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Original Paper

Why Is It so Difficult to Make a Paradigm Change?

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Abstract

Difficulties of proposing a new idea against a standstill or stagnated paradigm are described. In order to achieve a breakthrough or paradigm change, one requires a creative data assembly, the sense of timing, confidence, courage, patience, endurance and even a wit. A few suggestions are made to overcome the difficulties.

Keywords

Paradigm, continental drift, plate tectonics, Kelvin

1. Introduction

Perhaps, a good example of how a newly emerging paradigm is greeted is the continental drift theory by A. Wegener. After learning Wegener's theory, Sir W. L. Bragg, physicist, mentioned about it to his geologist friends. Their response to the theory was:

The local geologists were furious; words cannot describe their utter scorn of anything so ridiculous as this theory, which has now proved so abundantly to be right (Akasofu et al., 1967, p. 50).

Wegener's theory is now polished as the paradigm of *Plate tectonics, in which thousands of researchers are working*, although Wegener could not observe the days when his idea was seriously considered.

2. Perils of Introducing a New idea to a Stagnated Paradigm

First of all, most researchers do not recognize that they are working on a particular paradigm and are working towards 'improving' or 'advancing' it by their efforts in removing difficulties or contradictions in their paradigm. When a paradigm develops and becomes mature, unsolved problems become like a 'difficult exercise problem' in the chapter of a textbook, although the 'problem' is actually beyond its scope. Thus, those who engage in a paradigm believe that the problem (actually, unsolvable difficulties or contradictions in their paradigm) must be solvable (or removable). They cannot consider anything else other than what is learned in that chapter. The failure of solving is considered to be researcher's failure, not of the textbook. They cannot consider that their paradigm is stagnated.

Thus, in spite of the fac that the ‘problem’ is beyond the scope of the textbook, those who are participating in a particular paradigm cannot accept the stagnation, so that they reject any suggestion that the textbook is not suitable in solving the ‘difficult’ problems.

A new idea of a possible solution for the ‘difficult’ problem is perhaps like a newly published textbook (an early stage of a new paradigm), which describes an entirely new idea on the same subject or even a textbook in a different field, which suggests a new way of considering the ‘difficult’ problems.

This stagnation is particularly serious, if the same textbook has been used for a few generations (at least 30 years), since the knowledge in it becomes ‘truth’. This is why it is so difficult to propose a new idea, which might remove the ‘difficult’ problem.

A newly proposed paradigm or a breakthrough idea is, however, most often very incomplete when it is first proposed; it may look ‘the back of envelope’ calculation compared with a sophisticated supercomputer simulation results under the present paradigm. Thus, the present well-developed paradigm researchers can easily criticize a new-born paradigm (or the beginning of a breakthrough) in terms of quality and quantity. A new idea must survive and overcome somehow those criticisms.

Practically, when one wish to publish a new promising idea, one obstacle is that reviewers of the submitted paper are most likely to be experts or authorities of the present paradigm; in fact, the editor of a scientific journal states so in rejecting the submitted paper. The reviewers do not want to see that what they have built up at least during their lifetime will collapse by the proposed new (‘unsophisticated’) idea, recommending the rejection on the ground of quantity and quality.

They forget that it took a long time for the development of their paradigm, surviving through similar criticisms. In fact, a scientific field tends to make a series of abrupt developments, rather than a continuous development, when one can learn its history; a continuous development occurs during the period when a paradigm is developing; every new finding seems to support it. It is unfortunate that present researchers do not have the time to learn the history of his field, although it is one way to become interested in his own field, not just getting a PhD and moving into another subject.

For these reasons, a new idea may often be considered to be exotic or heretic against the established paradigm, until it could become fairly well established. In fact, the one who proposes a new idea may be called skeptics, deniers or heretics against the present paradigm. Thus, he may decide not to submit a new idea, even if he believes firmly that he has something worthwhile to consider.

Koestlier (1969) noted: “The history of science has its Pantheon of celebrated revolutionaries---and in catacombs, where the unsuccessful rebels lie, anonymous and forgotten.”

It is too late to claim that he had the same idea after finding some else published same idea.

3. Some Suggestions to Overcome the Difficulties

When a paradigm is in the maturing stage, it generally difficult to propose a new idea. One may have to wait for some time when the present paradigm participants begin to recognize some ‘unsolved’ or ’difficult’ problems or ‘conflicting’ observations.

Even when a researcher with a new idea to solve a crucial problem of his paradigm, he becomes often at odds with their colleagues. Thus, first of all, he has to convince himself that he has something new. Actually, when his new idea is denied or doubted by his colleagues, he should consider that he has a chance to make a breakthrough. On the other hand, his colleagues can easily agree with his new idea, it may not be worthwhile to pursue it. In general, people, including scientists, tend to be naturally conservative. It is easy to stay in the established paradigm, rather than facing criticisms.

Thus, the task for proposing a new idea becomes convincing skeptical colleagues or more likely fighting against unreasonable criticisms. This requires both confidence, courage, patience and endurance. He should be willing to respond seriously to reasonable criticism. Without them, he may be considered to be a failed researcher in his research career (being considered to have made a serious mistake). In fact, some of those who stated to support Wegener's continental drift theory in the 1950s lost their credibility, but fortunately they regained it later after Plate tectonics was established and became even pioneers in developing Plate tectonics.

Achieving a breakthrough and establishing a new paradigm is a very lonely task. However, in order to overcome the loneliness, he might consider that in a paradigm, researchers advance like in a large military march with the commanding general (authority). For a researcher proposing a new idea is like confronting with them alone with a new weapon unexpected to them.

In convincing the colleagues, the crucial thing in *natural science* is a *solid or unmistakable* data set to support his new idea. It is not a mathematical theory, because for any one data set, there can be several theories. If the data set can solve the problem or remove the contradictions of the problem of the present paradigm, it is so much better, although the use of the data set is only the beginning.

Here, it is emphasized that data are a *set.* Although a single discovery could make a paradigm change, it is rather rare. Most often, the data set is a new way of *unexpected syntheses of preexisting* data. If the synthesized two observed facts had been considered to be entirely unrelated before, the impact of a new idea will be welcomed. This is the power of *creativity* (Akasofu, 2019).

On the other hand, the fighting against the criticisms is not only way to overcome them, particularly when one has to face an authority of his field. A young researcher could avoid a direct confrontation by wit. Ernest Rutherford, the discoverer of the atomic structure, avoided the confrontation with Lord Kelvin on the age of the earth with his remark, saying in his talk at the front of Kelvin: "Lord Kelvin had limited the age of the earth, provided no new source was discovered". When he mentioned it, he noted: "Behold! the old boy beamed upon me". Kelvin was known to oppose Darwin's Theory of Evolution by his theory on the age of the earth (before the discovery of Radium): (Segre, 1980, p. 59).

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