

Abstraction and idealism

From Plato to Einstein: how do we acquire knowledge?

Semir Zeki

Brain studies are poised to occupy a dominant scientific position during this century, but one of the enduring problems was defined over two millennia ago by Plato and reinforced by his successors in the Western philosophical tradition. The problem revolves around the acquisition of knowledge, a primordial function of the brain. Impressed by the Heraclitan doctrine of flux or constant change, Plato and his successors sought to understand how we can obtain knowledge about the permanent and non-changing properties of all that is around us, when the information reaching us is changing all the time and when we ourselves are subject to change. With the exception of Schopenhauer, they did not cast the problem in the context of the complex organization of the sensory brain, because they imagined that 'real' things (Platonic ideals and the Kantian 'thing-in-itself') belonged to a supra-sensible world accessible through thought alone. Kant sought to define the limitations imposed by the mind in the acquisition of knowledge, and the formal contribution that it makes to that acquisition. He believed that there are two innate intuitions, time and space, into which all experience is read. In more recent times, Einstein emphasized the importance of the thought process in acquiring knowledge when he wrote that "the critical thinking of the physicist cannot ... proceed without considering critically a much more difficult problem, the problem of analysing the nature of everyday thinking".

Implicit in these writings is the supposition that a fundamentally similar thought process

underlies the acquisition of all knowledge. Yet neurology has taught us that knowledge, in terms of both its acquisition and the processes underlying it, is modular and distributed. Even within the visual system, knowledge about the colour of surfaces, for example, is acquired by a different neural process from the process dealing with visual motion. This can have bizarre consequences, as when lesions occurring in the colour centre lead only to an incapacity to acquire knowledge about colour, leaving the sensing of motion, for example, unimpaired. Moreover, the 'innate intuitions' of time and space for constructing colour and motion, although they share similarities, are also significantly different: colour requires the brain to determine the amount of light of different wavelength reflected from different surfaces simultaneously, whereas successive stimulation in time is essential to the motion system.

Where, then, can we seek that unity of thought processes which constitute the foundations of all knowledge? I believe that there are two closely linked and automatic processes — abstraction and the formulation of ideals — which underlie our ability to acquire all knowledge because they are the characteristic features of any efficient knowledge-acquiring system. The former is both selective and eliminative; it allows the brain to determine some property or relation which is common to many particulars, thus making it independent of the particular. Abstraction is also imposed on the brain by the limitations of its memory system, since it does away with the need to recall every detail. Memory is a critical step in obtaining knowl-

edge, but, as Descartes saw, it could not be trusted in an unqualified way, even within the certain

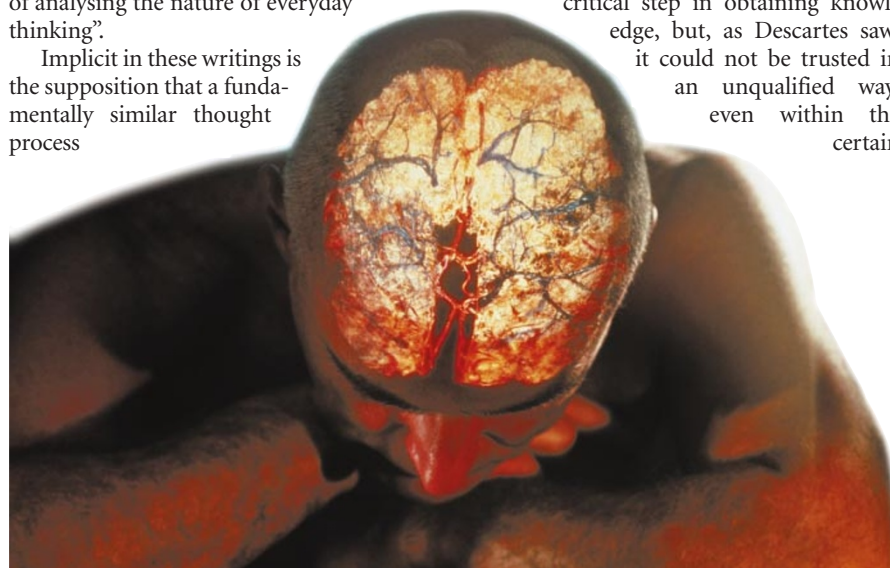
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world of mathematics. A cardinal step in mathematical formulations is the deductive one. But in deductive arguments, the mind has to rely on memory in tracing the earlier steps in a deductive process. And the memory process itself can be at fault (as it often is).

Abstraction leads naturally to the formation of ideals. Plato used the term 'ideal' to mean a universal — derived from the intellect alone — as opposed to the particular, derived from sensory experience. Because memory of the particular fades, the ideal built by the brain from many particulars becomes the only real thing about which we can have knowledge, much as Plato and Kant believed. I would depart from their ideas by saying that the 'thought processes' involved in generating brain ideals are automatic neural processes, which differ according to the ideal that is being constructed, but that each of the many distributed knowledge-acquiring systems of the brain has an independent capacity to form ideals. We are not conscious of the automatic neural thought processes that are necessary for us to perceive the reality behind all natural phenomena, although the results of the processes are consciously perceived. This leads to my supposition, modified from Leibniz, that a different unconscious process underlies each of the conscious events that we experience.

A study of the neurological basis of abstraction and ideal formation is now within our reach. It may also shed light on another issue, namely the psychological 'suffering' which Freud traced to our 'mental constitution'. If, as I believe, abstraction and the formation of ideals are the necessary characteristics of efficient knowledge-acquiring systems, and if knowledge can be acquired only through particulars — which is the staple diet of the brain — then it is not hard to see that there will forever be a clash between the ideals built from many particulars and the experience of the particular, leading to a perpetual dissatisfaction. ■

Semir Zeki is in the Wellcome Department of Cognitive Neurology, University College London, Gower Street, London WC1E 6BT, UK.



Abstract thinker: the intellectual ideal clashes with sensory experience.

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