collection of visual skills and the production skills that embody them.

Another group is three-dimensional product disciplines, including product design (normally taken to mean consumer durables), and industrial design (which may be taken similarly). For these, visual skills are considerable; and practitioners deal with the behaviour of surfaces, lighting, and how form is arranged and is perceived, how surfaces link, how decoration is applied and so on. For the engineer, this type of design is ephemeral – but for these products it is crucial. Design is a three-dimensional form. Within these disciplines functionality is not overlooked, and neither is the human interface: wherever the human relates to the product, there is an interface.

These three dimensional visual skills are seen best in automotive design. Ray Land, John Owen and Mike Tovey presented a paper at the 2005 E&PDE conference on how to enter the community of practice in Automotive Design and concluded it was the ability to use the language of 3-dimensional surfacing [7].
Architecture is also a three dimensional language; the building in its site or landscape and how spaces interrelate are crucial. Decoration, apparent mass, scale and detailing are important. These are visual three-dimensional skills.

4.2 Human interface languages

Product relate to humans. The product is a marketing tool that generates emotions – through the visual language. The product performs – *works* – in a way the user appreciates. IDEO has developed this. Their success is derived from understanding people, their experiences, behaviours, perceptions, and needs. How do humans behave? We observe them. We ask them questions. We learn from patterns and insights and we create simulations to empathise and evaluate designs [8]. Research goes on: watching, asking and learning before one idea is tested. Such is the content of interaction design.
Another human language is inclusive design. Design for people so they remain human through their trials and tribulations. A people-oriented, people-empowering design that provides for dignity for those who might be forgotten, ignored. A design that doesn't concentrate on the product but on the user.
Green design could be construed as a human-oriented language. Or possibly an environmentally-oriented language. The proponents of green design relate to the human stance with respect to the environment. They say where they stand in relation to the world. The rest of the world bends to comply and integrate the 'should'. It's human-oriented and relates to lifestyles. Change is needed. This product is designed to make your world a better place and change the way that you relate to it.
A range of human-oriented design languages exist within the 'softer' disciplines, where design is for human living. Disciplines such as furniture, fashion, interior and retail design come into this category. The human interface is on the overall emotional effect: but the form relates intimately with humans. Although the language relates to humans, the designers develop sensitivities to materials, visual aspects and manufacturing methods. These relate not only to the immediate user, wearer, home owner, but also to the effect they are having on bystanders, guests – you wear clothes for the beholder, not simply for comfort. A specific language is that of textiles and fabric. Learning how these produce effects is crucial to success: drape, upholstery and cut are not things the product designer understands or experiences. It's a foreign language…

5 NEW LANGUAGES

5.1 Concept generation languages

Two movements are examples of a certain conceptual design position. Ideas meeting their philosophical criteria are proposed, using the appropriate criteria to identify which ideas are embodied and developed.

5.1.1 Anti-design. This language was a reaction against brutalism and modernism in the 1960s. It moved from the permanent, serious nature of grey concrete towards frivolity, temporality, colour and playfulness. Its nature plays with concepts and uses this as a major criterion for concept generation and selection. This led to Memphis and post-modernism. The frivolity, playfulness and temporary nature of the language changes its nature. Design is fun and enjoyment. Any serious, academic character can be forgotten. Function is less important.

5.1.2 Alternative design. This movement is anything but flippant. It contradicted mainstream, business-based design and put in a human and environmental emphasis.

People like Papanek [9] were influenced by writers like Schumacher [10] and Illich [11] and developed design schemes based on people rather than profit and on sustainability rather than consumption.

5.2 Imposed process languages

These have come from outside, where useful processes have been adopted or adapted.

5.2.1 Computer-aided design covers those useful pieces of software developed from computer modelling and graphic systems. Originally 2D graphics software adapted to produce engineering drawings; CAD now displays and modifies apparently solid models, interfaces with analysis programs, rapid prototype machines and CNC. As CAD has become more versatile it has become more designer friendly and shows great promise, but designers had to learn terminology in order to understand it.

5.2.2 Decision making methods were applied to design and have had some success. Mainly used to plan more complex projects, Nigel Cross [12] has reviewed a number and one of his conclusions is that it is more important to have a useful method and stick to it, than which method you choose. Again, new languages had to be learned.

5.2.3 Model making has been part of the design for centuries. Models were and are used experimentally to find out what works in three dimensions when two are not enough. CAD solid modelling and a rapid prototype machine now shortcut some of the process, but it the mental aid of seeing and touching the model helps the designer to solve 3D problems. The necessary craft skills have their own technical terms.

5.2.4 Idea generation is the key to good design. Without new ideas, design copies what has gone before. Various ways of promoting creativity have been enthusiastically promoted in design from group activities of brainstorming to individual methods of exploring ideas by analogy or mind maps. Many of these originate from psychology and are accompanied by their sometimes arcane language.

6 COMMON THREAD

Some people wish to define design as a problem-solving activity. Others disagree, saying that design is hardly the same as trying to determine how to solve a problem – more like trying to create one you didn't know you had in the first place. So we have instant disagreement about the design process.

But there is a common thread. Design, at its core, includes a process whereby ideas take on some form of reality. This changes the way someone, somewhere, lives. And it provides a pattern for someone to alter material through manufacturing.

The process starts with an investigative phase, resulting in a determination of what has to be designed. It may be a defined document or may be looser. It might have originated from the designer, or have been imposed. In some disciplines, this phase forms a significant part of the process: in others it may not be construed as being significant.

The process continues with a conceptual phase where ideas are produced, and may be selected. The may be called ideation, or more formally as, say, conceptual design. From that point ideas are developed into reality and given form and embodiment – whether two- or three-dimensional is irrelevant – within a phase that has makes ideas concrete and real. This may be called embodiment, development, layout or scheme. Some designers (eg Pugh) [13] feel that this should be classed as part of conceptual design, others (eg Pahl and Beitz) [14] prefer it to be separate. Then there is a detail phase where the embodiment is tidied and details sorted out. Frequently there will be involvement with manufacturing or production, but essentially this completes the 'editing' process and could be legitimately subsumed in detail design. This design process understanding is helping break down language barriers between designers.

7 CONCLUSIONS

Different design languages have grown up for perfectly valid reasons. In a growing era of multi-disciplinary projects, these differences cause misunderstandings between team members and between designers and clients. The gradual acceptance of the common thread is developing understanding and leading to an appreciation of each others' emphases. The new external, more formal languages, such as CAD, have led to a common approach, tending to bring designers together. People are learning to understand more languages and translate them into their own thinking. Designers are, at last, learning to talk to each other.

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