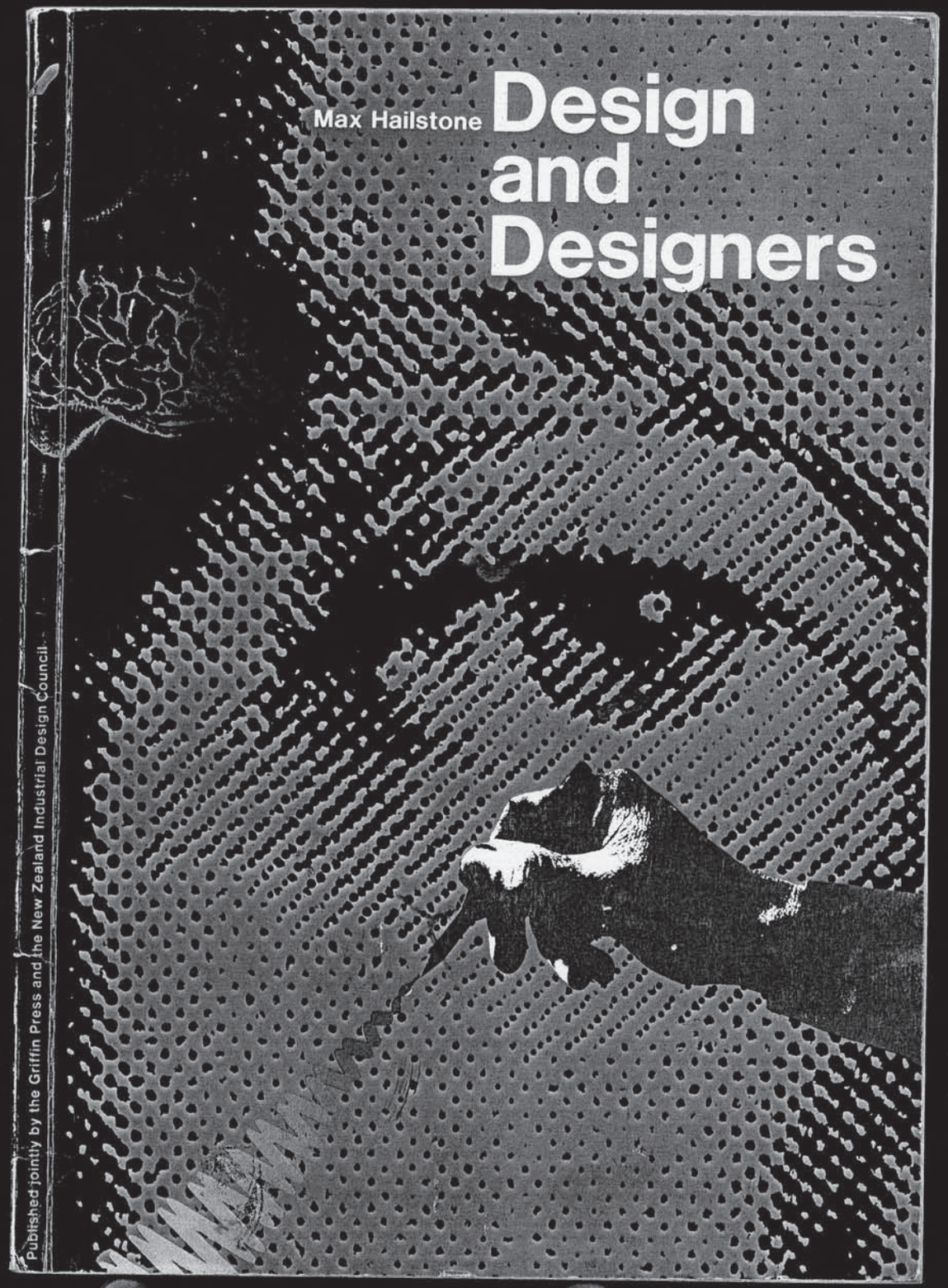


What is Design?

What is design?

This is a question that in many respects is more easily answered today, than it would have been several thousand years ago. One thing is certain however; it can only be answered by mankind, as the activity or process of design is a product of human intellect — unless, of course you include God as a designer/manufacturer!

However, before attempting to answer the question, "What *is* design?" it is important to examine what design *is not*. Two words that are often confused with the process of design are "evolution" and "invention". While invention is an activity that is very closely related to the design process, evolution is merely a term that has been applied to the *ideas* and/or the *products* of designers rather than to the process of design itself.

Evolution

Evolution usually means the physiological change or series of changes that have taken place within a living organism over a period of time, usually in response to a changed environment. Because the development of products (which are inanimate) and ideas seem to be a similar phenomenon, the word evolution has been applied. Likewise the term "design" has been inappropriately applied to the colour, form, etc, of natural phenomena. It is quite common to hear one refer to a seashell, flower, bird, insect, honeycomb, etc, in terms of it "being beautifully designed". This is foolish as it suggests that some agency other than the organism actually perceived the (environmental) problem and conceived the solution, i.e. the organism and its many parts.

But organisms evolve only in response to the changed conditions of the environment. Those that do not evolve quickly enough to counter the changes disappear; those that do, survive.

When one reads that the "motor-car evolved from the horse and cart" one should remember that if two horses and carts were left in a field together, the only evolution (if any) that would take place would be within the horse. The carts would have deteriorated somewhat in 10,000 years. No amount of evolution would have produced a motor-car.

Certainly, the designer will observe natural phenomena and may, through a biomorphic process, adapt and incorporate certain natural principles into his design. A good example is the angle-poise lamp which is based upon the bones, joints and muscles of the human arm. The human arm did *not* evolve into a lamp! If, however, we were to examine the preliminary drawings we may observe that the thought process parallels the idea of evolution, *i.e.* one drawing or idea is slightly different or more refined or resolved than the previous one(s). This process of refinement, modification, or styling can be observed within the products themselves, again a parallel to the process of evolution.

Invention

Invention is a little more confusing and a little more difficult to identify. Certainly invention is a human process. It is caused and produced by man. The word

"caused" is used purposefully because inventions are discoveries. They are all in existence and only need to be discovered and activated to be given *cause* to exist.

Invention is the discovery of a principle or class of systems, a generalisation. The *facts* which inventors discover are facts about the nature of the world just as much as the fact that gold amalgamates with mercury. Every useful invention is a discovery about the way that things and energy can behave. The inventor does not make them behave as they do.

The following is a description of an invention or discovery. It does not tell you what to use it for but just how the principle works.
If you have a wheel, and if at any place except the centre you fix a pin to it standing at right angles to the plane of the wheel, then (provided always that the system is properly designed) the wheel can be turned by the piston rod of a reciprocating engine. It must be linked to the piston rod by a connecting rod which is larger than the distance from the centre of the wheel to the crankpin. One end of the connecting rod must be hinged to the piston rod so that it is free to swing, and the other end must be pivoted on the pin so that the pin can rotate freely in it.
It gives no indication of size, materials or actual shape or colour. It is only a description of a set of facts that have always existed, just waiting to be discovered.

Another distinction that needs to be made is the one between *fine art* and *design*. While closely related, one main difference distinguishes fine art (painting, sculpture, etc) from design, and that is that the designer has limits set upon his/her freedom of choice. A painter can choose any colour or shape, a designer cannot. If a designer is designing a hammer it must have a handle and a weighted head. These limits are imposed by what is commonly known as the "function".

Function
The word *function* has also been the cause for a certain amount of confusion when dealing with design. It has been embraced by designers in recent times (and rightly so) to such an extent that cliches or tenets have been constructed around it, for example "form follows function".

Because there is an element of tangibility or rationale in the idea of function, it seemed to provide a concrete *"raison d'etre"* for design and designers.

The danger, quite often, is in attributing function to an object as though it were something inherent. But function is an activity on its own. All that the designer can do *is create a device for performing that function.* The object itself has no function, it is entirely passive and inanimate — (only a "paper weight" has such an inherent "function"!!). Let us take a simplistic example: a small bar of steel, 20mm x 5mm diameter. What is *its* function? It does nothing; it cannot do anything on its own. Certainly we can apply it in several ways, as a plant support, a hole maker, a stirrer, a drumstick, etc, etc. . . . Probably for every function we have suggested, something else could have been used, in many cases to better effect. Because we give it many functions, does it mean that *it has* many functions? No. All that has been established is that in some instances it can help solve a particular problem identified by man. It has become a tool. Function, then, may be considered as *being something that somebody has provisionally decided that a device may reasonably be expected to do at present.*

So much for what design is not. Therefore, what is design?

As established earlier, everything that is man-made has been designed and we are surrounded by numerous examples of the results of the design process. In other words, a product of the design process is anything that has had intellectual thought applied to its making.

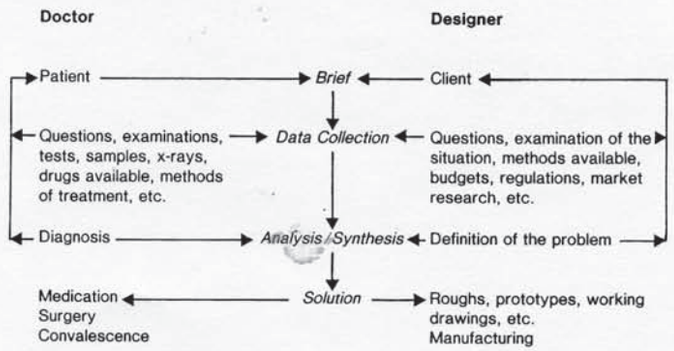
All pieces of design originate from raw materials which are eventually transformed into the finished product. This is made possible by passing the raw material through various processes. There are four main processes involved; the process of extraction; mining, drilling, logging, etc: the process of converting the raw material from one state to another, usually from a raw to a refined state; smelting, rolling, refining, pulping, etc: the process of decision-making concerning how it will be used; *designing* etc: and finally the manufacturing process which involves converting the material from its refined basic state to the finished product; printing, building, injection moulding, etc.

[Whilst "design" is placed in the process of "decision making, etc", it should be obvious that the design process is involved in making all other processes possible, i.e. the design of the extraction, conversion and manufacturing systems and machinery.]

The word *process* is used advisedly here. Design is a process; what is more, it is a process that has set procedures which, minor variations aside, are common to *all* designers. This is quite different from the *modus operandii* of painters, sculptors, etc, who develop their own individual work methods, and may even change them from time to time. Having a set procedure and similar components of work are two further elements that distinguish design from fine art activities.

The design process itself is very simple. If the role of the doctor in general practice is compared to that of the designer then it may become easier to understand. Normally a doctor cannot practice medicine without a patient. He cannot prescribe any treatment before he has ascertained the nature of the illness, by identifying the symptoms. This is achieved by questioning and examining the patient. The doctor then analyses the findings of his/her questions, examination and tests, and makes a diagnosis of the patient's condition. Acting on this diagnosis he/she then prescribes treatment or medication to cure the problem.

The designer is in much the same position. Normally he/she cannot practise design without a client. Like the doctor, the designer has to ascertain exactly what the problem is that the client wants solved. By questioning the client and examining the situation he/she will accumulate a considerable amount of information and will be able to analyse and establish *exactly* what the problem is that the client has. It is possible that the client, like the patient, may have identified the wrong problem: for example *all* stomach-aches do not require the removal of the appendix to provide the cure!! Being satisfied that the problem has been correctly identified, work can now commence on producing the solution.



It is clear from the above diagram that the critical stage for *all* concerned is the "data collection" stage. If insufficient or false data is collected then the "diagnosis" or definition of the problem will be wrong or inadequate. The proposed "solution" will not provide a "cure". The designer should be prepared to retrace his/her steps from the "analysis/synthesis" stage, back athrough the "data collection" stage to the "brief" stage until he/she is confident that all possible avenues of inquiry have been exhausted, and that he/she is fully armed with all *available* information. This may take place several times before one establishes the true problem (complaint). As stated previously, this process is quite simple. It really is no more than commonsense. Any activity that we undertake has gone through a design process of sorts; i.e. we identify the problem, collect the relevant data, order and evaluate the data and finally produce a proposed course of action.

Whilst the design process has purposefully been reduced to four main stages it should be understood that there are many more smaller ones that fit in between these major ones. In the case of large scale projects, each of these can involve many people, a lot of time, and a considerable amount of information. One apparently excessive example gives a good indication of the lengths and depths to which one could (should?) go. The project, "To design a hospital bed", was undertaken between 1963-7 at the Royal College of Art, London, under the direction of Dr L. Bruce Archer.

Firstly, 41 critical factors and 85 problem areas involved in the use of a hospital bed were established requiring a worldwide search of literature covering 100,000 documents. Having built the prototypes, the project team then organised and carried out trials in hospitals, with attendant pathologists, anaesthetists, radiologists, physiotherapists and work study staff. The prototype was then studied in practice by a team of nursing tutors and staff nurses and their comments recorded. Twenty beds were then installed in a hospital and each bed was monitored from 6 a.m.-10 p.m. All activities concerning the beds were recorded. This trial was designed to yield information on 60,000 activities, 4500 samplings and about 270 attitude surveys: in all about *1,700,000 pieces of information!*

Ultimately, it is for the individual designer to decide how exhaustive the enquiries should be, and whether clear rationale should take precedence over personal intuition. Personally, I much prefer the thought of flying in an aircraft knowing that throughout its design and manufacture, intuition has been replaced by rationale and exhaustive research.

The question "What is design?" may therefore be answered as follows:
Design is a process. It is a process whereby a designer, equipped with a technical knowledge of all processes and materials available at the time, and a true understanding of the problems to be solved, and of the constraints that may be imposed upon the solution, together with a sensitive and humanitarian respect for the same, combines these different elements into a cohesive practical whole.

Max Hailstone, 'What is Design?', *Design and Designers*, The Griffin Press and NZ Industrial Design Council, 1985