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Purposive Pattern Recognition:

The Nature of Visual Choice in Graphic Design.

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Abstract

Every pamphlet, brochure, booklet, advert, package, poster, etc that has ever been produced involved a visual choice made by a human being - even if the choice were restricted to 'doing it like the last time' or 'copy this one'. Whether graphic designer, information designer, advertising executive, programmer, printer or the Managing Director's wife, someone decided this picture, this type face, this layout etc rather than some available alternative.

How are visual choices made? And, in particular, how do professional graphic designers make choices between visual alternatives.

It was decided to probe this question by interviewing professional designers and looking at their work. The initial plan involved some sophisticated analysis of variables but it soon became apparent that such an approach was not possible.

Specific interview questions such as, "You decided to use a picture of an elephant. Why an elephant and why this particular one?" met with responses along the lines of, "It just felt right" or "It's intuitive". It became clear that although some designers can tell a story about their choices, most designers make use of their experience and the experience of others to arrive at a decision that is not the result of some carefully thought out decision tree or a calculus of competing requirements.

It was felt by both of us that there ought to be a better way to describe this process of 'just knowing its right' than intuition. Eventually we came up with Purposive Pattern Recognition, abbreviated to PPR. One of us (M A-R) gathered the evidence from interviews, case studies and existing studies of Masters in Design (a title awarded by a US magazine, following a poll of its readership) The other one (J Z L) placed the notion of PPR in a conceptual framework using current thinking in neuroscience and in evolutionary memetics.

Keywords

Graphic Design, Intuition, Neuroscience, Memetics.

The pages of Design Studies contain many papers based on designers and what they do. But they are predominately based on architects, engineers and industrial designers. Many are based on student designers rather than professionals. It follows that research into what professional graphic designers actually do or say they do is rare and how they select images is even rarer.

One study of 302 graphic designers (Nini 1995) investigated their gathering and analysis of information. The weakness of surveys with simple direct questions is illustrated by the findings of this survey. For example, in response to a question about initiating a project, 23% claimed 'acceptance of client's brief', 56.6% went for open-ended problem inquiry and 19.8% for direct enquiry. Nini seems disappointed with the way that graphic designers say they analyse information. One of Nini's conclusions is:

"Most graphic designers have no system in place to measure the effect of their work on an intended audience. Professional recognition currently consists of peer-approval ... where emphasis is almost exclusively on the development of sophisticated graphic form." (pps 8-9)

Nani's study is an example of what Papanek (1988) calls the rational approach which attempts to develop "rules, taxonomies, classifications and procedural design systems". He criticises this approach, "such a method leads to reductionism and frequently results in sterility and the sort of high-tech functionalism that disregards human psychic needs at the expense of clarity"

An interesting insight into what graphic designers actually do is provided outside the academic literature by one of those 'how to do it' books. Tony Seddon's book on workflow for graphic designers is unusual because it incorporates the results of interviews with 27 other designers (Seddon 2007).

The title of the book is 'Images' and its introduction offers a summary – "Which image is the right one for the job? How much will the image cost? Where did the images come from and who shot them? Whose permission do I need? How do I make sure the image will reproduce perfectly? All will be revealed."

The first of these questions – 'which image is the right one' is central to the theme of visual choice. Just how do designers choose this image as the right one and another as the wrong one?

Unfortunately, the claim that 'all will be revealed' is not true for this crucial question. The various chapters in the book conclude with a section headed, 'The professionals' view'. These sections are based on responses to interview questions. The key question of choice of image is not there. For example, in response to a question about working practice, Michel Vrana of Black Eye design is quoted as saying, "We use iView MediaPro to sort and manage images. We create contact sheets which we send to the client for final image selection. The sooner you eliminate images that aren't required, the better it is for the project." But what is the basis for 'elimination'? On what basis do they 'create' contact sheets? We are not told. (That, of course, is not the subject of the book, which is about how to organise workflow. But organising a workflow is not much use if the images are not suitable for the required job)

The first chapter is 'Establishing an image-preparation workflow'. This chapter includes 'An image workflow overview' which starts with the sources of images – image libraries, commission photographer, commission illustrator etc. These lead into a box marked 'Collate all images and review them using Adobe Bridge to gain an initial overview of available choices'. This leads into 'Edit and select images based on quality and suitability'.

Most of the boxes have sections in the book, providing detailed advice. There are sections on 'using image libraries' and 'briefing photographers and

illustrators'. But conspicuous by its absence is any discussion of 'which image is the right one for the job?' or what is meant by 'select images based on ... suitability'. What happens when graphic designers make a visual choice? How do designers know what is 'suitable'? Questions like these were in mind when the research project came into being.

The Research

The study was an attempt at discovering the nature of the visual sources used by professional designers and how they selected and adapted their visual inputs when they created designs for specific needs in the graphic communication domain.

There were three parts to the research.

1) Interviews were carried out with 41 professional designers from 34 organisations. 31 of the organisations were design consultancies obtained from the Chartered Society of Designers under the general heading of 'Graphic Consultancies'. The others were organisations with in-house designers. The interviews asked general questions such as "what do you use as visual sources and "how do you choose from your sources".

2) Twelve mini case studies of specific design projects were carried out. The case studies involved interviews and observation. Interviews were used to ask specific questions; for example, "Why did you choose to put an elephant on the front of this brochure?" and "Why this particular elephant?"

3) As a check to bias caused by the interviewer, 15 interviews published by an American publication were examined. The readers of "How – The Bottomline Design Magazine" had been asked to pick twelve people who were the most influential designers. The twelve winners were given the title 'Masters of Design'. These twelve, together with three 'Grand Masters', were interviewed by experienced staff from the magazine. The results of these published interviews were found to be comparable with the results from the interviews in 1 and 2 above.

Visual Choice

The following 13 quotations are taken from transcriptions of taped interviews with professional graphic designers responding to questions about visual sources and their method of selection.

- Q1 Of course you select your visual sources. You do it largely intuitively and you choose whatever you feel is appropriate.
- Q2 I don't know; it's not specifically scientific. It's purely intuitive. You just have your own ideas that you think are right. I don't think I ever get scientific about it. It is just that.
- Q3 I just pick up something and I don't know why but it seems to have a purpose to it.
- Q4 It's all quite intuitive really. It's difficult to describe. You're thinking about the brief and about a particular design.

- Q5 Instinct; you know when something is the right sort. There is no formula to it and they will always be very different.
- Q6 Sometimes you are not sure yourself but you know that it has some relevance. It is not always obvious.
- Q7 It is innate behaviour for a designer to think that what they are doing and how to achieve the best for the client whatever the object is.
- Q8 I have certain things that I like to refer to but it is mainly subconscious things that I collect.
- Q9 It really comes from the peoples thought processes and then it is just a matter of where to get the visual source for the image they want.
- Q10 It is difficult to answer. I think you have in your own mind what you are looking for. Anything can spark off an idea and usually you can go to several books and select those images to support your idea.
- Q11 That presupposes that we sit down and think what sort of visual treatment should I give this. (The respondent was suggesting that he did NOT 'sit down and think')

A minority of respondents attempted to give more detail to their way of selecting a visual input. For example.

- Q12 I think we would look at what we're trying to communicate and we would link that with the visual and say what communicates that most strongly. You would be looking for a particular image that was saying something and you would choose the one that says that most strongly. Also, how this is going to reproduce in the end might have an impact on which image you select.
- Q13 If I have to choose from ten tree pictures, I would choose the most graphic. I mean the one that looks best at the end of the day. The one that looks best in your layout or whatever you are doing. The one that suits.

This, of course, still leaves open what is meant by 'the one that says that most strongly' or 'the one that suits'. The decision remains a matter of personal choice based on somewhat mysterious 'thought processes' (Q9)

The mini case studies provided similar statements but with more detail. For example, discussing the design of a CD cover.

- Q14 Talking to the record market. Talking to the client. And we know a lot of music business. If you were talking to a packaging designer he would know about food and he would know supermarket shelves. We know music, we know what looks good. We know what audiences expect. So we get all our information. It is intuitive and its knowledge that we hold already. ... There was no research commissioned. It was entirely intuitive.

The masters of design interviews also provided similar statements. For example, in answer to a question about his 'design philosophy', Paul Rand claimed,

Q15 When you design, you do things intuitively. Either it comes to you or it doesn't. Your work is you; it's part of your experience. It's the distillation of your experience.

Pattern Recognition

The above quotes are just a small fraction of the many revealing statements obtained from over fifty designers and reported in a lengthy PhD thesis (Abu-Risha 1999). How does a researcher make sense out of so much data? This problem is similar to the problem facing the designers in the study. They were professionals with a wealth of experience in techniques, market requirements, financial considerations, fashion, the opinions of other designers and so on. Out of all this knowledge, how were they able to say, 'you just know its right'?

The first thing to note is that the problem of choice was not tackled through conscious 'reason'. One of the designers (Q 2) specifically said he was not being 'scientific'; others used words such as intuitive (Q1, Q4, Q14, Q15), instinct (Q5), innate (Q7), subconscious (Q8).

One way of approaching the problem of intuitive choice is through the realisation that modern neuroscience has shown that brains can make decisions before the conscious mind is aware of what is happening in the brain. Chris Frith (2007) puts it this way,

"We think we are making a choice when, in fact, our brain has already made the choice. Our experience of making a choice at that moment is therefore an illusion." (p 67).

Frith is Professor in Neuropsychology at the Wellcome Trust Centre for Neuroimaging at UCL and describes experiments in which the brain cells, the neurons, can be activated in regions that make decisions and activate muscles before the subject is consciously aware of the decision. These experiments involve simple choices such as when to lift a finger or press a key. To apply this concept to complex decisions like those made by graphic designers, we need another ability of the brain. This is a mechanism for coping with too much sensory information. It takes incoming and remembered data and then presents the conscious mind with an 'experience'. This can be summarised under the term 'pattern recognition', a mental activity that we use all the time as, for example, when we recognise a face.

Antonio Damasio is head of the Department of Neurology at Iowa State University and well known in some design circles for writing about emotion versus reason in decision making. In 'The Feeling of What Happens' (2000), he writes

"Images come from the activity of brains and those brains are part of living organisms that interact with physical, biological and social environments. Accordingly, images arise from neural patterns, or neural maps, formed in populations of nerve cells, or neurons, that constitute circuits or networks. There is a mystery, however, regarding how images emerge from neural patterns" (p 322)

The 'mystery' is the mystery of consciousness. Damasio distinguishes between an 'image' which is a conscious perception and a 'neural pattern' which is an

underlying electrochemical network. The mystery is how one leads to the other.

Damasio is not suggesting that we need some extra ingredient to fill the gap. He is not returning to the Cartesian split between brain and soul. He states,

"we cannot characterise yet all the biological phenomena that take place between a) our current description of a neural pattern at various neural levels , and b) our experience of the image that originated in the activity within the neural map. There is a gap between our knowledge of neural events at molecular, cellular and system levels, on the one hand, and the mental image ..." (p 323)

In this paper, we use 'pattern recognition' to mean this conscious experience of an underlying neural pattern which itself is formed by the brain's power to abstract essential information from the mass of sense data that it receives and interprets using stored memory circuits.

Two kinds of pattern are important in our description of what happens when a graphic designer 'just knows it's right'. These we call the need pattern and the visual pattern.

Professional designers have a vast store of knowledge about the general requirements for their design (eg Q 14 above) to which is added the specific requirements of a particular project. Most designers in the study referred to something like 'formulating the design problem'. We describe this as recognising a need pattern. Many alternative visual patterns exist and one has to be selected to match the need pattern.

One feature of the brain that is important here is the power of parallel processing. Although our conscious experience takes place in a linear manner through time – one thought after another – our brain is doing lots of things at the same time. It can, for example, compare one pattern with other patterns. We are slightly aware of this kind of comparison when we try and match a name to a face. We have a visual pattern – the recognised face – but we cannot remember the name that goes with it. The unconscious part of the brain will run a comparison of the face pattern with patterns from our memory and it sometimes comes up with the answer when we are consciously thinking about something else.

This power of parallel processing is described by Michael O'Shea, Director of the Sussex Centre for Neuroscience. O'Shea (2005) asks, "What happens when I recognise the word 'banana'?" He claims, "information about shape, size, texture and colour must somehow be bound together with stored knowledge about fruit, my appetite and so on". "These processes are associated with different networks of neurons in different parts of the brain".

He then tells us, "assemblies of nerve cells in different parts of the brain co-operate with one another in parallel". (p 10)

We are suggesting that the process of making a choice between alternative visual patterns uses similar neural processes to recognising a face (ie parallel processing of different networks or patterns). The visual alternatives are compared with the need pattern until there is a mental 'click' that is the

brain's way of telling our conscious mind that we have a match between two circuits or patterns.

The concept of two thought patterns coming together in a moment of creativity is well known. The moment when insight occurs was described by Arthur Koestler (1964) as 'bi-sociation' - two areas of thought becoming so integrated into one that it is difficult to imagine how these previously existed separately. What we are attempting to describe is different in that the two thought patterns come together as the result of a comparison rather than a symbiosis.

We use 'purposive pattern recognition', abbreviated to PPR, as our way of naming this comparative click of recognition. It is purposive because it tells us what to do next. Sometimes, this recognition arrives as a flash of inspiration; at other times it emerges slowly after much thought. The history of science has many examples of the 'click' arriving in dramatic fashion including Archimedes' 'Eureka' and examples like Kekule thinking of a hexagonal structure for the molecule of benzene (in different accounts, he saw a snake or snakes eating their tail in either a fog or staring into a fire).

The 'flash' makes a better story than a gradual unfolding but does this happen to designers as well as scientists? In 1987, this question was tackled in a paper (Davies & Talbot 1987), which won the award for the best paper of the year in Design Studies; Davies interviewed 35 Royal Designers for Industry (ie more than half of those designers given the title of RDI by the Royal Society of Arts). The paper lists the "main categories of mental events concomitant with experience of having the idea and knowing it is right" and the authors use the word 'imago' to describe this experience. It is clear that the RDIs were able to describe the feeling of getting THE idea and knowing it to be the right idea. Whether this imago happened suddenly or gradually is not clear from the paper but it is clear that the RDIs gave similar accounts to those given above in the present study.

Modification of Choice.

After an initial choice, most designers described how design choices are subsequently modified. This modification can take place within the head of one designer or as a result of interaction with other people – the client, a senior designer, other designers or a group of people. Some quotes from the interviews illustrate the ways in which this can happen.

- Q16 You understand your project, then you select particular ingredients for your project, then you decide how much of each ingredient you need for your design. You modify colour, shape and contents as you go along. It is similar to cooking a special meal in your kitchen.
- Q17 We talk about it a lot, because we all have different ideas and it helps. If we can have two different designers who discuss these ideas and bounce ideas off each other, we find that by discussing it better things come out of it rather than one person blindly pursuing and struggling in a corner.

Q18 We try and create more inspiration by having creative focus meetings. We discuss and analyse the things we have done and see where we can take it.

Q19 Sometimes something may have to be changed because really it is considered to be outdated or not suitable at all for the job. Whether you think something looks right or whether it's appropriate can depend on whether it's changed or not in your final design and then you have to accommodate that change. Hopefully you keep the idea the same but you can adapt it.

Sometimes, modification takes place within an environment of competition. Different ideas can compete within one head or between different people.

Q20 You might choose more than one. It is a matter of trial and elimination. You might pick a particular one and dismiss the others because it matches the brief. It becomes objective too because you have a team of creative people and then you have a marketing team and they agree which one fits the brief better.

The themes of competition and modification also occurred in the mini case studies –

Q21 Sure we develop the ideas; it's a starting point. But sometimes a design idea does not develop. Sometimes an idea does develop. I don't think one idea goes all the way to the final thing. Sometimes ideas don't go anywhere. It's difficult to give a definite answer.

Q22 Quite often, design is as much discarding as it is coming up with new ideas.

Q23 This is design detailing very specifically. At this particular point the concept of the banner has already been established. Then it becomes the different ways of looking at how the typography may be used. Do you use the product title? Do you think the title has to work with an ingredient possibly within the banner or do you put the ingredients outside the banner?

Q24 You can see it in your mind what you want to do and then it's just a matter of exploring different ideas to make sure that what you can see early on is still possible and the client will accept it.

Q25 It was basically getting together with the copywriter from the outset and coming up with the concept and the idea and making sure that visually and literally the words and the way it looked all hung together and you can only do that when you work with the copywriter from the outset.

The masters of design interviews also provided related statements –

Q26 To me, the important thing about being a designer is to evolve, to test and retest. The minute you stop searching you die, (Michael Vanderbyl)

The quotations given above (Q16 – Q25) illustrate how design is much more than getting THE idea. Ideas interact, compete, change and perhaps 'evolve'. Design evolution has been the subject of a previous paper (Langrish, 2004)

which claims that design change has to be Darwinian (not Lamarckian and not Spencerian). Darwinian change needs replicators and in human activities outside biology, the replicator is the meme. The concept of PPR can be shown to add to a memetic view of design change. In an earlier paper (Langrish 1999) it was claimed that Dawkins' (1972) idea of the meme as a cultural replicator could be developed by thinking in terms of different kinds of memes. Two of these memes are helpful in advancing an understanding of PPR. These are selectemes and recipemes. Recipemes are idea patterns of how to do things; selectemes are idea patterns about what sort of thing is desirable. If we are thinking of making a cake, we have ideas – selectemes – about what sort of cake we want to make. These selectemes can change over time eg from cream cakes being a 'good thing' to becoming a 'bad thing'. When our selectemes have told us what sort of cake we want, then we have competing ideas of how to make it. (c f Q 16) For a cake we have recipes; in more general terms, ideas about how to do things are recipemes. This memetic description of choice matches the concept of PPR. Memes are not just crude analogies with genes. Memes exist as electrochemical patterns in the brain. Selectemes correspond to the need pattern and visual alternatives are recipemes. When the two are found to match, then we know what to do and how to do it.

Summary

1. The intuitive feeling that a choice is the right one can be described in terms of Purposive Pattern Recognition (PPR).
2. PPR is an experience resulting from a comparison of a need pattern with alternative visual patterns.
3. The need pattern and the visual patterns have a physical location in patterns of interacting circuits in the brain.
4. Changing idea patterns can be described in memetic terms with selectemes corresponding to the need pattern and recipemes corresponding to the alternative visual patterns.

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