4 THE ART OF THE INVENTOR

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TRAINING ONESELF TO BE ABLE TO INVENT

If we return to the analogy of chapter 1, of a sportsman who aspires to be an Olympic champion, it is clearly necessary to train one’s natural inventiveness very rigorously and continually for years, if one wants to achieve the ability to produce really creative solutions to the problems one sets oneself. In this section I shall try to formulate some of the training rules for a would-be inventor.

First he* has to develop in himself the inventor’s eye. This means he learns to look at every operation or construction around him and think ‘why is it done that way or built that way’ and whether there is a better way of doing it. This applies to buildings, bridges, tools, kitchen utensils, factory machinery, fireplaces, chimneys, aeroplanes, ships’ propellers and to one’s own body considered as a mechanism (chemical, mechanical, structural) doing all kinds of jobs with all kinds of tools, and to waterfalls, waves and winds as usable sources of energy. He also thinks about and experiments with every manual job he does, such as washing up, digging in a garden or sawing wood, to see if he can do it better, for example so as to be less tired, so as to use less of his own energy or less water or electricity, so as to balance the use of the muscles on both sides of the body and to do it quicker. This work is for the inventor the exact equivalent of the work in the laboratory for the physicist or chemist.

This development of the inventor’s eye not only teaches one to think things back to first principles and to think what are the objectives of the designer, but it also stocks one’s brain with all kinds of useful pieces of practical information. When I was working on robots I used to study every job I did with my hands and think whether a computer-brained robot could do it. I gained such an admiration for the trained human hand–eye coordination and adaptability to unexpected circumstances that (for this and other reasons clear from chapter 3) I have now decided to concentrate on telechirics (see chapter 10) where man’s skill is available all the time.

*I am using the term ‘he’ to denote Mr or Ms as women are every bit as inventive as men and often more likely to invent the common-sense everyday things that humanity needs.
The second quality he has to develop in himself is self-confidence to the level of brashness, to the point where he is convinced that he can succeed where everyone else has failed and where all his friends will laugh at him for tackling such an impossible task. Children have this self-confidence and a would-be inventor has to retain it all through his education or, if it has been crushed, he has to restore it. This can best be done by practising inventing small things to improve one’s daily activities – gadgets for one’s desk, one’s kitchen, one’s hobbies or for making it easier to use one’s tools in one’s home, whether it is a flat or a house. By constructing them, one also learns that the path from the first idea to the final successful realisation always involves considerable modification of the first prototype. The examples given in chapter 8 can also be used to develop self-confidence in one’s ability to invent.

The third quality that a successful inventor must cultivate in himself is a persistence sufficient to take him past the failures which are an essential part of the successful development of a novel idea. There will always be times when one has failed to foresee some serious difficulty which is revealed by experiment, and the inventor has to see clearly but without giving way to despair whether this difficulty is a basic fault which makes the whole idea impractical, or whether it can be successfully overcome by redesign or a subsidiary invention. There is usually a time and money limit pressing hard to end the experiments and the inventor is the only person who can really see the right decision. He must be very honest with himself: on the one hand not pig-headedly refusing to accept the inevitable; on the other hand not allowing his faith in his idea to be destroyed by his own depression, when the idea is really sound. Being forewarned that such bad moments are inevitable is the best way of being able to cope with them when they come. One can also acquire this persistence by strengthening one’s feeling that the thing one is trying to invent is humanly, socially and morally right – by making use of what William James called the ‘moral equivalent of war’ to give oneself the kind of determination one has in wartime. This is why it is so necessary to choose a problem, such as those discussed in chapter 3, which one is absolutely certain is humanly desirable.

Next the inventor has to learn how to handle his own creative faculty – he has to learn to know himself. First he has to learn how and when he is most creative. All creative people can find periods when they are in a supernormal state, where the brain is most fertile with new ideas and the normal inhibitions, tiredness, laziness etc. are swept away in a flood of energy released by enthusiasm. This occurs at different times of day for different people. Some wake up in the middle of the night and have ideas, others are at their best early in the morning or even around midnight. There is a connection with physical factors, such as a relaxed (but not twisted or slouched) posture and good support in the small of the back, with not having too full a stomach, not being too tired, with plenty of walking exercise in the open air. Walking may even be the best way to achieve the creative state. All these help, but of course do not automatically produce the desired state.

The recent experiments reported in the *Scientific American*, in which it was