HAS THE INTELLECT A FUNCTION?

By WILFRED TROTTER
From *The Collected Papers of Wilfred Trotter*

WILFRED TROTTER*, who died in 1939, was one of the most distinguished surgeons of his day in London. He was also a clear and penetrating writer, whose collected essays are much enjoyed by discriminating people today. His best known book is* ***Instincts of the Herd in Peace and War****. As a writer he follows a long tradition in his profession, for many doctors are very able writers. He is also an outstanding example of a current phase in English prose; many of the best and the most exciting English essays today are written by scientists. He was a great character, adored by his students for his ability as a surgeon, for his odd sayings, and most of all because he had one of the finest minds of his generation. In this essay he defends the use of the intellect; and in these times all citizens in democracy must defend the use of brains in all questions affecting human society, or freedom will disappear.*

THE things that come into the mind have a disarming air of obviousness and certainty. But it must have been known at a very early period that they are not to be taken for what they seem without some corrective test of their validity, and some other authentication than their own charm.

In the age-long struggle with the problem no solution has been found that has been able to make human reason a universally applicable and generally trustworthy implement. Nevertheless something has come out of the struggle. This has been the evolution of three methods of setting about the pursuit of knowledge. They are not sharply marked off from one another and tend a good deal to overlap the limits one may be tempted to define for them. They do, however, clearly differ in the aspect of their task on which each lays its chief emphasis. Of these three methods the first is that of the practical art, which is mainly directed to the preservation of knowledge; the second is that of the natural sciences, which is directed to the increase of verifiable knowledge; and the third is that of philosophy, which seeks the unification of knowledge. The objects then of these three attitudes towards experience—the rewards of man's struggle for intellectual discipline—are respectively to preserve, to verify, and to unite. What their success has been we may now inquire.

THE METHOD OF THE PRACTICAL ART

The method of the practical art is that of the carpenter, the farmer, the builder, the doctor; it has of course, as such, nothing to do with the plastic arts and the aesthetic, but it may well excite our reverence as perhaps embodying the fundamental intellectual discovery on which all civilizations have been built up. Its primary interests have always been the preservation and transmission of knowledge rather than its discovery. These characters have made it the nurse of civilization at a time when a new discovery could survive only by being fixed in the tradition of an art. A practical art comes then in its very nature to be strongly conservative, reluctant to accept the new, still more reluctant to give up the old; it will teach by precept and example of the master, by apprenticeship; it will embody its lore in traditional dogma and in rule of thumb. It's ideal of success will thus be fulfilled as much by a given course of conduct having been correctly carried out as by its object having been attained. If he knows that he has proceeded secundum *artem* (here it means 'according to the traditions of his art'. The irony is obvious. Editor) the practitioner will not be greatly distressed by a mere lack of success; and will readily blame the weather for failure of his crop, the materials for the collapse of his building, and his patients' constitutions for their diseases.

The extended reasoning process has little function in the practical arts. If allowed to enter them it finds itself in an environment possessing no indigenous methods of controlling it and is apt to develop a harmful exuberance. Nothing could illustrate this principle better than the speculative systems that devastated the medicine of the eighteenth and early nineteenth centuries in the way I have already referred to. To maintain its health a practical art must be sparing of theory and keep closely in contact with facts. It has no method of discovery other than that of almost purely random trial and error; it has no characteristic method of proof and can assimilate truth only when the prestige of its discoverer is great. For example, Steinhauser might discover in 1840, and Hughes Bennett proclaim, that cod-liver oil cures rickets, but this enormously important fact remained unproved and no more than a not very respectable pious opinion for the next eighty years.

THE METHOD OF NATURAL SCIENCES

The second of what I have called the three methods of setting about the pursuit of knowledge is that of the natural sciences. We need not attempt a complete definition of natural science, and if we were to try we should find that its margins tend to grow indistinct as we concentrate on them. A perfectly adequate practical definition is the statement that its central function is to acquire verifiable knowledge. A verifiable fact is one that has shown itself to have a relation to certain definable conditions such that wherever and whenever the conditions have been reproduced the fact in question has always accompanied them. Such verification is the

characteristic and only sanction of science. Whether we like a given fact or not, and whether it seems true or revolts our reason, are quite irrelevant to its scientific validity.

All knowledge comes from noticing resemblances and recurrences in the events that happen around us. Although some of us may be much quicker than others in the power of seeing and comparing, it is obvious that the greatest talent cannot carry us very far as long as observation and experiment are applied only to random experience. It is the discovery of the natural science that experience can be simplified so that on the one hand resemblances and recurrences in events can be more easily seen, and on the other that the conditions in which they occur can be completely specified. This, using the term in the broadest sense, is the experimental method. In one aspect it may be regarded as a mere refinement of the rough and ready trial and error of the craftsman and the common man. In another aspect, however, the change is so great as to be virtually a qualitative one and to make the method distinct from all others. It is not necessary to dilate here on the power it has displayed in advancing knowledge or the huge acceleration it has imparted to that process. It is more relevant to note the limits to which its application is subject. The scientific method is unfitted to tackle directly the turbulent stream of everyday experience and common affairs; it must run off minute fractions of it into carefully specified and engineered channels before it can bring its powers to bear. Thus, for example, the work of social government is not as such directly accessible to it on account of the jumbled miscellaneity of the matters involved.

In saying this I must guard myself against being thought to pronounce on a wholly different question which might be supposed to be similar. It is, of course, obvious that governments now existing fail to make use of much knowledge already established by science and capable of immediate application. Even, however, if this deplorable lag could be abolished, the direct application of scientific method to government itself as a whole, would, with our present powers, be impossible.

After what has been to some extent a digression we pick up the line of our argument again when we ask ourselves what part in the scientific method is taken by what I have called the extended reasoning process. The history of science is generally supposed to furnish a wonderful display of the triumphs of human reason. I must confess the reading of it does not induce in me any such grandiose conception of the mind. The separate steps of progress have rarely been much prepared for by long flights of rational forecast. Great investigators seem mostly to have been led from fact to fact; to have depended on a kind of intuitive flair for the behavior of their material; and to have used reasoning rather for the planning of their work and the design of experiments than for elaborate structures of argument.

Although rational and imaginative speculation is of the greatest general value to science in keeping it from going dry and orthodox, as an actual implement of research it has not very much to its credit. Experience has shown time and again that as soon as science leaves immediate contact with the facts it begins to lose direction and reality; and must constantly return to them for orientation. Great discoveries will therefore continue to be unexpected and the advance of science occurs on an irregular front in which the salients mark the places where amongst the facts the going is good. Even research deliberately directed against short-range targets is apt to be held up contrary to all reasonable expectation or to score its successes through unintentional deflections. In the light of these considerations we may contemplate with benefit the bitter war of attrition that has marked the enormous and world-wide attack on cancer; or remember Rayleigh setting out to determine the atomic weight of nitrogen and coming up against argon, or Holst and Frohlich setting out to study beri-beri and finding the cause of scurvy. We thus seem to get the plain hint of a rather odd conclusion. It is that natural science—by far the most successful of man's inventions for setting about the pursuit of knowledge—has not been able to make any extended use of the directive faculty of reason. If we were to allow the sceptical spirit full liberty for a moment, we might find ourselves wondering whether the mass of scientific knowledge has not in some queer way invented itself—a suggestion that makes it seemly to change the subject.

THE METHOD OF PHILOSOPHY

The third method of setting about the pursuit of knowledge is that of philosophy. We may content ourselves here by defining philosophy no more closely than to say it has for its central object the search for unification or less summarily the effort to bring all knowledge whatever into a single consistent scheme. We have perhaps been a little disconcerted at finding ourselves able at least to defend the view that the rational activities of the mind have played no overwhelming part in the practical arts or the natural sciences. We shall not have that fault—if it is a fault—to find with philosophy.

As far as history is able to tell us, the deliberate use of rational thought as an implement of research was invented by the Greeks of classical times some 2,500 years or more ago. It is difficult to think of now as a definite discovery and to call it such sounds like calling locomotion or digestion a discovery. Nevertheless it was a true discovery and produced a real deflection in the strange roads of human destiny. We can call a discovery great when it catches man unprepared, and we find in the history of many such the evidence of man's unpreparedness in the way he has tended to mix the use and misuse of these gifts. Rational thought in the pursuit of knowledge bears these marks of mixed use and misuse as plainly as do printing, gunpowder, and the internal-combustion engine.

This new implement was to impel intellectual activity into a course it was to follow for two and a half millennia. We may therefore well ask ourselves, what precisely was the device that could exercise so strong an influence? It was abstract thought. At that name of power we find ourselves at last compelled to devise an exact definition.

The discovery that was made by the Greek, and that we may fairly say intoxicated him, was that you can consider the qualities of things apart from the things themselves. You survey, let us suppose, a miscellaneous collection of objects, untidy and with no coherent meaning. Suddenly you notice that they possess in common some such quality as hardness or color or weight, and that you can think of this as existing apart from the disorderly mess you are looking at. A new thing has appeared—an abstraction—having an existence of its own and superior to the accidents of the apparent world. You find that these abstractions are easy to think about. They are clear, shapely, and can be depended on to stay where you put them. You can consider their relations to one another at your ease without being bothered by odd and 'insignificant' individualities. No wonder its discoverers were enchanted by this method of introducing order and seemliness into the chaos of experience and that they exploited it to excess.

A good deal of mystery has been made of the fact that the Greeks, with all their curiosity and liveliness of mind, turned away so obstinately from the immediate study of nature. Even Aristotle was rather contemptuous of direct observation and experiment, and Plato says somewhere concerning the study of natural phenomena, 'these things have no absolute first principle and can never be the objects of reason and true science'. The mystery seems to me rather artificial. The Greeks despised the mere pedestrian grubbing among facts because they had discovered something superior to it. In the abstract world they had found a better kind of reality—orderly, clean, unaccidental, and capable of being successfully manipulated without soiling a gentleman's fingers or compromising his dignity.

It must be admitted fully that the abstract method is ineradicably entwined in all our thinking and is indispensable. This is, however, by no means to acquiesce in its universal dominance or to excuse the general failure to examine sceptically its nature and limitations.

The charm and use of the method are that it permits us to take into our minds phenomena in their essence only, to examine them there, and as it were, acquire experience of them without being distracted by their mere individual oddities. The abstraction 'space' thus comes to represent a certain common quality of innumerable experiences in the world of corners, surfaces, heights, depths, and breadths. Vertebrate, amphibian, man are the well-behaved substitutes of countless creatures creeping, jumping, and running about the world in their odd unaccountable way. This process of abstracting what I have rather light-heartedly called the essence of phenomena will be found to reward a rather closer attention and such attention may well be directed first to the simplest case of the process.

Remarkably little attention seems to have been given to the important fact that the only quality we know of which can be *completely* abstracted is number. Five digits in the mind are, as regards number, as good as five fingers of the hand. Every numerical experience of them and every such manifestation of them that is possible in the outer world can be initiated or repeated in the mind and with validity. The science of positive numbers is then the science which is at once perfectly abstract and perfectly experimental. The moment we leave number there begins to appear a decline in the exactitude of the correspondence between the abstraction and reality. For a long time it seemed that the qualities of space could also be completely abstracted because the conclusions derived from the abstract consideration of space seemed to be confirmed everywhere in the outer world, even on the astronomical scale. Ultimately, however, it dawned on the geometers that there is a discrepancy between the abstraction and the reality. The need of an Einstein to point this out and the uproar that followed are perhaps a little surprising to mere commonsense. What seems truly remarkable is not that intuitions derived from the stretch of the arms and the range of the eye should ultimately break down, but their validity is so wide and the error so small.

When we apply the abstract method to events of the living world as we constantly do and must, we find ourselves faced by a greater increase in the individuality of phenomena and should be prepared for a sudden drop in the representative value of all abstractions. The abstraction 'man' must always be a thin, imperfect, and easily misleading summary of the innumerable individual 'men'. It is in the world of ideas, however, that the abstract makes its higher flights and develops to the full its fascinations and its dangers. Truth, justice, honour, beauty, being, right, wrong; I give a mere random list of abstractions from that world. These are no mere manageable equivalents designed for convenience of thought. They are creations which, made in all innocence, have taken on a life of their own and become the rulers of the mind. Could there be a more plausible and useful-looking conception than that of 'truth'—a unitary principle that is to be the ultimate sanction at once of the statesman and the theologian, the man of science and the poet? Yet it is easy to make out that such a supposed unity can never be, and that behind its solemn frontage is a mere jumble of ideas. Nevertheless this bogus unit has notoriously had a strange power over man's mind and proved itself to be perhaps the most disastrous idol he has ever set up.

Abstraction of some degree is universal and inveterate in all kinds of thinking; in philosophic thinking, however, it is in addition characteristic and indispensable. The aim of philosophy is to unify all knowledge; it must therefore seek the generality it supposes to lie behind the multitudinous particulars of experience. In thus separating reality from its accidents it must depend on the abstract method as its instrument and on reason as its sanction. Things will be true when they are pronounced true by the informed and enlightened intellect. The ultimate standard of philosophic truth is therefore an internal one; in the last resort such a

truth is one that 'feels true' to the philosopher. Philosophy has been cultivated by many, perhaps even most of the ablest minds the human race has produced. It has evolved innumerable systems of doctrine, each rationally proved by its founder to be true, and all inconsistent with one another. No enterprise has ever been longer or better pursued than the effort to find a body of philosophic doctrine which should compel the universal assent of rational minds. An experiment that has gone on failing for two and a half millennia may well make us wonder whether the apparatus is adequate or the method sound.

SCIENCE AND PHILOSOPHY IN CONSTRAST

The rough definitions I have tried to make of the scientific and philosophic methods should now permit us to bring the two into useful comparison with one another. Before doing so, however, it is necessary to have clearly in mind that in practice the two procedures are by no means always kept distinct. Many a supposedly scientific opinion gets itself supported on purely rational grounds, and many a philosophic conclusion affects to depend on verification. We are concerned here with the characteristic quality of two methods, and the fact that in actual use they are often confused only adds to the need for clear definition. Philosophy then desires its conclusions to feel true, science that they should come true; philosophy needs certitude, science needs verification. Science has no certitudes because its conclusions are based not at all on internal conclusion but wholly on the regularities of observed experience.

It seems at first sight a very hard saying that science has no certitudes. In face of it we may expect to be reminded that the precision and trustworthiness of science are its very essence. These are undoubtedly among its most attractive characters, but they do not depend on the complete inner conviction of truth that alone gives the sense of certitude. Science makes great use of reason in its special way; it often appeals to the rationality of its conclusions in confirmation of them; and most of its conclusions do in fact come ultimately to seem profoundly reasonable. Nevertheless it does not possess, and should not claim to be based on, a fundamental rationality; the conception that the order or rationality of the universe tallies with the order or rationality of the best human minds, while it is for philosophy a vital necessity, is for science no more than a useful working hypothesis and therefore the servant rather than the master of research. Expositors of science, however, have unfortunately sometime tended to drift into the philosophic mood. On such occasions they are apt to tell us of the august and inflexible uniformities of nature, the iron laws of cause and effect, the inevitable certainties of science and similar rationalistic dreams. If we examine science more realistically we shall find that its two most impressive aspects are first its detailed trustworthiness in practice, and secondly its *provisional quality*.

It is in this second and rather unobtrusive character that the essence of natural science is revealed. The man of science within his own, often narrow, department can cheerfully regard all his knowledge as provisional only, and indefinitely liable to subversion by further inquiry. He gives us our only hope that some day the human spirit may learn to distrust all certitude, and live bravely in its own right and its own strength.

While it is to be insisted on that rationality is not the ultimate test of scientific truth, there is no reason to question the value of the rational process as an implement of research. It is, however, an implement of which no finding can be regarded as valid until it has found verification in experience. Whatever flights of reasoning science may take, it must ever be returning to the facts for reassurance. Even in the most extended feats of pioneering in the light of theory---as, for example, we see in some degree in the evolution of the thermionic valve—there must be this repeated verification of actual experiment. The wings given to science by reason must be used like those of the ostrich rather than like those of the eagle, and help it along without raising it from the solid earth.

Philosophy, on the other hand, is characteristically free from these scruples about the validity of the most extended process of reasoning. It insists, of course, that reason must be correctly used, but with this restriction, inflexibly maintains its ultimate validity. I need not repeat the pessimistic conclusion we have been compelled to draw from the failure of philosophy to yield any single dominating system of doctrine. But it is necessary to notice the even more formidable attack on the ultimate validity of reason made by modern psychology. To the rationalist the intellect presents itself as a perfect instrument; if its material is prepared for it by competent logic, precise definition, and a proper awareness of the difficult relations between language and meaning, then its operations must be carried on with frictionless integrity and its conclusions possess irresistible force. I have expressed this view in its extreme and perhaps least credible aspect. Other forms of it, less frank but far more insidious, are so nearly general in us all, that it should be described quite brutally as a complete delusion. To the eye of the psychologist the intellect has shown itself to be after all no more than a human organ, with preferences and caprices like the stomach and the kidney. Every structure of arguments it builds, however massive and symmetrical it may look, rests on foundations from which it has no means of excluding disturbance by bias and preconception. Under the attack of this kind of knowledge there can be no doubt that sooner or later the supposed independent validity of reason must go down.

THE INTELLECT IN DAILY LIFE

We set out on this inquiry with the innocent and laudable idea that people should be able to think for themselves. It has already led us rather far, so that before allowing ourselves to be still more deeply involved we may well ask what is to be the function of this admittedly desirable independent thinking. It is to enable us to contemplate usefully our current experience, and to develop opinions on social, political, and national situations without being entirely directed by custom and by prejudice. Now it is characteristic of the experience of daily life that it comes before us as a miscellaneous jumble of elements of which the mixture is irreducible. It must therefore be obvious that the scientific method cannot be directly applied to it since that method demands complete specifications of its situations so that they may be subject to direct observation or controlled experiment. It is necessary here to guard ourselves from thinking that the practice of the scientific method enlarges the powers of the mind. Nothing is more flatly contradicted by experience than the belief that a man, distinguished in one or even several departments of science, is more likely to think sensibly about ordinary affairs than anyone else. The philosophic method, on the other hand, is no more useful for direct application in daily life than is the scientific. Its rationalism and its confident faith in abstraction would in themselves disqualify it as a guide in the real world. In judging its capacity for this part, however, we are in a stronger position than we are with regard to science. The scientific method has never been tried in public affairs; the philosophic method has been tried with a persistence and self-devotion worthy of the higher insects. Utilitarianism, Hegelianism, dialectical materialism, totalitarianism are all characteristic products of the philosophic method; however rational and self-consistent they may be, they do not seem very helpful in causing people to think for themselves.

Our search for a method that shall assist the useful contemplation of daily experience has thus had a totally negative result. The common tendency to regard destructive criticism as always easy and generally reprehensible is one that I do not share; indeed, I doubt if it could be acquiesced in by any sensible person making a frank survey of the intellectual world of today. We cannot but be struck by the remarkable prevalence of systems of doctrine, by their loudness, their confusion, and their deleterious effect on conduct. In all these systems the most indulgent examination will find little evidence of really enterprising thought, but it will find a great deal of reconditioned lumber, at its best of a low order of reality and now used to justify the lazier, the uglier, and the baser inclinations of the human spirit. At no time in the history of the intellect has the sanitary work of destructive criticism been more needful.

- From L. Brander, ed. A NEW WORLD, Oxford University Press, Calcutta, 1950/1956, Pp 175-189