Theory of Knowledge Exhibition:

Reactions to New Knowledge in Science and Religion

Samuel Martineau

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For this Theory of Knowledge exhibition, I have selected the prompt, **"Can new knowledge change established values or beliefs?"** I find this question particularly interesting because of my internal dilemma between believing that new knowledge ought to change established beliefs, while knowing that it often doesn't. I will therefore, focus on the *beliefs* portion of this prompt. But what are *beliefs*? For the purpose of this essay, I will define them 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*

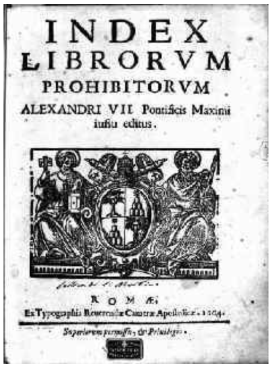
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Figure 1: An old copy of the *Index Librorum Prohibitorum*[1]

The *Index Librorum Prohibitorum*, "Index of Forbidden Books" in English, was the Roman Catholic Church's list of banned books, curated by the official censors. Its publication stopped in 1966, more than 400 years after its initial publication[2]. 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, from Descartes to Jean-Paul Sartre[1].

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. That no matter what we see, we should not fold. Essentially, the idea is that theological knowledge is the fundamental building block of understanding and that what goes against it must therefore be false.

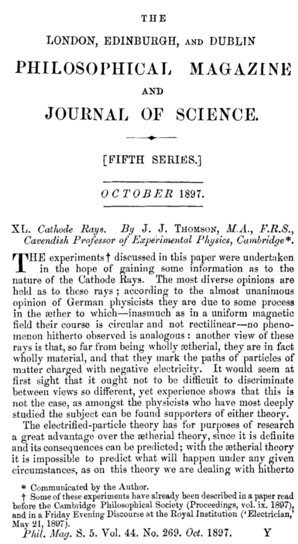
This highlights a first interesting point about whether new knowledge changes established beliefs: in areas of knowledge and communities where convictions and tradition are more important than current observations, new knowledge can often be dismissed as completely irrelevant.

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 did[3]. Thomson, with the rigour of the scientific method, was able to show that the behaviour of cathode rays was in fact due to the existence of negatively charged particles. Furthermore, he was able to assert that they were subatomic particles, even if atoms were previously thought to be indivisible. Less than a few years later, the majority of the scientific community agreed with his conclusions[5].

This is the scientific method at its best. Someone comes along with a theory, designs and executes an experiment, analyzes and then publishes the results. The scientific community, after reviewing the scientific's work, will consider the new findings as part of scientific knowledge if they are deemed truthful and rigorous.

This is a perfect example of how new knowledge can change prior beliefs: in areas of knowledge and communities where evidence and proof are the most important concepts, new knowledge can often be quite quickly accepted and used as a basis for further investigations. In those areas of knowledge, it often doesn't matter if old ideas are disrupted, as current empirical evidence is the basis of knowledge.


THE

LONDON, EDINBURGH, AND DUBLIN

PHILOSOPHICAL MAGAZINE

AND

JOURNAL OF SCIENCE.

[FIFTH SERIES.]

OCTOBER 1897.

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

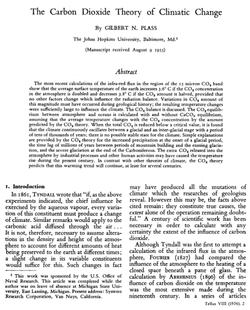
* Communicated by the Author.

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

Phil. Mag. S. 5. Vol. 44. No. 269. *Oct.* 1897. Y

Figure 2: The first page of J. J. Thomson's Article *Cathode Rays*[3,4]

Object 3: Gilbert N. Plass' Paper "The Carbon Dioxide Theory of Climatic Change"


The Carbon Dioxide Theory of Climatic Change

By GILBERT N. PLASS

The Johns Hopkins University, Baltimore, Md.[1]

(Manuscript received August 9 1955)

Abstract

The most recent calculations of the infra-red flux in the region of the 15 micron CO_2 band show that the average surface temperature of the earth increases 3.6° C if the CO_2 concentration in the atmosphere is doubled and decreases 3.8° C if the CO_2 amount is halved, provided that no other factors change which influence the radiation balance. Variations in CO_2 amount of this magnitude must have occurred during geological history; the resulting temperature changes were sufficiently large to influence the climate. The CO_2 balance is discussed. The CO_2 equilibrium between atmosphere and oceans is calculated with and without $CaCO_3$ equilibrium, assuming that the average temperature changes with the CO_2 concentration by the amount predicted by the CO_2 theory. When the total CO_2 is reduced below a critical value, it is found that the climate continuously oscillates between a glacial and an inter-glacial stage with a period of tens of thousands of years; there is no possible stable state for the climate. Simple explanations are provided by the CO_2 theory for the increased precipitation at the onset of a glacial period, the time lag of millions of years between periods of mountain building and the ensuing glaciation, and the severe glaciation at the end of the Carboniferous. The extra CO_2 released into the atmosphere by industrial processes and other human activities may have caused the temperature rise during the present century. In contrast with other theories of climate, the CO_2 theory predicts that this warming trend will continue, at least for several centuries.

1. Introduction

In 1861, TYNDALL wrote that "if, as the above experiments indicated, the chief influence be exercised by the aqueous vapour, every variation of this constituent must produce a change of climate. Similar remarks would apply to the carbonic acid diffused through the air ... It is not, therefore, necessary to assume alterations in the density and height of the atmosphere to account for different amounts of heat being preserved to the earth at different times; a slight change in its variable constituents would suffice for this. Such changes in fact may have produced all the mutations of climate which the researches of geologists reveal. However this may be, the facts above cited remain: they constitute true causes, the *extent* alone of the operation remaining doubtful." A century of scientific work has been necessary in order to calculate with any certainty the extent of the influence of carbon dioxide.

Although Tyndall was the first to attempt a calculation of the infrared flux in the atmosphere, FOURIER (1827) had compared the influence of the atmosphere to the heating of a closed space beneath a pane of glass. The calculation by ARRHENIUS (1896) of the influence of carbon dioxide on the temperature was the most extensive made during the nineteenth century. In a series of articles

[1] This work was sponsored by the U.S. Office of Naval Research. This article was completed while the author was on leave of absence at Michigan State University, East Lansing, Michigan. Present address: Systems Research Corporation, Van Nuys, California.

Tellus VIII (1956). 2

Figure 3: Gilbert N. Plass' Paper *The Carbon Dioxide Theory of Climatic Change*[6]

In May 1956, Gilbert Norman Plass published a paper titled *The Carbon Dioxide Theory of Climatic Change*. In it, he outlines the relation between the concentration of CO_2 in the atmosphere and the Earth's surface average temperature. Furthermore, he points out the possibility that the rise in temperature observed in the last century, relative to the date of publication of the paper, may have been caused by the industrialization of human activities, due to their high production of CO_2[6].

All of this to say, humankind has known about climate change for a while now. Especially with the fact that studies about this have only gotten more and more common over the last few decades. Yet, to this day, we are still yet to really act about it. I don't think that the wise words of Benjamin Franklin, "You will observe with concern how long a useful truth may be known, and exist, before it is generally received and practiced on," have ever been more relevant than they are today. We know that we are heading directly towards our own destruction and we have scientific evidence that this is true. So, why don't we act?

This highlights a third key idea of whether new knowledge changes our beliefs: it seems to be that when new knowledge would require the average human to change his behaviour in his day-to-day life, humankind is exceedingly slow to change his real beliefs. It is easy to accept scientific knowledge when it requires no effort from our part, when we only need to say: "Yes, I recognize that subatomic particles exist." However, similarly to how religion might often reject new knowledge that contradicts their way to think about life, most humans seem to reject, or at least not completely accept, new knowledge that contradicts their way of life.

Conclusion

In summary, when new knowledge doesn't require us to change our fundamental beliefs about the world or our day-to-day life, we can be quite efficient at changing our beliefs, especially in the field of the natural sciences. However, we can also be exceedingly stubborn to the point of denying what is in front of our very eyes when new truths do not fit with what we want them to be, may it be sciences or in religion.

Bibliography

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