On being a scientist with scientifically controversial beliefs

An exploration of the experiences and views of scientists with beliefs that are not endorsed by a scientific consensus

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Abstract

Beliefs that concern the religious, spiritual or paranormal domain are often scientifically controversial. Science is valued highly among scientists and in society. As a result, both the influence of science and the resistance against scientifically controversial beliefs seem to rise. Such a development could be challenging for people, especially scientists, who entertain such beliefs. The purpose of this thesis is to explore how eight Dutch social and natural scientists handle personal scientifically controversial beliefs and how they experience the scientific community's response to these beliefs. Semi-structured interviews with these scientists were conducted. They give various explanations of why they do not experience an internal conflict between their scientific work and their scientifically controversial beliefs. The non-Christian interviewees, entertaining ideas concerning spirituality, the paranormal or alternative medicine, experience relatively more resistance against their beliefs from within the scientific community, possibly because, other than the Christian interviewees, they wish to study these beliefs in a scientific context. Suggestions for how further research can build on this graduation project are included.

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1. Introduction

1.1 The leg that grew

February 2013. Onno van Schayck, professor of preventive medicine at Maastricht University in the Netherlands, gives an interview about his views on the relationship between science and religion. Van Schayck is a protestant Christian, and explains that his religion does not play a role in his scientific work. After some hesitation, however, he mentions that he has experienced a miraculous healing. Twenty-five years ago, van Schayck saw how a leg that was too short grew longer spontaneously. This experience was irrefutably confirmed by X-rays, according to the professor (ForumC, 2013).

These comments caused a lot of commotion and public discussion in the following weeks. Although van Schayck persisted that he saw the leg grow, he admitted that the evidence for this event was not irrefutable and stepped back as research institute director at Maastricht University (Kuiken, 2013). In response, a group of 27 Christian professors signed an open letter in support of van Schayck, claiming that, apparently, "scientists are not allowed to speculate publicly about possible alternative explanations when observing a scientifically inexplicable phenomenon". According to these professors, this "lynching culture" in the Netherlands severely limited scientists' freedom of speech (Bovenberg et al., 2013). Of course, in turn, this letter stirred up the conversation about religion and science (e.g. Keulemans, 2013).

1.2 Scientists with controversial unscientific beliefs

Just like everyone else, scientists can entertain beliefs that are not supported by a scientific consensus. There are, for example, scientifically trained doctors who are specialized in homeopathic healthcare (e.g. doctors affiliated with AVIG, a Dutch organization promoting integrative medicine[1]), scientists who believe in a god (as demonstrated by the peer-reviewed scientific journal *JISTech, Journal of Islamic Science and Technology*), and scientists who reject evolutionary theory (e.g. Discovery Institute's Center for Science & Culture, 2006). In this graduation project, I will explore the views and experiences of Dutch researchers in social and natural sciences with scientifically controversial beliefs (also referred to as *unscientific controversial* or *alternative beliefs*), through the conduct and analysis of semi-structured interviews. Detailed criteria for controversial unscientific beliefs are provided in section 2.1.2. interviewees hold this kind of beliefs about 1) spirituality and religion, 2) the paranormal, or 3) alternative medicine. Of course, these categories can overlap, but they are helpful in providing a preliminary characterization of scientifically controversial beliefs.

A subset of the ideas that are controversial among scientists are beliefs that involve the existence of paranormal phenomena, such as extrasensory perception and ghosts. By definition, paranormal beliefs clash with science, as they are characterized as beliefs that cannot be explained by scientific laws, involving strange and unknown forces (Sinclair, 2008). Both believing and skeptic researchers have investigated these phenomena. As scientific research did not yield sufficient results, most academic investigations of parapsychology ended around the beginning of World War I or the 1930s, whereas

[1] Integrative medicine is the combination of medical treatment supported by science and alternative medicine.

Dutch parapsychology was common at universities in the Netherlands throughout the twentieth century (Kloosterman, 2016).

Another subset of ideas that are controversial among scientists originates in religion and spirituality. The question of whether science and religion are compatible has been debated continuously since – at least – mid-nineteenth century in philosophy and theology (Roberts, 2011). In the 1960s, the systematic study of the relationship between science and religion – primarily Christianity – started, a discipline populated mainly by theologians, philosophers with an interest in science and scientists with an interest in religion. At that time, this new field challenged the predominant conception that science and religion were fundamentally incompatible (de Cruz, 2017). Frequent reasons to doubt the compatibility of religion and science are 1) the scientific aim to provide explanations for all aspects of reality without the involvement of supernatural causes, which can result in certain scientific and religious beliefs that seem contradictory (de Cruz, 2017),[2] 2) the idea that religious dogma clashes with the scientific attitude that no belief should be held sacred or beyond question (Krauss, 2015). The aforementioned anecdote about Onno van Schayck links to the first reason. It demonstrates the belief that prayer can have medical effects, which contradicts scientific consensus.

Some of the interviewees believe in (some aspects of) alternative medicine practices, another form of scientifically controversial belief. Alternative medicine is a type of medicine that is not backed by scientific beliefs. Such practices can involve claims that are hard or impossible to test in a scientific experiment, or they make claims that contradict current scientific beliefs. Often, these practices have originated long before modern science, e.g. acupuncture and Ayurvedic medicine (What Exactly Is Alternative Medicine?, 2019).

1.3 Relevance

According to Hertzberger (2019), de Ridder, Peels and van Woudenberg (2018) and Boudry and Pigliucci (2018), the influence of science in society is currently growing. This statement is supported by data on the relatively high public trust in science (e.g. see Funk, Hefferon, Kennedy, & Johnson, 2019 for data on the USA and see van den Broek-Honingh & de Jonge for data on the Dutch public). Hertzberger (2019), de Ridder et al. (2018), authors included in Boudry and Pigliucci (2018, specifically Buekens, Edis, Pigliucci, Ruse, & Sorell) and van Egmond (2019), all indicate possible consequences of this development, like the repression or avoidance of other ways of acquiring beliefs. This development might lead to difficulties for those who hold alternative beliefs concerning, for example, the religious, spiritual and paranormal domains. Researchers with these kinds of beliefs occupy a special position in the midst of this development, as they are representatives of both parties: the scientific community and the people whose beliefs are perhaps increasingly looked down on. Working in a scientific environment, they might experience increasingly less tolerance towards their scientifically controversial beliefs. Scientists with religious beliefs as well as researchers with other alternative beliefs, involving spirituality the paranormal and alternative medicine, are interviewed here. This makes it possible to compare the experiences of holding these different scientifically controversial belief in a single study. Religious belief in the scientific community has been studied before (e.g. Ecklund & Park, 2009; Ecklund, Park and Veliz, 2008; Ecklund & Scheitle, 2007; Ecklund, 2010; van Veelen, 2011) but rarely with a qualitative method. The qualitative approach

[2] Supervisor Bas Haring pointed out the example of Thales of Miletus (624-545 B.C.), a philosopher who offered a natural explanation for the flooding of the Nile, avoiding the concept of divine intervention. In that respect, he is considered to be a scientific pioneer (Vastenhouw, 2007).

taken in this thesis can lead to more in-depth information. Additionally, qualitative and quantitative studies about why people, and how many of them, hold beliefs that do not conform to scientific consensus exist (e.g. Hameed, 2008; Harambam & Aupers, 2015; Smith & Wu, 2012). This thesis add new information to this domain because I focus on the alternative beliefs, experiences and views of *scientists* specifically.

1.4 Research questions and objectives

The central questions in this explorative project are 1) how members of a group of Dutch social and natural scientists handle personal controversial unscientific beliefs and 2) how the scientific community responds to these beliefs in their eyes. To answer these questions, the study is operationalized in six concrete steps. The interview questions need to be developed first. Then I will define a sample and contact possible participants. Third, in-depth interviews with the defined sample of researchers who have controversial unscientific beliefs are conducted. The responses given in these interviews will be coded and analyzed, as the fourth step in my research. Fifth, the relevant literature will be discussed. Last, I will reflect on the interview responses, while considering the reviewed literature.

1.5 Reading guide

In chapter 2, a literature review is provided, in which definitions and sketches of important concepts are provided. This chapter also includes a discussion of theories that will form a basis for interpreting the findings. Chapter 3 gives an overview of the research procedures of this project, including the philosophical assumptions that are involved in qualitative research and the methodology that has been applied to gather and analyze the empirical materials. The findings are discussed in chapter 4, which is structured around the three main themes that emerged from the materials. In chapter 5, these findings are summarized and discussed in the light of the literature review. Moreover, the limitations of the project and recommendations for future research are covered in this last chapter.

2. Literature review

In this section, the concepts and theories relevant to this project are considered. Section 2.1 explains the concepts *belief* and *knowledge* and includes a review of literature about how scientific beliefs can be demarcated from beliefs in general. Furthermore, this section explains how scientifically controversial beliefs are defined in this project. Literature about the growing influence of science in society and the friction between scientific and alternative beliefs is discussed in section 2.2. This chapter ends with an outline of related research about scientists and other people who have religious and/or scientifically controversial beliefs in section 2.3. In addition to section 1.3, section 2.3 should clarify the research gaps that are addressed.

2.1 Beliefs in and outside of the lab

This thesis is about beliefs. *Belief* can be defined as an attitude towards a proposition, namely the attitude that that proposition is true (Schitzgebel, 2019). In colloquial use, and in this thesis, one can believe something, even when one is in doubt. In other words, the definition used in this thesis allows for varying degrees of certainty when it comes to believing. Beliefs need not be justified; one can believe something without having an available justification for others or themselves. *Knowledge* is a special kind of belief. Both traditionally and in some contemporary philosophical debates, a definition

that is widely accepted is that knowledge is a belief that is both true and justified (Boghossian, 2007). Even though this definition has been shown to be imperfect and insufficient (see e.g. Gettier, 1963), I believe it will suffice for this project. Beliefs can be acquired and justified in different ways. A belief is justified when people are convinced by evidence or other support for it, *more so* than by evidence or support for rival beliefs. What counts as evidence or support for a belief differs per person. Common examples of justifiers for beliefs include reason, testimony, an appeal to criteria and authority and evidence of the senses, i.e. empiricism (Tallman, 2016; Theory of justification, 2019).

2.1.1 Demarcating scientific beliefs

In everyday language, science is referred to as 1) the research into "the nature and behavior of natural things" as well as 2) the beliefs obtained through this inquiry (Sinclair, 2008). In this thesis, I write about 1) scientific research (or inquiry) and 2) scientific beliefs to distinguish these two concepts. Of course, there is no univocal definition of science. There is a spectrum between natural and ahistorical sciences, dealing with 'simple' subjects and social and historical sciences, focusing on complex subjects. The methods that are used by the different disciplines can vary greatly. Following Pigliucci (2010), in this thesis, *science* refers to the natural and the social sciences, excluding the humanities. This division is partly culturally determined. There is no single way in which scientific beliefs can be acquired. Often, this kind of beliefs can be justified with evidence of the senses, i.e. using empirical argumentation. Other scientific beliefs come about without empirical, experimental data, such as beliefs in theoretical mathematics and logic, which are justified by logical reasoning. Many philosophers of science have grappled with the question of how science can be distinguished from other methods of inquiry, and whether this enterprise is capable of uncovering the true nature of the world. What are scientifically justified beliefs, and are they better than beliefs that are justified by different means? A related issue is whether scientifically justified beliefs are necessarily true, because that would be support for the idea that scientific beliefs are superior. Chalmers (2013) has provided an overview of many attempts to answer these questions, attempts stemming from ca. 1900 and onwards. The central aim of his book is to clarify what, if anything, is characteristic of scientific beliefs. The different approaches in Chalmers (2013) are summarized and compared below and supplemented with a discussion of the approaches taken by Richard Rorty and Bruno Latour, relatively contemporary philosophers whose work builds on that of the philosophers in Chalmers' review.

Chalmers (2013) begins his review with a discussion of Inductivism. According to Inductivists, scientific knowledge can be induced from the accumulation of observations and experimental data that verify it. The probability of scientific beliefs is based on the quality and quantity of its verifications. Scientific research is seen as a predominantly objective, rational and logical process, which involves the gradual discovery of the true nature of phenomena in the world (Bos et al., 2019). However, scientific research is not completely objective, rational and logical in practice. The interpretation of observations and experimental data is theory-dependent and fallible, as Chalmers (2013) states, basing his claim on works of Quine, Duhem and Kuhn. Moreover, inductive reasoning is problematic, since a previously verified hypothesis can be 'knocked down' immediately when counterevidence arises.

Like the Inductivists, Karl Popper saw science as a largely objective and well-organized enterprise, gradually approaching a true description of the phenomena in the world. He tried to solve the problem of induction. According to Popper, scientific research cannot verify any hypotheses, but these hypotheses can be falsified by counterevidence. Popper's theory of falsification is built on the

assumption that the best theories will survive the severest tests. However, in scientific practice, it is impossible to find out exactly why a theory has failed to pass a test, as so many factors are involved.

As both verification and falsification of theories proved to be insufficient representations of the scientific process, Thomas Kuhn shifted the focus to the theoretical frameworks in which groups of scientists work. Sociological factors are taken into account. The current theoretical framework in a discipline influences how results of observations and experiments are interpreted and which methodologies are seen as accurate. Consequently, the framework affects the acceptation or rejection of these results. Kuhn explained a change from one framework to another, a scientific revolution, as a sociological and somewhat subjective process. Such a revolution does not always lead to a step forward in scientific inquiry and increased knowledge about the true nature of things. The seemingly capricious course of science, steered by these sociologically and subjectively informed revolutions, led to accusations of being a relativist towards Kuhn. Kuhn tried to escape these allegations by putting emphasis on five criteria that he formulated. According to him, in practice, these criteria would guide scientists in choosing the most promising framework for their field (Kuhn, 1962/2012). The involvement of these criteria made framework shifts seem less arbitrary and subjective.

Imre Lakatos also paid attention to the role of theoretical frameworks in scientific research and he also included sociological factors in his account of science. However, unlike Kuhn, Lakatos argued that scientific revolutions were brought about by rational methodological decisions, made by individual scientists. These decisions were informed by methodological guidelines. As these guidelines were not binding, and because Lakatos never prescribed a method, it was still impossible to determine how a shift between theoretical frameworks would necessarily bring researchers a step closer to finding true beliefs.

Paul Feyerabend jokingly referred to Lakatos as a "fellow anarchist", as both Lakatos and he did not prescribe any rules to scientists. According to Feyerabend, scientific research is an anarchic enterprise and therefore its dogmatic high status in society cannot be justified rationally. He argued that scientists should be free to adhere to whatever methods and theories they saw fit and that individuals should be free to choose between science and other sources of beliefs. In a society that is truly free, every person "has learned to make up his mind and [...] then *decided* in favor of what he thinks suits him", Feyerabend wrote (Chalmers, 2013, p. 145). His utopia was a state neutral between ideologies.[3] Like Kuhn, Feyerabend characterizes scientific research in practice as a sociological process, in which power is more important than truth (Bos et al., 2019). This resembles how Dutch conspiracy theorists tend to look at the scientific community, claiming that scientific beliefs tend to be "the product of selection and exclusion". Lay beliefs are ignored by scientific experts who form a "global power elite" (Harambam & Aupers, 2015). According to Chalmers (2013), Feyerabend's assertion that there is no universal ahistorical scientific method is right. However, Chalmers argues that a universal method does exist in the sense that most researchers agree on a set of basic, common-sense criteria. He does not explain how those criteria can be identified (Worall et al, 2000, commenting on the third edition of Chalmers' book).

[3] Of course, this statement does not rule out the possibility that Feyerabend himself preferred policies based on scientific research over other ideologies.

Chalmers continues his story of how philosophers have grappled with the demarcation of science with a discussion of the approach taken by subjective Bayesians. Here, similar to Kuhn, Lakatos and Feyerabend, scientific research is characterized as a sociological and subjective process. In this approach, the best scientific theories have the highest subjective degrees of belief by scientists working in the field. Critics emphasized that this approach is based on subjective interpretations that are not subjected to critical analysis, which means that extension of the body of scientific beliefs does not necessarily lead to more knowledge about what reality is like. Moreover, the theory defines scientific beliefs as the most popular opinions of those who work in science, but it does not define what good science is.

The new experimentalists (Chalmers [2013, p. 193-212] mainly focuses on the work of new experimentalist Deborah Mayo[4]) shifted their focus from "theory-dominated accounts of science" to an account of science based on the accumulation of – in their eyes – theory-independent experimental knowledge. According to new experimentalists, scientific revolutions are rational in that they are forced upon us by an accumulation of experimental results (Chalmers, 2013). In this approach, scientific beliefs distinguish themselves from other beliefs in that they are justified by experimental results. The approach is criticized because it fails to recognize that the experimental results are guided and interpreted through the prism of prevailing theories, which makes them more subjective than the new experimentalists make them seem.

Like Feyerabend, Richard Rorty claims that scientific research is not objectively better than any other method of inquiry (Bos et al., 2019). According to Rorty, we can only create interpretations of reality. Absolute reality will always remain unknown (Rorty, 1991; Harambam, 2007). In an interview with Kayzer (2000), he asserted "you can't rise above interpretations and get to facts, or dig down below interpretations and get to facts". According to Rorty, we should not focus on whether beliefs are objectively true but on whether they are useful for us to solve problems and to achieve goals (Bos et al. 2019). Knowledge is the set of beliefs on which a certain consensus has been reached within a society (Rorty, 1991). These beliefs are believed to be so plausible that they do not need any more justification. In many societies, the principles of scientific research are generally held in high regard. It might be possible to demarcate scientific research from other methods of inquiry, but a preference for scientific research, or any other method, cannot be objectively justified. Consequently, Rorty argues that scientific knowledge is not universal and ahistorical and it does not necessarily lead to progress and the truth (Rorty, 1979/2007, as cited in Harambam, 2017). Scientific research and the beliefs that are produced by it just have the collective preference of western society. (Rorty, 1991).

Bruno Latour, like Kuhn, Feyerabend, and Rorty, does not believe that scientific beliefs are direct reflections of what the world is really like. According to this philosopher, scientific beliefs are the result of processes that can be both irrational and sociological (de Vrieze, 2018; Harambam, 2017a). Latour studied how scientists reinforce their public image and convince their colleagues, money lenders, and the public that their research leads to truth-finding (Bos et al., 2019; Harambam, 2017b). For example, he argued that the scientific community tries to emphasize differences between scientific theories and conspiracy theories, sometimes exaggerating the rationality of scientific research and the irrationality of conspiracy theories (Harambam & Aupers, 2015). However, Latour does not believe in

[4] Deborah Mayo is an American philosopher of science. Her current research focuses on how statistical reasoning and learning from errors in experiments can lead to progress in science.

a completely sociological account of scientific research. He distinguishes facts that are still 'under construction' and established facts. When a scientific belief has been published in a well-argued scientific paper in a peer-reviewed journal, when the belief has been debated with colleagues, when colleagues have cited it, and thus recognized the belief as reliable and scientific, the belief has been established. It should be stripped of its 'relative' label, at least until new relevant findings emerge (de Vrieze, 2018). Latour took an anthropological approach to analyze how scientific inquiry differs from other methods for acquiring beliefs. This approach makes it possible to compare beliefs obtained with different methods, based on their content, robustness, and background (Harambam, 2018). Regarding these criteria, Latour argues that science does deserve its authority, even though subjectivity, coincidence, and irrationality are involved (de Vrieze, 2018).

In this section, two issues were discussed. The first issue is whether and how science can be demarcated from other methods of inquiry. The second issue is whether humans can approach or discover the true nature of things in the world, and whether science is the best method for doing this. Attempts considered in this section show that the final answers have not been found. The Inductivists, Popper and New Experimentalists concentrate their characterization of science on the verification or falsification of theories or experimental data. Especially the Inductivists and Popper understand science as a relatively objective and thus superior enterprise that gradually uncovers reality. Kuhn, Lakatos and the Subjective Bayesians have a more sociological conception of science. What makes scientific beliefs special is that they are agreed on by a group of scientists who follow certain criteria in the process. However, as scientific progress is dependent on sociological processes, it does not necessarily lead to increased knowledge about the world. Feyerabend denied the existence of any universal criteria for conducting and thus demarcating scientific research. He believed science to be unfairly authoritative in western society. Similarly, in Rorty's eyes, science mainly distinguishes itself as the preferred method of inquiry in western society. However, unlike Feyerabend, Rorty pragmatically accepts the authority of scientific research and beliefs given certain goals, while Latour appreciates the professionalism and social control in the scientific community.

2.1.2 Beliefs not accepted by the scientific community

As we have seen in the previous section, there is no clear answer as to how scientific research can be distinguished from other ways to acquire beliefs, and therefore there is no clear answer as to how scientific beliefs are different from beliefs in general. However, some beliefs are generally regarded as unsupported by a scientific consensus. This means that there is no substantial community of scientists working in a certain field or paradigm that thinks that the belief in question is contemporary scientific knowledge[5]. I will refer to these beliefs as *unscientific beliefs,*.[6] Regarding these beliefs, it might be possible to establish why some of them are controversial in the scientific community while others are

[5] Scientific consensus is not defined as the collective judgement of a *majority* of scientists working in a particular field and paradigm, but as a *substantial proportion*. This broader definition is also used in practice (e.g. Doran & Zimmerman, 2009). In some cases, the collective of scientists working in a particular field is split up into multiple parallel paradigms or research programs (e.g. linguists at VU Amsterdam are mostly working in the structuralistic paradigm and linguists at Utrecht University are mostly generativists).

[6] Of course, these beliefs might turn into scientific beliefs in the future, when more research has been done and a scientific consensus has been formed around the belief. However, some of these beliefs have been studied by scientists, who subsequently abandoned them after a lack of promising results (e.g. paranormal phenomena, compare Kloosterman, 2016).

not. I want to distinguish relatively uncontroversial beliefs, such as “the sky is blue”, “I am drinking water” and “I feel connected to the people around me” from relatively controversial beliefs such as “aliens have already invaded earth”, “disabilities and diseases can be cured by prayer” (i.e. Kuiken, 2013) and “all-natural systems inherit a collective memory that influences their form and behavior” (Sheldrake, 2011).

I will list features that connect the controversial beliefs, even though – in my eyes – no feature is common to all of these beliefs. Using such a description, based on Wittgenstein’s theory of family resemblance, difficulties in formulating a conclusive definition can be bypassed (Armstrong, Gleitman & Gleitman, 1983; Keller, 1995). A further reservation is that the uncontroversial and controversial beliefs can all be placed on a continuum, similarly to how scientific and unscientific beliefs are part of a continuum. When a belief conforms to all of these features, I see it as a highly prototypical example of a scientifically controversial belief (Rosch, 1999). The following features were formulated after studying examples of such beliefs.

1) The first feature I propose is that evidence for controversial beliefs can be found only through the direct experience of people with special paranormal or charismatic gifts, e.g. by people with certain psychic abilities or people with the ability to interpret glossolalia.
2) Similarly, other controversial beliefs can only be verified or falsified through experiences that are hard to replicate, e.g. mystic experiences and sightings of extraterrestrials. These first two features lead to scientific controversy because they make it difficult or impossible to test the beliefs in scientific experimental settings.
3) A third feature is that these beliefs are likely to be at odds with established scientific beliefs. This means that the claims can only be true if a portion of established scientific beliefs is not.
4) Fourth, these controversial beliefs are likely to have supporters who argue that these beliefs should be studied in a scientific context. This feature makes beliefs controversial among scientists, because then, these beliefs start to poach on scientific territory.
5) Lastly, often, the relevant concepts involved in these beliefs can be explained in a different way that readily conforms to existing scientific beliefs, which makes the these beliefs less attractive to those who adhere to problem-solving principle Occam's razor[7].

2.2 Friction between scientifically controversial beliefs and scientific work

I assume here that scientists generally put more trust in the effectiveness of the scientific method in the pursuit of true and justified beliefs than the general population. At the same time, scientists – like any other – can hold scientifically controversial beliefs about religion, spirituality, the paranormal or alternative medicine. In this thesis, I explore whether said scientists experience uneasiness around their scientifically controversial beliefs, and why. In this section, possible explanations for scientists’ worry or ease around these beliefs are put forward.

2.2.1 Epistemic instability

According to Harambam (2017b), we are living in an age of *epistemic instability*: a context where we can no longer look to one epistemic authority or tradition (e.g. the government) to know what is true and what is not. This instability has developed as a result of four main changes in society:

[7] Occam's razor entails that, when presented with multiple hypotheses that make the same predictions, the hypothesis with the least assumptions is to be preferred. This principle is used as a heuristic in the development of theories and models (Gibbs & Hiroshi, 1997).

secularization, mediatization, democratization and globalization. People are not as religious as they used to be. It is supposedly harder to distinguish what is fact and what is fiction in the media. Also, through the democratization of knowledge, people have become more critical of knowledge claims. Lastly, globalization made us realize that what is considered to be true is culturally dependent. Harambam describes two (ideal-typical) movements that people use to cope with this epistemic instability. In the first place, it has let to a movement of people who are giving space to other ways of knowing, like emotions, intuitions, metaphysics and traditions. This would stem from a postmodern disbelief in objective truth claims. For example, according to Ernst (2001) and Kloosterman (2019), the popularity of alternative medicine is rising. On the other hand, there is a movement of people hunting for proof and facts. People believe that hard scientific research and strong logic can reveal truths that will otherwise stay hidden in a world full of misleading stories and fake news. They treat science as a new beacon in a sea of fake news.

2.2.2 Overvaluation of science

In a 2019 essay, Hertzberger argues that modern life has become disenchanted and that, as a consequence, science has taken up the moral role that religion used to play. Scientific research is becoming the most important tool for the validation of our personal preferences and morals. In her words:

> I see a new generation of Western secular policymakers, politicians, administrators, thinkers, writers, entrepreneurs and leaders who no longer see science as a tool for generating knowledge, but as a new infallible authority; an all-knowing judge who decides what is good and what is evil. (Hertzberger, 2019, p. 25).

This development resembles the 'proof and facts' movement identified by Harambam (2017b), described in the previous section. Hertzberger believes in the power of scientific research in learning about reality, but disapproves of the overreaching of science, drawn into the domain of personal preferences and values: western societies put too much trust in scientific beliefs and science has too big a role in our lives. Indeed, the public's trust in science seems to be high compared to trust in other institutions, such as the courts of law, trade unions, media, government and corporations (e.g. see van den Broek-Honingh & de Jonge for data on the Dutch public and see Funk et al., 2019 for data on the USA). Hertzberger (2019) states that personal morals and preferences that are not justified by evidence-based scientific research can be valid nonetheless. This view is similar to that of Feyerabend, who argued earlier that science's high status in society is not rationally justified and that individuals should be free to choose between science and other methods for acquiring beliefs (Chalmers, 2013).

Hertzberger (2019) and Feyerabend (as characterized in Chalmers, 2013) defend the freedom to hold beliefs that are not scientific against the overreaching of science in society. Furthermore, the following authors emphasize the importance of all aspects of human inquiry, disapproving of a one-track focus on science. Van Egmond (2019) argues that Europe has developed a materialistic orientation during the Enlightment, which carried on after nineteenth century Romanticism. Secularization and science have both pathed the way for a focus on matter, nature and the physical body, at the expense of the mind, spirituality and religion. According to van Egmond (2019), this imbalance has led to loss of morality. The latter qualities are currently not given the attention and respect they need. He states that humanity is best of when spiritual, material, collective and individual qualities are balanced. Likewise, Pigliucci, Sorell, Buekens, Ruse and Edis, included in Boudry and

Pigliucci (2018) defend morality, humanities and philosophy as valuable fields of study outside the scope of science. Some of them worry that the overvaluation of science will lead to the demise of these fields. Harambam & Aupers' (2015) interviewees, who are active in the Dutch conspiracist scene, also state that the scientific community is trained in "materialistic orthodoxy": a doctrine that is simply dismissive of phenomena beyond the material here-and-now and views them as illusionary. These interviewees claim they are proscience, but that modern science has gone off the rails, because it has supposedly lost its openness and skepticism.

2.2.3 Scientism

Hertzberger (2019), Feyerabend (Chalmers, 2013), van Egmond (2019), and previously introduced authors in Boudry and Pigliucci (2018), are among many others who critique the authority and prestige of science in modern society (Boudry & Pigliucci, 2018) - albeit at various levels of fervor. What they comment on is a manifestation of scientism, an overreaching of science, which entails "being overly deferential toward science, unfairly disparaging of other disciplines like the humanities or philosophy, or to have an inordinate confidence in the future successes of science" (Boudry & Pigliucci, 2018). When scientism is excessive deference towards *contemporary* science, it might also limit further progress in science, as the current scientific standards and procedures are overvalued. According to De Ridder et al. (2018) too, the influence of scientism is growing in scientific literature and intellectual life.

2.3 Scientists and others with alternative beliefs

Above, the concepts *belief, knowledge* and *scientifically controversial beliefs* are discussed, as well as the philosophical debate on how scientific beliefs can be demarcated from beliefs in general and literature on the growing influence of science in society. As mentioned in section 1.3, this thesis addresses a gap in the research literature, as the experiences of researchers with different scientifically controversial beliefs – religious, spiritual and paranormal – are compared in a single study.

Previous studies can be split into three categories. The first category is literature on the prevalence and acceptance of religious belief in the scientific community. This topic has been studied mainly by sociologist Ecklund and her colleagues through the analysis of quantitative survey data. These studies indicate that field-specific and interdisciplinary differences are weaker predictors of religiosity among scientists than demographic factors (Ecklund & Scheitle, 2007), that religiosity among university scientists has declined between 1969 and in 2005, possibly through the emergence of science as a master identity[8] (Ecklund, Park and Veliz, 2008), and that most scientists (working at 21 elite U.S. research universities) do not perceive a conflict between science and religion, especially scientists who are religious conservatives themselves (Ecklund & Park, 2009). Lastly, a 2010 study by Ecklund showed that between 25 and 39 percent of U.S. scientists has a theistic philosophy of life, while the 63 percent of the general population was religious. In the Netherlands, respectively 17 percent of (scientific) professors and 24 percent of the general population believes in one or more gods (van Veelen, 2011). Van Veelen (2011) also included accounts of professors and their views on God, science and philosophy. Most of the studies about religious belief in the scientific community have applied a quantitative method and qualitative research is scarce. This is another research gap addressed in this graduation project.

[8] A master identity is an identifying characteristic with exceptional importance for someone's social identity.

The second category of research concentrates on people who hold beliefs that do not conform to scientific consensus. For example Smith and Wu (2012) studied the beliefs, experiences and practice regarding complementary and alternative medicine of Taiwanese nurses, which showed that few of those nurses practice complementary and alternative medicine (Smith & Wu, 2012). In Hameed (2008), quantitative data on the disregard of the theory of evolution in the Islamic world nowadays is reviewed. The author suggests that scientists should emphasize that much of modern biology is based in the theory of evolution and that it has many practical applications. These arguments could stand firm, as there is already an existing proscience attitude in the Islamic world in general. A third example is Harambam & Aupers (2015), a qualitative study on conspiracy theories that diverge from scientific theories and how these two types of beliefs battle each other for epistemic authority. This thesis add new information to this domain because I focus on the alternative beliefs, experiences and views of a new population: scientists.

Lastly, cognitive dissonance theory is relevant for this study. Cognitive dissonance is a mental discomfort, developed when a person experiences an internal conflict between two or more (seemingly) opposing beliefs (Festinger, 1985/2009). According to Festinger's (1985/2009) cognitive dissonance theory, people will avoid psychologically inconsistent beliefs and they will try to change (one of) the beliefs, justify the apparent dissonance or ignore it (Festinger, 1985/2009). If the interviewed researchers themselves have an orientation towards materialism and scientism, while also holding on to scientifically controversial beliefs, they might have experienced cognitive dissonance.

3. Research procedures

This chapter will give the reader an overview of the research procedures that are followed in this project, including the philosophical assumptions that are involved (section 3.1), and the methodology that has been applied to gather and analyze the empirical materials (sections 3.2, 3.3 and 3.3). The main source of information for designing the appropriate research procedures has been Creswell's 2007 textbook on qualitative research methods. In this book, five approaches to qualitative research are discussed: narrative research, phenomenology, grounded theory, ethnography, and case study. This discussion is substantiated with references to researchers involved in the (recent) developments in these approaches, such as Moustakas (1994) and van Manen (1990) in the case of phenomenology. Creswell, an academic with expertise in both qualitative and mixed methods research, takes his time to review the history as well as the key elements of these approaches. He also explores the philosophical assumptions that are involved in qualitative research. The practical series on qualitative research by Moser and Korstjens, both health researchers specialized in nursing, patient participation and qualitative research, has also been helpful in all steps of the research process (Korstjens & Moser, 2017; Korstjens & Moser, 2018; Moser & Korstjens; 2017; Moser & Korstjens, 2018).

3.1 Philosophical assumptions

This project is based around a series of semi-structured interviews. A qualitative research design is used; quantitative measures and statistical analyses do not fit this problem. Specifically, I have applied characteristics of the transcendental phenomenological approach, but I did not strictly conform to one existing methodology. As is conventional in qualitative research, the researcher makes the broad philosophical assumptions that are involved in the study explicit. This transparency helps in assessing the methodological choices (Creswell, 2007).

3.1.1 Ontology

Qualitative researchers assume that there are multiple interpretations of reality (Moser & Korstjens, 2007). In phenomenology, the different perspectives from individuals, who share similar experiences among them, are investigated and compared. (Moustakas, 1994). This thesis includes multiple quotes from the interviewees to give evidence of these different but comparable perspectives (Creswell, 2007). Moreover, as I have my own perception of reality, the findings are unavoidably interpreted subjectively. Some measures are taken to limit the influence of my values on the research.

3.1.2 Epistemology

To learn about the experiences lived by the interviewees, I conducted semi-structured in-depth interviews with them. In each conversation, I tried to build rapport with the interviewees, as we had to talk about personal topics like mystical experiences and the afterlife. To de-emphasize a power relationship, I talked about my personal perspectives. Moreover, member checks were performed during the interviews and after the data analysis to achieve credibility and a more equal relationship between the researcher and interviewee. This means that I repeatedly asked the interviewees whether my understanding of their statements was correct. During the interviews, I did this by restating or summarizing the answers and asking whether my understanding of their statements was accurate and complete. During the data analysis, this process was repeated (Wikipedia, 2019). This means that this phenomenology is a collaboration between the participants and me.

3.1.3 Axiology

It is inevitable that my personal experiences, values, and beliefs will play a role in this thesis, as I am also an individual with my own interpretation of reality (Korstjens & Moser, 2017). It is therefore important that I include my own perspective on the research topic. I wrote about my perspective in a logbook that was updated at every stage in this thesis project (Appendix H) Moreover, I answered the same questions as my interviewees did after all interviews were conducted (compare Hussien, 2017). My answers and logbook entries are summarized in Appendix F, an overview of the role of my perspectives in this project. I tried to set aside my own prior 'expert knowledge' as well as personal biases concerning the research topic to reduce the impact of my assumptions on the research (Lopez & Willis, 2004). This practice is named *epoché* and central to transcendental phenomenology, established by Edmund Husserl (1859-1938). I tried to give the interviewees and myself room to talk about subjects that were not directly brought up by the questions that I had prepared. Also, I postponed my literature review until after the interviews were conducted and analyzed, which gave me a relatively naive perspective (a practice endorsed by Streubert & Carpenter, 1999, as cited in Lopez & Willis, 2004).

3.1.4 Rhetoric

Creswell (2007) recommends that researchers who engage in qualitative research write in an informal style using the personal voice to emphasize the personal involvement of the researcher in his or her study. I did not commit to structuring this thesis as a chronological story, another recommendation of Creswell (2007). Structuring this thesis chronologically would not benefit the ease of reading, in my opinion.

3.1.5 Methodology

For this thesis, I started out with a list of interview questions I was genuinely curious to know the answer to, and with no clearly defined research objective. This is fine, as qualitative researchers often use emerging and flexible research designs to fit the context they work in (Moser & Korstjens, 2017).

Through the conversations with my participants and the subsequent data analysis, I found out which of my questions touched upon the themes that my interviewees cared about the most. Besides an emerging research design, qualitative methodologies are characterized by inductive analysis: working from the bottom-up rather than starting with a theory (Creswell, 2007; Korstjens & Moser, 2018). As I found out along the way, the research I was doing showed similarities with the methodologies of studies that adhere to Husserl's transcendental phenomenology. I definitely took inspiration from this philosophical approach (see section 3.2), but this study is pragmatic in the sense that it does not strictly conform to one existing methodology. Rather, I focused on the outcomes of the research more than on committing to one system of philosophy (Creswell, 2007).

3.2 Inspiration from transcendental phenomenology

Phenomenology is a qualitative research tradition concentrating on phenomena: people's lived experiences (Creswell, 2007, Korstjens & Moser, 2017). According to Husserl, who established the school of phenomenology, our mind is directed towards things in the world. We experience and we give meaning to these "objects of consciousness" through whatever is already present in our minds, e.g. thoughts, ideas, beliefs, concepts and images (Lopez & Willis, 2004). Husserl firmly believed in the value of studying experiences if we want to understand human motivation because what humans do is influenced by how they perceive the world (Lopez & Willis, 2004). He assumed that any phenomenon has features common to all who have experienced it (Creswell, 2007; Hussien, 2017; Lopez & Willis, 2004). This true objective nature of the phenomenon can be extracted from the subjective, individual experiences (Creswell, 2007). The universal features together are referred to as the *essence* of the experience. Realistically, the essence is still somewhat dependent on the choice of participants and the researcher's interpretation. However, it also functions as a general description of the phenomenon (Creswell, 2007). In this graduation project, the essence of being a scientist with scientifically controversial beliefs is sought after. However, I have added some elements that are not customary in phenomenology. Other experiences of individuals or subgroups are also reported on, as well as their opinions on the topics that were discussed.

In phenomenology, the researcher actively attempts to practice epoché, as explained in section 3.1.3 (Lopez & Willis, 2004). According to Husserl, this practice is essential to grasp the experiences of the interviewees. Complete epoché is "seldom perfectly achieved" (Moustakas, 1994) or even "never possible" (Colaizzi, 1978, as cited in Morrow, Rodriguez, & King, 2015). Still, the act of trying helps a lot in interpreting the empirical materials with less preconceptions. As mentioned before, in Appendix F, my personal views on the topic are made explicit.

3.3 Data collection

3.3.1 Participants

For this study, I conducted semi-structured interviews with eight Dutch scientists (one woman, seven men, ages between 48 to 73, mean age: 59.5, ST: 8.818) who publicly express beliefs that are not endorsed by a scientific consensus. The interviewed scientists are currently working (or did formerly work) at departments of social sciences or natural sciences at Dutch universities. They are openly religious, otherwise spiritually oriented or engaged in research of topics that are often dismissed in the scientific community, like research regarding intelligent design, UFOs, psychic phenomena and

alternative medicine. Although most interviewees did not find it necessary, I preferred to guarantee their anonymity. Necessary information about the interviewees is summarized in Table 1.

Table 1
Overview of disciplines, ages, and personal interests and beliefs discussed in this study.

Interviewee	Discipline	Personal interests and beliefs discussed	Age group
1	Physics	Roman Catholic	50-59
2	Public Administration	Non-affiliated religion[9]	40-49
3	Environmental sciences	Telepathy, extraterrestials, Antroposophy, spirits	70-79
4	Engineering	Extraterrestials	50-59
5	Biosciences	Chinese medicine, Holism	60-69
6	Anthropology	Zen Buddhism, aspects of Ayurveda	60-69
7	Physics	Reformed Churches in the Netherlands	40-49
8	Physics	Pentacostalism	60-69

Criterion sampling was used, a sampling strategy to find participants who meet predefined criteria. I selected researchers who shared the experience of working as a scientist while maintaining beliefs controversial in the scientific community. As there are many such beliefs, I tried to account for variation in the scientifically unsupported beliefs held by participants. Other personal characteristics as well as individual experiences did vary among the participants (Korstjens & Moser, 2018).

I found these participants by searching the web combining queries like *Nederlandse wetenschapper* (Dutch scientist) with queries like *homeopathie* (homeopathy) and *christelijk* (Christian). I aimed to contact a diverse group of scientists. In selecting the scientists, I also took travel time in consideration, selecting people who worked not too far away from Leiden. Finally, I emailed thirteen researchers, of which I interviewed eight. Three out of five people that I did not get to interview responded that they were interested but not available for an interview at the time. Moser and Korstjens (2018) state that fewer than ten interviews are required. Polkinghorne (1989), as cited in Creswell (2003), recommends researchers to interview five to 25 people in phenomenological studies. Sampling stopped when data saturation was reached. This is the case when the materials show the patterns, categories and variety of the phenomenon that is studied and new interviews yield redundant information on the studied phenomenon (Moser & Korstjens, 2018).

3.3.2 Materials

Answers from the interviewees have been elicited by means of semi-structured interviews. A list of questions was prepared, but the order of the questions and the topics could vary. Also, additional (follow-up) questions could be asked and there was space to discuss related topics brought up by the interviewees. A list with all questions that were prepared in advance can be found in Appendix C. The list of questions was not pilot-tested, but commented on by my supervisors. Question 25 ("Do your spiritual values or ideas play a role in your scientific work?") was changed to stress that values might

[9] Their religion is mainly inspired by Christian Rhineland mysticism.

play a role in scientific work, as values rarely clash with scientific beliefs, while alternative beliefs about the nature of the world are far more likely to conflict with science. I did not change the order of the questions in the interview list, but, as one of the supervisors suggested, I made sure to start each conversations casually and friendly to make the interviewee feel comfortable. Every interview started off with some chit-chat and questions about personal particulars. Four substantive topics were discussed. I asked the interviewees what their views on reality were, to what extend and how humanity could acquire knowledge about reality, and whether scientific inquiry played a special role in knowledge building in their eyes. Second, we spoke about experiencing friction between, on the one hand, religious, spiritual, paranormal or 'alternative medicine' beliefs, and on the other hand, scientific work and attitudes. Third ,the interviewees' views on and relationship with the scientific community and the role that science should play in society, according to them, were also discussed.

A consent form (Appendix D) was created to ensure that the participants were fully informed before consenting to the nterview. The form specifies the goal and procedures of the interview, as well as how the privacy of the interviewees is handled and how their anonymity is guaranteed. Before telephonic interviews took place, the form was emailed to the interviewees and they verbally agreed to the conditions in the form.

All audio files were saved on a password protected laptop and deleted from the recorder, immediately after the interviews took place. Amberscript software automatically transcribed the audio into text. Amberscript signed a Data Processing Agreement (Appendix E), in which was specified that the audio files and transcripts would not be used for software training purposes and that these materials would be deleted from their servers when I deleted the files from my Amberscript account. Transcriptions were downloaded to my password protected Acer Swift 3 laptop and deleted from the Amberscript website. The text files have been edited manually to create literal transcripts of the interviews, meaning that hesitations, stop words and stuttering were excluded and punctuation was added to increase readability. Information that could give away the identity of the interviewees has been redacted and replaced with *XXX*. Chit-chat before and after the interview was mostly left out of the transcripts.

NVivo 12, a tool for qualitative data analysis, has been used to discover themes in the transcripts. With this tool, all relevant statements were assigned one or multiple labels, summarizing their meanings. These labels were subsequently organized hierarchically, with the main themes of this thesis emerging at the top.

3.3.3 Procedure

The researchers were interviewed between 24 May and 4 June 2019. Half of the interviews took place in interviewee's office, speaking face-to-face, and the other half took place over the phone, with the interviewee in their office or home. These were quiet spaces where the interviewees would not be interrupted. E-mail was ruled out as a suitable medium, as it stretches out the interview over more time and makes asking follow-up questions an unnecessarily difficult process. Before the interviews, the researchers had read and confirmed to the conditions in the consent form. The interviews lasted between 30 and 86 minutes (mean duration in minutes: 61, ST: 16).[10] The interviews were recorded with an audio recorder and in a notebook.

[10] The interviews took 30, 49, 52, 60, 66, 67, 81 and 86 minutes, respectively. The 30-minute interview was with a researcher who only agreed to a short interview.

3.4 Data analysis

Creswell (2007) included an example of a phenomenological study by Anderson and Spencer (2002) who use Colaizzi's method. Colaizzi's method for analyzing empirical materials in phenomenological research (as described in Morrow et al., 2015). Below, my application of this method is described, as well as how I deviated from it.

1) First, I read the literal transcriptions of the interviews several times to become familiar with all materials.
2) Then I identified the significant statements in all of these interviews: statements that are relevant to the studied phenomenon.
3) The third step in this method was to identify the meanings of the statements that were directly relevant to the research questions.
4) Fourth, these meanings were put in clustered into themes that all (or most) accounts share. In phenomenology, these themes are the basis for an exhaustive description of the studied experience. As indicated before, this thesis also includes a description of the interviewees' views on the scientific community's handling of these beliefs.
5) In Colaizzi (1978) method, these descriptions are then condensed into a short and dense statement which reflects the essential aspects of the phenomenon. This statement is shared with the participants, who are asked to indicate whether this statement reflects their experience. Here, however, the complete findings were communicated back to the interviewees, as multiple experiences and opinions were discussed.
6) After this, I could modify previous steps in this process as a response to the feedback. This was not turned out not to be necessary.

This concludes the description of the research procedures. In the next section, the findings, approved by all interviewees, are presented.

4. Findings

The shared views of the interviewees, as well as striking disagreements, are summarized below. All interviewees agree with how their views and experiences are presented in this chapter. Statements about the interviews are always supported by quotations from the interviews, which are provided in footnotes or as part of the running text. In the accompanying footnotes, which refer to the anonymized literal transcripts in Appendix G, the reader can find which researcher was quoted (interviewee 1 to 8) and which paragraphs from the interviews are relevant. For example, *3:21, 25* refers to interview 3, paragraphs 21 and 25. Some quotations and their translations are included here to illustrate the discussion.

The findings are split in three subtopics. The first subtopic is the views of the interviewees on how beliefs can be acquired and to what extend people can learn about reality. This subtopic is relevant for the following reasons. If people believe that we can learn about the true nature of the world through a certain method of acquiring beliefs, such as science, they might believe that this method is superior to other methods. Moreover, when they leave room for doubt around their beliefs, conflict between these personal beliefs might be relatively unproblematic. Similarly, if people believe that humanity cannot learn everything about reality, they might have more space for spirituality in their lives. The second subtopic concerns the role that science plays and should play in society, according to the interviewed

researchers. In the section on this subtopic, 4.2, the researchers give their account of the responsibilities of science towards society and how the contemporary scientific community should progress. The interviewees share to which extend they feel that their scientifically controversial beliefs are accepted among colleagues and the broader scientific community in section 4.3. This is the third and last subtopic discussed in this chapter.

4.1 Acquiring beliefs and knowledge

4.1.1 Knowable reality

The researchers spoke to me about their views on reality and to what extend we can learn about it. There is no consensus among them as to whether there is one objective reality, even though five of them explicitly subscribe to this statement.[11] This includes all interviewees who were inspired by Christian mysticism or identified as Christian (interviewee 1, 2, 7 and 8). (Henceforth, these interviewees are referred to as *Christian interviewees*.) Interviewees 2, 3, 4 and 5 believe that what we perceive as reality is part of a bigger spiritual reality, consciousness or knowledge sphere.[12] Although interviewee 4 is the most confident that multiple realities exist (4:42, also see 4:38), interviewee 3, 5 and 7 also leave open this possibility.[13] All interviewees argue that humanity still has a lot to learn about reality and that people should not forgo doubt in their lives.[14] Five interviewees believe that scientific research produces highly reliable beliefs, knowledge even.[15] However, interviewee 3 notes that science is ultimately limited as a result of the limits of human consciousness (3:56). Two interviewees are certain about some mystic beliefs, even without external proof.[16] However, six researchers that I spoke to maintain that humanity, at this point, cannot learn everything about our reality.[17] They give various reasons for this assertion. Interviewee 2 argues that our knowledge will stay limited because of the way our brain is structured (2:44, 80) and because of the limitations of our instruments (2:80, 99). Interviewee 4 believes in infinite layers of knowing (4:49). Interviewee 3, 4, 5 and 7 emphasize the limits of human perception in general and the resulting inability to reach complete objectivity,[18] while interviewees 3 and 4 believe that the development of human consciousness and perceptional abilities will lead to increased understanding. Moreover, four interviewees assert that we cannot really know reality. We can only adhere to interpretations of reality that work for us.[19] For example, interviewees 1, 7 and 8 have *chosen* to believe in God, because that fits their view of the reality the best.[20]

> I am not sure, but I have the feeling that God exists and that I have found him. That is enough for me. There is a chance that it is all imagination, but I will take the risk. For me, it is a helpful view of reality that has not disappointed me. (1:13)

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[11] 1:37; 2:52; 6:19; 7:12, 8:20, 24, 36
[12] 2:32; 3:16, 20, 50; 4:73, 79; 5:32; also see 2:16; 4:47, 79
[13] 3:16, 20; 5:20; 7:12, also see 5:22
[14] 2:20, 42; 3:46, 50; 4:59; 5:50; 7:65; 8:36; also see 1:45; 6:49
[15] 1:90; 2:16, 95; 3:8, 7:59; 8:16
[16] 2:18, 20; 5:16, 24
[17] 1:39; 2:44, 80; 4:45, 49; 5:22, 30; 7:29; 8:22
[18] 3:18; 4:45; 5:20, 24, 30; 7:21
[19] 5:24; 6:17, 19, 21; 8:22, 24; also see 6:2; 7:21
[20] 1:13, 66, 70; 7:65; 8:36

4.1.2 Multiple types of inquiry

Another topic that was addressed in the interviews was the pursuit of knowledge. All interviewees, except interviewee 7, explicitly state that scientific research distinguishes itself from other methods as an established system and continuous process to minimize wrong conclusions, including techniques such as triangulation and replication. A body of scientific work isn't just another theory. It has proven itself as a powerful tool for finding reliable, true information.[21] For example, interviewee 1 asserted the following: "People say that it is just another theory. Well, we have been working on it for the last couple of 100 years, creating a framework that minimizes the chance of making mistakes." However, the interviewees all say that spiritual, intuitive or subjective beliefs are acquired in different ways; that scientific research is not the only route to acquiring beliefs.[22] As interviewee 2 put it, "There is a domain of knowledge which cannot be reached through words and reasoning" (2:14). Indicative of the statement that scientific research is just one way of acquiring knowledge is the fact that three interviewees spontaneously shared their criticism of neurobiologist and Dutch bestseller author Swaab, who argues that the behavior of any individual is largely determined by their brain (Swaab, 2014).[23] Interviewee 1, 2, 3 5, 7 and 8 regard spirituality and subjectivity as important parts of their lives.[24] As stated before, all interviewees agree that scientific research is not the only method for finding beliefs. In fact, interviewee 2, 3, 4, and 5 explicitly express their regret that some researchers and members of the public see the scientific way of reasoning as the only path to knowledge and truth.[25]

> For centuries, the church claimed that it had a monopoly on the ultimate truth, and some church groups still do that. [...] Science is the continuation of the church, by other means. Science has simply taken over the role of the church and has subsequently claimed the truth monopoly. (3:14)

4.1.3 Choosing between scientific and other beliefs

The interviewees value different ways of acquiring beliefs and not just scientific research, but there are domains in which scientific research – and the beliefs that are based on it – are preferred. Interviewee 7 put it as follows:

> I am open to prayer, especially for people with mental issues and if those people are open to it too. [...] But at the same time, when someone suffers from a life-threatening psychiatric disorder, healthcare professions should get involved. [...] I am in favor of a combination [of prayer and regular medicine]. (7:85)

Although interviewee 1, another Christian interviewee, does not write off believing in alternative cures that have not been scientifically proven yet (1:51), they drew a clear line between what they consider to be science and spirituality. Their faith does not benefit from them being able to see the beauty of nature as a scientist (1:11). In their opinion, science is more fruitful in treating illnesses than wishing for miracles is (1:55, 59) and similarly, the Bible cannot be used as a source for the natural sciences (1:5, 9). Interviewee 6 also prefers regular medicine over alternative medicine when severe

[21] 1:5, 70, 90; 2:14, 30; 3:26, 28; 8:18; also see 4:81; 5:16, 6:29, 57
[22] 1:5, 51; 2:14, 16, 22, 60, 121; 4:10; 5:24; 7:37; 8:28; also see 1:49, 64; 3:20; 6:7; 8:46
[23] 4:47, 59, 79; 6:67; 7:27
[24] 1:27, 29; 2:50; 3:6, 32; 7:41; 8:28, 38; also see 1:33; 5:22; 8:12
[25] 2:22, 24, 30, 32, 58, 60; 3:14, 28; 4:49, 59; 5:26, 50; also see 1:27; 8:28

illness occurs[26] and feels uncomfortable when spiritual Ayurvedic views are mixed in with scientific research into the efficacy of Ayurvedic treatments (6:35). Another example of how interviewees 1 and 7 prefer science over certain religious beliefs is their rejection of the intelligent design movement[27] and their acceptance of evolution theory.[28]

On the other hand, sometimes spirituality is seen as a better source for answers than science. For example, interviewee 1 stated that science does not provide answers to philosophical, moral or ideological questions (1:5, 39) and that a scientific explanation is not necessary for believing in God (1:49, 51). Similarly, interviewee 2 said that some beliefs cannot be acquired through science (2:14). Interviewee 2 and 3 explained that their integrity and morals, even when it comes to scientific research, are inspired by their spiritual beliefs and not by science itself[29].

Some interviewees prefer a separation between science and other domains. Interviewee 1 keeps their religious beliefs and scientific work almost completely separated (see 1:15 for an exception). Interviewee 2 believes that the mystical domain and the scientific method should not become intertwined (2:56). Interviewee 6 has a nuanced view. This researcher, who does subscribe to the Ayurvedic holistic view of the body as something that is subjectively experienced and connected to its ecology, holds back when it comes to integrating spiritual or religious elements from Ayurveda in modern science:

> They [Ayurvedic medicine researchers] base themselves on those Ayurvedic texts, which contain an awful lot of layers. And of course, one of those layers chronicle about the spirit world, the world of the gods and the world of the demons. But they want to ignore that. [...] They think that these religious elements cannot be integrated in current medical science, because we live in a time where religion and medical are separated. I am a product of this time, so I also think that you shouldn't mix it all up. (6:35)

However, scientifically controversial beliefs and science do intertwine sometimes: four interviewees gave examples of how their spiritual beliefs informed their scientific views on e.g. quantum mechanics and evolution and the laws of nature.[30]

> I believe in a god who created this world and who is still involved in this world. And that god is so faithful and reliable that the way in which God runs the world normally can be described as natural laws by physicists. Occasionally, God does things differently for a special – usually symbolic – reason. We call that a miracle, because it does not comply with the laws of nature. (8:48)

Moreover, there are cases in which the interviewees certainly prefer scientific research into their scientifically controversial beliefs. I show how interviewees 3, 4, 5 and 6 argue in favor of a broader conception of science in section 4.2.3.

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[26] 6:35, 55, 57

[27] A movement that promotes the idea that some features of the universe and life are best explained by the intervention of a supernatural being (Understanding Evolution, 2006).

[28] 1:16-21; 7:31

[29] 2:28, 56; 3:42

[30] 3:48; 6:41; 7:12, 16, 22, 28, 32, 34; 8:48

4.2 Role of science in society

In this section, the role that science should play in society as well as the role that science currently plays in society – according to the interviewed researchers – is discussed. The interviewees criticize the scientific community in two respects.

4.2.1 Responsibilities of science towards society

The interviewees ascribe three responsibilities of the scientific community towards society. First, the scientific community should produce reliable, replicable, true and justified beliefs, according to interviewee 6 and 8.[31] In addition, interviewee 1, 7 and 8 assert that these beliefs should be communicated honestly,[32] with attention to what is still unknown and uncertain (5:50). Lastly, scientific beliefs need to be applied to make the world a better place with less suffering, according to interviewee 2, 3 and 4.[33] For example, interviewee 2, 7 and 8 describe how applications of scientific beliefs can provide solutions for pressing problems in society.[34] Interviewee 7 wants the scientific community to stimulate people to think deeply and to put things in perspective. In that sense, science can support democracy (7:97), while interviewees 3 and 4 believe that science could help both society and individuals to find purpose and wisdom[35].

4.2.2 Criticism of modern science

Most Interviewees (2, 3, 4, 5 and 6) are critical of the scientific community. In the first place, interviewee 3, 4, 5, 6 – the non-Christian scientists – believe that the scientific community is focusing too much on the technological and material aspects of life. According to interviewee 3, the scientific community, as well as society, regards economic growth and technological development as intrinsic goals, while these should only be used as potential means to create a better, more purposeful society.[36] Interviewee 4 emphasizes the importance of moral and ethical consciousness in the scientific community (4:32 40). This researcher believes that scientific research, especially at technical universities, is done increasingly in service of big businesses instead of society. According to them, technology is increasingly regarded as a deity. Scientists focus on developing smart appliances and artificial intelligence, while this interviewee believes that, to avoid disaster, wisdom play a bigger role in science again (4:71). The non-Christian interviewees (3, 4, 5, and 6) critique the scientific community's hyperfocus on the material side of life, servicing businesses and ignoring topics around spirituality and the paranormal.[37]

A second point of criticism is built on the belief that the scientific community, and society too, are overstating the importance of scientific research in comparison to other methods for inquiry. As stated before, all interviewees agree that scientific research is not the only method for finding beliefs. But interviewee 2, 3, 4, and 5 also explicitly regret that some researchers and members of the public see

[31] 8:52; also see 6:17, 57
[32] 1:88, 92; 8:52; also see 7:97
[33] 2:109; 3:68, 70; 4:32, 40
[34] 2:111; 7:97, 8:52
[35] 3:68, 70; 4:71
[36] 3:8, 32, 34, 58, 68, 70
[37] 3:6, 10, 12, 48, 50; 4:48, 80; 5:10, 50, 6:67; also see 1:27; 4:44; 7:31

the scientific way of reasoning as the only path to knowledge and truth.[38] Interviewee 3 and 5 described their worries about the overreaching of modern science as follows:

> For centuries, the church claimed that it had a monopoly on the ultimate truth, and some church groups still do that. [...] Science is the continuation of the church, by other means. Science has simply taken over the role of the church and has subsequently claimed the truth monopoly. (3:14)

> It seems like everything is known, beautiful and cleared up when science has passed by. However, then you deprive people of the feeling that they can still give meaning themselves. Sometimes we are completely drawn into technological thinking and then we are not involved in the psycho-social, spiritual side of life. (5:50)

4.2.3 A broader view of what science can be

Notable was the contrast between the Christian interviewees (interviewee 1, 2, 7 and 8) and those who are not (interviewee 3, 4, 5, 6) when it comes to criticizing the scientific materialism described in the previous paragraph. The second group was more outspoken in condemning the fact that some topics (e.g. extraterrestrial life, telepathic dreams, clairvoyance, near-death experiences) are excluded from scientific research or side-eyed by the scientific community because of the fact that research into these topics will need to base itself mostly on subjective experiences, which are not taken seriously currently.[39] Interviewee 4, for example, believes that there is a lack of scientific research about UFOs because that topic is taboo:

> I thought more people in science would be interested in UFOs. The subject is definitely researchable, but the scientific community is cheating. They say that there is no scientific evidence for it. That's right, I say, because everyone who has ever asked if they can investigate it was told "no, you cannot, because UFOs are nonsense. There are many thousands of pilots, astronauts and air traffic controllers who have seen special things that we cannot explain, but a 'Catch 22' is created, where the premise that UFOs are nonsense is maintained because serious and competent people are not given the opportunity to actually investigate it. (4:10)

Interviewee 6 argues that in positivist science, complex real life situations are abstracted in experiments to make measurements possible. A possible consequence is that subjective, experiential aspects in, for example, psychological disorders, are overlooked, as they are difficult to objectivy.[40] During the last 20 years, however, interviewee 6 has noticed an increased interest in alternative healthcare from medical students (6:51). Three interviewees in the 'second group' argue for a more holistic approach, where more topics are open for study and subjective experiences are taken seriously.[41] Interviewee 3 criticizes the lack of trust in individual perceptions in science:

> They have a whole set of experiments in parapsychology. [...] Science is nothing more than a hygienic way of observing. And if you take individual perceptions seriously and stop immediately labelling them as fraudulent, you will get pretty far. But there are many

[38] 2:22, 24, 30, 32, 58, 60; 3:14, 28; 4:49, 59; 5:26, 50; also see 1:27; 8:28
[39] 3:10, 28, 58; 4:10, 18, 43, 48, 52; 6:10; see 2:42, 103; 3:6, 10 for a similar issue; also see 5:6, 16; 6:2; see 1:45 for another perspective
[40] 6:17; also see 3:10, 20, 28, 32
[41] 3:10, 26, 28, 54; 4:20, 51, 64; 5:2, 6, 8

> prejudices in the academic world. I think that is pretty terrible and primitive. There is a lot of arrogance, which was true for the church then and now also for the scientific community. A number of people pretend to know the ultimate truth. [...] They become rigid, just like in the church in the old days. (3:28)

To create new knowledge, experience- and evidence-based, holistic and reductionist approaches can be combined, according to interviewee 4, 5, 6 and 7.[42] For example, interviewee 7 mentioned that the relationship between doctor and patient can play an important role in the healing process and that they believe in the power of prayer, especially in curing mental illnesses.[43] Similarly, interviewee 5 argues that western and Chinese medicine have complementary qualities:

> Western and Chinese medicine both have beautiful insights. The combination is also beautiful. Intruders, such as viruses and bacteria, are stopped in western medicine. If something is acute and life threatening, that is of course very important.[...] Chinese medicine, however, is much more concerned with how the system [the body] can prevent such an intruder from entering it. The two complement each other nicely. (5:6)

4.3 Acceptance of alternative ideas in the scientific community

Scientifically controversial beliefs can lead to internal and external conflict for scientists. This section recounts how the interviewed scientists personally deal with their controversial beliefs, as well as how the scientific community responds to these ideas – as experienced by the interviewees.

4.3.1 Non-conflicting views

Internally, the interviewees do not generally experience a conflict between their scientific work and their scientifically controversial beliefs. Broadly, they give two types of reasons for this lack of friction.

The first reason given by the interviewees is the idea that science is limited. For example, interviewee 2 beliefs that scientific knowledge is only part of a bigger knowledge sphere which we all can access if we open ourselves up to it (2:32), which means that inconsistencies between scientific and alternative beliefs can have unknown explanations. Interviewee 3 does not experience a conflict either, as philosophies relevant to them, like Anthroposophy, and scientific theories are still inconclusive or vague in areas where they might conflict (3:46, 48). Similarly, interviewee 7 believes that scientific research will always leave room for interpretations[44]: "Science keeps digging deeper and ultimately ends in riddles" (7:27). Interviewee 4 loathes dogmas in the scientific community. To them, science is purely a tool to find truth and not a belief system (4:40, 61). According to interviewee 6, differences between scientific results and other beliefs can be explained, because scientific beliefs are often based on percentages and probabilities, leaving room for the occasional anomaly (6:25) as a result of the unpredictability of our bodies (6:27). Interviewee 5 argues that observations are often over-interpreted as to fit a certain theory. Observations that are similar can seem divergent because they are interpreted with different theories (5:24).

[42] 4:32; 5:2, 6, 10, 12; also see 6:33, 51; 7:85
[43] 7:85, 88, 90
[44] 7:21, 27, 31

A second explanation for the lack of an internal conflict is that scientific beliefs and scientifically controversial beliefs are different ways of looking at the same thing. Interviewee 5 and 6 both spoke about how regular evidence-based medicine and alternative, personalized experience-based medicine are two ends of the same continuum (reductionist vs. holistic) (5:8) or different models of reality (6:21). In a like manner, interviewee 1 and 8 regard the beliefs acquired from the scientific and spiritual domains as complementary beliefs (1:74), or as "different languages" (8:46). Their Christian word view accounts for the existence of good and bad and other values and these values do not interfere with scientific beliefs (8:28).

4.3.2 Position of Christian interviewees

Christian interviewees 1, 2 and 8 are confident that, most of the time, their colleagues only judge them on their scientific work and not on their personal beliefs.[45] People can "do their own thing" in this tolerant climate (1:29) and the interviewees feel free to share their personal beliefs (8:56). On the other hand, interviewee 1, 2 and 7 shared that strong "militant" anti-religious atheism is around.[46] This means that they have encountered atheist fellow researchers who think that religious people should not work in the natural sciences (1:29) or who think that religious researchers are naive and need to be better informed.[47] Even though the interviewees are able to share their views, they suspect that some students and colleagues are not and that people keep their views private (4:14) and try to adjust to a secular vision.[48] According to interviewee 8, "Some Christian colleagues do not dare to be as open about their faith. Students hear in class that Creationism is nonsense. There is a certain amount of peer pressure to conform to the secular vision".

4.3.3 Position of other interviewees

Other interviewees do not identify as Christian but feel attracted to other religious or spiritual movements (Holism, Anthroposophy and Zen Buddhism). Moreover, the beliefs of this subgroup involve the paranormal (extraterrestrials, telepathy, and spirits) as well as alternative medicine (holistic and Chinese medicine and Ayurveda). They feel some resistance against expressing their beliefs from their university colleagues[49] or executives (4:6, 14). For example, interviewee 4 was asked to keep their interest in certain topics private, as their university did not want to be associated with those interests (4:6). Moreover, all interviewees in this subgroup have been in direct or indirect contact with one of two Dutch organizations that claim to combat pseudoscience, paranormal beliefs and quackery. Two interviewees have been under scrutiny by *Stichting Skepsis* (Skepticism Foundation)[50], "tackling all science that smells of alternative, spiritual or subjective ideas" (3:28) and two other interviewees have experienced (indirect) pushback from *Verening tegen Kwakzalverij* (Association against Quackery)[51], "acting against non-biomedical medicine" (6:49). According to interviewee 2, 3, 5 and 6, the scientific community should be more open-minded and less anxious when it comes to these or new alternative ideas, not claiming to know the ultimate truth.[52]

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[45] 1:29; 2:119, also see 8:58
[46] 1:29, 76; 2:62, 103; 7:30
[47] 2:58; 7:31
[48] 7:32; 8:56, 58
[49] 3:66; 5:56
[50] 3:66; 4:65
[51] 5:56; 6:49
[52] 3:28; 5:56, also see 2:42; 3:46, 66; see 6:49 for alternative view

5. Discussion

This last chapter includes an interpretation of the findings, an overview of the limitations of this study and suggestions for further research.

5.1 Synthesis

In this section, the key findings of this study are summarized and interpreted in light of the research and theory from chapter 2. There are two central questions in this project. First, I explored how members of a group of Dutch social and natural scientists handle personal controversial unscientific beliefs. The scientists do not feel uncomfortable around these beliefs. A second issue was how the scientific community responds to these beliefs, according to the interviewees. The interviewees with non-Christian scientifically controversial beliefs experienced relatively more backlash. Below, I speculate about how this difference between Christian and non-Christian interviewees can be explained. The section ends with a discussion of how the interviewees criticize the attitude of the scientific community towards scientifically controversial beliefs.

5.1.1 Interviewees' place in an epistemic unstable society

I start this synthesis with a characterization of the interviewees in view of Harambam's (2017b) explanation of epistemic instability. This author described two antagonistic ideal-typical movements that emerged as a consequence of this instability. There is a movement of people who started giving more space to other ways of knowing. Other people, however, began to treat science as a lonely beacon of reliable knowledge in a sea of misleading information. Remarkably, the interviewed scientists are similar to both of the opposing movements that are described in Harambam's dissertation (2017b). On the one hand, they are all attracted to multiple ways of acquiring ideas, which could, according to Harambam (2017b), resonate from postmodern skepticism towards objective truth claims. Indeed, most interviewees state that humanity cannot achieve complete objectivity, believing that we can only approach reality through the creation of models and interpretations (section 4.1.1). This view is reminiscent of modern philosophers such as Kuhn, Lakatos, Feyerabend, Rorty, and Latour. They believe that people cannot rise above or dig below interpretations to get to the facts. On the other hand, most of the interviewees explicitly adhere to the power of scientific research and logic, stating that scientific beliefs are remarkably reliable (4.1.1) and that, especially in the medical domain, scientific beliefs are to be preferred to other beliefs (4.2.3). Like Latour, they appreciate scientific beliefs for the robust, sociological process that is behind it.

5.1.2 Peace of mind

As described in chapter 2, a scientist with ideas that are not met with a scientific consensus might experience unease about these beliefs, from within – as a result of cognitive dissonance – as well as from the outside world – resulting from the overvaluation of science and scientism. Regarding the former, the interviewees generally do not experience friction between their scientific work and their scientifically controversial beliefs. This means that they do not experience cognitive dissonance as a result of these beliefs at this point. Cognitive dissonance theory asserts that people avoid holding opposing beliefs about reality and continually try to align their views to function, and to lessen mental stress. The interviewees, for example, could have created psychological consistency within themselves by adapting their views, by finding a justification for the seemingly opposing beliefs or by denying some of their beliefs (compare Festinger, 1985/2009). The explanations given for this lack of conflict can be sorted in two categories. All explanations involve the rejection of scientism. First, the

interviewees maintain that science has its limits, they accept that not everything can be submitted to scientific research and they believe in multiple ways of acquiring beliefs (section 4.1.2). Interviewee 2 believes that scientific beliefs are only part of a bigger knowledge sphere, in which contradictions can be explained. Similarly, interviewee 3, 4, 5, 6, and 7 emphasize the limitations of science and the fact that scientific research can be interpreted in different ways.

A second explanation, brought up by interviewee 1, 5, 6 and 8, comes down to seeing the scientific domain and the domain of religion, spirituality and the paranormal as domains that complement each other, as two ends of the same continuum, as different models of reality or as different languages (4.3.2). In general, the interviewees claim that humanity still has a lot to learn about reality (4.1.1). They argue that people should not forgo doubt in their lives and that for some issues, a scientific explanation could be waiting in the future (4.3.2). This account of why researchers feel comfortable around their beliefs that are not supported by a scientific consensus supplements the existing studies about people who hold beliefs that do not conform to a scientific consensus exist.

5.1.3 Explaining the acceptance of Christian and non-Christian beliefs

Regarding the acceptance of scientifically controversial beliefs by the outside world, what stands out is the difference in the extent to which Christian interviewees and the other researchers feel accepted by their colleagues and in general. In this study, I intentionally included both religious interviewees as well as interviewees with other scientifically controversial beliefs. The findings do not per se show a difference between these two groups, but it does show a difference between the non-Christian interviewees, some of whom believe in Holistic ideas, Anthroposophy or Zen Buddhism, and the Christian interviewees.

The four Christian interviewees are confident that, most of the time, their colleagues only judge them on their scientific work and not on their personal beliefs (section 4.3.2). In contrast, the other interviewees feel some resistance against their beliefs from their university colleagues and executives. Moreover, researchers in the second subgroup have all been in contact with organizations that claim to combat pseudoscience, paranormal beliefs, and quackery (4.3.3). This finding fits in with the findings of Ecklund & Park (2009), who has found that most U.S. scientists do not perceive a conflict between science and religion, especially scientists who are conservatively religious themselves.

A possible account of the discrepancy between the acceptance of the beliefs of these subgroups is the fact that the beliefs of the second group meet all five features that I used to describe scientifically controversial beliefs, while the beliefs of the first subgroup do not conform to the fourth feature. The fourth feature was that controversial beliefs are more likely to have supporters who argue that these beliefs should be studied in a scientific context (section 2.1.2). The Christian interviewees are relatively uninterested in the scientific study of their religious beliefs, while the interviewees with otherwise spiritual or religious beliefs, or beliefs concerning the paranormal and alternative medicine, argue for scientific research into their scientifically controversial beliefs (4.2.3). The absence of the fourth feature would make the Christian beliefs relatively uncontroversial, at least in the way that they are treated by the interviewees. Why is there less urgency to study the religious beliefs in a scientific context?

A first explanation is that these religious beliefs mainly inform moral beliefs, which do not conflict with scientific views about the natural world. For example, a Christian might not believe in the literal

meaning of the story of Jesus' feeding of the 5,000, placing importance on the moral interpretation of this story instead.

Secondly, religious, Christian people might be convinced that scientific research looking into their beliefs is not necessary to legitimate them. Religious faith generally does not need scientific evidence to legitimate it for its believers. As interviewee 1 put it, "the nice thing about religion as a philosophy of life is that you can believe it right now. You do not have to wait until everything has been explained" (1:49), and "God is there for everybody. This means that the path that leads to God cannot be a scientific route" (1:51).

Third, religious people might believe that scientific research about religious beliefs might be of no avail. As interviewee 1 repeated multiple times, "it's a dead end".[53] Interviewee 2 mentioned that some beliefs are part of "a knowledge domain beyond or before words. […] Words and reason do not induce these beliefs" (2:14). This kind of reasoning applies to beliefs acquired through and inspired by spiritual, paranormal and mystic experiences, like a vision from a God or a glimpse of the afterlife. Ames (1915) put it as follows: "The uniqueness of this mystic knowledge is further emphasized by the fact that it is attained by no ordinary means. It does not lie at the end of a process of perception or of reasoning or of scientific experiment. [...] It is, they insist, an indescribable experience, and therefore to be understood only by being felt."

Fourth, if we interpret this result in the light of the epistemic instability described by Harambam (2017b) (section 2.2.1), the Christian interviewees might have found an authority that supports their scientific views, namely the scientific community, as well as an institution that accepts their faith, namely the church of their Christian denomination. On the other hand, the interviewees with beliefs concerning other forms of religion, spirituality, the paranormal and alternative medicine, might look to one authority, the scientific community, for acceptance of all their views — both scientific and scientifically controversial. Possibly, this is also one of the explanations for why they are relatively interested in the scientific study of their controversial beliefs. This explanation also accounts for the difference between Christian interviewees and otherwise spiritual interviewees. The other forms of spirituality among the interviewees (Anthroposophy, Holism and Zen Buddhism) are less prominent and institutionalized in Dutch society, which could mean that they might have less epistemic authority here than Christian organizations such as the Roman Catholic Church and *PKN* (Protestant Church in the Netherlands).

5.1.4 Paradoxical criticism

The interviewees expressed two types of criticism of the scientific community. At first glance, their comments give the impression of a paradox. One subgroup of interviewees, all non-Christian interviewees (3, 4, 5 and 6) in fact, prefer a broader view of science, with opportunities to research topics related to spirituality, the paranormal and alternative medicine practices. Moreover, it seems like these interviewees surmise that the scientific community has lost sight of its third responsibility towards society as a result of its focus on technological and economic progress. This criticism is similar to the criticism expressed by Harambam & Aupers' (2015) interviewees, members of the Dutch conspiracy milieu, who accused the current scientific community of "materialistic orthodoxy" (section 2.2.2) .

[53] 1:5, 7, 9, 77-84

On the other hand, a similar group of interviewees (2, 3, 4 and 5) criticized the overvaluation of science by researchers and society, and the idea that science can provide answers to all questions in life. This group of interviewees seems to experience the effects of scientism in their academic environments and in society. This corresponds to Hertzberger's (2019) views, who argued that the level of trust in science is undue and that people should be comfortable believing something that is not supported by scientific research. Also similar, but more extreme, are the views of Feyerabend (as represented in Chalmers, 2013), who denounced that the scientific community had any reasonable arguments to claim superiority over other ways of acquiring beliefs (section 2.2.2). Apparently, interviewees who are part of both subgroups (interviewee 3, 4 and 5) argue for a more inclusive and holistic conception of science, while they are also critical of the belief that science is the only path to knowledge and truth, and the resulting influence of scientific beliefs on personal preferences and values.

An explanation for these seemingly contradicting views is that these researchers are just *professionally* interested in a scientific explanation for their personal scientifically controversial beliefs. They might already have justified these beliefs to themselves, with arguments that do not belong in the scientific domain. Scientific and alternative beliefs are viewed as complementary ways of looking at issues. For example, a person who has experienced a sense of oneness with all other living beings and can see this as a justification of the belief that telepathy is real. This person does not need scientific backup to justify this personal belief. They are simply interested in the scientific perspective.

However, a supplementary reason for studying this kind of beliefs in a scientific context might be that science is valued so highly in society. In Rorty's eyes (1991), scientific research is a great method for explaining phenomena, simply because this method is already known and valued highly in western society (section 2.1.1). In this respect, scientific evidence might be the best possible approach to gaining society-wide acceptance of beliefs.

5.2 Limitations

In this section, my approach to aswering the research questions and fulfilling the research objectives is evaluated. I also discuss how limitations of this project might have impacted the trustworthiness of this study.

5.2.1 Evaluation of the interview questions

A first objective for this thesis project was the development of a list of interview questions for the semi-structured interviews. While creating this list, I had not yet conducted in-depth research into the relevant topics. A disadvantage of this is that the interview questions were not necessarily an adequate and comprehensive reflection of the phenomenon under study. However, the literature review was purposefully postponed until after the interviews were analyzed, as to allow myself to interpret the data with less preconceptions. Another limitation of the prepared interview questions is that it was not pilot-tested, although a first draft was changed according to feedback from my supervisors.

The interview questions are applicable to scientists who are openly religious, or otherwise spiritually oriented, as well as scientists who are engaged in research of topics that are often dismissed in the scientific community. However, the experiences of Christian and non-Christian interviewees turned out to be different in multiple cases. These differences show that the scope of this study might have

been too broad. Still, the difference between these two subgroups is a thought-provoking finding in itself.

5.2.2 Evaluation of the sampling method

Another objective in this project was defining what kind of participants I had to look for, and subsequently contacting potential participants. I found my interviewees through an online search. This means that the sampling method is biased towards scientists who are publicly open about their beliefs. The fact that these scientists feel comfortable expressing their beliefs might indicate that they feel comfortable around them. Conversely, people who are struggling with reconciling their alternative and scientific beliefs might have gone past my radar. A related issue is that non-response bias may have impaired the quality of the sampling. This means that the non-responding scientists might have given different answers in the interviews than the researchers that did take part in this study. Three researchers responded but did not take part in this study. They were interested but not available at the time.

5.2.3 Evaluation of the interviews

Conducting the interviews was the third objective for this project. To ensure confirmability of the findings, I described how the interviews were arranged and how they transpired. Moreover, the interviews were all transcribed literally. Half of the interviews was conducted by phone and half of the interviews took place face-to-face. This variation of media is an extraneous variable in the study. The introduction of this variable might have accidentally influenced the interviewees' answers. Both media are said to have their advantages and disadvantages. Interviewees can be more open when the interviewer is not physically present. On the other hand, a personal face-to-face conversation can make it easier to talk about sensitive topics (Dingemanse, 2019). In short, both media can have similar effects on the openness of the interviewees, so the influence of the extraneous variable might have been quite limited.

While interviewing the participants, I did not focus sufficiently on beliefs that might cause a conflict between science and other ways of knowing. The interviewees and I spoke about many beliefs that are quite irrelevant, as they are not so scientifically controversial, e.g. religious beliefs that mainly involve the interviewee's values and personal preferences, not about the nature of reality. On the other hand, as discussed in chapter 2 and in section 4.2.2, one of the criticisms expressed by the interviewees is that science is overvalued in the scientific community and in society, which might withhold people from making personal, subjective judgements that go against the values of the scientific community. In this respect, a conflict between scientific beliefs and subjective value judgements is a relevant object of study.

5.2.4 Evaluation of the data analysis

Data saturation had probably been reached when new interviews added only little new information about the research topics and when the patterns emerging from the interviews became clear. However, I did not check whether data saturation had been reached for the two subgroups that emerged (Christian and non-Christian researchers). Consequently, there is still a possibility that the similarities within subgroups and differences between subgroups are coincidental. However, it turned out that the interviewees within the subgroups expressed similar views, considering the results that were discussed per subgroup. Hence, it appears that an acceptable degree of data saturation has been attained concerning these specific results as well, even though the subgroups are relatively small for a phenomenological study(compare section 3.4.1).

Coding the interviews was another objective that had to be reached. I coded the interviews on my own, as an untrained qualitative researcher. The work of multiple trained coders might have resulted in more credible results. To limit a loss credibility, I consulted an MSc who applied similar research methods during her studies. The credibility and confirmability of the description of the results was build up through the inclusion of numerous citations from the interviewees, presented in the running text or in footnotes, to substantiate the claims made in chapter 4. This clarifies whether statements apply to all interviewees or a subset. Moreover, about 6 months after the interviews took place, a member check has been performed to check the accuracy and the dependability of the findings: the participants read chapter 4 and all agreed to how their views and experiences were represented.

5.2.5 Evaluation of the synthesis

The last objective of this graduation project was to reflect the responses and themes that emerged from the findings. Unfortunately, only *speculative* explanations are offered for the finding that Christian interviewees are less interested in submitting their beliefs to the scientific test. This is a consequence of the fact that I did not ask enough follow-up questions about this. A second issue is that the criteria for scientifically controversial beliefs, used in the interpretation of the findings, were not based on a literature review. However, they are drawn up after careful consideration of examples of ideas that have caused controversy in the scientific community in the past.

5.3 Recommendations

This section includes recommendations for how further research can build on this graduation project and can investigate questions that remain unanswered.

5.3.1 A different approach to sampling

First, future work should take measures to guarantee that the sample of interviewees is not biased against researchers who feel conflicted around their scientific work and scientifically controversial beliefs, as to discover whether the findings in this thesis can represent scientists with scientifically controversial beliefs *beyond* the sample of my interviewees.

5.3.2 A scientifically substantiated definition of scientifically controversial beliefs

In this explorative study, I defined scientifically controversial beliefs without much scientific backing. The definition could be improved by studying more examples of ideas that have been labeled as scientifically controversial. For example, researchers could analyze a corpus of news articles about ideas that have caused scientific controversy in the past, or similar articles published by science watchdog organizations, such as the aforementioned Dutch *Stichting Skepsis* and *Vereniging tegen Kwalzalverij.* A classical definition or a family resemblance characterization of scientifically controversial beliefs could be defined through the analysis of the findings.

Moreover, the reality of the five features of scientifically controversial beliefs as proposed is this study could be studied. For example, the fourth feature states that non-scientific beliefs are perceived as more controversial when their supporters want to study these beliefs scientifically, because then, these beliefs start to poach on scientific territory. The reality of this statement could be supported through a corpus analysis similar to the one described above or through interviews with scientists, science journalists, or members of science organizations such as the KNAW (Royal Netherlands Academy of Arts and Sciences), NFU (Dutch Federation of University Medical Centers), NWO

(Dutch Organization for Scientific Research), *Vereniging Hogescholen* (Association of Applied Universities), and *Vereniging van Universiteiten* (Association of Universities) in the Netherlands.

5.3.3 Research into the differences between Christian and non-Christian scientifically controversial beliefs

In section 5.1.3, I explained the difference between the acceptance of Christian and non-Christian scientifically controversial beliefs with this fourth feature. The beliefs of non-Christian interviewees seemed to be more controversial, because these researchers were relatively eager to study their beliefs in a scientific context. Future quantitative research is needed to establish whether the differences between the two subgroups hold up when more participants are surveyed about this.

5.3.4 Motivations for researching scientifically controversial beliefs

A point of interest for further qualitative research is what motivates people to research their scientifically controversial beliefs in a scientific context, and what keeps them from doing this. I suggested four explanations in section 5.1.3. These could also be studied quantitatively with questionnaires. For example, a study could focus on whether people are less motivated to research their beliefs in a scientific context when these beliefs are already supported by *another* relevant epistemic authority, e.g. the Roman-Catholic Church.

5.3.5 Review of research based on subjective experiences

Two other features of scientifically controversial beliefs included in this thesis are that often, evidence for controversial beliefs is found only through direct experiences of people with charismatic or paranormal talents or through experiences that are hard to replicate, e.g. mystic experiences and sightings of extraterrestrials. A literature review could clarify which criteria are in place for scientific research based on subjective, personal experiences, with a focus on the spiritual, religious or paranormal phenomena that are experienced, instead of a focus on the experiences themselves. If certain topics seem to be banned from research, even though they are understudied and they conform to the criteria, these topics might simply be taboo. This kind of research could support or contradict the statement that the current scientific community is overly fixated on technological and materialistic issues, which was suggested by interviewees in this study and in a 2015 study by Harambam & Aupers.

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