it's important to have one or two dissimilar lines of thought to follow. Not too many, but just so that you can rest one groove in the mind and work in another.' Thus the practising designer and the design student alike need several things to work on in order not to waste time while one 'incubates'.

We have already documented the apparently magical moment of 'illumination' earlier in this chapter and little more needs to be said. Quite how and why the human mind works in this way is not certain. Some argue that during the incubation period the mind continues to reorganise and re-examine all the data which was absorbed during the intensive earlier periods. In a later chapter we shall examine some of the many techniques recommended for improving creativity. Most rely upon changing the direction of thinking, since it is generally recognised that we find it easier to go on in the same direction rather than start a new line of thought. The incubation period may also bring a line of thought to a stop, and when we return to the problem we find ourselves freer to go off in a new direction than we were before.

Finally we come to the period of 'verification' in which the idea is tested, elaborated and developed. Again, we must remind ourselves that in design, these phases are not as separate as this analysis suggests. Frequently the verification period will reveal the inadequacy of an idea, but the essence of it might still be valid. Perhaps this will lead to a reformulation of the problem and a new period of investigation, and so on.

Speed of working

We can see from the previous section that the creative phases of the design process are likely to involve alternating periods of intense activity and more relaxed periods when little conscious mental effort is expended. This is characteristic of the descriptions we have from many good designers about their working methods. An excellent example of this comes again from Alexander Moulton:

> Thinking is a hard cerebral process. It mustn't be imagined that any of these problems are solved without a great deal of thought. You must drain yourself. The thing must be observed in the mind and turned over and over again in a three-dimensional sort of way. And when you have gone through this process you can let the computer in the mind, or whatever it is, chunter around while you pick up another problem.

Moulton also talks of a 'fury of speed so that the pressure of creativity is maintained and doubt held at bay'. Philippe Starck talks of

working intensively in order to 'capture the violence of the idea'. Starck famously claims to have designed a chair on an aircraft flight during the period of take-off while the seatbelt signs were on! In describing this intensive period of investigation a number of architects have likened it to juggling. Michael Wilford uses this analogy of a

> juggler who's got six balls in the air . . . and an architect is similarly operating on at least six fronts simultaneously and if you take your eye off one of them and drop it, you're in trouble'.
>
> (Lawson 1994a)

Richard MacCormac (Lawson 1994) echoes this idea and also points out that 'one couldn't juggle very slowly over a long period'. This explains the particular feature of being creative in design. It is rarely a simple problem with only one or two features, but more normally a whole host of criteria must be satisfied and a multitude of constraints respected. The only way to keep them all in mind at once, as it were, is to oscillate very quickly between them like a juggler. This of course may well not bring the solution immediately, as we have seen, that may come after a more relaxed incubation period.

The creative personality?

Already in this chapter we have studied the words of a number of famously creative people who are scientists, mathematicians, composers, poets or, of course, designers. This raises the question as to whether or not some people are naturally more creative than others. Is creativity correlated with intelligence or are there some relationships between creativity and personality? Psychologists have studied highly creative people in the search for answers to these questions.

One study of exceptionally creative scientists (Roe 1952) found that they were characteristically very intelligent, but also persistent and highly motivated, self-sufficient, confident and assertive. Designers have been a popular subject group for such studies. Mackinnon has conducted a whole series of studies of the creative personality and he explains his choice of architects:

> It is in architects, of all our samples, that we can expect to find what is most generally characteristic of creative persons . . . in architecture, creative products are both an expression of the architect, and thus a very personal product, and at the same time an impersonal meeting of the demands of an external problem.
>
> (Mackinnon 1962)