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## **Drawing and Designing - exploration and manipulation through two-dimensional modelling**

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**NSEAD/BEROL BURSARY WINNER 1987/88**

**S. W. GARNER**

**DRAWING AND DESIGNING: EXPLORATION AND MANIPULATION THROUGH TWO-DIMENSIONAL MODELLING.**

The subject of Design and Technology has seen enormous development in recent years. A great many of the complex and wide ranging elements that make up this subject have, for the most, received scrutiny and encouragement. As the vital contribution of design activities across the curriculum gains recognition the demand for analysis and articulation of these building blocks of the subject become ever more acute. However, these elements have not received equal investigation. This paper seeks to redress the balance by promoting research into the relationship between drawing and designing. More particularly, the paper sets out to present an overview of a recent piece of research at Loughborough University that supports the theory that drawing facilitates exploratory and manipulative activity that is essential to designerly thought. Recent curriculum development in schools has provided evidence that Design and Technology must closely examine the teaching of this subject if its full potential is to be realised. The programme was sponsored by the NSEAD and Berol Ltd. as part of the 1987 bursary award.

The demands for clarification and development of the role of drawing within design have long been voiced but very rarely met. In a short article in Design magazine in 1979 Phil Gray, then design group manager of Loughborough Consultants proposed '...the skill of drawing is so low on the list of priorities in design education that people now have to be reminded that drawing is, after all, a fundamental element in the design activity' (1). Colin Tipping in 1985, echoes this view by stating that a fluent sketching ability is '... the single most important factor in developing any general design ability' (2). Evidence of research or analysis into the importance of this activity is, however, thin on the ground. It has been nearly fifteen years since Professor Bruce Archer proposed his three language model of education in which drawing was identified as a fundamental component of the wider language of 'modelling' (3). The relationship of drawing to the modelling of ideas had received little subsequent attention from designers or design educators.

Perhaps it is the immense scope of drawing that stifles clear articulation of its function. Not only can it be employed to communicate precise intentions as in a technically drawn orthographic projection but it can encompass mood or feeling. It may be exploited at the very earliest conceptual stages and as a final act in the design process. Between these extremes drawing can

provide a profound and diverse resource. The scope of the activity of drawing, in addition to the range of products referred to as drawings, results in a variety of definitions for the term. The Collins English Dictionary provides clarification on forty-one uses of the verb 'to draw'. Whilst it includes '...to depict or sketch as with a 'pencil or pen', it also interestingly refers to '...choosing at random, shaping and attracting'.

The NSEAD/Berol bursary research acknowledges the contribution of a number of authors active in the field of drawing. Rawson (4) and Blake (5) provide seminal studies but it was always the intention of this research to base the findings largely upon selected case-studies of professionals active in design. Case-study analysis has been examined and supported as an entirely appropriate method for certain types of research. Authors such as Parlett and Hamilton (6) and Kidder (7) have demonstrated the benefits of exploiting case-study methods of research in the social sciences. The basis of their argument is that where research is not of the classical kind, that is, not logically supporting or disproving testable hypotheses then the research strategy ought to be different. They propose that the 'richness' of any individual case-study is likely to reveal greater 'truths' about chosen issues than any classical hypothetico-deductive strategy. It is an important feature of case-study analysis that primary material is made available for later researchers to analyse and propose alternative interpretations and for this reason the final report includes transcripts of each interview. This paper refers to comments recorded in these transcripts.

The interviewees were chosen to reflect as wide a range as possible of professional design activity and this results in varying opinions concerning benefits of graphic strategies within designing activity. The designers range from those involved with industrial product development such as Roy Axe, Director of Concept Engineering at Austin Rover to sculptors such as Clifford Bowen who leads that department at Glasgow School of Art. Between these are a rich and varied collection of people including ceramists, architects, fine artists, engineers, silversmiths and graphic artists many of which have some first-hand experience of the requirements for education in this field through their own teaching activities.

In spite of the breadth of the case-studies there appears to be unanimous support for the importance of drawing. Not only is it seen as an appropriate means of defining a better solution or product but it is presented as profoundly affecting this process. For a spectrum of designers drawing is a tool and many believe that it is vital to the organisation of thought. Why it is that

people view drawings as a vital aspect of design activity forms the substance of this paper.

Communication is only one of the purposes of drawing within design activity. Design necessitates creativity and this may often be a private activity. Those interviewed display a widespread exploitation of drawing even when no other person will view this output. Communication to other people cannot be the primary objective for such graphic activity but it may have something to do with the personal construction of an appropriate response to a given area of enquiry.

## **DRAWING FOR EXPLORATION AND MANIPULATION**

It is quite clear that designing and creativity exhibit a very close relationship. As a product designer and author Dick Powell believes that 'one is a more creative person if you can draw...because you have this conversation with yourself, you can express your ideas to others and you can organise your thoughts better'. The complexity of 'conversing with yourself' is compounded by the variety of activities in designing which may include answering problems, constructing the right structures and asking the right questions. Perhaps Clifford Bowen's reference to his use of drawing as a means of 'assimilating information' provides a link. He presents drawing as a means of turning over fresh information, a way of trying things out and a way of consolidating a theme or thought. Bowen uses the term 'homing-in' which extends the role of drawing from a 'problem-solving' device into a 'problem-finding' one.

As an architect and lecturer, Ian Ballentine categorically states that the whole process of drawing is to do with identifying very clearly what the problem actually is and he goes on to stress, as Einstein did, that the solutions to problems are much less important than are the definitions. Similarly Alan Williams, a director of the prestigious David Carter Associates, uses drawing to assist the definition of problems. 'If I go and see people and talk about potential problems, I always end up with a pencil in my hand, drawing the problem,.

Exploratory drawing receives support for more than its role in the definition of particular problems. Peter Ashton is Head of the School of Furniture at Birmingham Polytechnic and views drawing as a valuable means of gaining visual literacy. He promotes the activity of observational drawing as a means of exploring, understanding, remembering and particularly critically judging. Raising the awareness of quality, detailing and proportion are presented as vital to the development of visual literacy and Ashton believes that drawing is the appropriate means of doing so. This is strongly supported

by Mike Fuller. As an architect he believes that when you draw you 'look at things more thoroughly, in a much more concentrated way than if you don't draw'. It is interesting to note here the concensus of opinion between designers and artists. Whilst the end of product is likely to be vastly different, Claire Webber as a sculptor, points to drawing as an aid to understanding. Observational drawing is sometimes broken down into two-dimensional line and she refers to 'tracing' the object in order to understand it better. As she says 'I draw to help me understand . It's rarely used to express myself. It's learning about what you are looking at and being surprised'

Somewhere between the analysis of the problem and the conscious exploration of proto-solutions lies a cloudy perceptual domain within which designers refer to sources of motivation or inspiration that result from quick sketches they have made. Certain sketches are produced within which reside sufficient ambiguity for the mind to see no obvious subsequent move. Thus a creative analysis is begun that appears to display some congruity with Tovey's dual-processing model of activity within the mind (8). There is some support for the importance of ambiguity. Bowen, for example, refers to his reliance upon drawings with flexibility, 'drawings which can be interpreted in a number of ways'. Central to this issue is the deliberate reduction of pre-conceived 'meaning' without the sacrifice of 'feeling'. Imogen Margrie illustrates this point when she discusses the nature of her drawn studies made at London Zoo in preparation for the construction of a ceramic sculpture:

'I like the movements of the birds but it is very difficult to draw them. I make just a quick squiggle ... sometimes it is a feeling from the birds, perhaps it is aggressive or cheeky - there isn't anything definite, it's just a feeling I want to get over'.

The traditional subject for drawing studies, the human model, receives some support as an appropriate focus but this is by no means unanimous. Whilst Powell suggests that designers may improve particular capabilities by sharpening their powers of observation and recording through life-drawing, McNally is more cautious about its contribution. His belief that life-drawing provokes certain ways of drawing, "in the way that marker pens do' should be considered carefully alongside the traditional easy acceptance of such activity.

The role of drawings within an exploratory strategy is clearly then not limited to small patches of application. It lies at the very heart of Man's search for understanding. Exploration has been presented as a conglomeration of inter-related activities, some revolving

around problem analysis and inquisitiveness, others around creativity or discovery and still others that are concerned with making visible the products of such exploration. The roughness of a sketch would appear to be an important characteristic of some types of design drawing. A very detailed conceptual sketch may stifle ambiguity and might tend to fix early thoughts that could be improved upon. Williams describes a certain type of drawing he does as 'appalling' but that is only if it is evaluated as a communicative device. Such sketching clearly provides a valuable function for a director of a major consultancy. This function is supported by Margrie and Webber who exploit their drawing talents in the production of different types of images, some of which are deliberately unpolished; 'Sometimes the best drawings for me are the rough sketches' says Webber.

The area between exploration and idea development is a very grey one in the design process. Rarely does one get the opportunity to thoroughly complete research activity before manipulating such information in a response to various problem areas. In fact a case could be made for the importance of creatively examining the breadth of the problem and possible response to it before a systematic research process is completed. Thus drawing strategies that aim to explore problems, manipulate information, and visualise responses, have no clear divisions between them. Designing is not a linear process. Its iterative nature is well accepted and this results in different requirements for drawings at any one stage of the process. To compound this issues skilled practitioners, as presented in the case-studies, are able to produce drawings that provide more than one function. That is, whilst a designer may be exploiting drawing to creatively and personally explore an area, these same drawings may communicate form, detail, scale or other information quite readily. Similarly much sketching activity is used to simultaneously clarify conceptual development, facilitate evaluation and provoke the further generation of ideas. In reality, drawing styles and purposes merge gradually into one another and reflect the personal preferences of the artists, engineers, sculptors, designers or craftspeople themselves. Williams provides a suitable statement that illuminates this inter-relationship between exploration and manipulation:

'Perhaps in certain circumstances a quantity of sketching or scrawling is an indication of a poor or illogical process of thinking, but it can reveal a way of using a pencil as a tool to uncover ideas. Few people can actually sit down and draw something that they have imagined. It is a natural way of developing ideas. One can usually identify by looking at somebody's scrawlings how hard it is for them to get any ideas. If there is a flow of ideas

the sketches, the drawings seem to indicate the lucidity of thinking.'

This link between the two domains is referred to by Margrie as 'formulating' ideas but perhaps McNally provides the most appropriate articulation which owes something to Archer referred to earlier:

'Drawing is a very economical way of modelling, it is the fastest and best way of having a quick idea - a visualisation - of what is in your head and thus leads naturally into solid modelling.'

The use of the word 'play' occurs frequently - and a little apologetically - within the transcripts, as if there should be no requirement for such apparently unfocussed activity. On the contrary, play can be quite a focussed activity and there are times when such a capability is extremely useful within the design process. Drawing and playing appear to possess a particularly close relationship which may reveal itself in both a formal and an informal sense.

Drawing has been promoted as an essential component of designerly thought. However, the research indicates that it has implications beyond the relatively narrow sphere of the design professions. Support for graphic skills of all types has been documented and analysed and researchers have already proposed links with short-term and long-term memory. The value of drawing cannot be overstated and its development is viewed as a prerequisite for all students, not only those specialising in design. Drawing appears to facilitate creativity in the most fundamental sense with many of the case-studies illuminating the relationship between the two. In addition to qualitative advantages there appears to be much evidence that highlights quantitative benefits of drawing on design thinking. The paper has presented important views on the relationship between drawing and seeing. Hill is one of the many authors who have promoted drawing for its major contribution to perceptual development. He notes: 'Drawing can and does heighten visual sensitivity. It prods the draughtsman to sharpen his observation beyond the ordinary level.' (9)

Many of the case-studies reveal strategies of graphically turning around and recoding information in a similar manner to Bruner's identification of the capability of natural language. They present strong evidence for viewing drawing as a major means of supporting manipulative thought, particularly in design activity. Perhaps drawing may rightly be considered a language. The facility afforded by drawing for exploration also has a number of parallels with published studies of language. Barnes identifies a type of talk which he terms



'exploratory talk' and which is presented as a means of groping towards a meaning. The similarity between this activity and the graphic version of designers is striking. 'It is usually marked by frequent hesitations, rephrasing, false starts and changes in direction.' (10)

It is the purpose of this report to stimulate research into this complex field of graphic strategies - not just the communication of information. The case-studies highlight the vital role that drawing plays in exploring ideas and manipulating information and the nature of drawing may differ widely depending on its purpose. They also illuminate the valuable service afforded by drawings for the analysis and understanding of ill-defined problems. Educationalists of all disciplines - but particularly design, need to be motivated to examine the role of graphic strategies within the learning process. They require more than the 'hows' of drawing - they also need the ;'whys' of drawing in order to undertake their own curriculum development.

The NSEAD/Berol bursary report was submitted to the Society in March 1989. It has led to a variety of new curriculum developments that aim to promote drawing activity in schools. The In-service teachers course at Loughborough has provided an ideal link between this research and secondary schools. The Design and Technology teachers studying on this five-term course are presently evaluating resources and strategies which include video material produced as part of the project. Subsequent papers will relay the evaluation of these In-service developments.

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