Is science objective?

Can it help conservation ?

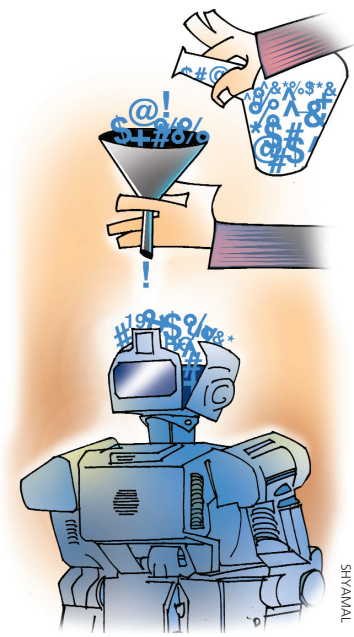
KARTIK SHANKER

In a world where technology plays an increasingly important role, and science is invoked almost as often as the *Bible*, few people understand what good science is. In principle, science is considered to be an objective knowledge system that proposes theories that can be supported or refuted by data. In fact, the very definition of science, as formulated by Karl Popper, is that it must be refutable. In this formulation, articles of faith, like most religious doctrines, are not science because they can neither be proved nor disproved. Science allows itself to be constantly updated by new information and empirical evidence. Science is also supposed to be open and democratic and in some sense, casteless, though many social scientists will argue that the high priests of science have as much influence over their faithful as any religious leader.

Many philosophers and historians of science have examined the way in which science operates and evolves. Thomas Kuhn, in his seminal work, *The Structure of Scientific Revolutions*, laid out a scheme for the progress of science. He suggested that science remained constrained within the bounds of 'normal science' — paradigm which came with a set of assumptions that scientists shared and defended; they even subverted novelties because it questioned the paradigm. A shift in shared commitments and assumptions, a 'scientific revolution', occurred when there was an anomaly or a discovery that changed these assumptions and resulted in a new theory or paradigm.

The fundamental assumption about science is that it is objective. In fact, it strives to objectively perfect even if that is never truly attainable. Historians agree that while most scientific disciplines were very much products of societies in their early days, they have evolved to become largely objective over time. However, most also agree that science, even today, does have social influences. In fact, objectivity itself is a social value that the scientific community has imposed on its activities.

Why is objectivity important? Science is, amongst other things, about talking a shared language with minimum ambiguity. Two observers of primate behaviour must record the same actions by the same terms; they should observe the animals at the same times of the day and year, and not be influenced by the fact that one researcher likes to sleep late or work in summer; their sampling sessions should be randomly chosen and not biased by one researcher's interest in aggression. In sociology or psychology, differences in perception are fascinating. In animal behaviour, it is noise or error, that needs to be eliminated. Admittedly, science does not always attain this level of sophistication, though it has objectivity as its holy grail.



SHYAMAL

The path to objectivity can be subverted in many ways, including the process of peer review in journals. For example, one study showed that scientific papers were much more likely to be accepted by journals if they supported existing theories (also held by editors of a journal) rather than if they contradicted the theories. Another study took 30 published papers written by well respected authors from large universities and replaced the author and university names with lesser known names. The very same pieces were now rejected by the same journals.

This is of particular relevance to conservation, which needs an integration of rigorous research in a wide variety of disciplines from the physical sciences (geology, hydrology, atmospheric sciences), life sciences (ecology, epidemiology, genetics) and social sciences (environmental sociology and anthropology, history, law). Furthermore, ecology deals with complex systems that have a great deal of variability and poor predictability. And the field of conservation science is perhaps even more imbued with values than other sciences. Philosophical debates about co-existence between humans and wildlife, pristineness of wild areas, and animal welfare seep through every discussion of conservation paradigms. This does make scientific studies in this discipline difficult. However, rather than jettison science as a tool (which many opponents and proponents of conservation would be happy to do), we need to learn to use it carefully. In conservation, science cannot answer the questions of 'why' such as 'why do want a pristine forest ?', but it can help us address the question of 'how' or 'what': 'how can a forest be managed ?' This has a great deal more to do with science than management. All said and done, in a value laden world, science is a valuable tool and enterprise, that has a significant role to play in the future of conservation. ■

Kartik Shanker is faculty at the Indian Institute of Sciences, Bangalore