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What does the "non-discovery" of gravity waves episode teach us about the nature of experiments and scientific discovery?

One of the important issues that the "non-discovery" of gravity waves demonstrates a side of science not usually considered, but one all too familiar to non-scientists.

This issue arises when *real* questions are posted. Questions that we do not already have an answer for. From these questions can arise a phenomenon known (as detailed in *The Golem*) as The experimenter's regress. This phenomenon is due to the circular logic involved in setting up experiments to solve interesting questions. An issue arises when this circle cannot be broken by previous scientific data. When this system breaks down, the scientific community appears ill equipped to deal with the resulting chaos.

The case of Weber and his discovery of gravity waves is a perfect example of this. He followed the established scientific methods and procedures. He set up multiple, independent experiments. Found trends that could be easily explained by known scientific fact. His gravity waves showed up every 24 hours with the rotation of the planet and were correlated between different locations on Earth.

However when it got to the last phase of the scientific method (the persuade other scientists that your results are meaningful phase) he ran into trouble. On this particular issue no one agreed. Some scientists thought that using a computer to analyze data was the convincing point. Others said it made no difference (*The Golem* p97). What was most troubling though, is the reasons that scientists gave as valid reasons for not agreeing. These ranged from experimenter nationality to personality/intelligence to the presentation format of their results. (p101)

Ultimately, this tells us a few important things to note about scientific experimentation. First, despite appearances there is sometimes a very human factor present in scientific discovery that we should be aware of, especially in cases of new or politically controversial discoveries. Secondly, before presenting the results of your scientific experiments, dress nicely and make very pretty graphs.

Sources

The Golem: what you should know about science, pp91-107