

The Problem of Certainty in Religion and Science: two critically rational solutions to the Feynman Dilemma

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Article Info

ABSTRACT

Article type:

Research Article

Article history:

Received 22 January 2023

Received in revised form 26
April 2023

Accepted 26 May 2023

Published online 18 June 2023

Keywords:

Critical rationalism; Feynman;
Popper; science and religion

The influential physicist Richard Feynman became interested in the relationship between religion and science during a mid-career phase. He proposed that their interface was embroiled in unresolvable difficulties. He felt that science demanded an attitude of uncertainty for its claims, while religion contrarily required certain belief in its core doctrines. Though possessing several non-contradictory dimensions, Feynman felt that the nature of the truth claims of science and religion suffered from insurmountable elemental conflicts. This was by contrast to Karl Popper, the leading critical rationalist of the 20th century, who argued that there could be no tension between science and religion. This paper will argue that the 'Feynman Problem' is not as insoluble as it appears. Rather, several solutions exist within critical rationalism. Two will be presented-the first revolves around the conjectural basis of knowledge and is already a well characterised critical rationalist notion. The second is a novel solution based on the separate categorisation of psychological, pragmatic, and epistemological attitudes to religion and science. Karl Popper's view of religion-science dissimilarity was a minimalist point of departure for critical rationalists, who have developed increasingly sophisticated frameworks for investigating the relationship between faith and reason. Critical rationalism represents an equally inspirational methodology for the pursuit of scientific and religious truth. Though both Feynman and Popper's views on religion were underdeveloped, they foreshadowed the religion-science frameworks advocated by many late 20th century scientists, especially in the form of New Atheism and Gould's NOMA theory.

Cite this article Zaidi, S. (2023). The Problem of Certainty in Religion and Science: two critically rational solutions to the Feynman Dilemma. *Journal of Philosophical Investigations*, 17(42), 352-373. <http://doi.org/10.22034/jpiut.2023.16592>



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<http://doi.org/10.22034/jpiut.2023.16592>

Publisher: University of Tabriz.

Richard Feynman (1918-1988) was one of the most decorated physicists of the 20th century, a Nobel laureate for the development of quantum electrodynamic (QED) theory. In both his early and very late career, he expressed disdain for philosophy, condemning it as “low-level baloney” (Feynman, 1997 [1985], 199). He described philosophers as “. always on the outside making stupid remarks” (Gleick, 2011 [1992], 11). He favoured a pragmatic approach to knowledge (Ibid, 2011 [1992], 12) while affording some level of prestige to logic (Ibid, 2011 [1992], 165-166), especially within a mathematical context. However, aloofness from philosophy has resulted in the following notorious apocryphal saying being attributed to Feynman: “The philosophy of science is as useful to scientists as ornithology is to birds” (Trubody, 2016, 10).

Far from being an exceptional outlook, Feynman’s estimation of philosophy has been echoed by subsequent physicists, such as Stephen Hawking and Lawrence Krauss, with the former’s stance typified by the claim that: “Traditionally these are questions for philosophy, but philosophy is dead. Philosophy has not kept up with modern developments in science, particularly physics. Scientists have become the bearers of the torch of discovery in our quest for knowledge” (Hawking & Mlodinow, 2010, 7)¹. Feynman’s views on religion have also influenced the New Atheist movement (Dennett, 2006, 220, 231; Stenger, 2012, 274).

However, a few famous physicists that were contemporaneous with Feynman upheld the compatibility of religion and science and the crucial value of philosophy. Albert Einstein and Freeman Dyson are two prominent examples (Einstein, 1954, 44-45; Dyson, 1998, 7-9). Their opinions influenced Stephen Jay Gould’s later non-overlapping magisteria (NOMA) theory (Gould, 1999, 30-33), which competed with New Atheism.

Unfortunately, Feynman’s anti-philosophical rhetoric has obscured the fact that he sensitively engaged with philosophical questions about the nature of science, religion, and their mutual relationship, at least in the mid-point of his career (Feynman, 1997 [1985], 242)². Though his feelings towards philosophers of science seemed less than amiable, Feynman articulated some major problems in accomplishing compatibility between the worldviews of religion and science, at least as he understood them. This dilemma is centred on the apparent asymmetry between certainty in the outlook of the modern scientist and the traditional religious believer. Though Feynman’s understanding of philosophy and religion was quite naïve, he remains an inspirational figure for many physicists, due to his charisma and renowned teaching style. His lectures on physics continue to be used by physics educators (Philips, 2013, 30-31) and his views on religion are influential to New Atheists. However little critical assessment of his religious claims is to be found in literature. After stating Feynman’s concerns, this paper will consider the religion-science problem from the perspective of critical rationalism. This will be represented through Karl Popper (1902-1994), the most prominent explicator of this methodology. His approach to religion was far more expansive

¹ Hawking & Mlodinow attempted to fuse Feynman’s QED theory with string theory to propose a Theory of Everything in this book, coupled with rejection of theism; their echoing condescension of philosophy is hence hardly a surprise.

² Feynman humorously claims here that “In the early fifties I suffered temporarily from a disease of middle age: I used to give philosophical talks about science... I also thought about the relation of science and religion”.

and inclusive than Feynman's. His later views on metaphysical theories inspired other critical rationalists to advance critical treatments of religion. It will be argued that these principles can be used to overcome what I will call the Feynman Problem and to create a better epistemological outlook for science and religion. The conflict between Feynman's claims and those of critical rationalists will be critically assessed. Feynman's assessment of the relationship between religion and science is a rationally deficient treatment and it will be argued that he would have fared better as a critical rationalist. It would have provided him with a better philosophical framework to reason with.

Feynman was famously irked by interdisciplinarians who claimed to have found successful solutions to problems that had been improperly stated (Feynman, 1997[1985], 242-245)¹. In keeping with this rational spirit of problem solving, we will now turn to formally stating Feynman's Dilemma.

The Feynman Problem

This section will explain 5 different facets of the Feynman Problem. He did not delineate these in a methodical fashion, and various scattered statements made by him about religion have been drawn upon in constructing this account. Though the way in which he stated the problems was less than ideal, it will hopefully be described here in the manner that Feynman intended it.

Feynman (Feynman, 1999, 23) believed that there is a difference between scientific answers and 'mystic' or philosophical answers². Scientists, he claimed, seek to further understand the unknown without prejudicing what they will discover, while mystics predefine what can be known and then claim to know it.

Yet definitive religious answers to thought-provoking mysteries, such as the difference in capability between humans and animals and the relationship between man and the cosmos, or God and the cosmos, seemed too plain and uncomplicated for a scientist like Feynman to tolerate (Feynman, 1999, 24). He suggested that such answers constrain the curiosity and love of perpetual perplexity that a scientist must cherish and harness as an impetus for research.

Reality, he claimed, consists of indefinite layers of complexity, which are reduced to platitudinous abbreviations by the faithful. The scientist's attitude of doubt is sufficiently sophisticated to empower enduring attempts at unpeeling the layers of an enigmatic cosmic onion (Feynman, 1999, 23). However, religion contrastingly satisfies the believer with a prematurely prosaic denouement, one that convinces him/her that he/she already comprehends all that is

¹ He alludes here to an ethics conference at which the solutions presented were tautological and without a clearly defined set of problems. Feynman thought the participants were "pompous fools.... I'm not going to get upset like that again, so I won't participate in interdisciplinary conferences anymore" (Feynman, 1997 [1985], 246).

² By 'mystic and philosophical' answers, Feynman meant scientifically untestable claims of all types, of which religious ideas are a particular subset. Within traditional religions, however, metaphysical claims are theoretical while 'mysticism' is typically more of a practice.

worthwhile to know. This is the first part of the Feynman problem, the matter of attribution of appropriate complexity to nature, and it's converse attenuation by religious thought.¹

The second part of the Feynman Problem pertains to the capacity for acceptance of mistakes. Religions appear to have conflicting “theories” about the same ideas, and adherents of each claim that their version is true (Feynman, 1999, 24). Feynman asserted that truth is forever equivocal and that the scientist does not face the same problem, as he/she has the option of alleging that nothing about current conflicting theories is true; not only this, but he/she can throw the entire framework into doubt with ruthless fidelity in the quest for capturing the true nature of reality.

Religions do not tolerate individuals contending that the entire system of belief is erroneous². Feynman believed that it is preferable to uphold continual doubt and “not knowing” instead of beliefs that are erroneous (Feynman, 1999, 24). Thus, the admittance of the total fallibility of knowledge of every kind is the second aspect of the Feynman Problem.

The third part of the problem concerns unquestioning acceptance of untested claims by religious people. While science focuses on establishing a claim's veracity through experimental tests, religious faith healing is accepted without being subject to stringent tests (Feynman, 1999, 107). Feynman believed that a scientist gathers evidence for a claim and tries to be objective in reporting collected data, and concludes what is necessary from it, not what he/she desires³. Religion encourages believing in what one desires, without an impetus for testing the claim. However, Feynman did implicitly accept that some theoretical religious beliefs, such as God's existence, cannot ever be tested (Feynman, 1999, 247).

Feynman believed that this results in a religious scientist holding two logically inconsistent worldviews. The only way to escape this is for scientists to hold discussions that “attack” religion and other untested claims, such as astrology (Feynman, 1999, 110-111)⁴. This can roughly be described as a problem of cognitive dissonance and lack of consistency around a scientific worldview.

The fourth part of the Feynman Problem, which he considered to be the most significant, is the problem of certainty. Feynman believed that a scientist is “never certain” (Feynman, 1999, 111). He/she is not concerned with whether theories are true or false, but rather with the *probability* that

¹ Feynman's claim here is an over-generalisation. It is very unfortunate that he was unaware of philosophical and religious thinkers with highly sophisticated views about the cosmos. One of my reviewers has suggested Einstein as an example of mature philosophical thinking.

² Religious believers may repeatedly change their views after critical assessment, hence the existence of different doctrinal schools of thought. Feynman may have a point here only with respect to excommunication based on rejection of core beliefs. Of course, it can be argued that those who challenge scientific consensus are also sometimes ostracised from the scientific community.

³ Some of the assumptions in scientific frameworks e.g., metaphysical ideas, are also untestable, unbeknownst to Feynman. I am again indebted to one of my reviewers for suggesting this.

⁴ Though this is what the ‘New Atheists’ more recently attempted to do, Feynman differs from them in his humility—he did not think that the views of scientists regarding unscientific subjects were necessarily cogent – “I believe that a scientist looking at nonscientific problems is just as dumb as the next guy—and when he talks about a nonscientific matter, he will sound as naïve as anyone untrained in the matter” (Feynman, 1999, 142).

they are true or false; Feynman thought that this was equivalent to the scientist making statements that have “varying degrees of certainty” (Feynman, 1999, 146).¹

Feynman suggests that religion is “unscientific” precisely because it does not encourage questions about the likelihood of its beliefs being true (Feynman, 1999, 111-112). He believed that scientific evidence informs the degree to which a claim is probably true or false. Yet perfect certainty one way or the other is never achieved. Feynman argued that religious people are unwilling to harbour any doubt whatsoever; they evade interrogation about their beliefs because questions naturally produce doubt². He thus advised becoming comfortable with a lack of knowledge and certainty (Feynman, 1999, 112).

The fifth part of the Feynman Problem relates to the search for ultimate meaning. He felt that human beings cannot know the purpose of existence, nor discern any essential meaning from it (Feynman, 1999, 114). When we believe that we know final eventualities, it occasions disastrous socio-political misadventures, manufactured with imposition of a definitive purpose in mind. Yet despite innumerable attempts, no consensus on the meaning of life has ever been achieved. Feynman concluded that the method of choice for containment of risky policy making is to deny that any ultimate meaning can ever be known (Feynman, 1999, 114).

Though he argued that universal education and universal financial security are useful for human progress, they are double edged swords that can lead to regress due to the possibility of teaching falsity and propagation of dangerous ideas (Feynman, 1999, 113-114). However, he felt an attitude of doubt to life’s purpose was conducive to optimal human development, without any drawbacks. It avoids presupposing what future human potentialities could be (Feynman, 1999, 114). This attitude, the “scientific way of progressing”, does not “decide upon the answer” (Feynman, 1999, 115). It continues to probe for answers undogmatically, while the religious attitude delivers answers without probing³. Such is the fifth aspect of the Feynman Problem, the problem of designation of ultimate meaning and purpose to life⁴.

A deeper understanding of the Feynman Problem involves appreciation of why he was interested in the science-religion debate. This can only be realised through appreciation of the *problem situations* that he was responding to. This article uses the term ‘Feynman Dilemma’ to collectively refer to the above stated problems *and* the provocative situations Feynman encountered. Here will be attempted a reconstruction of a few of the incidents which influenced his religious thought.

¹ Hence Feynman is a proponent of some form of Bayesian probability as a methodology for science.

² Some discussions of Christian faith today focus more on doubt than on certainty; Feynman seems to have been unaware of this; again, I am grateful to a reviewer for this point.

³ This is a strawman fallacy- Feynman is assuming that all religious claims are made by uncritical and poorly informed thinkers.

⁴ Feynman alleges that believing in any definite existential teleology is a path to totalitarianism. There are many objections to this:

That it is a kind of is-ought fallacy- should firm personal beliefs about the meaning of life necessarily lead to totalitarianism? He is confusing political ends with personal existential meaning or ends.

The claim that there must be a consensus on the meaning of life for it to be useful is a rather futile claim- ethical and spiritual matters are not democratic affairs; in fact, science is not democratic either.

Does believing in an ultimate purpose for life contradict a scientist’s work- especially since Feynman has conceded that science does not produce moral propositions of any kind?

Feynman encountered religious devotees who seemed uninterested in unravelling the laws of nature-their primary concern was to manipulate scientific claims in service of their existing dogma. It is to Feynman's credit that he did not restrict this observation to religious zealots-he also attributed the trivialisation of science to artists (Feynman, 1997 [1985], 225, 240-241). He felt that science had largely failed to capture the public imagination due to a flawed representation in early education (Feynman, 1999, 178), which meant that many adults (including some religious and artistic types) failed to reap benefits from it. Feynman spent some time working as an artist to try to overcome the lack of accurate scientific representations in that field (Feynman, 1997 [1985], 231), but did not quite dabble with religion in the same way. Nevertheless, he did stay in a Jewish theological seminary (Ibid, 1997 [1985], 246) and became superficially acquainted with the Talmud.

Feynman related an anecdote of his encounter with the problematic religious mind. In a conversation with trainee Rabbis, a scientific opinion on whether electricity is in fact a form of fire was solicited from him (Feynman, 1997 [1985], 247). Puzzled by what predicament these religious students were grappling with, Feynman answered "No...but what is the problem"? He discovered that their concern was regarding permission to use electricity on the Sabbath, given that they believed the Talmud to forbid the use of fire on that day. It was not the nature of electricity that fascinated them, but whether their religious legal tradition could interpret modern phenomena in such a manner as to avoid God's wrath¹.

Another anecdote is Feynman's scrutinization of a Hawaiian Buddhist proverb: "To every man is given the key to the gates of heaven; the same key opens the gates of hell" (Feynman, 1999, 142-143). He questioned how the key being advocated here could possess any worth, without simultaneous provision of well-defined guidelines on recognition of the entirely separate gates. Feynman's aim here was not to criticise religion or Buddhism per se, but to enquire how anything of value, including science, could possess such merit if it posed serious dangers to the world. However, this nonetheless subtly alludes to his view that vague religious teachings, bereft of a distinct and sophisticated morality, could have quite destructive effects, or at least could be superfluous to a human being's ethical development. Despite this, Feynman did think that traditional religious teaching held an advantage over scientific teaching- it repetitively underlined moral standards for all age groups, while a comparable platform did not exist for science, resulting in its undervaluation (Feynman, 1999, 185)².

Another situation that troubled Feynman was that many of his scientific colleagues were religious believers. He conceded that faith in an "ordinary" God and science were compatible, and

¹ Given that Feynman was a pragmatist, it is ironic that he found the jurisprudential pragmatism of these orthodox Jews objectionable.

² An example of the tendency of organised religions to provide continual moral and ethical admonitions is the function of the Holy Qur'an as a 'reminder' (or 'dhikr'), as stated for instance in Sura 73 verse 19 'Surely this is a reminder, then let him who will take a way to his Lord' (Shakir, 2002, 587).

that science could not disprove God's existence (Feynman, 1999, 247)¹. Nonetheless, he contended that it was extremely difficult to maintain congeniality and that it was not an equilibrium worth preserving. Holding doubt and uncertainty in the forefront of one's thought was indispensable to the scientific mind, while heresy to the holy mind. The scientist must insist that nothing is "proved beyond all doubt" and that truth is elusive; we can only know what is more probable or less probable (Feynman, 1999, 248). Scientists must not claim to know that their decisions are correct-only that they have tried their best².

Thus, for Feynman a scientist cannot say, if they are consistent, that 'there is a God'; they can only say that they are close to certain. A scientist can ask "how sure is it that there is a God?" but cannot ask "is there a God?" (Feynman, 1999, 249). Feynman's engagement with religious scientists convinced him that this was the real epistemological difference between science and religion.

His acquaintance with fellow atheist scientists convinced him that though religion is not a necessary condition for possession of morals, it is required for motivating their lasting implementation. He suggested that religions have three domains - metaphysical claims, ethical norms, and an inspirational function (Feynman, 1999, 252). He felt that some atheists acquired sublime ethics despite rejection of the divine (Feynman, 1999, 251). Yet only religion provided ample enough inspiration and admonition to continually act upon moral principles³, in addition to encouraging various creative arts. Science did not possess such functions. The frailty of human nature is such that holding theoretical moral values is no guarantee of achieving the drive to live by them. Though the belief in a divine metaphysics bolstered the ethics and inspirational features of religion, by connecting the individual with a wider cosmic reality, Feynman worried that science forced religion to 'retreat' when it sometimes corrected false metaphysical claims (Feynman, 1999, 253)⁴

He noted that both religion and science were straining to answer metaphysical questions, but scientists alone accepted that their answers would be false (Feynman, 1999, 254). Religious metaphysical schemes demand certainty but will also be outed as false and will inevitably face conflict with science⁵. The situation at the heart of the Feynman Dilemma is that refutation of religious metaphysics hinders its inspirational function from being fulfilled, as man no longer feels connected to God and the cosmos (Feynman, 1999, 256). Feynman knew of no solution to the

¹By an "ordinary" God, Feynman meant the God of a traditional faith, such as the Abrahamic religions. This would contrast with a deistic God, a God that creates but then does not involve Himself in the affairs of His creation, a belief held by some post-Renaissance European thinkers.

² To faithfully represent Feynman's claims, his ambiguity with respect to the difference between theoretical claims and practical decisions has been left uncorrected. Feynman frequently obfuscates the line between knowledge claims and decision-making, due to his pragmatism.

³ Feynman's substandard account of moral philosophy has been highlighted to me by one of my reviewers.

⁴ This is the cardinal feature or core of the Feynman dilemma. Feynman felt that the scientific attitude and Christian ethics were logically consistent, but that scientific facts and religious metaphysics were not (Feynman, 1999, 256).

⁵ Metaphysical claims are unfalsifiable, according to critical rationalists, who would thus reject Feynman's claim. However, historical, and pragmatic principles of religions do undergo change under pressure from scientific and technological advances.

conundrum of diminishing religious beliefs with uncertainty while maintaining a sense of its essential truth. Thus, he was pessimistic about the merits of advocating a consistent and coherent dual religious-scientific worldview. Support for science as it stands would necessitate a full-frontal assault on religion, and vice versa (Feynman, 1999, 257).

Critically Rational Religion

So far Feynman's Problem has been aided by an orderly presentation, which suggests that he is right about the conflict between religious faith and scientific reason. We will now turn to the position of critical rationalists. Though this perspective does overlap to some degree with Feynman's claims, it will be argued that the more meticulously moulded account of science here provides a better explanation of the suppositive nature of knowledge.

Karl Popper, the most significant proponent of critical rationalism, fundamentally disagreed with Feynman about a religion-science conflict. However, we will first have to consider Popper's scientific views. Like Feynman, Popper regarded science as a great 'adventure' into the unknown (Popper, 2002 [1959], 15). He rejected inductive and probabilistic logic as a basis for scientifically true statements (Popper, 2002 [1959], 6)¹. Such truths are not pursued due to the need to find utterly confident answers, but because the answers provide provisional solutions to our problems via their explanatory power. Scientific statements are not science due to being verifiable, or fully justified by experience, but due to being experientially testable, and therefore falsifiable, at least in principle (Popper, 2002 [1959], 18, 22).

Conviction, or certainty, and its degrees are psychological processes and incapable of justifying a claim to knowledge. Thus, Popper distinguished between subjective states of mind and the logical relations which exist between statements of knowledge (Popper, 2002 [1959], 22). Certainty has no place in epistemology. Psychological states are subjective responses to experience. Testing scientific statements is an assessment of their truth properties but scientifically testing certainty in human subjects only establishes the presence or absence of degrees of certainty and cannot be a test of truth². Certainty can be neither true nor false as it is not a form of knowledge, nor even an associated epistemological feature of objective knowledge³.

Science has methodological rules, which are linked to the need to have theories that are always exposed to testing, and unshielded from falsification (Popper, 2002 [1959], 32-33). Popper suggested that scientific statements are thus only provisionally correct, if by testing they remain corroborated, that is corresponding to some basic statements (and unfalsified by them). The degree

¹ "For it is the tendency of inductive logic to make scientific hypotheses as certain as possible" (Popper, 2002 [1959], 271).

² Neurophysiologists and psychologists have developed experimental techniques that attempt to measure degrees of certainty (and uncertainty), as well as some of their triggers and consequences. See Polyportis, Kokkinaki, Horváth and Christopoulos (2020) and Seidel et al, (2015).

³ Popper (2002 [1959], 24) does not deny that certainty can be tested in psychology, nor that statements of objective knowledge can lead, in some cases, to subjective psychological states such as certainty (Popper, (2002 [1959], 23). However, what he denies is that certainty is a form of objective knowledge, or that it has any bearing on whether knowledge that we possess is objective or justified.

of corroboration of a theory may change over time and new basic statements emerge to falsify a claim, meaning that the truth of science is not absolute or final, even though truth is taken by convention to be a permanently fixed or timeless concept (Popper, 2002 [1959], 274-275). We will reject scientific claims in the future once falsifying statements crystallise, but this nevertheless takes us closer to truth by eliminating false possibilities, replacing them with new provisionally true ones. Popper called this provisional claim a conjecture, and the process by which scientific knowledge grows ‘conjectures and refutations’ (Popper, 2002 [1959], 278; Popper, 2002 [1963], 57, 65)¹.

Though only science is falsifiable, Popper expanded the scope of critical rationalism to philosophy, metaphysics, mathematics, and the humanities. Though philosophical and metaphysical theories are irrefutable by empirical tests, they can nonetheless be critically assessed based on how well they act as solutions to the given problem situation they were angled against (Popper, 2002 [1963], 233-234). After criticism exposes various ways in which an alternative theory acts as a better solution, the original conjecture is renounced. Philosophical and metaphysical knowledge claims are, like scientific claims, only provisional and fallible. Popper’s view that metaphysical theories can be developed in a positive direction based on criticism was a reassessment of his earlier belief that such theories are inert (Popper, 2011 [1945], 424-425).

This brings us to approaching religion as a critical rationalist. Popper argued initially that science and religion are unconflicted, if their proponents avoid encroaching on the territory of the other (Popper, 2012, 41-42). To suggest that science supports religion is damaging, as any scientific conjecture may be overturned and refuted. While it is considered a virtue to attack a scientific hypothesis so that it is superseded by a better one, it is regarded as impious to scorn belief in God. Popper hence originally rejected the idea that religion contains hypotheses or conjectures (Popper, 2012, 43).

Religion by default has normative elements, while science can only make factual claims in the form of descriptive statements (Popper 2012, 44-45). It is hence impossible for science to provide moral guidance. Popper’s view, like Einstein’s, foreshadowed Stephen Jay Gould’s later NOMA theory, which suggested that religion and science cannot ever be in conflict if their adherents avoid overstepping boundaries.

Popper also argued that atheism is an untenable position as all people are religious, in the sense that they have some preference as to a set of moral propositions and ethical choices (Popper, 2012,

¹ Popper said “Although it can attain neither truth nor probability, the striving for knowledge and the search for truth are still the strongest motives of scientific discovery. *We do not know: we can only guess*” (Popper, (2002 [1959], 278). Though ‘we do not know’ could easily be mistaken for a declaration of extreme philosophical scepticism, Popper was in fact only a moderate sceptic. He argued that scientific knowledge grows via refutation of provisional truths; hence we do possess knowledge, just not a certain and fully justified set of propositions. It is the latter that Popper was denying, thus allowing for the aim of science to remain truth.

45)¹. Rather than debating whether one should be religious, one should instead avoid ‘bad’ religions, in which Popper included fascism and totalitarianism (Popper 2012, 46). As some adherents of organised faiths make immoral decisions, it is imperative to avoid renouncing moral agency and the placing of one’s conscience in the hands of religious authorities conveying perverse religious interpretations (Popper, 2012, 47).

Popper saw the scientific attitude as profoundly religious and worthy of respect on this basis. It sought to unveil truth and to bequeath to humanity what was beyond their immediate personal interests (Popper, 2012, 47). Amongst the organised religions, Popper viewed Christianity and Islam as the most meritorious, as they sought to globally reduce suffering through the universal kinship of humankind (Popper, 2012, 46; Popper, 2011 [1945], 420). Religions that advocated the value of individuals were in keeping with reason, while collectivist ideologies that divided and enslaved people and entailed great suffering were anathema to reason (Popper, 2011 [1945], 423). Popper criticised Arnold J. Toynbee’s claim that the Prophet Muhammad compromised his rank as a Prophet by entering statecraft (Popper, 2011 [1945], 432). Popper saw no contradiction between religious leadership and political success, the latter of which would mean using the state to alleviate suffering of individuals.

What then of certainty? Popper criticised forms of religious certainty which guaranteed future outcomes without any regard for personal moral responsibility (Popper, 2011 [1945], 451). He contrasted such religious ‘historicism’ with a religious faith that gives hope via realisation of personal conscience and ethical obligations:

Historicism, I assert, is not only rationally untenable, it is also in conflict with any religion that teaches the importance of conscience. For such a religion must agree with the rationalist attitude towards history in its emphasis on our supreme responsibility for our actions, and for their repercussions upon the course of history. True, we need hope; to act, to live without hope goes beyond our strength. But we do *not* need more, and we must not be given more. We do not need certainty. Religion, in particular, should not be a substitute for dreams and wish-fulfilment; it should resemble neither the holding of a ticket in a lottery, nor the holding of a policy in an insurance company. The historicist element in religion is an element of idolatry, of superstition (Popper, 2011 [1945], 451).

Popper contrasted early Christian ethics, at a time when its followers were oppressed and martyred, with some of the religiously themed abuses of power which followed the spread of Christianity by the Roman empire. He considered theological justification of misrule to be “one of the worst kinds of human idolatries”, “superstition” and “pure blasphemy (Popper, 2011 [1945], 444). He saw the early martyrs as embodiments of the true “spirit of Christianity” (Popper, 2011 [1945], 446).

¹ Popper’s argument from universal morality is an argument against irreligiousness, not an argument against atheism per se. To argue against atheism would require metaphysical assertions, not merely moral ones- I thank one of my reviewers for inspiring this footnote.

By suggesting that the true values of faiths and of spiritual leaders like Jesus and Muhammad could be extricated (and even historically excavated) from later aberrations designed to service the priestly classes and rulers via promotion of dogmatism and authoritarianism, Popper raised the tantalising prospect of treating religious doctrines as provisional truths, or conjectures. With science, Popper said “the process may never be perfected, but there is no fixed barrier before which it may stop short. Any assumption can, in principle, be criticized. And that anybody may criticize constitutes scientific objectivity” (Popper, 2011 [1945], 402). Similarly, religious creeds and beliefs can be amended and further developed in a positive direction if they are subjected to appropriate critical assessment, in line with the procedure of conjectures and refutations.

After Popper, several philosophers have remodelled critically rational assessments of religion. Albert (1997, 234) examined how science can sway religion, while Shearmur (2010, 475-76) has considered how religion may influence science. Paya (2018, 52-53) has developed Popper’s later idea of criticizability of metaphysical claims into a framework of refutable religious conjectures.

Some Criticisms of the Claims of Feynman

Feynman’s views of religion and science have so far been presented in a relatively uncritical fashion. This section will assess some of the merits and faults of his claims. Unlike Popper, who was a thoroughly well-read philosopher, Feynman eschewed the study of philosophical works. In fact, James Gleick (2011[1992]), his biographer, has alleged that Feynman shunned reading altogether:

but pragmatic knowledge was Feynman’s specialty. For him, knowledge did not describe; it acted and accomplished. Unlike many of his colleagues, educated scientists in a cultivated European tradition, Feynman did not look at paintings, did not listen to music, did not read books, even scientific books. He refused to let other scientists explain anything to him in detail, often to their immense frustration. He learned anyway (12)

Gleick (2011[1992], 14) furthermore claimed that “He made islands of practical knowledge in the oceans of personal ignorance that remained”. The motive for raising this is not disparagement *ad hominem* but to highlight the fact that Feynman was at a considerable disadvantage in dealing with philosophy of science problems, unlike Popper. Nevertheless, there are great merits to Feynman’s framing of the religion-science quandary, and I will start by considering the similarities between his claims and those of critical rationalists.

Both Feynman and Popper regarded science as the noblest and highest of knowledge pursuits. They also both expressed a high degree of humility- Feynman with respect to his lack of expertise in religion (Feynman, 1999, 246), and Popper in his difficulty in attaining to a proper knowledge of God and how to speak of Him accurately (Popper, 2012, 50-51). Though Feynman professed atheism, as his parents had (Brian, 1995, 49; Gleick, 2011, 196), he did not attribute this belief directly to science. Thus, he considered it reasonable (though difficult) to maintain a theistic worldview alongside a scientific one. Likewise, Popper left his nominally Christian background with assent to agnosticism; nevertheless, he did not attribute his agnosticism to critical rationalism;

rather his doubt about the existence of God stemmed from his inability to resolve the problem of evil (Popper, 2012, 52).

Feynman and Popper both regarded the ‘Western’ tradition as inextricably linked to the scientific attitude and Christian ethics (Feynman, 1999, 256; Popper, 2011 [1945], 421) and both considered democracy to be in keeping with rationality and totalitarianism inhospitable to it (Feynman, 1999, 251-252; Popper, 2011 [1945], 28). They also both deemed religions to be serving a key ethical role in human affairs (Popper, 2011 [1945], 80), with science incapable of producing moral guidelines (Feynman, 1999, 254; Popper, 2012, 44). This formed an important cornerstone of their claim that science and religion can be complementary and non-contradictory. While Feynman noted that science can sometimes support religious metaphysical beliefs (Feynman, 1999, 254-255), he perceived that using science in this way usually leads to downstream refutation of the religious position, given that scientific hypotheses are always refuted (Feynman, 1999, 253-254). Popper believed that science could neither support nor refute religion, as it does not produce moral conclusions (Popper, 2012, 42), quite apart from the fact that metaphysical claims are irrefutable (Popper, 2002 [1963], 232).

Perhaps the most significant similarity with respect to the Feynman Dilemma were Feynman and Popper’s perspectives on certainty. Despite appearances, neither condemned some degree of certainty, but both considered absolute certainty to be abominable, in the sense of being incompatible with the growth of knowledge. Feynman (Feynman, 1999, 249) said “I do not believe that a scientist can ever obtain that view-that really religious understanding, that real knowledge that there is a God-that absolute certainty which religious people have”. However, he did not object to fainter theological certainty (Feynman, 1999, 249). Popper’s condemnation of absolute certainty was more severe than Feynman's (Popper, 2011 [1945], 451).

However, Popper made it clear that his criticism was directed to blind following of religious authoritarianism and not to religious interpretations which were based on “personal responsibility and freedom of conscience” (Popper, 2011 [1945], 80). His frequent declaration of his own personal certainty indicate that he was not opposed to certainty in a general sense (see for instance Ibid, 2011 [1945]; 82, 85, 98; Popper, 2012, 52)¹.

Let us now turn to criticisms of Feynman’s claims. To achieve this, here is a summary of the 5 facets of the Feynman Problem, which are ‘problems’ because each is allegedly countered by religion:

P¹: The need for attribution of appropriate complexity to nature (the ‘infinite onion layer conundrum’)

P²: The need for a total fallibilist epistemology with approval of the value of mistakes

¹ The certainty that Popper spoke of was a subjective psychological state-he was not making a knowledge claim as he did not believe that certainty has any epistemological significance.

P³: The need for logically consistent integrative worldviews, as opposed to worldview cognitive dissonance

P⁴: The need for perpetual uncertainty of belief

P⁵: The avoidance of designation of an ultimate meaning and purpose to life

(P= Problem)

P¹

Does religion deter attribution of infinite complexity to nature, and reduce its mysteries to naught, thus acting as an impediment to the curiosity of a scientist? This may hold true for simpler, relatively naïve, or even fundamentalist readings of religion. There may well be religious believers who settle for the most parsimonious of explanations about the nature of reality.

However, this does not seem to hold true as a specific property of ‘religion’. On the contrary it appears that accepting what is convenient, self-satisfying and confirmatory of existing biases is a commonplace psychological weakness in human society (Nickerson, 1998, 208-209). This is not only the case with religious people, but is also found throughout the educational system, legal system, in medical practice, socioeconomic policy making and even in mathematics and science (Ibid, 1998, 189-197).

Though Feynman is right to claim that the scientific attitude aims to oppose confirmation bias and oversimplifications, he does not distinguish between the aims of science and the psychological failings of scientists, who are after all, human beings. Scientists are capable of the same monotony and primitiveness of claims as anyone else.

For instance, the ‘New Atheists’ seem to have ignored Feynman’s advice to avoid underestimation of complexity. This group regularly accuses religionists of violating Occam’s Razor through overly elaborate theological explanations of reality (Dawkins, 2006, 109-114, 146-147, 158)¹. This philosophical principal advocate's abstention from multiplying entities beyond necessity-however it lacks universal applicability within science, and can sometimes hinder scientific progress (Ball, 2016). Ironically, invocation of Occam’s Razor allows religionists to accuse New Atheist scientists of underestimating complexity, instead settling for reductionist accounts of natural processes.

Many innovative scientists have been religionists, or even religious scholars, historically speaking, from Naṣīr al-Dīn al-Ṭūsī to Gregor Mendel. This jars with Feynman’s claim that religious belief hinders exploration of the cosmos. Furthermore, some religious cosmologies are so complex that they require several years of study to properly comprehend, such as the theories of Ibn ‘Arabī, Mir Damad and Mullā Ṣadrā. Given the wide availability of such ideas in multiple languages in modern times, the caricature of religion as necessarily simplistic seems anachronistic. Even the religious ‘layperson’, will typically be exposed to discussions about the problem of evil,

¹ As Pigliucci (2013, 148) has pointed out, Dawkins’ argument from improbability is a use of Occam’s Razor against the so-called ‘God Hypothesis’.

justice, and conflicts between freewill and determinism. These are discussions which scientists and philosophers also continue to grapple with.

Thus, the *P*¹ branch of the Feynman Problem is truly pertinent only with respect to the uncritical religious believer; the attitude of such an individual may conflict with the scientific need to uncover the many complex processes governing nature. However, it does not apply to the critically rational religionist (which will be further explained below under Solution 1) and many forms of religious interpretation seem to fit in well with a complex cosmos.

P²

Feynman deserves credit for disapproving of the suppression of the search for mistakes in religious thought. However, he has framed this problem with an obtuse, flawed explanation. He has claimed that one cannot follow a religious theory without knowing which is true. Here he has shirked on the human rational responsibility to choose between theories after critical assessment. Though Feynman recommends a lack of definite methodology for science, favouring a kind of anarchism akin to Feyerabend (1993, [1975], 13-14), he still demands some definite principles by which he can know which religious claim is true. However, for science he says that one must not claim to have found truth. These demands are at odds with each other.

The idea that religious claims are hopelessly indistinguishable, is the forte of relativists or epistemological nihilists, as well as a common anti-religious argument. But it does not fit well with realism. For instance, Popper argued that monotheism could be selected over polytheism on account of both rational and psychological factors (Popper, 2012, 49), despite there being some useful values in polytheistic traditions.

Unfortunately, Feynman, despite being a scientific realist, adopted a critical lassitude when it came to selection between religious theories. But he was no doubt correct that religious dogmatism is opposed to a scientific attitude. Wherever we see religious creeds being imposed as unquestionably true, we find that it leads to restriction of freedoms. The Abbasid government of al-Ma'mūn punished by death or torture questioning of the belief that the Qur'an is created (Melchert, 2021, 201-208). Al-Ghazzālī (2000, 226-27) declared peripatetic philosophers to be heretics due to disagreeing with the theological position he officially espoused on behalf of the Seljuk Turk rulers of Baghdad¹.

Orthodoxies imposed by political fiat are a notorious example of how intellectual and legal liberties can be curtailed. Permission to question dogmas and to tolerate alternative theories is essential to the growth of religious knowledge. Fortunately, many religious traditions do exist which encourage challenges to existing doctrine, such as the Twelver Shi'i notion of keeping the 'gate of ijtihad', or research, open. Some thinkers influenced by critical rationalism have contributed to this school of thought (Takim, 2022, 96-220).

¹ Though Al-Ghazzālī (2000, pp. xxii-xxiii) claimed that his book did not endorse any theological doctrine, the fact is that the Seljuks benefitted from the condemnation of peripatetic philosophy, which was being promoted by the Ismaili political rivals of the Seljuks.

P³

Feynman's lack of familiarity with critical rationalism disadvantaged him here. He seems to have desired a kind of methodological and epistemological monism, where every aspect of reality is explored in the same manner. Of course, this is impossible. Science and religion have different aims- the former to discover facts of nature, the latter to provide metaphysical, ethical, and spiritual guidance. It seems unreasonable to require a single approach for the achievement of all these aims. Feynman's impression of objectivity in science is erroneous- he argues that it lies in the objectivity of the scientist, who tries his/her best to avoid reaching predetermined conclusions. Here he would have benefitted from realising that objectivity lies in a theory being subjected to tests, and more generally to critical scrutiny, irrespective of the individual scientist's attitude. Both religious scholars and scientists could try to avoid bias, but objectivity of knowledge does not lie in this¹.

Here critical rationalism provides an epistemological bridge between science and religion- even though religious doctrines are not usually falsifiable, they can be criticised. This is possible despite the attitude of the advocate of those doctrines. If science can be tested, and religious theories can be criticised, objective knowledge can be extended in that field. The partialities of individual theorists would not hinder this process.

P⁴

Here we deal with the thorniest part of the Feynman Problem- that scientists should always be uncertain about all things, should deny knowledge of a claim's truth or falsity and should only affirm probabilities.

Apparently, Feynman thought that relative degrees of certainty were directly relevant to the search for facts and laws of nature. However, this view has been strongly contested². Certainty and truth are not directly correlated, either positively or negatively. This is obvious from the simple observation that some individuals are certain about false hypotheses or reject true hypotheses with the assertion that they are completely uncertain about them. Certainty is a psychological mind-state, while knowledge and truth are epistemological categories (Paya, 2018, 19).

Feynman claims that absolute certainty is quite damaging for science. Yet the physicist Fred Hoyle maintained until the end of his life that a falsified steady state theory was correct, with certainty, long after its displacement by big bang cosmology (Gregory, 2005, 336-38). Did this

¹ Complete avoidance of bias is impossible -see Popper (2011 [1945], 468-469) on counteracting bias through criticism and (2011 [1945], 278-279) for criticism of Baconian eliminative induction.

² Seeking assurance about our statements and confusing this with logical relations between statements was a common notion in past models of logic (Popper, 2002 [1959], 80). Feynman puts forward a theory of probability which is subjective, which Popper described as "psychologistic" (Ibid, 2002 [1959], 135). Here probability is equated with subjective feelings of certainty and belief, and their opposites. This contrasts with an objective probability theory, which would instead focus on stating the relative frequency of incidence of events within a given sequential group (Ibid, 2002 [1959], 137). In footnote 3 of (Ibid, 2002 [1959], 172), Popper points out that degrees of certainty of knowledge are a conventionalist idea as they do not necessarily have to be paralleled with the fractions from 0 to 1, as would be the case in an objective relative frequency theory.

harm science? Evidently not, as most of the cosmology community refused to accept Hoyle's claims. It may have harmed Fred Hoyle.

Science is supposed to be a pursuit of truth, not a psychological confidence building exercise (Miller, 1994, 11-12). It thus does not matter much if some scientists insist on being certain about their own claims. In the long run, those theories survive which are corroborated by tests.

There is a positive side to certainty, which Feynman does not fully consider. Certainty can encourage perseverance on an arduous path that we have chosen to undertake. An ordinary scientist presumably is certain that the principle of causality is valid¹, and that the instruments they use in their experiments do give verifiable readings, at least some of the time. If they did not believe in this with certainty, it's hard to imagine that they would want to come into work in the morning. However, this surely does not prevent them from questioning the validity of any specific scientific hypothesis if they remain open to cogent criticism. Certainty with respect to some matters does not by itself act as a pervasive inhibiting constraint on the scientist.

Similarly, it appears that religion requires certainty about some basic preliminaries for a believer to practice it—for instance that God exists, and that revelation to a person is possible. Yet this does not prevent that believer from questioning every religious interpretation under the sun.

One can go further than this and even say that religions demand uncertainty, both relative and absolute, for some beliefs. For instance, Islam advises its followers to be moderately uncertain about the timing of a final Day of Judgment, and of the nature of the Rūḥ-spirit or soul (Shakir, 2002, 158, 268 [Sura 7, 187; Sura 17, 85]). However, it demands absolute uncertainty about the essence of God, unlike His attributes and actions (Al-Ṣadūq, 2009, 898, 901).

Feynman spoke of:

the scientific spirit of adventure—the adventure into the unknown, an unknown which must be recognized as being unknown in order to be explored; the demand that the unanswerable mysteries of the universe remain unanswered; the attitude that all is uncertain; to summarize it—the humility of the intellect”. (Feynman, 1999, 256)

Substitute ‘scientific spirit’ with ‘religious spirit’ and this would function well as a statement about the nature of God's essence in Islam. A believer may be certain that a God exists yet is ordered by religion to be completely uncertain as to exactly what He is. Feynman underestimated the complexity of religious beliefs and opted for a stereotyped monolithic religion in which certainty alone prevails.

¹ My reviewer has suggested that causality must be further qualified by whether one accepts a deterministic or indeterministic framework. While this is true, it seems that many scientists accept some form of causality without deeper reflections on its philosophical implications. I mean here only to comment on it as a psychological phenomenon, in relation to certainty, and not on its philosophical credibility.

P⁵

Feynman's association of a lack of assigned meaning or purpose to life with scientific curiosity and scepticism makes about as much sense as his associating certainty with the quest for truth. There is no direct correlation.

Critical rationalists, who are scientific realists, argue that life can be assigned a meaning by us (Popper, 2011 [1945], 450). This meaning does not have to be fixed and can change or evolve over time as our values and understanding of our reality grows. What they oppose is suppression of consideration of evidence that is contrary to our assumptions. Hence Popper condemned the 'historicism' of Hegel and Marx for allegedly creating a predetermined future outcome which is unalterable. All facts are made to fit into this narrative, while inconvenient contravening events are ignored or dissimulated in an uncritical manner¹.

Feynman seems to agree with the socio-political damage that 'historicism' entails. However, his insistence that a scientist must lack any belief in a definite overarching purpose to life could descend into nihilism, rather than the psychological flexibility that he hopes for. A nihilist could choose to reject science as meaningless or could deal with it as a conventionalist exercise. However, a critical rationalist approach to meaning and purpose does not threaten science and a belief in objective truth.

We will finally turn to two further tentative critically rational solutions to the problem of certainty.²

First Solution: Conjectural Religion

Though the founder of a religion, such as Jesus or Muhammad, brings a vital new faith that attracts followers, the 'religion' that is later created out of the claims of their followers is partly a social construct. Religious theories are conjectures that can be refuted if found to be unsuitable representations of the original spirit of the faith, or unable to meet the needs of its community. Amongst the questions that could be asked of a theory when criticising it are:

Does the conjecture solve the problem situation it claims to meet?

Is it consistent with core early spiritual, moral, and ethical values of that faith?

Can it be validated by the core scripture of that faith?

There is a legion of other lines of critical inquiry. While Popper argued that metaphysical theories could be criticised and Feynman also regarded religious claims as 'theories', Feynman was despondent about choosing between divergent claims. However, adopting a critically rational

¹ A reviewer has pointed out the following: 'There are two different things involved in Popper's criticism: (a) his view that there is no intrinsic teleology to history; (b) his view that Marxists typically either did not expose their views to criticism, or reacted in evasive ways when there were criticisms'.

² Critical rationalism is a deductive methodology which rejects justificationism, induction, positivism and the indubitability of knowledge claims. Knowledge grows only by criticism, and can only be considered provisional, or the best current understanding. Scientific claims can be refuted by experiment, while metaphysical claims cannot. Nevertheless, the latter can be further developed and mended through criticism, and one can completely reject a metaphysical theory when it seems to be taking one further away from truth.

fallibilist epistemology allows one to hold hope of selecting better theories. Critical rationalists are moderately sceptical but radically optimistic about the search for truth¹. They believe that progress on this path is possible through refutation of unsuitable assertions.

Would certainty about religion hinder a believer from such criticism? It might if it climbs to the level of absolute certainty, which often descends into dogmatism. However, a fallibilist would maintain an openness to criticism, which would stifle the development of intransigence. They would make their claim about religion available for assessment by others. The certainty of a believer would not prevent others from criticising their assertion, much as Popper suggested that the progress of science is not hindered by the undue certainty of individual scientists (2011 [1945], 399).

Feynman (1999, 253) claimed that if factual scientific claims corrected a religious theory, this would mean that religion was in ‘retreat’. This is an overly pessimistic judgement-faiths do not retreat when religious theories are refuted any more than scientific revolutions result in denunciation of the totality of science. However, complete overhauls of some aspects of religious systems, such as legal frameworks, can and do occur, though it is beyond the scope of this work to provide examples of this.

Religious theories can (and should) be criticised and supplanted according to critical rationalists. Religions are not monuments on the mantelpiece that we simply take or leave as they are, as Feynman thought. Rather we must work within a religious tradition to improve upon its claims if we have a choice of competing narratives or interpretations with respect to the solution to a problem situation.

Second Solution: The Trifurcation of Psychologicistic Certainty, Pragmatic Conviction and Epistemological Humility

Popper used the term ‘conviction’ interchangeably with certainty (2002 [1959], 22-25). While this is linguistically unobjectionable, another model of conviction can be proposed to help solve the apparent contradiction between believing in certainties of faith and the uncertainties of science, or uncertainties of religion together with maintaining faith in its truth.

Certainty is a psychological state related to one’s feelings about a belief, or set of beliefs, being true. Conviction is a pragmatic commitment to act in a particular way. Epistemological humility is concerned with the pursuit of truth, despite knowing that our claims may well miss the mark and will be strewn with some errors.

Beyond prima facie considerations, there is no necessary logical or causal relationship between these three concepts. Though it is often assumed that certainty must lead to conviction, this is not

¹ The moderate scepticism of Popper is like the ‘mitigated scepticism’ of Hume (this contrasts with the ‘excessive scepticism’ of the classical type-see Blackburn, 2016, pp. 429-30). Both Popper and Hume regarded common sense and traditional beliefs as starting points for a higher rational journey. The difference, however, is that Hume became pessimistic about the possibility of succeeding in any advance to truth due to being unable to solve the problem of induction. While Popper was ‘radically optimistic’ (my terminology) as he believed that one can gain proximity to truth by abandoning induction and through working perpetually with unjustified knowledge.

the case. An employee can be 100% committed to observing a workplace directive to escape being disciplined, and yet have zero certainty about the moral merits of such a regulation. Conversely a theist may feel that they have absolute certainty about God's existence, and yet may lack any conviction to alter their behaviour based on this belief, as may see with some nominal Muslims or Christians, or in the case of some deists.

Just as there is no necessary causal relationship between certainty and conviction, there is also no such relationship between these and a fallibilist epistemology¹. A religious critical rationalist can be uncertain about theoretical aspects of their faith, and yet act with *complete* conviction with respect to some pragmatic aspects of faith. Maintaining a critical attitude to theories produced by their co-religionists can run in parallel with conviction, in the hope that practicing their faith will increase their knowledge and understanding. There is no contradiction here, and no ensuing cognitive dissonance. Full conviction is often taken as conflicting with epistemological fallibilism, though it does not have to.

It is often assumed that the Qur'an recommends certainty alone-but this is a misunderstanding, as it advocates conviction: 'Say: Oh, my people! Act according to your ability; I too am acting; so, you will soon come to know...' 'So, act, we too are acting' (Shakir, 2002, 130, 471; Sura 6, 135 and Sura 41, 5). This conviction aids the pursuit of knowledge. Psychological uncertainty and epistemic humility, when combined with pragmatic conviction, intensifies the search for truth. Practical conviction need not stand in the way of epistemic fallibilism, be it with respect to religious or scientific knowledge².

Feynman confused certainty with truth, while Popper separated psychological and epistemic categories to differentiate personal confidence strategies from the pursuit of truth. This section has argued that there is a need to further separate psychological mind-states from pragmatic commitments. This further distinction will aid understanding of why religious 'certainty' is not in conflict with openness to criticism and a fallibilist approach to knowledge. Thus, the core enigma enabling the Feynman Dilemma, that strong scientific persuasions weaken religious metaphysics and its moral inspirations, and vice versa, can be dissolved.

Conclusion

The Feynman Dilemma is a paradigmatic example of a prominent 20th century physicist's personal struggle to reconcile faith and reason- and failing to do so. His ideas, which represent a kind of

¹ The argument being made here is not that knowledge, certainty and conviction do not influence each other; of course, they can, and often take a similar trajectory- for instance greater knowledge can be accompanied with greater certainty, which can in turn be linked to greater conviction. However, there is no necessary relationship between them. This is obvious from the simple observation that increased knowledge can be accompanied by a lowering of certainty. Likewise low levels of certainty can be associated with high levels of conviction. Though this all may be paradoxical and contrary to common sense, it indicates that there is no self-moving inevitability about the relationship between knowledge, feelings, and actions.

² This will be elaborated upon in an upcoming paper by the author called 'A Reinterpretation of Certainty in the Qur'an and Islamic Tradition from a Critically Rational Perspective'.

proto scientism, would go on to influence later generations of physicists as well as the full-fledged scientism of some of the Neo-Atheists¹.

Unfortunately, Feynman's problem situation was such that he encountered several fundamentalist or dogmatic religious believers. This, combined with his lack of sufficient background research on advanced theology, limited his insight into solutions to apparent religion-science conflicts. Furthermore, despite Feynman's scientific expertise, his antipathy to the philosophy of science meant that he could not benefit from more erudite representations of the nature of scientific knowledge and how it related to truth.

His claims demonstrate an inadequacy of understanding of the intricacies of more refined philosophical and religious thought. He constantly engages in stereotyping of religious beliefs. He would have been able to acquit himself more honourably through engagement with religious scholars and philosophers of science.

However, unlike some of his later admirers, Feynman strongly believed that religion had great moral and inspirational functions that science lacked. He also candidly admitted his lack of acquaintance with relevant religious and philosophical literature, marking him out as comparatively intellectually honest. He was open to criticism and was a fallibilist. He also desired that religionists and scientists peacefully co-exist. Thus, the problems proposed by Feynman, albeit minus solutions, are more conducive to inter-faith dialogue between believers and non-believers, as well as between scientists and religionists, than the more hostile approach of his successors.

Additionally, this research piece has argued that Feynman's beliefs about science have some common ground with Popperian epistemology². However, the lack of concord, especially with respect to certainty, restricted Feynman's ability to solve the problem of compatibility between science and religion. Though critical rationalists are of various religious persuasions, achieving consistency between faith and reason is undemanding in a critically rational framework. More research needs to be undertaken into the significance of certainty and conviction in religion, which should aid full resolution of the types of conflict proposed by Feynman. Feynman would have fared much better in his evaluation if he had been a critical rationalist.

Both scientists and religious believers maintain a pragmatic conviction regarding the possibility of knowing reality through the methods of their respective fields. In fact, even some philosophers hold such a conviction, resulting in an optimistic outlook. Nevertheless, conviction is not an epistemic category such as truth, nor a purely psychological one, as certainty is³. It is

¹ See Pigliucci (2013, 142-146) for more on why New Atheism is in fact largely a movement characterised by scientism.

² It is obvious that Feynman accepted many of the proposals made by modern philosophers of science, such as the falsification principle and tentative nature of scientific knowledge, despite his antagonism regarding study of philosophical works.

³ Both conviction and certainty belong to Popper's World 2. However, certainty is a type of feeling or mental state, the absence of which creates anxiety and unease; while conviction is more of a behavioural disposition that grows out of our state of consciousness and obligates us to interact in a particular way with World 1 or World 3. Absence of conviction does not usually create anxiety. Hence conviction is a different type of mental state to certainty and is also not a purely environmentally conditioned behavioural disposition in the behaviourist sense, though it pushes one to interact in a specific way with the environment.

uncontradictory to be critical in epistemological terms of scientific and religious knowledge claims, while simultaneously embracing conviction in scientific and religious methods and methodologies.

Without pragmatic convictions to act upon, we would fail to acquire the high degree of lived experience necessary to make the most effective and interesting criticisms of our claims. Critical assessment takes place against a background of traditional ideas and experiences which are deeply intertwined into the human psyche, and with our practices.

Feynman saw some artists and religious people as uninterested in science- he tried to solve this by becoming an artist and saw that through his art he could express himself scientifically. However, he did not replicate this experiment with religion, and thus did not attain realisation of how to possess the conviction of a religious believer without detriment to his scientific outlook. A critically rational attitude to science and faith can alleviate disharmony through better distinctions of psychological, pragmatic, and epistemological aims.

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