



Paradigm Shifts in Science and Need for New Mindset for Scientists

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Humans have been bestowed in their nature to be intellectually curious. This innate curiosity of human nature lead to ponderings, observations, and inventions. Though, we don't know the exact makeup of the first human paradigm, it must have consisted of a select few individuals with the basic observations and inferences. It can be assumed that the very first paradigm of humanity came into being to find the reason of its existence, its relationship with surrounding and eventually to look for an answer for a purpose of the entire universe.

Is there a divine power? Is there a life after death? Is this life real? Is universe infinite? And many such questions must have intrigued his or her first intellect. As few researchers and believers got together and formed a core mass of a group, cult or a nascent religion, it gets challenged by the similar simultaneous competent and rival group. Intellectual debates ensued, arguments took their forms – sometimes emotional and ugly. Older paradigms get critically examined by newer observations, and older paradigms have progressively been replaced by newer paradigms. This curiosity led to inventions. The wheel is said to be the first invention of humanity. It not only challenged the idea of primitive time and distance, it also brought human tribes in proximation to each other. This led to question the information and inferences and the learning evolved.

Though human history is on a constant journey of maturity by paradigm shifts, it also remained a constant catalog of war, death, and destruction. The industrial revolution of the eighteenth century is a classic example of both those phenomena existing together. On one hand, scientific discovery starts dismantling the centuries-old beliefs. It also led to the sophisticated form of colonization and domination of stronger paradigms by force. Philosophical ques-

tions can be raised about the ethical existence of new paradigms and even the disappearance of some weaker but rightful paradigms.

It would be a fallacy to assume that a given paradigm consisted of basic and incontrovertible facts. Kuhn used the word 'puzzle' about the scientists who worked in the given paradigm assuming it to be incontrovertible [1]. It's like getting lost in the details without realizing the challenges of the given data.[2] Having said, the most basic quality of a good investigator is to question the persistent pattern of anomalies or even a single anomaly. Many revolutionary inventions happened not because of accidents, but because the attention was paid to the details and inquisitive mind questioning the facts. Analyzing the "abnormal science"! Another important quality of a scientist is to continue to work on refining the old concepts, though they are proved to be irrefutable. The new paradigm does not need to be a completely new metaphor. It can be just a more rarefication of a previous paradigm, an invisible revolution. As John of Salisbury famously said: "We are like dwarves perched on the shoulders of the giants" [3]. Taking steps back to analyze the previous paradigm shift in the light of the newer discoveries may lead to refine, reframe, change, or dismantle the present paradigm, called resolution of revolution and progress through revolution [1]. We are living in an age of information, where criticism, arguments, and counter-arguments can be done instantly. A good investigator will step back and ask an important question to himself: "Am I getting carried away on a wrong note of redundancy or is this a real quest of a truth I am seeking?"

Indeed, it sounds irresponsible and callous that the subgroup of the scientific community is rigid about its processes. As well aware, these protocols are developed to protect the integrity of science. Approach to shift the paradigm needs to be rather

evolutionary. It would be naive to think that paradigm shift can be achieved with one article or a study. It takes decades before even an idea gets accepted. This is not because scientists are resistant to paradigm shift, but because to have a paradigm shift requires scientific minds to have evidence. Procrastination is also labelled as a virtue in science! Anomaly needs to be reported. This may encourage others to write and publish similar researches and experience.

Inquisitive mind, flexibility, open mind, collaboration and connection are few of the attributes which can help to explore and can help in accepting the alternate hypothesis with much ease. Scientists working on the same idea across different continents may benefit more by working together and reporting a unified version of their work (multi-national and multi-center trials) instead of several studies with unclear hypothesis creating confusion and ambiguity. The Internet has brought an enormous opportunity to find and connect with people across the globe working on a similar theme. Taking advantage of this sharing will benefit science and research significantly. The scientific journals should be more open to accepting two contradicting theories on the same concept. Encouraging Pros and Cons debate at scientific conferences will encourage discussion and exchange of ideas more positively. Not to ignore, the virtue of Emotional Intelligence (EI)! A constant check of one's ego, accepting the opposing ideas, embracing the criticism, trusting others and responding respectfully to arguments require a lot of continuous introspection.

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