CURRENT SCIENCE

Volume 118 Number 10 25 May 2020

EDITORIAL

A tale of two views: why are scientists polarized?

In his book, *The Two Cultures*, C. P. Snow, the chemist and writer, laments the fact that the world comprises of 'Two polar groups: at one pole we have the literary intellectuals, at the other scientists, and as the most representative, the physical scientists. Between the two, a gulf of mutual incomprehension' exists (*The Two Cultures*, Cambridge University Press, London, 2012). People of the two dispensation, seem to inhabit entirely different universes. The gulf could be even deeper and catastrophic, if we throw in laymen and clergy with scientists, as was witnessed during the Renaissance period. The most tragic fallout of such divide was of course the unfortunate fate met out to Bruno in 16th century Rome. In hindsight, the fault lines and the different universes, and the polarized views, could be attributed to the belief systems and grammar of life in which one was brought up. Simplistically therefore, had all been schooled similarly, one would not be witness to mutual incomprehension and polarized groups in society. But that is, as said, only simplistically.

For how often have we not been witness to such claims and counter claims in the world of science that have divided the scientific community into highly polarized groups? In fact, it is rather perplexing, that even within the academia, claims and counter-claims are rampant, when one would have expected the evolution of a consensus viewpoint. In a manner more compliant with academic finesse, these differences are often referred to as 'schools' of thought. Thus, we have schools that perfectly believe and swear on genetically modified organisms, as much as we have schools that are tooth and nail against them. In cosmology, we have had people and schools that believed in the steady state theory of the origin of our solar system to those that swore by the big-bang theory. In matters of organic evolution, for some time there was a fierce competition between those who believed in gradualism versus those who believed in punctuated equilibrium theory. And of course, who can forget the vicious battle over the issue of anthropogenic-induced climate change or for that matter over sociobiology?

Let us consider a specific example of the long-standing interest in medical science about the relationship of salt intake to blood pressure and health benefits. A search of the words, 'salt and blood pressure' in Google Scholar returned over 2,350,000 hits in 0.04 seconds. Now by any stretch of imagination, this seems to be an incredibly staggering number of studies and still growing. Haven't we arrived at reasonably robust knowledge on this issue yet? Perhaps not.

Trinquart and his coworkers from Columbia University, New York undertook a meta-analysis of studies conducted between 1978 and 2014 to evaluate the health benefits of reduced salt intake. Incidentally, a meta-analysis is done to examine the overall trends in data, especially when the field is riddled with conflicting results. They found that while 54 per cent of the studies were supportive of the claim, a substantial minority 33 per cent was contradictory (Trinquart *et al.*, *Int. J. Epidemiol.*, 2016, **45**(1), 251–260; https://doi.org/10.1093/ije/dyv184). Surely something was amiss here. Should we reduce or not reduce salt intake in our diets? Trinquart and his colleagues decided to examine the publication histories of the studies by conducting a network analysis. A network analysis allows us to find out who has cited whom and are studies reporting similar results, geographically clumped and are they all originating from one 'mother' lab. In short, it allows asking if some clique or friends' group influences the results that we are consuming. Trinquart and his colleagues made three important findings: First, reports were likely to cite 1.5 times more frequently studies that reported similar results than those that reported otherwise. Second, analysis of co-authorship showed a high percentage of homophily – that there was strong clustering and with little collaboration existing between authors holding different positions. Finally, it was found that a few prolific authors tend to dominate the literature in the field and reinforce their views by repeating their viewpoints in the literature. Thus, for the last three decades or more, a silent battlefield has been created among the warring camps, the, for and against salt intake group, with little evidence of their reconciliation. Workers pitted in these respective groups have been largely restricted to their respective within-border view points, with little effort to transgress the border and meet with the other's viewpoint and thus setting in a deep polarization on the issue of salt intake and health benefits.

So why does such divergent or polarized views and schools exist and divide communities of scientists, just as people of countries are divided? Surely scientists, unlike laymen, are not constrained to blindly owe their allegiance to the state. They could easily walk over to the other camp without the fear of being shot and examine the pros and cons of the opposing theory or proposition? Easy as it seems, in practice it is not. Examining the origin and evolution of polarization in science, Connor from the University of California, Irvine (Connor, C. O., *Eur. J. Philos. Sci.*, 2018, **8**(3), 855–875) argued that the 'key mechanism that generates polarization (*in science*) involves treating evidence generated by other agents (*scientists*) as uncertain when the beliefs are relatively different from one's own'. It is important to remember that these differences in beliefs are not rooted in any moral, religious, political, emotional or national identities but arise by one's perception of what is right or acceptable and what is not. And therein lies the source of the polarization. A bunch of perfectly rational human beings, the scientists, given the same set of data or evidence, can split into polarized groups based on one's own and the group's perception about the things. Using epistemological model, Connor shows that 'a group of learners who share evidence and who have the same aim and values, can nonetheless become polarized'.

Once polarized, what cements or forges and sustains such polarization? Cannot the rationality of individuals break free and coalesce the polarized groups into one? Yes and no. Has one ever wondered about the so-called mob culture? Pick up any individual at random forming the mob and your guess is the guy will be as straightforward as you are. But a bunch of such straight-forwards lose their individual rationalities when they go on in a rampage. The origin of such group-madness or irrationality may lie in some person that stoked a random thought and there in aggregated a self-organized emergence of a mob. Mayo-Wilson *et al*. in trying to disentangle the group and individual argued that 'rational individuals can form irrational groups, and conversely, rational groups might be composed of irrational individuals' (Mayo-Wilson *et al*., *Philos. Sci.*, 2011, **78**(4), 653–677).

Science is basically pattern finding. This involves sieving signal from noise, which is notoriously difficult, especially in some sciences, such as biology, leading to a fertile ground for polarization to breed. On a lighter vein, I am reminded of a story of class of physics, where the students were asked to peer through a telescope to view some stellar object and duly record their observations. Student after student went to the telescope and peered through it and diligently recorded their observations, except one student. When his turn came, he peered through and saw nothing and therefore had nothing to record. His teacher standing by, understandably rebuked him and asked him to see again carefully, for haven't a dozen students before him recorded their observations? The student once again went through the motions and saw nothing. Upon a quick investigation, it was discovered that the cap on the lens of the telescope had not been removed from the previous week's class! So what did the many students who recorded their observations see? They basically saw what they were told to see and not what they saw! Funny as this story may be, it has a simple take home for the origins of polarization. We are often blinded by our biases and become myopic to data and theories that might suggest otherwise.

Polarization could also arise, especially in the early days of discovery, for when facts are few, speculations abound. Melvin Calvin, who won the Nobel Prize in Chemistry for deciphering the mechanism of carbon fixation in plants once said, 'It's no trick to get the right answer when you have all the data. The real creative trick is to get the right answer when you have only half the data in hand and half of it is wrong and you don't know which half is wrong. When you get the right answer under these circumstances, you are doing something creative'. How well this can be seen to apply to any field that has seen deep polarization, from climate change to sociobiology.

Finally, preposterous as it may sound, could both views be right? And on this note we have to take refuge in philosophy and in the theory of quantum mechanics or quantum superposition, for only then, can a cat be both alive and dead at the same time.

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