In 1990 Steve Garner produced a school text book titled Design Topics: The Human Factors of Design. He briefed the various graphic artists engaged by the publishers, Oxford University Press, via nearly 140 thumbnail sketches. A comparison of these sketches with the final illustrations reveals important values of drawing. Not only do the comparisons enable the viewer to see something of the intent of the sender; they reveal processes of interpretation, selection, rejection and development, which are normally not available to examination. The paper seeks to contribute to substantiating the value of sketches to these processes of design team working. Since the author is also the originator of the sketches an additional level of insight and commentary is made available to the reader via a process of reflection.
Introduction

Recent decades have seen a significant growth of interest in drawing amongst the public and academic communities. Most recently the Big Draw events at the Science Museum in 2000 and the British Museum in 2001, organised by The Campaign for Drawing [1], encouraged public consideration of sketching via participatory activities. In the 1980s, exhibitions such as Leonardo at the Hayward Gallery and Back of the Envelope at the V&A museum presented the public with early conceptual sketch imagery of relatively well known outputs. The juxtapositions presented in these latter exhibitions possessed two distinct values. Firstly the sketches allowed visitors to view processes of idea transformation and translation by the originators of ideas and between the originators and those they collaborated with in turning the ideas into reality. Secondly such exhibitions inspired visitors to make their own connections between original sketched images and their final manifestation. The exhibitions engaged the public, in a non-didactic way, in a process of reflection on intentions and perceptions. This paper adopts a reflective approach in an analysis of the author's own work concerning the field of book illustration.

This paper focuses on the qualities and value of the sketches that were made to brief the various illustrators who were employed on the human factors book project. The paper seeks to make some specific observations about the use of drawing as a device in the publishing industry. However, and perhaps more importantly, it seeks to reinforce the established debate concerning the importance of sketching to wider human activity. It is hoped that the reflection that appears here can assist the dislocation of drawing and sketching from the relatively small sector of traditionally creative professions and activities associated with art and design. Sketching can find applications in all fields of human endeavour including science, business, industry and commerce and, if it is to do so, its values need to be made more transparent.

Establishing the sketch resource

In 1988 Oxford University Press (OUP) outlined their ideas for a new book series on design and I was invited to contribute one text aimed at Key Stage 4 of the emerging National Curriculum subject of Design and Technology. There were to be four books in the series and the subject of this particular one was to be the human factors of design taking in user-centred design, ergonomics and anthropometrics appropriate for this level of study. It was agreed that the visual impact of the book series was very important and as such each book in the series would be heavily illustrated with drawings and photographs. The illustrations were to be produced by several graphic artists and photographers employed by OUP but the problem of briefing the illustrators emerged. It was decided that rough sketches should supplement the text and together they would provide sufficient briefing for the illustrators. Several drafts of the manuscript were produced which contained not only the text but also pasted in were sketches for the illustrations and photographs providing an idea for the page layouts. The production process was for the most part uneventful. The final manuscript was handed over in 1989 and the book was published in 1990 [2]. Recently, the drafts of the manuscript came to light and an opportunity for drawing research became apparent. A comparison of thumbnail sketches appearing in the draft material with the professionally produced illustrations seemed to offer scope for comment on the nature of graphic communication, for example the ability for drawings to convey meaning with qualities not possible in written or spoken form. There were qualities that were retained and transferred from the roughest sketch to the finished image. There was also evidence of concept development by the illustrators. In some cases the illustrations were improvements on the original conceptions—they more successfully illustrated the topic being presented—but it wasn't at all clear how this shared understanding was being achieved. At other times the illustrations were surprising or
stimulating in their interpretation – like seeing a painting or drawing of yourself for the first time.

The process of self-reflection could only have taken place recently (although it is possible that a competent third party could have interrogated me on the subject at the completion of the work). Partly I was too close to it then and partly my subsequent experience in drawing research has provided new frameworks with which to evaluate the work. The use of reflection as a drawing research method has been variously used. In some studies, subjects involved in drawing research have been asked to provide commentary on their drawing and thinking after the completion of a set task (see Suwa & Tversky) [3], or in some cases during the task (see Dorst & Cross) [4]. Such verbalisation of drawing as process and/or drawings as output has enabled researchers to label drawing activity with meaning deriving from interpretation by the maker of the drawings. As such it has proved to be a robust and illuminating strategy – certainly when compared with alternative strategies such as trying to interpret drawings where access to the maker is not possible. In contrast there is a considerable body of drawing research that consists of the interpretation of drawing output by people other than the maker. Most historical studies of drawing output rely on this form of ‘expert’ interpretation. It is proposed that self-reflection as a research strategy offers some unique opportunities in this context. In theory, there is an opportunity for a rich, internalised cognitive process of analysis.

Nearly all the thumbnail sketches which appear in the manuscript (approximately 90 relating to drawn illustrations and a further 50 referring to photographs) were the first draft. The ones reproduced in this paper reveal fast and crude images. Pressures of time meant that few developed over the course of the writing process. Some appeared late in the process, others appeared alongside the first draft of the written material. Also there was no perceived need to meet with the illustrators. The sketches and the associated text were my only contact with the team hence my recent interest in their role in conveying meaning. Throughout the paper both the original sketch and the final illustration as it appears in the published book have been reproduced. Each is used to illustrate phenomena that have emerged from this recent process of reflection.

**Supporting the production of illustrations**

The ability of sketches to support communication is, on the face of it, the most transparent value of drawing and possibly the best understood capacity by experts and public alike. Clearly the briefing sketches here had the function of supporting the communication of concepts which were, to a greater or lesser extent, formed in my mind. The sketches were made to assist the transfer of intent but in reality the sketches I produced varied in their ability to capture the pictures I saw in my mind’s eye. In some cases I was surprised how the final illustrations had captured intention which didn’t seem to be present in the briefing sketch. In other cases the illustrators had interpreted my written and graphic offerings and come up with illustrations which differed from my perceptions with varying degrees of success (as I judged it). Thus the initial reflective process focussed on the two phenomena of communication and interpretation. From these emerged more elusive observations.

The purpose of the briefing sketch shown in Figure 1A was to highlight the need for the illustration to show two physically different school pupils using a workbench. There has been very little translation here and the final illustration captures the difficulties and discomforts caricatured in the sketch. Similarly the illustration of the hand holding the flint tool is a very close likeness to the original sketch (Figs 2A and 2B). Sketch 3A was attempting to convey a busy restaurant environment where a study of human factors would, by definition, involve the designer in the dynamic relationships between work activities rather than a series of discrete and static studies. The dynamic graphic style selected for the illustration seems appropriate to the intent but the clear work surfaces, taken directly from the briefing sketch, unfortunately do not assist the conveying
Top:
Figures 1A and 1B
Ergonomics of school furniture: illustration closely matches original sketch

Middle:
Figures 2A and 2B
Flint tools: illustration closely matches original sketch

Bottom:
Figures 3A and 3B
Error in briefing. The environment should have looked much busier in the original sketch
of a busy restaurant environment.

My sketch for the shopping centre (Fig 4B) looks cold, unwelcoming and oppressive and this is the opposite of what I intended. This illustrator used a similar free style as in Figure 3B producing a warm, busy and welcoming environment (Fig 4A). The single vanishing point has been retained from the original sketch but the interpretation more successfully matches the intention.

Figure 5B displays a greater level of interpretation whilst conforming broadly to the original briefing sketch. The illustration presents the same content as the briefing sketch but it offers an improved dynamic to the design – particularly via the tennis player. I remember I had difficulty thinking of the stance of a tennis player in action and reluctantly opted for a serving pose (note the particularly angry face on the sketch version which was probably a transference of frustration!). The swimmer is another good example of interpretation. I imagined this rather like Leonardo’s Vitruvian Man but I think it works much better as a real sportsman rather than an idealised human figure. The folded body form also more successfully reinforces the text which concerns human physiology, stretching the readers perception of movement and capability.

Figure 6A provided quite a surprise when it
was returned. I had intended an assembly of images as in Figure 5B. My briefing sketch emerged as I drew one image into and over earlier ones and as such I knew it wasn’t right – the earlier ones needed adjusting to suit the needs of the composition. For example, the person closing the lock gate was originally drawn over the face of the shaving man. As it turned out, the illustrator’s vision of quartering the composition was an improvement and offered artistic opportunities for the arrangement of the parts. On reflection, the final version of the man closing the lock gates isn’t conveying the level of physical effort intended and the focus onto the ‘control’ aspects of the JCB isn’t achieved as I had hoped. The other two images convey the hand as interface better than I had expected.

Figure 7A reveals an example of correction rather than interpretation. My original sketch was not very accurate but I believe the intention to portray height differences in a typical classroom was clear. In sketching out the proposal I crudely resized the same figure which did not conform to real physiological differences but was expedient in providing differences in height. The illustrator had corrected this in the final image by selectively decreasing leg length whilst maintaining dimensions of other parts such as the head. My
intention for the illustration shown in Figure 8 was to construct an assemblage of figures of various age groups to illustrate the fact that we all differ in many physiological ways. Partly it was to illustrate a warning that much anthropometric data available to designers and design students comes from particular populations – typically military personnel. The balance and rhythm in the final illustration is much improved over the briefing sketch. The final image is distinctive whereas my sketch is potentially too similar to earlier illustrations (see Figures 5 and 6).

The illustration shown in Figure 8B has been given a sense of personality that the original sketch totally lacked. More importantly, I hadn’t realised the potential of this to bring life and vitality to the illustration. In the final version the crane operator now has his own distinguishing facial features. Even the woman’s hands using the calculator seem to say something about her without detracting from the central message. The blemish-free skin, the manicured nails and the ring are all illustrated in sufficient detail for us to speculate on her imagined being. Pleasingly the images of controlling the crane and controlling the JCB are not repetitious when the original briefing sketch and the text could easily have lead to this interpretation.

Figure 9B was particularly vague. The image is ambiguous and the briefing relied heavily on the text to communicate the context for the illustration. It was intended that the illustration was located at the beginning of a section on the value of symbols to communication but the symbols are less prominent than the context. For example, the use of symbols on the hand controller is not immediately apparent. My briefing could have been more successful here. In Figure 10 the illustrator has taken my rather hesitant dancers and turned them into flamboyant extroverts, much more successfully capturing the theme of the text on socialising in groups. The irony here is that the illustrator has used imagery and details reminiscent of the 1950s to produce a more modern and dynamic image than the vision I had. The juxtaposition with rail commuters is as I had intended but even here the distinction between the two illustrations and the imposition of a clear focus by the use of colour is superior to my intention.
Clearly drawing has played a significant role in the briefing of the illustrators. Some illustrations are very close to the original thumbnail sketches, even if the illustrators used the text to confirm or provide detail to my proposals. My sketches were produced quickly and in all cases here they were the first and only sketches produced. There were very few occasions where the sketches went through a process of development and there are none included in this review. However, the process of writing was long and the potential illustrations had much time to formulate and develop in my mind prior to putting them down as thumbnail sketches. By the time I got to the drawing process many of the images were very clear in my mind but others proved more elusive and I was hoping for insight on the part of the editorial team and the illustrators.

Much has been written on the notion of ambiguity in drawing and this is a subject which has much to offer those interested in the broad area of human creativity as well as the more specific field of art and design education. Jonathan Fish [5] has noted that far from being an obscure capacity, the human ability to cope with ambiguity has been an aspect of the development of our fundamental cognitive mechanism. The ability for humans to make sense of incomplete informa-
tion – either because we don’t have time to take in all the information or because it is partly hidden from us – enabled our distant ancestors to react to situations of danger. Today humans still exploit their ability to place a construction on incomplete information. In the world of design, sketches are used to present ourselves and others with deliberately incomplete models of conjecture as stimuli for other human abilities associated with analytical thinking and the generation of creative responses to ill-defined questions [6]. The ambiguity of the sketches used in this paper would seem to provide open spaces within defined parameters that support, facilitate and even provoke the reinterpretation of information and the generation of conjecture and proposals.

The use of sketches in this particular design situation has clearly involved communication – the transference of intention and ideas from the mind of the originator to the minds of others. The activity has also highlighted the importance of interpretation – the transformation of information by individuals or groups. This is particularly susceptible to the level or quality of information provided and is associated with the notion of ambiguity discussed above. Too little information and the transformation is ineffective or unusable; too much information and the processes of trans-
formation are bogged down by detail resulting in a slow or restrained process. There is clearly an economy of information present in the briefing sketches. In some cases the sketches needed to capture the essence of a thought during the formation of ideas so some took only a few seconds. Other sketches presented the result of longer-term contemplation of ideas and as such took several minutes to put down.

**Research, practice and education**

Pam Schenk has produced a considerable body of analysis of sketching in the graphic design process [7], [8]. Her work describes the functionality of sketching in design phases such as ‘accepting briefing from the client’ and ‘passing on the briefing’. The work described in this paper confirms the values identified by Schenk but there are important differences in the studies. This work highlights the value of sketching by the client at the briefing phase of the design process rather than by the designer seeking to interpret written or verbal instructions. Also, Schenk’s work reveals a valuable use of sketching in a rich, iterative process of idea formulation, evaluation and development taking place between client and designer. This study was a one-off communication rather than an iterative process.
If sketching is to perform useful functions in professions other than those associated with design then the foundations of drawing confidence and competence must be laid in the early school years. Anning [9] has noted this importance and has highlighted practices and attitudes which work against this. Clearly drawing is still undervalued in mainstream education [10] and it is still largely viewed as a means of communication to the exclusion of other capacities. The way forward has been variously plotted. Some have sought to promote drawing as a vital aspect of the development of certain cognitive processing skills [11]. Others view drawing as essential to the development of perceptual skills and sensitivities. Either way, it is ironic that some of the earliest writings on the development of ‘graphicacy’ in the school curriculum should emerge from the field of Geography rather than Art and Design [12]. Clearly the promotion and development of drawing must be a cross-curricular responsibility if it is to be effective.

The work discussed in this paper uses evidence from activities which took place twelve years ago but the age of the original material doesn’t detract from the value of the observations. In many ways the evidence could have been produced in recent years and it is considered representative of modern practice. Clearly the digitisation of the graphic design process has brought change but at the briefing and conceptual design stage freehand sketches are still common. The need to understand and promote sketching remains as important today as it was twelve years ago.

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References
