

Abstraction & Scientific Understanding

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Karl Popper in his “Logic of Scientific Discovery (1939)” argues that scientific theories are characterized by falsifiability. Thomas Kuhn states in “Structure of scientific revolution (1952)” that progress in scientific understanding are by paradigm shift. But whichever model of a particular aspect of science is in acceptance at a particular period, it is a reflection of the level of human understandability of that phenomenon during that period. Abstraction provides one of basis for analyzing cognition and understanding. Coined and proposed by Aristotle, abstraction as a concept has occupied the philosophers and thinkers for ages. What really is abstraction? How is this marvelous feat performed in humans? V. S. Ramachandran, a neuroscientist opines (2011) that perhaps the inferior perital lobule (IPL) within our brain, rich in mirror neurons is ideally suited for abstraction. This neurological basis provides support for Chomsky view of Words as mental objects. Words are the objects which have sound and meanings (innately) specified in one’s mind with “superficial details of the kind provided by the experience”. This forms the basis for his theory of Universal Grammar.

Frege (1892) has made a distinction between objects and concepts. In 1998 Kit Fine published a Fregean theory of abstraction. This theory provides new insight in philosophical foundations of mathematics and account for mathematical truths.

In the talk we will discuss all these aspects of abstraction. At the end we will briefly look into abstract quantum computational aspects and how it helps transform a computation requiring, say, super polynomial time when using classical method to polynomial time.