11 From 'Taking a stand against Mr Starck', *ID* magazine, New York, October 1993.

12 A. Branzi, *Domestic Animals* (London, Academy Editions, 1987).

13 Richard Seymour and Dick Powell formed the consultancy Seymour Powell in 1984. See Thompson (ed.), *Review,* for a discussion of the phenomenon of 'soft-tech'.

14 See K. and M. McCoy *et al.*, *Cranbrook Design: The New Discourse* (New York, Rizzoli, 1990).

15 For a discussion of this idea, see J. Woudhuysen, 'In defence of the Enlightenment', in J. Myerson (ed.), *Design Renaissance,* selected papers from the International Design Congress (Horsham, Open Eye Publishing, 1993).

16 Quoted in Paul Forster, 'They have designs on your rubbish', *The Weekend Telegraph,* 15 April 1995.

17 *The Ethical Consumer,* 12, February/March 1994.

8 ✧ *Craft and the Turing Test for practical thinking*

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This chapter is an examination of the studio crafts in the context of machine and computer technology. Computer technology now provides craft with its most serious philosophical and practical challenges. A hint of this challenge was provided by Oliver Morton, editor-in-chief of *Wired* magazine (Europe), when he lectured at the 'Doors of Perception' conference in Amsterdam (9–11 November 1995). He pointed out that computers, coupled to the very latest multi-armed 'lathes', were now producing objects that had never before been seen on earth. Human choice was involved, but no 'hands-on' making. He also said, however, that the only way to understand how a thing works is to make it. These two observations alone provide us with a wealth of possibilities and contradictions for the crafts. On the one hand our very notion of what it is to *make* something is being transformed; on the other, the importance of hands-on making is not thereby removed by computer technology's ability to 'make' everything. For it is conceivable that different kinds of making provide different kinds of understanding, and so my chapter ends with a discussion of why intelligent people continue to make things in a 'craft' fashion in an intellectual culture that seems indifferent to their presence.

Craft in the context of technology

When, in his book *The Nature and Art of Workmanship* (Cambridge, Cambridge University Press, 1968), the designer, craftsman and writer David Pye set out to answer the question, 'Is anything done by hand?', he

showed us how very confused we can be about the nature of craft. He argued that very few things can properly be said to have been made by hand. The activity we call craft does not, he said, mean 'made by hand'. Most things that are made by craft workers require tools, and some of these tools are elaborate, time-saving machines. In fact Pye could think of very little pure handwork beyond such examples as basket-weaving and coiling pots.

Pye preferred to write about workmanship rather than craft. And when he examined what workmanship meant as a concept and as an activity he concluded that there were two sorts of workmanship. He called these 'the workmanship of risk' and 'the workmanship of certainty'. These definitions have had a considerable influence upon the way many of us who are interested in craft and technology generally view the notion of workmanship.

The workmanship of certainty refers to mass or serial production. You design, you prototype, you test your prototype and you try to iron out all the production problems before you set production into being. You set the lathes, the cutting tools and the assembling teams in such a way that you can predict the outcome and the quality of each and every object that is to flow from your final prototype. Once production begins the manufacturing process is supposed to provide you with certainty. It was this goal that Japanese car-makers had in mind in the 1980s. They set out to attain it and, in the process, achieved almost 100 per cent certainty in production, which meant that, unlike their European rivals, there were few if any defective cars requiring further quality checks and consuming valuable labour. The workmanship of certainty is the product of testing and planning a design, a series of prototypes, and the system of manufacture that is to produce the design. As far as production is concerned, it is a system, not an individual, who produces.

In the workmanship of risk we are in the realm where individuals, rather than a process of manufacture, hold the key to success. The crafted product may or may not be the product of a single person; it may be the product of several skilled persons, but each of them at any moment could ruin the product with a mistake. Here, in a sense, every fresh object is a new beginning rather than a continuation of one beginning. Every new beginning is a risk.

There is another way of looking at the distinction between craft and

non-craft production. We can look at it in terms of the difference between *personal know-how* and *distributed knowledge*.

The concept of personal know-how is plain enough. It is knowledge of a 'how to' kind which you have and can call upon whenever the need arises. You not only know that you know but you feel that you know. To know how to throw a pot is to feel how to throw. Such personal know-how is a characteristic of experts that novices do not have – it comes with experience.

Distributed knowledge is a messier concept and it refers to two linked ideas. First, we live in an age in which the majority of objects exist only because of the coming-together of a variety of disciplines and industries. For example, whilst many people could learn to *assemble* a television set, the idea of any one person *making* a television set is absurd. You would need to be a metallurgist, an expert in plastics, and much else besides. Or, to take another example, there are no handmade cars. There are cars that are hand-assembled with panels beaten by men wielding mallets, but the electronics, the lights and the light bulbs are bought in. The knowledge needed to make any piece of product design is spread over many systems of production and thought.

The second, related idea contained in the concept of distributed knowledge concerns the notion of tools, jigs and, indeed, computer software. For there is a category of tool and artefact that allows us to make things without ourselves possessing the know-how to make them. This category contains a range of tools: some, such as 'instant cameras', are an example where you need know nothing of the skill involved (photography) in order to take some pictures. Other examples are more equivocal. Desktop publishing and graphics software packages can be used in an uninspired way which allows every editor of a parish newsletter to become an instant graphic designer by assembling images from a menu of images and typefaces. However, someone who has an interest in and knowledge of graphic design can take that same menu and make designs from it that have quality. It is rather like the difference between someone who buys instant food from a supermarket and eats it as it comes and another individual who uses instant foods as the foundation for something more palatable. The critical ingredient is the possession of knowledge that can supplement or override that which you have bought as a package.

Long before such sophisticated tools as software packages there were

(and remain) simple but powerful means of distributing knowledge. Moulds are a good example. A mould enables someone to make more than one of something. It might be a clay bowl or a clay figure. Moreover, having made your original model and made a mould of it, you can hire someone else to produce more of your original model using the mould.

The beauty of this system is that the user of moulds need not be very skilled or knowledgeable. Pressing clay into moulds is probably one of the most basic senses in which practical knowledge is distributed from a skilled to an unskilled producer.

However, the mould user may not in fact be unskilled or unknowledgeable. He or she may have different skills. And thus, though unable to model a figure, she or he may be a superb colourist and decorator. In this case one set of skills (the modeller's/sculptor's) is distributed in order to be the foundation for another set of skills (the colourist's).

Most contemporary technology has embedded within it knowledge that is not and cannot be ours to possess, but it does not follow necessarily that technology removes the need for personal know-how. For example, a potter, whether he or she is a professional or an amateur, may rely on an electric wheel and an electric kiln, but the technology is quite useless without the potter's personal know-how of how to throw pots and what different sorts of firing to adopt for different sorts of clays and glazes. The same is true of a great many (although not all) tools. The metal- or woodworking lathe, the electric drill or router, are of no use unless you know how to use them and have some use to which to put them.

Which leads to the conclusion that craftspeople can be defined generally as people engaged in a practical activity where they are seen to be in control of their work. They are in control by virtue of possessing personal know-how that allows them to be masters or mistresses of the available technology, irrespective of whether it is a mould, a hand tool, an electrically driven machine or a computer. It is not craft as 'handcraft' that defines contemporary craftsmanship: it is craft as knowledge that empowers a maker to take charge of technology.

The relationship that has just been outlined between personal know-how and knowledge distributed through technology sounds very benign. Without the potter, the electric wheel is dumb and so we can rest with the assurance that humans remain forever in control. But we know that the

relationship between personal know-how and technology need not be as accommodating to individual human talents as the potter and his or her wheel suggests. We are aware that one of the common effects of distributed knowledge is to do away, as far as possible, with the need for personal know-how. Indeed, this doing-away with individual know-how, and the risks and uncertainties that accompany it, is one of the goals of the users of contemporary technology.

One of the features of late-twentieth-century technology as applied both to the manufacture of objects and to the provision of services is the refinement of the concept of a system in which all risks, especially those produced by human error, are removed.

Consider architecture. Modern buildings are complex objects and they are shaped by complex planning and health and safety laws, as well as by the expectations of developers, bankers and pension-fund managers. There is, among everyone concerned with a new building, a desire, often driven by fear, not to make mistakes because mistakes have financial penalties. Consequently there has been a surge in the development of systems that give predictable, guaranteed outcomes of quality. In particular there has been a pronounced development in the idea of a building as a kit of parts whose individual functions are tested and known, whose cost and performance has been set and whose use can be specified in one country and used in another and everyone concerns knows what to expect. Such a 'kit' approach to building components is paralleled by the designs covering the management of the labour forces erecting the building and fast-track, time and motion study analyses governing the performance of all contractors and subcontractors. Wherever possible, methods of building are employed in which the know-how is embedded in the system rather than in individuals, in order to exchange the workmanship of risk for that of certainty.

Among the ingredients that give technology its organising and mould-making power appear to be the following:

(i) simplicity;
(ii) distribution of knowledge through systems and organisations;
(iii) ubiquity.

Simplicity. When two or more people pool different skills that allow each of them to do together more than any one of them can accomplish on their own, then there is a price to be paid: none of them may any longer

fully comprehend all that is involved in their joint production. Consequently, the concept of simplicity becomes desirable.

Keeping things simple does not mean that the objective is only to make simple things. The objective is to make complicated things with procedures that are as simple as possible.

Systems. Kits or collections of prefabricated components exemplify technology's ability to create systems that rely on distributed knowledge and are not subverted by a local lack of know-how. Systems also aid clear communication: if you have a kit of parts, as you have in the building or the print industry, for example, then designers can specify their design by numbers and have some guarantee that wherever in the world their designs are to be made they will be made accurately. However, this does suggest that designers and architects could be replaced by managers whose job is not to invent but to manage the use of existing systems.

Ubiquity. The commonest feature about technology, with its distributed knowledge, is that everything begins to look the same. If all over the country the same building technology or computer or graphics software is applied to the variety of architectural, graphic or industrial design commissions, then each of these individual jobs and commissions receives the same underlying thought. Consistency and predictability of outcome are almost guaranteed, but the price is uniformity.

Mimicking machines

At this point, taking simplicity, systems and ubiquity as the cue, it would be easy to argue that what gives 'craft' its distinctiveness from technology is that technology has become so predictable that its aesthetic is predictable, even boring. Meanwhile, the familiar argument in favour of supporting craft is its potential to provide variety and an unexpected diversity of form and texture.

To some extent the path of 'looking different' is the one that many practitioners, advocates and curators of craft have chosen to take as the platform for 'why craft matters'. But it is important to recognise that looking different is a choice for the crafts, it is not a necessity. There is no essential reason why the products produced by a process of the workmanship of risk should look different from those produced by the workmanship of certainty.

Contrary to expectations, the appearance of the product of the workmanship of risk and that of certainty is often so similar it is hard to tell them apart. Consider a minor example. Anyone who has ever dented his or her car is pleasantly surprised by how neat and machine-like the finish created by the panel-beater and paint-sprayer can be. Indeed, there are many examples of handcraft or craft producers mimicking machine-produced wares. More recently, machines have begun to produce objects that mimic handcraft and craft ware.

The elusiveness of 'craft' versus 'machine-made' appearance is illustrated by George H. Marcus in his book *Functionalist Design* (Berlin, Prestel Verlag, 1995), in which he discusses the Bauhaus in terms of handcraftsmanship applied to the production of prototypes for industry. He describes two teapots made by Marianne Brandt in 1924 in the Bauhaus metal workshop:

> one, made of silver, clearly reveals its handcrafted nature in the repeated marks of the hammer that cover the surface of its spherical bowl, witness to the arduous process of its creation. The second, in brass, takes the same shape, but its bowl is smooth and reflective, masking all evidence of its hand manufacture under a highly finished surface, implying that it could have been made by machine.

I like this example because here we have the same craftsperson working the same product by hand in two separate idioms – crafted and machined – and it reminds us that the model of perfection that technology delivers is not set by machines but by humans. We set up machine technology to achieve more efficiently that which we can nevertheless and with great effort achieve without machine technology. The standards of 'perfection' that are so often ascribed to the example of machine production were set first by human imagination and craft achievement.

This idea has interesting consequences for the way in which we divide objects into those that have 'humanity' and those that do not. There is a tendency, for example, to see regularity, neatness and 'perfection' as cold, and irregularity as 'warm'. But regularity is as much a human desire as irregularity and some people feel warmly emotional towards the precision of a motor vehicle, an aircraft component or a machine tool as others do towards carved stone or textured pots.

But from the point of view of appearances, and especially from the

point of view of the craftsperson, the central issue is no longer 'Can I create perfection?' but 'Is technology robbing me of my unique claim to diversity?' From the contemporary studio craftsperson's point of view, the most destabilising effect of technology is how effectively technology can *mimic* craft in its randomness, accidental quirks and less than perfect condition. Or, in other words, how many consumers can now tell the difference between handmade and machine-made lace?

The harnessing of computer technology to machine tools and the use of software that includes 'fuzzy logic' makes it possible to loosen up perfection and give an appearance of the differentiation of pattern and surface that we have hitherto associated with crafted work. The ability of machines to mimic craft may not yet be very widespread or deep but it might already be significant. For it may be that whilst the world of computing science has not made as much headway as it wished to in the world of artificial conceptual intelligence, it is perhaps further down the road with regard to artificial practical 'intelligence'.

Consider the famous Turing Test. Alan Turing, one of the people credited with imagining and defining what artificial intelligence would look like, believed that computers would one day operate in a manner virtually indistinguishable from human thought. He proposed what is now known as the Turing Test. A Turing Test calls for a person to interact with a computer for an hour or so, the results of the conversation being printed out. If, from a reading of the transcript, an outsider is unable to determine that one of the participants is a machine, then the machine has passed the test.

Suppose one adapted the Turing Test to cover practical thinking. Suppose one cannot tell among a group of similar objects which one is the product of personal know-how and handcraft and which was produced by machine (or through the system of distributed knowledge): then one of the foundations of the status of craft – that it produces things that machines cannot imitate – becomes wobbly.

I accept that it is a moot point as to whether or not computer-organised production yet possesses this ability to defeat the connoisseur when it comes to differentiating between the products of personal know-how and the products of the computer, but in some fields, especially textiles, the differences are becoming harder to distinguish. I suspect that another area of craftwork that is vulnerable to the ever

improving mimicking capabilities of computer software is calligraphy and lettering.

Such developments do bring into contention many of the accepted beliefs that make up the ideology of studio craft: that the hand of the maker is necessarily special, that craft objects are poetic objects, that craft objects reveal aspects of the personality (some say the 'soul') of the maker. But the Turing Test for Personal Know-How in Crafts would call all this into question. If you cannot tell whether a piece of machined textile is hand-done or machined, then either the much-vaunted poetry of the handcraft aesthetic is a myth, or the same poetic aesthetic claimed for handcraft is also achievable through technology, and consequently what technology distributes is not only knowledge but also 'poetry'. Either way, the special status of craft would collapse.

Woven textiles are the single most natural candidate for computerisation. Ann Sutton, weaver, textile designer and textile artist, has made the following comments:

> Life can now be very different for the handweaver, whether weaving art works, craft products, or designs for industrial production. Dobby looms are now available with an interface to a computer. I have one. I still have ideas in the bath, work them out on the back of an envelope, then sort my brain out on some graph paper. But then it's straight to the computer and with the help of my favourite software I am able to see, more or less, the result of my ideas on screen. I still have to set up the warp and thread it through the loom, but there the chores stop. I press two buttons and my loom is programmed and ready to weave. No pangs if a mistake shows up: a second's tweak and we're off again accurately. It's magic. It's given me twenty years' extra weaving life. (interview with author, 7.11.95)

Middle-aged wisdom

The introduction of Ann Sutton's experience into the discussion raises another question about the relationship between craft and technology. As a person with a craft and with experience of making things by hand she has, like many people who trained in a design profession during the 1950s or 1960s, achieved a situation in which she has two sorts of knowledge. She has the personal know-how of craft experience and she now has the possibilities of computerised, distributed knowledge at her disposal.

Many middle-aged designers in a similar position to hers (they may be weavers, engineers or architects) argue that you get the best out of the computer and its software if you are able to drive the tool rather than being driven by it.

Consider Neal French's chapter in this book, where he discusses CADCAM in the ceramics industry, an industry he worked in as a designer for twenty years. His conclusion is that CADCAM is here to stay in the ceramics industry and that it will become more central to the industry and more refined. His more tentative conclusion, based on his own experience, is that those who use CADCAM as a modelling tool will be better able to exploit its potential and the potential of clay as a material if they have the tacit knowledge of modelling by hand and by eye.

In principle the argument that one needs a variety of personal know-how in order to take control of such powerful tools as computer software packages is cogent. The cogency of the argument rests on this logic: (a) design software is very powerful, and although it does not do the designer's thinking it has, embedded within its own design structure, a style, a way of procedure, and limitations on refinement that will impose themselves upon the designer's work. (b) Therefore, in order to be alert to the biases within the design software the designer needs alternative knowledge of his or her own by which to compare and contrast and form the basis of individual discrimination. (c) Consequently, one may argue that a person who has worked real materials as well the virtual materials of CAD will have an advantage over a person who has knowledge of CAD only. QED – it is the triumph of the middle-aged over the young.

However, it is not a foregone conclusion that a craft background is a necessary condition for being a successful 'modeller', graphic designer, or any other sort of designer using CADCAM. After all, young designers, in graphics, for example, are under no compulsion to be able to draw or paint, let alone do calligraphy or cut letters in stone or wood. Their design education is as likely now to be directly on to the computer software. Their favourite resource is the scanner, which enables them to take any existing image they want, load it into the computer and then 'play' with it.

Yet Neal French has made the point in conversation that the big difference between craft and CADCAM is that in craft the relationship is between a person, a tool and real material. In CADCAM the relationship is only between the person and the tool.

There is more to this issue of the idealism of virtual making than may at first meet the eye. In real making with real materials one comes up against gravity and physics. One also comes up against the unexpected in the materials themselves. Materials have flaws, and in real life these flaws have to be worked on or worked around but on computer the material remains imaginary and flawless. Now it may be that the response from the materials industries in respect of the fact that CADCAM designers will be specifying flawless materials, will be to perfect metals, alloys, composites and plastics in order to make them ideal. In which case there is no necessity for designers to gain practical experience of 'real' materials because what is 'real' and what is 'virtual' will have been made one and the same thing: the materials technologists will meet the standards set by the computer.

This may, however, leave a niche for the craftsperson or designer who is able to design for and work with flawed materials, including the natural ones of wood and stone. In a world of easily achieved perfection flaws may become rather special.

What is the nature of craft?

Craft relies on tacit knowledge. Tacit knowledge is acquired through experience and it is the knowledge that enables you to do things as distinct from talking or writing about them. That in itself is an apparently odd thing to say, because one might assume that if you know something well enough to write explicitly about it then you can do it. But it does not follow. One may write fairly vivid descriptions without being able to enact those descriptions for real. For example, a scientist with no practical ability can describe an experiment, a crime novelist can describe the perfect murder without being in the least able to wield the carving knife in an efficient manner, and a theatre critic can describe how an actor *should* play Cleopatra without herself being able to act.

Tacit knowledge is practical know-how, and it exists in people. Consequently tacit knowledge is learned and absorbed by individuals through practice and from other people; it cannot usually be learned from books. Books (and videos, CD-ROMs and models) are effective sources in helping a student to understand the principles of practice, but the actual business of learning is usually best done by face-to-face teaching or

apprenticeship with people who are already themselves practically knowledgeable. Students or apprentices need to be shown how to make things.

However, different sorts of tacit knowledge have different sorts of relationships with explicit knowledge. For example, whilst it seems unlikely that someone who wanted to learn to throw pots on the wheel could get very much help from a book, someone who wants to learn to draw can find 'how to draw' books informative and instructive.

If knowledgeable people fail to pass on their tacit knowledge then that knowledge will disappear. When practical knowledge disappears it is hard and time-consuming to rediscover it. One of the reasons why tacit knowledge, once lost, is difficult to regain is explained by the fact that when a body of knowledge disappears the institutions (collections of like-minded persons) that helped to sustain it – academies, guilds, workshops, unions – also disappear.

There are circumstances where we might want to encourage the loss of tacit knowledge. In the July 1995 issue of the *American Journal of Science*, and subsequently reported in *The Independent* (London, 1 August 1995), two social scientists, Donald Mackenzie and Graham Spinardi, both at the University of Edinburgh, stated that whilst the theoretical knowledge of atomic weapons is unlikely to be lost, we could lose the skills, the tacit knowledge, needed to make them since the number of people who now know how to build a weapon is dwindling. The two scientists wrote,

> To the extent that nuclear weapons depend on highly specific tacit knowledge, they can be uninvented. Tacit knowledge is, quite literally, embodied in the people who possess it. If these people die without a new generation of nuclear-weapons designers to pass it on to, their knowledge dies with them. It could be recreated only by going through a process of learning akin to the original invention of nuclear weapons. Nuclear weapons could be reinvented after a period of nuclear disarmament, but the task would be much harder than commonly thought. (p. 22)

As has been stated, the nature of tacit knowledge is that it is personal know-how – you must know 'x' in order to do it, as distinct from knowing about 'x' in order to write about it. However, tacit knowledge is also, as has already been suggested, institutional or communal knowledge. Any craft of any complexity is always greater in content and range than any one individual; hence the importance to the health of a craft that many rather

than a few, people practise it. Moreover, these people need to get together from time to time in guilds, demonstrations and conferences, whilst working together consistently through institutions such as art schools or university engineering departments. In technology, knowledge is distributed especially among systems of people and hardware; in craft, knowledge is also distributed but through people alone.

The possession and practice of practical know-how has, like the acquisition of other forms of knowledge, the potential to be open-ended – you keep finding new ways of doing things and new applications for the things that you do. Yet, and this is one of the contradictions about 'the crafts', a number of studio craft practitioners do not build themselves careers based on continuous invention.

Within the studio crafts the pattern tends to be that a person will find a form or a limited series of forms, and work year after year mining the same vein of possibilities, by extending the form or the methods of shaping or decorating the form cautiously and incrementally. The practical lives of many craftspeople really do fall under the heading of 'The diary of a snail'. Why is this?

One answer to the question of specialisation rests in the nature of individual crafts. Setting aside the fact that you can get by on a little knowledge (slabbing, coiling and thumb pots, for example) it is a fact that if a craft is to be pursued in any depth then it can take years to acquire. The British calligrapher Ann Hechle, for example, believes that the disappearance of calligraphy as a major subject in British art-school education was partly the consequence of its taking a long time to learn, and also that it was expensive in terms of intensive teaching.

Moreover, one of the lessons that a novice learns is quite how long it takes to make any single object, be it of art, craft, design or engineering. Dr Tom Bligh, of the Cambridge University Engineering Department, a teacher on the Manufacturing Engineering Tripos, explained why an experience of prototyping in design was important for his students. He said,

> The advantages of prototyping lie in the experience of making or getting something made, and in recognising the gap between theory and practice. ... Making things yourself takes a long time and making anything takes longer than most inexperienced people imagine. (interview with author, 16.5.95)

(However, it was ironic to discover that – despite the formidably impressive work of the Engineering Manufacturing Department at Cambridge – whilst the tutors espoused the need for hands-on knowledge, their students did not have time for it. Most if not all design and 'making' was done using CAD systems.)

Yet if single objects take so long, why not go for variety rather than continuity? Life is short and the imagination is fertile. But the investment of time and the almost inevitable feeling that one might have done better than one actually did apparently have the opposite effect upon makers. Having seen where they went wrong, their desire is to go back and do it again. The studio crafts seem to be populated by people who are searching for their ideal forms.

Interestingly, it is this very search for an ideal form that has driven some craftsmen and craftswomen towards CAD. The attraction is that, provided they are content with virtual rather than actual objects, they can be spared the frustrations and disappointments of real making. And they can make so many more virtual objects than ever they could produce real ones. One such craftsman is the American metalsmith Professor Stanley Lechtzin of the Tyler School of Art, Temple University, USA.

He has given up making things. He creates virtual object after virtual object on his computer. He is experimenting with computer-aided manufacture and rapid prototyping but, meanwhile, the ability to quickly create objects in full rendering and three dimensions on screen allows him to

> keep up with my ideas. I am free to follow ideas now in a way that making by hand did not permit. I can, using CAD, refine and refine until I get each design right. The computer gives me the time to do this because virtual making is quicker than actual making and when computer-aided lathes or tools do the actual making for me I will be back at the computer creating the next object in the series whilst the machines labour away. (interview with author, 21.3.95)

'Why do you make things?'

There is a difference between 'craft' and 'the crafts'. Craft, or the workmanship of risk, or the knowledge of personal know-how, cuts across the design and making of all kinds of objects, from hand-thrown pots, sculpture and painting, to the making of vessels which contain the fuel rods in

nuclear reactors (there is a lot of craft there). But 'the crafts' refers to a wide range of objects made with craft but which are identified as art-craft, design-craft and studio craft. Each category has different ambitions and aspires to a different status from the others. Each has a different relationship to the dominant culture of technology.

So, to take a subject such as weaving, one may find a weaver creating installation artworks using woven fibres as the basic material; another weaver will use a loom connected to a computer to create designs and samples for use by industry; and yet another weaver will be creating shawls or scarves of great complexity or subtlety on a one-off basis.

For the time being – the reach of the computer's power is not yet godlike – each of these people can justify the use of craft procedures for apparently good logical reasons. The installation artist will want to create environments that have a reality whose sensuousness cannot be captured on computer; the craft-designer will argue that working small samples for industry is good because each real sample gives the factory more information than a computer print-out can provide (although that is changing); and the studio-weaver using a handloom can still argue there are techniques and effects that cannot be obtained using the computer-driven power loom.

And similar arguments can be used with greater or lesser degrees of strength for other activities including lettering, furniture production, pottery, glass, jewellery and metalwork. Indeed, ceramicists, glass artists, and jewellery artists will point out they are making things that only the human hand can make, because the technology to replicate handwork does not exist or because it is far too expensive for a small one- or two-person business.

But although such reasoning for the continuance of craft and 'the crafts' is logical, it is also secondary in importance to many craftspeople. The primary reasons for wanting to make things for oneself have little to do with good accounting or the availability of appropriate technology.

If you ask a craftsperson 'Why do you make things?' the majority respond predictably: 'I have always liked making things.' It is a basic liking, a fundamental preference which, like first causes, beggars further justification. This passion goes hand-in-hand with a passion for objects. Sue Halls, a ceramicist and figurative sculptor whose works owe a lot to pottery techniques of slabbing and folding clay as well as the more traditional modelling approach of the sculpture studio, says,

> As a child I loved objects – things. I used to spend hours rummaging through cupboards and turning out the contents of drawers. And I've always loved ceramics. I can remember the plates and cups we used when I was five or six ... and not just the stuff in our house! At the same time I was very attracted to sculpture ... Lord Kitchener was the most mesmerising local example. (letter to author, 29.10.95)

Sue Halls's remarks are endorsed in different ways by other correspondents, all of whom in their different ways are struck by the 'eloquence' of objects. Objects communicate to some people as powerfully as written texts or musical scores or mathematical equations do for others.

The receptiveness to the knowledge and achievement that an object represents and demonstrates is quite often not communicable in words but it is communicable by making some stuff of one's own. Which is why people who like objects appear to like making similar objects of their own. It seems that craftspeople make things out of homage to the objects that already exist – and this is also still true of some artists. They make things partly to articulate to the rest of us their passion for a genre and partly to understand and extend that genre for themselves.

For along with a passion for objects and as a part of wanting to make work of one's own in 'homage' to these objects there is the desire to gain understanding through making. Making is a form of intellectual and imaginative possession. For example, children who have an obsession – be it horses, aircraft, racing cars – like to draw pictures or make models of these things. Making things is a way of anchoring one's obsession in one's imagination. (Making by craft is not the only way of gaining the understanding of and possessing the objects of one's desire, but it is a powerful one.)

This is what Sue Halls says:

> Two things dominated my life from very early on (pre-school), Art and Animals. Not 'Art' in the grandiose sense – I didn't know about the Great Masters, etc., until much later. What I mean by 'Art' is pushing a pencil around – image-making. And the images that predominated were those of animals. Not figures, ANIMALS. It wasn't just that I found them easy to draw. I had a great desire to be near them and own them, obtain them in any way possible, and so drawing was a means of doing that ... My attitude to animals is still as powerful, if not more so. When I see an animal, and it doesn't matter if it's in a picture or a stuffed specimen in a

> museum, or the real thing there in front of me, the response is always the same. I am overwhelmed ... I'm very lucky really as I'm never stuck for ideas. As you have said, 'I have a subject', but it's not as though I chose it ... In many ways my subject is my downfall. Animal artists are never taken very seriously ... And you can't get much lower than making them in clay. At least bronze has some kind of status! (letter to author, 29.10.95)

Sue Halls presents a particularly clear example of an obsession and a desire to understand it through making because animals are an especially tangible subject. But other sorts of makers illustrate a similar pleasure in making and a similar desire to understand through making, but with less tangible subject-matter.

Consider Richard La Trobe-Bateman, furniture and bridge designer and maker. This is what he says about two simple structures:

> Four sticks joined together in a square are not rigid but three sticks joined in a triangle are. Most people know this (although it is surprising how many 'educated' people don't) but they do not stop to wonder; they merely accept it, they probably have other things, more interesting to them, to think about. There is nothing to be said about the physical fact; it just is; it's the result of the geometry; it doesn't mean anything – but it can be exploited, this simple shape phenomenon. That is one sort of 'beauty'. (letter to author, 20.10.95)

Another sort of beauty that matters to him is:

> the material, the stuff itself that the world is made of ... stone is strong in compression but weak in tension, hard but heavy. In contrast, wood is strong in tension, not so strong in compression, locally soft but light. These two characteristics in just two materials account for the appearance of a huge proportion of man's artefacts. (letter to author, 20.10.95)

Much of the making of his work, especially footbridges for crossing streams or small rivers, is just hard physical labour. Yet the labour involved in each piece he constructs, be it a bridge, a chair or a table, contributes to his tacit understanding of the physics of that object. The making of one piece contributes to the foundation of the thinking of another. This also coincides with Professor French's remarks concerning the difference between working with CADCAM and the more traditional design–tools–material relationship. La Trobe-Bateman is working a material as well as a design.

La Trobe-Bateman says he must make purposeful objects.

> My work seeks, as simply as possible, to demonstrate, to exemplify, to clarify, these physical characteristics and devices. The choice of utilitarian objects as a vehicle is then obvious because a required performance and its mode of achievement (support, shelter, span, lift and so on) is the way we see it. An art object would not do, as it does not provide a measure of performance. (letter to author, 20.10.95)

The performance that La Trobe-Bateman is concerned with has also to demonstrate the passion he feels for what an object can communicate about function and physics and material. For example, he writes, 'Forces travel in straight lines. When the object expresses this, or is seen to resolve a curve, it will be that much clearer (and therefore visually satisfying to me).' And, he adds, 'If the device is made of more than one piece of material then how those pieces are joined is important, so I seek to show it.' In any case the demonstration of how things are successfully put together is a part of the point of making things – it is a part of the craftsperson's exploration and pleasure in making things.

Making – craft, skill, and the realisation of the object through craft labour – is not a trivial issue for craftspeople. Making is both the means through which the craftsperson explores their obsession or idea and an end in itself.

Sue Halls wrote,

> The physical act of making things is very traumatic ... There's nothing frenzied about it ... I carry my work around with me all the time and wherever I go I'm constantly translating form, pattern and colour into subjects for my work. (letter to author, 29.10.95)

Or consider the following points raised by Dorothy Hogg, metalsmith and jeweller, in her letter to me of 3 October 1995.

> When I left the Royal College of Art I took a design job for industry. Working through design ideas mainly on paper does not satisfy me entirely, although I found it easy. I discovered that I need to make, because I need the challenge of working three-dimensionally. I do not find it easy to visualise objects in three dimensions.
>
> The step following the exploration of an idea on paper is one of attempting to come near to it in mock-up form and then to move it into a finished statement with the correct edges, surface finish, proportions made as well as I can and with a dynamic relationship to the body.
>
> When making something in metal it is NEVER easy, always a challenge. When you are soldering something difficult you have to tread the tightrope between overheating and therefore melting and correct soldering and a good join. You use all your skills, concentration, intuition and intelligence ... That feeling of being totally stretched must form a major part of the satisfaction.

However, people can grow out of their desire to make things. Michael Harvey is a letterer and a type-designer. As a carver of letters his most public work is probably the lettering he carved for the Sainsbury Wing of the National Gallery, London.

Relating how he was described as an 'artistic child', Michael Harvey explains that he missed a lot of schooling because of air raids and he left school having taken no exams (letter to author, 3.10.95). He spent six years doing engineering drawing but he did not like the fact that his drawings were only a part of the manufacturing process and not the final product.

In his early twenties he came across Eric Gill's *Autobiography*, which he thought contained the answer to his future: 'I would become the new Eric Gill, so I set about learning to carve letters in wood and stone.' He got himself a job with Reynolds Stone, letterer and wood-engraver, and in 1955 he exchanged his engineering drawing-office for Stone's workshop.

Eventually he became bored with executing Stone's designs and found he had a talent for creating book-jackets, which allowed him to develop all kinds of freely-drawn lettering. Harvey left Stone's workshop when he was able to live from designing book-jackets, although he also did some carving of inscriptions and part-time teaching. In 1966 he designed his first typeface. Today he has almost stopped teaching, he no longer does book-jackets, and designing typefaces on the computer is his main activity.

'Craft is now a dirty word to me', he says. And he adds that he has come to dislike 'one-offs' and the world of the connoisseur. He has misgivings about craft because of its connotations of preciousness and its aspiration to be seen as art; he much prefers the straightforward anonymity of artisans.

However, he does entertain seriously the notion that the variety of

craft experience has shaped his understanding of lettering and that his tacit knowledge so acquired is an important foundation for his current work with the computer. He says that carving, painting and drawing letters gave him an understanding of letterforms and how letters go together without which he could not design typefaces. The question that remains, of course, is whether 'understanding through craft making' is a necessary part of a designer's education or not. It is a subject worthy of research because it may have consequences for future design training or, conceivably, the design of the software that designers will use in the future.

Most craftspeople do not stop making, however. And I think it fair to give the last word to Mick Casson, the well-known British studio potter who has made pots for fifty years. The letter is dated 14 October 1995.

> When you 'phoned I said I had just unpacked a kiln – actually I had been all day unpacking it – a salt kiln – an emotionally draining job. I sorted them (the pots) into good (a few), not so good and awful (smashed). I attempted to evaluate them, get some vibes from some, sort out the trials (there are always many of these, most fail but they are the future).
>
> So, you asked me what am I doing? Well, I'm earning a living from what I make and I've always liked that fact and this time again I quickly added up the kiln load, roughly. It was all right and I was pleased. But the other, the real preoccupation always takes over – quality. Why are some pots better than others? I'm making pots that I hope people will use even if the word 'use' has to be interpreted differently by different people. I mean them to be functional.
>
> What am I doing? I'm taking 'raw' materials – clays, rocks, minerals – and I'm putting them together to make clay bodies, colours, slips and washes. I try to keep these technical aspects with me when I think about the forming method – throwing – and the firing process – high fired salt glaze and often wood fired.
>
> Michael Cardew said it years ago. 'The materials and processes the potter uses are not a category separate and distinct from the expression the artist makes with them.' I read that in 1950. I was 25 and I did not understand it. Now with my own slight variations it is my creed.
>
> What else is there to say? What else would I wish to underline as being of importance to me? Yes, it must be something about the use of the senses. The physical sense of throwing, for me a wonderful amalgam of power and delicacy. The sense of touch on a pot, smooth or craggy; the

> sense of sight – colour and visual texture (these are why salt is so good) and the sense of sound a pot makes when struck which tells much about form and materials and firing. Last but not least a sense of weight – apparently there is an African word that means 'good to pick up and feel right in the hand' – a good pot to lift. This speaks of form?
>
> Any last thoughts? Yes, what do I want to do? I want to make pots that have that compelling significance that many 'old' pots have that were so much a part of life – I'll never do it of course but that's what I aspire to!

So strong is the urge to make things in the fashion that Mick Casson has described that it seems likely that making will endure in the teeth of its apparent cultural or technological irrelevance. For some people the method of exploring ideas through making is the best route to understanding those ideas or responding to a class of objects that already exist. For others there is the control provided by directing their life through their work and making a living from it. These two reasons often overlap. Regardless of the status of craft or 'the crafts' and regardless also of the apparent irrelevance of some crafts to mainstream culture, craft making is unlikely to disappear. It gives some individuals so much intellectual, imaginative and sensory pleasure to make things and acquire the complexities of know-how for themselves that craft making will continue even when the Turing Test for practical thinking has been satisfied in every conceivable craft discipline.