

**“An Experiment in Physics Can Never Condemn an Isolated Hypothesis but Only a Whole Theoretical Group”**

Experiments of Application	Experiments of Testing
<ul style="list-style-type: none"> <li>• Do not aim to prove/disprove existing theories                             <ul style="list-style-type: none"> <li>• Draw on existing theories</li> </ul> </li> <li>• Utilize instruments that are legitimized by the existing theories</li> </ul>	<ul style="list-style-type: none"> <li>• Start with a new theory or aims to disprove existing theory</li> <li>• Prediction of experimental fact</li> <li>• Essential for the creation and development of science</li> </ul>

- The mode of demonstration by experimental contradiction seems as convincing and as irrefutable as the proof by reduction to absurdity customary among mathematicians; moreover, this demonstration is copied from the reduction to absurdity, experimental contradiction playing the same role in one as logical contradiction plays in the other.
- The only thing a “failed” experiment can teach us is that among the propositions used to predict the phenomenon and to establish whether it would be produced, there is at least one error; but where this error lies is just what it does not tell us. The physicist may declare that this error is contained in exactly the proposition he wishes to refute, but is he sure it is not in another proposition? If he is, he accepts implicitly the accuracy of all the other propositions he has used, and the validity of his conclusion is as great as the validity of his confidence.

**“A "Crucial Experiment" Is Impossible in Physics”**

- Physicist can never subject an isolated hypothesis to experimental test, but only a whole group of hypotheses; when the experiment is in disagreement with the predictions, what one learns is that at least one of the hypotheses constituting this group is unacceptable and ought to be modified; but the experiment does not designate which one should be changed.
- Even if we assumed that within the systems everything is compelled to be necessary by strict logic, except a single hypothesis; consequently, let us admit that the facts, in condemning one of the two systems, condemn once and for all the single doubtful assumption it contains. Does it follow that we can find in the "crucial experiment" an irrefutable procedure for transforming one of the two hypotheses before us into a demonstrated truth? Between two contradictory theorems of geometry there is no room for a third judgment; if one is false, the other is necessarily true. This is however not the case in physics. Two contradicting theories can coexist and can be useful in describing or testing physical phenomenon (for example the theory of light as wave vs the theory of light as a particle).