CORRECTING PHYSICS THEORY

James A. Putnam

Trying to improve theory is an arduous task involving many precarious decisions. Choices must be treated as being tenuous. Error must continuously be driven out. It is first necessary to determine what errors exist in previous theoretical interpretations. Secondly it is necessary to determine how those errors should be corrected. Thirdly, it is necessary to continue the effort of revision when your own work repeatedly turns out to be in error.

Sometimes these errors are made clear by incorrect results. Often they are discovered by an intuitive thought. It suddenly becomes clear that your subconscious mind has been thinking it over and has discovered that something no longer seems right. You are made aware of it in an instant as if you have been signaled to see it. This thought frees the way for your mind to offer a new idea about what may be the best way to proceed.

The important question becomes: How do we know when an intuitive idea is a better scientific answer? One common test is: If an idea helps to successfully predict new empirical data, it gains greatly in credibility. This occurrence is certainly of great value. However, it is not enough for the new idea to lead to new predictions in order to prove its truthfulness. These can very often be predicted by incorrect theory. This is true because all theories are designed to fit existing empirical data.

Theories are formed around the patterns found in empirical data. Afterwards, these patterns, incorporated into mathematical equations, are capable of making further successful predictions. This occurrence gives the appearance of confirmation of our theories, even though there is no other established physical connection between theory and reality. New theory needs more than predictions in order to demonstrate improvement.

One indicator of correctness is: Even in incorrect theory there appear fundamental constants. These constants are not dispensable, although their theoretical interpretation may be in error and in need of possibly radical correction. As the theory is corrected these fundamental constants reappear. Their new interpretations contribute importantly toward theoretical unification. In a truly unified theory, these constants will have clear physical reasons for their existence. They also will play a crucial role in preserving unity as the theory progresses into higher and higher levels.

Another important indicator is: After correcting an error, the new idea makes it possible to expand the theory. The theory grows into important new areas. Problems, that seemed unsolvable, now have solutions. If it is found that an idea has the opposite effect, or that the work using the idea remains compartmentalized, then the idea is highly suspect for being wrong. It does not save the idea if the work produced demonstrates greater simplicity then previous ideas. Isolated simplicity is not a good result.

The thrust of this measure of merit is whether or not the theory exhibits progress toward unity. I do not mean this in the sense in which current physics theory is being united. Unity cannot be an afterthought or an added on effect. Real unity does not follow after the fundamentals have been developed. It is, instead, an inherent property of good theory. Unity should appear as a part of the development of the fundamentals. As more theory is added it should demonstrate the continuity of unity. True unity will have a constant appearance in the theory. It will not be gained or lost by changing levels of energy or any other property of the universe.