Strong Criticism Against Popper 1:

According to Duhem, "a physicist who performs an experiment or gives an experiment report also implicitly accepts the accuracy of an entire group theory [not a single theory]." In other words, “an experiment in physics [science] can never falsify an isolated [isolated] hypothesis, but it also falsify an entire theoretical system” (Duhem, 1954: 183). According to this thesis, a scientific proposition (or theory) cannot be tested separately from the theories associated with it.

Experiments are generally divided into two as experiments of application and experiments of testing. The type of experiment that will determine the validity of a theory and make it preferable to other theories is determined as test experiments. Practice experiments relate to the application of an accepted theory to particular areas, especially when it comes to producing technology from it. In this process and experiments, the predictability of the theory is not measured and the validity of the theories is not checked. On the other hand, the experiments that reveal, produce and develop "science" are test experiments. But how is a test experiment carried out? In other words, how can a scientist who questions a certain law or suspects a certain theoretical subject prove this suspicion and how can the falsehood of a theoretical law be revealed?

A scientist who has adopted the falsificationist approach predicts an experimental phenomenon from the proposed proposition and provides the conditions for this phenomenon to occur. If the envisaged phenomenon does not appear, the proposition that served as the basis of its prediction is considered false. Because the empirical content that enables falsification will respond to the 'correct' and 'neutral' implementation of the experimental method that made it possible to apply. If the answer is negative, that is, if the experimental method applied correctly and impartially - open to intersubjectivity - did not reveal the predicted result based on the theory, this is nothing more than a falsification of the theory (proof of its falsity).

However, Duhem emphasizes that the 'proving' value of the experimental method is not certain and absolute, the conditions under which the experimental method is applied are much more complex than expected, and that evaluating and understanding its results requires much more attention and care.

When a physicist decides to prove that a proposition is false, she/he will create a case prediction based on this proposition. He will establish the experiment that should demonstrate whether this phenomenon will occur, and will interpret the results of this experiment and report that the predicted case is not exposed. However, in this entire process, that physicist cannot restrict himself only to the relevant proposition. The physicist uses a set of theories that he deems indisputable for 'falsification'. The relationship between the prediction of the case, which will determine whether the theory will be rejected and the result of the test experiment, and the experiment is more complex than it seems. The prediction of the phenomenon (the result of the experiment), which will terminate the argument or the argument on theory, from which it was derived, is produced not from a single proposition or theory, but from a whole set of theories. In this case, if the envisaged phenomenon is not revealed, this will show that not only is the question / theory that has been questioned and opened to auditing false, but the set of theories used by the physicist may also be false.

> The only thing that the experiment can show us is that at least one of the propositions used to predict the phenomenon and that reports whether the phenomenon can be produced is false. But what the experiment cannot tell us is where this error lies (Duhem).

When the scientist conducts a test experiment, he tests a whole set of assumptions (propositions / theories), not an isolated hypothesis (proposition / theory).

Strong Criticism 2:

Lakatos suggests a fictional example as a critique of the attitude he calls dogmatic (or naturalist) falsificationism. Accordingly, a physicist of the pre-Einstein era takes the Newtonian Theory (N) and accepted initial conditions (B) and calculates the trajectory of a planet (g) with their help. Observations show that the planet deviates from the calculated trajectory. In this case, will the physicist think that Newton's theory prohibits deviation, and therefore the deviation determined by observations refutes the N theory?

The Newtonian physicist argues that there must be an unknown g1 planet so far that disrupts g's orbit. Depending on the effect of this hypothetical planet on g, mass and trajectory calculations based on Newton's Theory are made and an observer (astronomer) is asked to test the hypothesis. Planet G1 is so small that even the most powerful telescope on hand cannot observe. In order to test this assumption, side studies are started to make more powerful telescopes (observation tools). In three years, the new telescope is made ready and the position of planet g1 is observed. The result of the observation is negative.

However, this situation is not accepted as a falsification of the N theory. The theorist argues that a cosmic dust cloud prevents g1 from being observed. The physicist theoretically calculates the location and properties of this cloud and requests that a satellite be sent to test its results. If the satellite's tools detect the existence of the hypothetical cloud, the result will be the triumph of the N theory. Because it will be strengthened as a theory that reveals a previously unknown phenomenon. Otherwise, the N theory will be falsified.

The satellite's observation tools cannot find the hypothetical cloud. The theorist does not give up neither the N theory nor the cloud assumption. It assumes a magnetic field that affects the satellite's vehicles in that part of the universe.

This process can be sustained as desired, without compromising the scientific criterion (testability). The history of science shows that the contradictions that falsify the theories have been eliminated with the savior assumptions or additions to the theory, if not as much as the fictional example of Lakatos, and if this cannot be done, the contradictions have been 'ignored' for too long. So falsification becomes problematic.