

A PHILOSOPHER'S VIEWPOINT

by

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With regard to many of the various practices and habits of Civilisation there is much dispute as to the precise age when they first made their appearance, but as far as Engineering is concerned there can be no such dispute or discord. It is as old as Civilisation itself, and all that ranks as controversial is the time when any one specific form of Engineering was instituted. For, like most complex and manifold aspects of scientific progression, it evades the law of absolute definition, and seeks only to find its expression in the multitudinous discoveries of mankind ; and finding the interpretation of that expression in man's capacity for invention, his ability to construct, and above all in his superb creative ingenuity.

Although very much indeed yet remains to be written about the historic struggle of Engineering, it is not proposed in this brief article to deal with this particular feature ; but rather with an aspect which has often been ignored, namely, the Engineer as an individual—an individual with a distinct personality.

Engineers as Realists and Idealists

The great men who we meet with in the history of human endeavour can be roughly divided into two classes—the Realists and the Idealists. Now, to say that the Engineer belongs to the former class exclusively would be erroneous, yet to admit of both, paradoxical ; nevertheless it is a genuine fact that the Engineer in the truest sense of the word is both an Idealist and a Realist. In the first place he must have vision, which belongs to the realm of Idealism. This precipitates a second and intermediary process which engenders a degree of creative ability ; and finally as a realist he must translate into practical action the final end by virtue of his capacity to construct. It is this third and final phase, which is a purely technical phase, that is responsible for the common misunderstanding that Engineers, apart from doing an extremely capable job of work, are a somewhat colourless lot of individuals whose whole life is bound up with grease and shiny parts. Little does the layman know, for example, of the superb and ingenious methods adopted by Engineering personnel at sea, sometimes in the most heart-breaking conditions, in order to keep things moving ; methods which are not always in the text books, decisions taken which do not always comply with the rule of precept, but which spring from pure individual initiative, plus that something which can only be adequately described as Engineering Instinct, and which in no way can be reconciled to the limitations of mere technical knowledge.

The Personality of the Engineer

The farther Science has pushed back the limits of the discernible Universe, the more arduous has been the task that has been presented to the Man called Engineer, who has the job of translating into practical action the speculative and sometimes apparently fantastic theories that are advanced in the name of Civilisation and Progress. Everything is in a constant state of change, and nobody realises more fully and adequately than the Engineer the necessity of justifying Man's accumulated knowledge of invention by constructing the means to keep pace with the endless demands that are required in the tremendous race towards the Future.

Thus, although it is not universally recognised, the Engineer is a distinct being whose life is dedicated to a higher specific purpose, that of constructing and maintaining all the vast mechanical projects in a near-mechanical world.

Rationalisation and Responsibility

One of the most outstanding characteristics of the good Engineer lies in his purely rational outlook, that is, his faculty for being able to make the right deductions from a given set of facts. Indeed, it would be of some considerable advantage to the community as a whole if the ability to reason was developed generally in the same way with the happy, logical conclusion, namely, that of always getting the job done.

Another notable feature of the Engineer lies in his excellent sense of responsibility towards the duties which fall within his province, duties which invariably necessitate a high degree of competence and skill. There remains the fact that the Engineer is a human being with the conscious knowledge that the inaccurate gauging of some particular part would be disastrous. In spite of this, the fact that he retains the capacity for cool, calculated judgment and efficiency is very much to his credit. Taking it by and large, the study of Engineering in all its multiplicity presents a proportionate amount of complexity in its divergence of personalities. The field is so large and the application so varied that a complete analysis would defy even a savant. But that the personalities exist in the field of Engineering and exist as supremely capable individuals there is not a shadow of doubt.

Of the Engineer, and the Neo-Engineer in particular, with all the technical responsibilities of an Atomic Age just around the corner, with all the super-sensible realisations of the wildest Wellsian possibilities to contend with, a need is evident for a greater mental superstructure with which to approach these problems.

Logic and the Engineer

We have agreed that the Engineer is by nature a rational creature whose being, though not consciously perhaps, but in fact, is bound up with the imperative laws of logical reasoning. Now, the introduction of order into the mind by its own acts, the arrangement of its ideas with a view to improving the faculty to reason, is a progressive work.

The Syllogism

In considering the orderly arrangement of knowledge or formation of Logical order we must appreciate that Judgments are only elements in a still larger system of thought which can only be approached by means of a process known as the Syllogism, or discursive form of Reasoning or Inference. To illustrate the Syllogism more simply it is better to start from the first concept of the mind, which is Apprehension, and through which the mind demonstrates to itself one or more things without denying or affirming them. The conscious effort of affirming or denying this apprehensive concept is known as Judgment, and its outward expression is the Proposition. The combination of two or more Judgments in such a way that a new Judgment is formed is known as Reasoning, and the commonest and most complete expression of the simplest reasoning process is known as the Syllogism.

The Science of Engineering, as in all sciences, is the attainment of Truth by practical demonstration. Of these Truths some are known as mediate and others as intermediate, according to their medium of apprehension. The Truths of

one kind which give rise to a second are known as Principles, and those of the others Conclusions, which flow as it were from principles. The intermediate process between Principles and Conclusions is Reasoning.

Practical Utility

It may well be asked at this point how this apparently scholastic form of Reasoning can have any bearing upon the Engineering profession from the point of view of the practical man. My answer is this. Engineering is built upon the broad basic principles of the mathematical physical Sciences, and is becoming more and more complex as each day passes.

Logic is a study which, from a psychological point of view, is not only absolutely compatible with the Personality of the Engineer, but is utilitarian in practice; for, I repeat, with the evergrowing complications and complex requirements that face the twentieth-century engineer there is an evergrowing need for a solid mental foundation with which to face these problems, and no Science is more worthy of serving another Science than Logic.

The Philosophy of the Engineer

The difficulty in comprehending the principles of certain branches of Philosophy frequently arises from their being at variance with an existing interest, or a bias to this effect. In my own experience working among Engineers I have observed that many friends of mine who have subconsciously utilised the fundamental principles have failed consciously to understand the value of Logic, or alternatively have failed to understand its desirability. The attitude is generally that there can be no connection between the sphere of Logic and the sphere of Engineering. This is not true, for the natural tendencies of the Engineer are in absolute conformity with those of the Logician.

Synthesis

The brain has first to understand the manifold aspects of its experiences one by one before it can co-ordinate its fragmentary explanations, and incorporate them into one synthetic whole.

Psychology has certain advantages, as it also deals with acts of the human mind as its object. Unlike Logic, it does not deal with them precisely, but only in as far as they are important acts whose natural Principles and general activities have to be investigated. Logic for its part is concerned only with the cognitional implications upon which the mind as a whole formulates its Judgments and builds up a scientific system of pure Reasoning.

Thus it should be perceived that the development of the human mind requires something more than a mere combination of Ideas or Notions, which are subject to the unstable factors of temperament and emotional basis. The only preparation for the mind when it is put to the test of facing problems of great magnitude is a logical preparation, *because rational knowledge has a tremendous superiority over empirical knowledge.*

This is one of the vital Truths which neither time nor argument can destroy.

Conclusion

I do not write these things in order to expound my own theories, but rather to draw attention to the immense advantages that can be derived from the study of Applied Logic in a profession for which I have the greatest admiration and respect. I have only dealt with an infinitesimal portion of Logic, indeed my only consideration has been to refer to those particular aspects, i.e., the Syllogism, in order that any interested reader could go straight to the heart of

its salient features and thus expand this method to his own satisfaction and, I sincerely believe, to the benefit of the Engineering profession as a whole.

Most of our forefathers thought only in terms of Idealistic intellect and, as a reaction, most modern thinkers are ultra-realist in their attitude to scientific problems, but an Ideal intellect is necessary, and without it development would be impossible. It is imperative that we do all in our power to assist and increase this development, and encourage the intuitive values but at the same time we must not lose sight of the essentially practical Truths. Even the most distinct concepts become blurred and totally useless unless they are effectively utilised in some methodical form of Reasoning and Deduction. The Realist has mastered a Truth which the Idealist has been prone to overlook.

But a perfect combination of these two types, which, as I have already demonstrated, exists in the good Engineer, together with the advantages of a logical attitude to the many and varied problems, would bring about a higher plane of activity from which may be seen much that will make the right path clearer and enable a very great profession to press forward with renewed vigour and fresh ambitions.