Intuition in Design
A perspective on designers' creativity

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Abstract
Creativity is manifest in different ways in individual creative people. Designers are shown generally to prefer an intuition led approach to seeking design opportunities. It is thought that this intuitive approach arises from the particular personality characteristics of designers.

The paper seeks to set out findings about characteristics relevant to designer personality which have been reported in the wider psychology and design literature, including a study of eminent designers and the ways in which they work. A special study was undertaken of UK design students to assess their personality characteristics and any possible bearing on intuitive preferences towards designing. Over three quarters of these designers were shown to prefer an intuition approach coupled with flexible open ended attitudes.

Some relations are drawn between these findings and explanations arising from theoretical models which may help to explain intuitive processes and which form the basis for ongoing research in this area.

Intuition is considered to be a distinct and transferable skill which is a precious asset as yet undervalued in the design domain.
1. Introduction

Simple observation of design students in departments of Art & Design shows us that they exhibit certain characteristics in creative thinking, and seem to have particular attributes of personality. For example, in designing it can be seen that there is a motivation for difference, often for its own sake; there is a desire for style, sometimes at the expense of practicality; or there is a drive for some particular aesthetic or tactile quality that must receive expression. They seem to like solving new problems — as opposed to incremental change — or seeking new opportunities, and occasionally have great fun so doing. Cognitively, they are given to generating unusual associations and relations, and they sometimes break the rules set by their tutors. Occasionally, they are rebellious and difficult. They rarely work from first principles and seem happy to work with uncertain or incomplete knowledge, and to feel their way intuitively through the problem. Intuition seems often to take precedence over either formal design processes or fact-based approaches. By comparison with, for example, engineering designers formal methodologies to aid the design process have met with little success in departments of Art & Design.

This paper suggests that designers’ creativity is inextricably bound up with their personality characteristics, and that their particular form of creativity is intuition led. Furthermore, intuition is not simply guesswork, but may be seen as rooted in designers’ particular ways of thinking as fostered by their training, and is a skill common to many creative persons. However, design educators, researchers and practitioners are often uncomfortable with expressing design thinking in terms of intuition, and it is a phenomenon which has not been adequately studied in our field. A better understanding of intuition is an important contribution to building a credible domain of design knowledge, and will be of practical use to academics in teaching creativity, as well as to design practitioners in gaining a better understanding of their own creativity and its enhancement.

2. Creativity

It has been suggested that there are ‘designerly ways of knowing’, particular cognitive styles typical of designers and the ways in which their world is sensed, and which underpin their creativity. There are many working definitions of creativity arising from various psychological studies. For example, creativity has been suggested to be: thinking which results in the production of ideas that are both novel and worthwhile; may be expressed in the production of artefacts having a notable degree of originality; and creative enterprise as simply an act that produces effective surprise; and an important and persistent feature of creativity — the ability to set aside established conventions and procedures. There are clearly many outcomes of creativity, some of them differ widely. For example a criterion of creativity in engineering may be predicated on there being progress i.e. a product may be made cheaper or stronger, or perform better or have additional functions. In fashion design, on the other hand, criteria for originality may include being different for its own sake. It is not
always possible to separate functional improvement from simple change, the eccentric and, occasionally, from the merely frivolous. One reported case from psychology illustrates this point well. A research subject tested with cards of the Rorschach psychodiagnostic (a set of ink blots of ambiguous form, from which patterns may be perceived) was asked to tell what he saw in each blot. Instead of looking directly at the test cards as expected, he inspected them edgewise and even bent cards in the middle and looked at them from various angles. He gave responses unique to the examining psychologist — a veteran of several thousand such tests — who was certain that the subject's responses were original because the test manual defines an original response as one that occurs less than than once in 100 examinations. But is this creative or merely eccentric behaviour? The eccentric may not be creative although in a statistical sense it is uncommon. A general and practical criterion of creativity is therefore difficult to establish.

A number of areas of significant difference between designers and others have been postulated, including engineers and other cognate professionals and that these differences have implications for education in the subject. Among these differences are thought to be the extent of, or preference for: divergent/convergent thinking; brain lateralisation; spatial modelling qualities; holism/serialism; and subjective/objective thinking. In problem solving, the cognitive style of convergence is, for instance, characteristic of many engineers. There are several secondary pointers to the particular cognitive qualities of certain designers. For example, in the area of brain lateralisation, as motor co-ordination of the left hand is under right brain control, it has been thought that in designers this might lead to a higher incidence of left-handedness and dyslexia, together with more ability in right brain activities such as visuo-spatial processing (anecdotally, Art & Design student populations n the UK do seem high in left-handedness and dyslexia, thought there are few corroborating data).

As an example, in one (USA) empirical study students and their tutors in a department of architecture were found to be more left-handed than would be expected. The norm for preferred left-handedness in the population was defined as 8-10 per cent. Of the staff, 29 per cent were left-handed. Of the students, left-handers represented 23.9 per cent in one year group and averaged 16.3 per cent across all student groups. In a related spatial awareness task, left-handers exhibited 100 per cent accuracy, whilst on the other hand (so to speak) right-handers achieved accuracy of less than 50 per cent.

However, left-handedness is strongly acculturated and may not generalise globally. Left-handedness has traditionally been repressed in children, and continues to be discouraged strongly in certain cultures. For example, oriental designers may therefore show less left-handedness, but this will not equate to higher levels of creativity among western designers! What is required are measurable and stable indicators of preferences which traverse cultural boundaries.
3. Creative personality

There has long been the suggestion of a particular personality which fosters creativity. Some observers have demonstrated creative personality as a pattern of cognitive traits which are characteristic of creative persons. This pattern is manifest in creative behaviour, including inventing, designing, and planning. Though creativity is manifest in quite different ways in the arts and in the sciences, in various psychological assessments of highly creative persons distinguished by contributions to their field, it was noted that there was a high degree of similarity across disciplines. In this respect it was observed that:

"it would almost seem as if the differences between science, art and literature are differences of particular skills and interests only, and that the fundamental characteristic of the creative, original person is a type of personality".\textsuperscript{12}

4. Study of UK design students

In order to ascertain whether designers differed from a normal population in respect of personality, a study was made of design students in typical courses in UK university design departments\textsuperscript{13}. This study used a form of the Myers-Briggs Type Indicator (MBTI) questionnaire\textsuperscript{14} in order to assess psychological types of design students. Two universities were selected which offered typical art-based undergraduate design courses in both 2D and 3D studies. Samples were restricted to whole subject-specialist cohorts in their first year of undergraduate study. First year students were chosen because they are relatively unchanged by their studies. The subject areas were industrial design (product), interior design, graphic design, furniture design, and design/marketing. The MBTI is based on Jungian theory, and classifies individuals into one of sixteen types resulting from four scales. One of these bipolar scales measures preferences for sensing or intuition.

Firstly, the sensing-intuition scale:

<table>
<thead>
<tr>
<th>sensing</th>
<th>sensing is perceiving reality directly through the senses, dealing with the practical elements of reality and facts. It is focused on what is actual, in the present or past.</th>
</tr>
</thead>
<tbody>
<tr>
<td>intuition</td>
<td>intuition is internal sensing using imagination, seeking possibilities, preferring relationships and problems to facts. It is focused on what might be, in the future.</td>
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\textbf{Figure 1:} sensing-intuition scale

Therefore, at one end of the sensing-intuition scale, sensing deals with preferences for fact based information rooted either in history or in the present, whereas intuition is much more future oriented and imaginative. In this study it was found that a large majority of design students (79 per cent) had intuition as a preference. In a normal population intuition is reported as 24 per cent.
Secondly, another scale, judgment-perception, defines the following:

<table>
<thead>
<tr>
<th>Judgment</th>
<th>judgment emphasises thinking in a decisive, planned and orderly manner, aims to control events, and is associated with closure and the settling of things.</th>
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</thead>
<tbody>
<tr>
<td>perception</td>
<td>perception is more about keeping options open, and is associated with living a more flexible, spontaneous existence, aiming to understand life and adapt to it.</td>
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**Figure 2:** judgment-perception scale

Therefore, at one end of the judgment-perception scale, judgment deals with preferences for working with order, whereas perception relates more to being open to experience. This may be described as the difference between going shopping and feeling good about making a decision to purchase (judgment) or enjoying the possibilities for purchase offered by the shop (perception). In this study it was found that a majority of design students (69 per cent) had perception as a preference. In a normal population perception is reported as 34 per cent. This kind of thinking has been reported as follows:

"Associated with openness and lack of rigidity is the ability to play spontaneously with ideas, colours, shapes, relationships, to juggle elements into impossible juxtapositions, to shape wild hypotheses, to make the given problematic, to express the ridiculous, to translate from one form to another, to transform into improbable equivalents. It is from this spontaneous toying and exploration that there arises the hunch, the creative seeing of life in a new and significant way"

Individuals in this sample clustered in a small number of types. Over a quarter (26 per cent) of design students were assessed as one type (ENTP). It is instructive to reflect on Myers' own description of this type:

"Their intuition acquires an unquestioned personal validity that no other process can approach. They will enjoy, use, and trust it most. Their lives will be so shaped as to give maximum freedom for the pursuit of intuitive goals. Because intuition is a perceptive process, these [types] will deal with the world in the perceptive attitude [...] They will consult their judgment [...] only when it does not conflict with their intuition"

5. Intuition

Though intuition is widely preferred by designers, the intuitive, future oriented, seeking of possibilities is a shared characteristic among creative groups such as designers, architects and artists. In MacKinnon's celebrated 1960s study of American architects the conclusion was inescapable that the more creative the architect, the stronger that intuition was represented. The most creative group in his study showed 100 per cent preferring intuition as measured by the MBTI.
More recently, further light has been thrown on this phenomenon by a study of members of the Faculty of Royal Designers for Industry (RDI). This comprises a group of eminent designers administered by the Royal Society of Arts, UK. Membership is by invitation only, and is based upon excellence in practice of the subject. The Faculty numbers no more than 100 RDIs at any one time. Thirty five RDIs were interviewed at length about the ways in which they design, in order to elicit how they experience moments of insight significant to themselves. How is it that, from the many ideas generated in a problem solving task, the designer knows that a particular proposal is the idea that should be taken forward? Several points emerged from this study which are typical of designers' descriptions of their experience of having the idea and knowing it is right. A typical response was

"I always know when an idea is right [but] I can't always put facts and figures against it".

It is significant from this study that the gaining of the idea is strongly held. It may appear intuitively, but is then felt to be absolutely right as a solution to the problem space under consideration. This realisation may also be attended by strong emotions such as feelings of wholeness and completeness. Designers also recognised the difficulties that intuitions present for providing rational explanations that are acceptable to others. While there was acceptance that the "intuitive bit comes first" it was argued that often

"you do rationalise every step of the way. But I think the actual way in which you got them [ideas] might even be called irrational."

These deeply held responses may be summarised as follows:

| a sense of wholeness and unity about the solution |
| experience of paradox |
| difficult or impossible to analyse, or to express process adequately in words |
| openness to all kinds of experience |
| deeply felt positive, pleasant ecstatic feelings and lack of anguish |
| originality, unique syntheses and harmony |

Figure 4: RDIs' responses

One of the characteristics of these designers is that they are open to all kinds of experiences, with high awareness to influences relevant to their design problem. In particular, they seem ready to notice particular coincidences or juxtapositions of events which others — less sensitised — fail to notice. The researchers state that these designers:

"are able to recognise opportunities in the way coincidences offer prospects and risks for attaining some desirable goal or grand scheme of things."
This is a model more of opportunity-seeking than problem-solving. Though intuition seems central to designerly thinking, these designers felt that their intuitive consciousness was impossible to articulate or to translate adequately into language. This must raise some doubts about the extent to which intuitive design can be taught explicitly, as opposed to the general studio-based manner of inculcating design values and thinking through opportunities which present themselves in the course of project-based teaching. This is learning design creativity by discovery, by osmosis.

Designers rely on intuition, some exclusively so. But alongside their more ‘rational’ colleagues from business, engineering and the like, many designers seem uncomfortable with the generally held perception of intuition being something vague, unquantifiable, and indeed unscientific. However, intuition is not guesswork. It is not random, haphazard, or hit & miss. It is the apprenticeship in learning how to think in designerly ways that produces the deep insights which designers characteristically manifest. What to the outside world may seem like a guess is in fact the result of experience coupled with a certain facility in thinking. It is the basis of our creativity, and yet we seem uncomfortable in claiming it for our own.

6. Mental models

One way of understanding the workings of intuition may be by reference to theories of mental models. For example, schemata\textsuperscript{19} and scripts\textsuperscript{20} underpin a range of cognitive theories. In this context, schemata are reported to be well supported empirically\textsuperscript{21} and form the foundations of many cognitive theories. They are mental representations which consist of general knowledge about events, objects and actions. These ‘chunks’ of information or schema are formed from an individual’s personal experiences, and are a representation of their unique view of those experiences. Schemata take the form of networks of schema which facilitate mental frameworks for understanding, remembering and acting upon information. These schemata are built up over time by designers in learning through designing. Memory is organised around personal experiences. Arising from these theories it is thought that all conceptualisations can be represented in terms of a small number of primitive acts. Scripts allow individuals to make the assumptions needed to understand events by filling in the missing pieces from the existing network. For often repeated events the response action for that event is embedded in memory as scripts. These become automatic responses for that specific situation. When presented with a new event, individuals will make assumptions based upon their previous experience. However, once a schema has been established, the existing understanding can be enhanced as additional related information is encountered. For example, in learning to drive a motor vehicle, the process of starting from standstill requires a considerable balance of judgment in throttle, clutch pedal, and movement of the gear lever in moving up through the gears. As learners, we have to concentrate hard on getting these actions in balance. After a time, these actions become internalised and we do not think about them openly — they become automatic in the context of that particular situation. Both schemata and scripts can take care of that particular task. If conditions change — for example a
Intuition may play a part in dealing with novel situations in two ways. Firstly, the preference for intuition carries with it comfort in making propositions that are not necessarily based upon evidence. This is not guesswork, but more an idea however preliminary or vague, that can be tested later. Designers are happy to work with uncertain knowledge and to form preliminary conjectures and assumptions. This is similar to Lawson's observation of the differences between architects and technologists in tackling a problem in that, whereas the technologists approached the solution of a problem by trying to understand the underlying rules and constraints and only then making conjectures, the architects took an altogether more playful approach by proposing solutions for consideration in the expectation that understanding would be gained later. This playful conjecture seems a natural cognitive style for designers and is well supported in project-based learning in the studio. Secondly, another designers' cognitive style is the facility and preference for divergency in thinking. It may therefore be that unusual associations and relationships may be formed between the more generalised schemata and their associated and more specific scripts. Intuition is clearly not simple guesswork. It is founded upon layers of the designer's existing knowledge structures and the rich complexity of associations between schema, schemata and related scripts. Nor is intuition a random activity. It is situated in the particular design task, and is tightly focused on seeking opportunities which are apparent perhaps only to the trained designer's creative mind.

7. Conclusion

Particular aspects of personality which bear upon designers' creativity have been highlighted. Many kinds of professional are creative, but the designer's particular brand of originality seems more connected with divergent thinking (coupled as it is with ideation and unusual associations) than it does with convergent thinking. There is also flexibility of thinking and openness to experience and ideas. An important aspect of design thinking is intuition. This is more than guesswork — it centres on a synthetical process, poorly understood and difficult to verbalise, yet which is utilised naturally by designers with confidence. Eminent designers have reported that they know intuitively when an idea is the right one.

A survey of design students shows them to be high on intuition. Their psychological type leads them to be imaginative, future focused, open-ended and curious about their world. Their profile is quite different to a normal population, particularly in respect of intuition. They also score high on perception attitude which facilitates flexible thinking. Designers share similar characteristics of intuition with cognate professionals such as architects and artists.

A number of issues are raised which require investigation through further research and the provision of empirical data. In order to clarify some of these issues, at Staffordshire University School of Art & Design, we are part way through two further studies of design students. One
study seeks to understand the social processes involved in design learning in the studio. Another project, conducted by a psychologist, is examining the relationship between creativity and cognitive styles in designers. Among the expected outcomes of this research is an attempt to relate a cognitive style measure to brain asymmetry. It is expected that some preliminary findings will be reported over the next few months.

Many design educators recognise that often, the skills we can give our students today will be out of date within a few years. The intuitive approach to design seems so fundamental to the designer's particular brand of creativity, and yet is so often regarded implicitly at best, or disregarded completely at worst. It is no wonder that designers show discomfort with attempting to rationalise their 'irrational' processes, but through a better understanding of these special ways of thinking, intuition may be seen as our most precious and transferable asset.
1 Students referred to in this paper are design students engaged in study on courses within the sector 'Art & Design' within UK university education. This sector is distinct from, for example, engineering design and architectural design.


