

Theory of Knowledge Exhibition:
Reactions to New Knowledge in Science and Religion

January 31, 2023

For this Theory of Knowledge exhibition, I have selected the prompt, “**Can new knowledge change established values or beliefs?**” I will focus on the *beliefs* portion of this prompt, as I believe that new knowledge conflicting with prior beliefs is something that happens constantly in our world. For the purpose of this essay, I will define beliefs as what is thought to be true within a given community, no matter what those opinions are based on.

Object 1: The *Index Librorum Prohibitorum*



Figure 1: An old copy of the *Index Librorum Prohibitorum*¹

The *Index Librorum Prohibitorum* (“Index of Forbidden Books” in English) was the Roman Catholic Church’s list of banned books. Its publication stopped in 1966, more than 400 years after its initial publication². Essentially, it was the Church’s way to prevent the spread of *erroneous*, *heretic* or *immoral* ideas. Some of mankind’s greatest writers and thinkers were silenced in this way, with Victor Hugo’s *Les misérables* and *Notre-Dame de Paris* being notable examples¹.

In fact, this was how the Church reacted to a wide range of new ideas and to evidence backing those ideas, in domains ranging from philosophy to natural sciences. The Church argued that true believers do not need proof, that faith is what matters. This approach to knowledge is particularly interesting, because it argues that factual observations about our world are less important than our convictions. Essentially, the idea is that theological knowledge is the fundamental building block of understanding and that what goes against it must therefore be false.

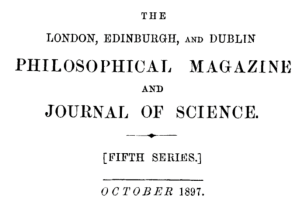
This highlights a first interesting point about whether new knowledge changes established beliefs: in areas of knowledge and communities where convictions and tradition are more important than current observations, new knowledge can often be dismissed as completely irrelevant.

Object 2: J. J. Thomson’s Article *Cathode Rays*

In 1897, Sir Joseph John Thomson published the results of his experiments on cathode rays in *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*⁴. At the time, there was no scientific consensus amongst the scientific community about why cathode rays behaved in the way that they did³. Whereas German physicists mainly believed that the observed behaviours were “produced by occurrence in the ether,” French and British physicists believed that particles were at cause⁵. Then, came along Thomson, who was able to show, in his now-famous paper *Cathode Rays*, that their behaviour was in fact due to the existence of negatively charged particles.

But what was so convincing about this paper? Well, it was a perfect example of the utmost scientific rigour. Thomson filled the holes in the previous experiments, notably those accomplished by Perrin, by laying down a clear set of experimental observations leading to the above conclusions and by addressing all assumptions he made. He repeatedly set testable hypotheses and then verified them to narrow down the cause of the observed behaviours, sometimes even using multiple methods. In truth, it is not Thomson’s paper that changed the beliefs as much as his rigour in writing it.

The scientific community, which bases its pursuit of the truth on that very high standard of proof and rigour, was convinced by his discoveries and most of those who originally disagreed with him changed their opinions about the explanation behind the behaviour of cathode rays in less than a few years⁵.



XI. *Cathode Rays*. By J. J. THOMSON, M.A., F.R.S., Cavendish Professor of Experimental Physics, Cambridge*.

THE experiments† discussed in this paper were undertaken in the hope of gaining some information as to the nature of the Cathode Rays. The most diverse opinions are held as to these rays; according to the almost unanimous opinion of German physicists they are due to some process in the ether to which—inasmuch as in a uniform magnetic field their course is circular and not rectilinear—no phenomenon hitherto observed is analogous: another view of these rays is that, so far from being wholly aethereal, they are in fact wholly material, and that they mark the paths of particles of matter charged with negative electricity. It would seem at first sight that it ought not to be difficult to discriminate between views so different, yet experience shows that this is not the case, as amongst the physicists who have most deeply studied the subject can be found supporters of either theory.

The electricity-particle theory has for purposes of research a great advantage over the aethereal theory, since it is definite and its consequences can be predicted; with the aethereal theory it is impossible to predict what will happen under any given circumstances, as on this theory we are dealing with hitherto

* Communicated by the Author.

† Some of these experiments have already been described in a paper read before the Cambridge Philosophical Society (Proceedings, vol. xi. 1897), and in a Friday Evening Discourse at the Royal Institution (“Electricity,” May 21, 1897).

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Figure 2: The first page of J. J. Thomson’s Article *Cathode Rays*^{3,4}

Bibliography

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