



# Science denial as a form of pseudoscience



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## ABSTRACT

Science denialism poses a serious threat to human health and the long-term sustainability of human civilization. Although it has recently been rather extensively discussed, this discussion has rarely been connected to the extensive literature on pseudoscience and the science-pseudoscience demarcation. This contribution argues that science denialism should be seen as one of the two major forms of pseudoscience, alongside of pseudotheory promotion. A detailed comparison is made between three prominent forms of science denialism, namely relativity theory denialism, evolution denialism, and climate science denialism. Several characteristics are identified that distinguish science denialism from other forms of pseudoscience, in particular its persistent fabrication of fake controversies, the extraordinary male dominance among its activists, and its strong connection with various forms of right-wing politics. It is argued that the scientific response to science denialism has to be conceived with these characteristics in mind. In particular, it is important to expose the fabricated fake controversies for what they are and to reveal how science denialists consistently use deviant criteria of assent to distort the scientific process.

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## 1. Introduction

Due to the prevalence of well-moneyed and politically well-connected antagonists of climate science, the phenomenon of science denial has become an increasingly discussed topic in the last decade. Several authors have commented on the similarities between unscientific rejections of climate science and similar reactions to other scientific areas such as evolution, vaccination, and tobacco disease. The terms *science denial* and *science denialism* are now commonly used to describe these anti-scientific activities, and a literature is emerging that describes their common features (Diethelm & McKee, 2009; Liu, 2012; Rosenau, 2012) and also the personal, organizational and economic bonds between them (Oreskes & Conway, 2010). However, few references have been made in this discussion to the literature on pseudoscience and the science/pseudoscience demarcation. The discussion on pseudoscience is considerably older and much more extensive, and it is also much more strongly connected to general themes in the philosophy of science (Hansson, 2008; Pigliucci and Boudry 2013). It is the purpose of the present contribution to show how science denial can be understood as one of two major forms of pseudoscience. It has

important characteristics in common with other forms of pseudoscience, but also some characteristics of its own.

In Section 2 the concepts of science and pseudoscience are briefly clarified, and a distinction is proposed between two forms of the latter, namely science denialism and pseudotheory promotion. The following two sections explore the characteristics of three prominent forms of science denialism, namely relativity theory denialism, evolution denialism, and climate science denialism. Section 3 is devoted to four major epistemological characteristics, and Section 4 to ten characteristics that may be described as more sociological. In Section 5 science denialism is compared to pseudotheory promotion, and characteristics that distinguish science denialism from other forms of pseudoscience are singled out. In Section 6 some implications of this investigation for scientific responses to science denial are pointed out.

## 2. Science, pseudoscience, and science denialism

Science is the practice that provides us with the most reliable (i.e. epistemically most warranted) statements that can be made, at the time being, on subject matter covered by the community of knowledge disciplines. This includes statements on nature, ourselves as human beings, our societies, our physical constructions, and our thought constructions. (Hansson, 2013a) As I have argued

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in detail elsewhere, a statement should be considered to be pseudoscientific if and only if it satisfies the following three criteria:

1. It pertains to an issue within the domains of science in a broad sense (the criterion of scientific domain).
2. It suffers from such a severe lack of reliability that it cannot at all be trusted (the criterion of unreliability).
3. It is part of a doctrine whose major proponents try to create the impression that it represents the most reliable knowledge on its subject matter (the criterion of deviant doctrine). (Hansson, 2013a)

The term “science in a broad sense” in the first criterion indicates that the word “science” is taken in a broad sense that also includes the humanities. (This corresponds to the usage of the German term “Wissenschaft”).<sup>1</sup> This broad definition simplifies discussions on science denial and other forms of pseudoscience. The misrepresentations of history presented by Holocaust deniers and other pseudo-historians are very similar in nature to the misrepresentations of natural science promoted by creationists and homeopaths.

Concerning the second criterion it should be observed that good science is characterized not only by being reliable but also by being fruitful for knowledge production and in many cases practically useful. According to this definition, lack of these other qualities does not suffice to classify a claim or a practice as pseudoscientific. (It may be sufficient for classification as bad science.)

The third criterion excludes some practices that satisfy the other two criteria but are still not called pseudoscience. In particular it excludes fraud in science. This is a practice that clearly satisfies the first two criteria but is still not called “pseudoscience”. It also excludes mistakes in science, for instance the inadvertent use of grossly inadequate measurements methods. As I have discussed in some detail elsewhere, the missing element in cases of fraud and serious mistakes is a deviant doctrine. (Hansson, 1996, 2009, 2013a) Isolated breaches of the requirements of science are usually not regarded as pseudoscientific. Pseudoscience, as it is commonly conceived, involves a sustained effort to promote teachings that do not have scientific legitimacy at the time.

This doctrinal deviation of pseudoscience can take two major forms. We can distinguish between *science denialism* and *pseudo-theory promotion*. Science denialists are driven by their enmity towards some specific scientific account or theory. Some typical examples are:

climate change denialism  
holocaust denialism  
relativity theory denialism  
aids denialism  
vaccination denialism  
tobacco disease denialism

Pseudotheory promoters are driven by their aspirations to advance a theory or a claim of their own. This implies the rejection of some parts of science, but that is not a primary goal for them, only a means to promote their own theory. Some examples are:

astrology  
homeopathy  
iridology

<sup>1</sup> The broad definition of the term follows from the basic definition of science stated in the first sentence of this section. For further justification of this definition, see Hansson, 2013a, 62–66, and 2015, 15–16.

scientology  
transcendental meditation  
ancient astronaut theories

The two categories are by no means mutually exclusive. Most pseudoscientific teachings seem to belong primarily to either of the two, but often the practice of one leads into the other. The distinction should therefore not be seen as a strict dichotomy, but rather as a spectrum or continuum with many gradations between its two endpoints. For instance, scientology is predominantly a case of pseudotheory promotion, but as part of the promotion of their own alleged solutions to psychiatric problems scientologists have engaged in vitriolic attacks on virtually all forms of psychiatry, including science-based psychiatric treatments that (contrary to scientological practices) have well-documented beneficial effects (Kent, 1999). Another interesting example is creationism. It originated in religiously motivated unwillingness to accept the overwhelming evidence for biological evolution. In order to make their case more credible, creationists have often portrayed their teachings as some form of alternative theory about the origin of life, but it is obvious from their writings that these more “positive” elements of the message have only a subsidiary role in relation to the denial of evolution. (Boudry, Blancke, & Braeckman, 2010) All major versions of creationism (including its skeletal version “intelligent design”) are still predominantly forms of science denialism.

In order to identify some major characteristics of science denialism, three influential forms of it will be compared, namely relativity theory denialism, evolution denialism, and climate science denialism. Relativity theory denialism had its heyday in the 1920s and 1930s but it still has enthusiastic adherents (Beyerchen, 1977; Wazeck, 2009). Evolution denialism (creationism) has a long history, but the elaboration of pseudoscientific arguments against evolution had a breakthrough in the 1960s (Kirkpatrick, 2000; Montgomery, 2012). Climate science denialism (self-named “climate skepticism”) got off the ground in the 1980s (Mooney, 2005; Oreskes & Conway, 2010).

### 3. Four epistemological characteristics

In this section, four characteristics of science denialism will be introduced that are all epistemologically significant and closely connected with the failure of these teachings to provide us with reliable knowledge.

#### 3.1. Cherry-picking

In order to form a well-considered scientific judgment it is essential to evaluate the whole body of evidence. In many if not most areas of science, reports can be found that might, if considered alone, be taken to support a conclusion different from that which follows from the full body of evidence. For instance, in clinical medicine there are often case reports that seemingly contradict the conclusions that are supported by the overwhelming evidence from well-conducted clinical trials. Arguably, you can prove almost anything you want by cherry-picking the evidence. A classic example is the tobacco industry’s campaigns in the 1990s in which cherry-picking was systematically employed to discredit the evidence showing that passive smoking causes deadly diseases (Barnes & Bero, 1998; Francis, Shea, & Samet, 2006).

The Conservapedia website entry “Counterexamples to Relativity” is a clear example of cherry-picking. It contains a long list of observations and alleged anomalies that have the appearance of counterexamples to relativity theory. (One of these purported deviations from the predictions of relativity theory is nicely explained in Turyshev et al., 2012.) Similarly, the deniers of evolution science

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