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# Re-evaluating the Effects of the 1755 Lisbon Earthquake on Eighteenth-Century Minds: How Cognitive Science of Religion Improves Intellectual History with Hypothesis Testing Methods

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This article articulates two prominent, competing explanations about cognitive effects of the Lisbon earthquake of 1755 and assesses them against historical documents. Humanities scholars' writings on the earthquake imply what I refer to as a "Secularizing Interpretation,"

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which says that the earthquake caused cognitive change across social classes and geographical regions. Results from the cognitive science of religion yield what I refer to as the “Cognitive Science of Religion Hypothesis.” This hypothesis says that people of the period interpreted this earthquake as caused (1) by God; (2) on purpose; (3) as a punishment; (4) on the out-group. The Secularizing Interpretation and the Cognitive Science of Religion Hypothesis are mutually inconsistent. This means that if one is shown to be true, the other is therefore false. This article advocates the Cognitive Science of Religion Hypothesis in two steps. Review of writings of philosophers and elites reveals little to no secularizing cognitive change. Review of writings by other authors reveals increases in religious and supernatural punishment cognition after the earthquake. This project recommends interdisciplinary methods to researchers in the humanities, which enable them to put their interpretations to the test.

CORRESPONDENCE OF THE DUTCH in Lisbon at the time of the 1755 Lisbon earthquake reveals that The Hague’s ambassador to Portugal, Charles Bosc de la Calmette, was moved by the suffering and desperation he witnessed among Lisboan Roman Catholics ([De Jong 1955](#)). Ambassador from 1751 to 1758, Calmette was a Huguenot who knew desperation. His Protestant family fled to Holland from persecution by Catholics in France. A letter dated November 6, 1755, written by Abraham Castres, King George II’s envoy, indicates Castres and Calmette were the first ambassadors to have an audience with King Jose after the earthquake. Calmette himself engaged The Hague’s States General in protracted, heartfelt communications to secure relief aid for Lisboans. Calmette mentions immediate support pledged to King Jose by Protestant King George II of the United Kingdom amounting to a whopping £100,000, half in bullion, half in material goods (£100,000 in 1755 is equivalent in 2014 to £159,000,000 using an average earnings index and £11,000,000 using a retail price index).

The Protestant Dutch government failed to respond to de la Calmette’s plea with relief aid for Portuguese victims. Why?

Historians conclude that Calvinist religious thinking prevented the donation of relief. “In this strongly Calvinist community there seems to have been little doubt but that the earthquake was an awesome example of the wrath of the Living God, and that Lisbon’s addiction to ‘Romish idolatry’ had brought the visitation upon her” ([De Jong 1955; Boxer 1956](#): 17). If God is punishing idolatrous heretics, then one ought no more seek to end that retribution than one ought to storm the gallows when the civil government justly hangs a convicted murderer. Relieving

the suffering of those being retributively punished by God risks countering divine authority. From the Calvinist's perspective, God obviously knew just how much victims would suffer.

Calmette's story prompts this article's guiding question: How did the pain and suffering caused by the Lisbon earthquake affect the religious minds of Europe? When I set out to answer that question, I found historians circling a shared set of claims according to which the earthquake caused widespread secularization. These historians reason that the unparalleled shock, pain, and suffering produced by the earthquake caused a rapid cognitive change in the minds of people of the time period. Specifically, the effects of the earthquake presented unavoidable and abundant counterevidence to the existence of an all-powerful, all-loving God. This argument is the kernel of the "Secularizing Interpretation." This dominant interpretation goes largely unchallenged in academic writing about the earthquake (though see [Ingram 2005](#) for an exception), despite two facts. First, textual evidence presented on behalf of the Secularizing Interpretation is minimal and often equivocal with regard to claims about cognitive change. Second, even if there were substantive textual evidence for the Secularizing Interpretation, its advocates would not yet be justified in endorsing the Secular Interpretation due to methodological problems with their reasoning.

What competing hypothesis or interpretation might plausibly explain cultural cognition in the wake of the Lisbon earthquake better than the Secularizing Interpretation? An alternative interpretation that I call the "Cognitive Science of Religion Hypothesis" is intended to better explain cognitive and emotional reactions to the Lisbon earthquake. Members of this set of theories come together to retrodict (that is, to state a fact about the past based on inference or deduction) that eighteenth-century Christian writers interpret natural disasters typically as (1) caused by God (2) on purpose (3) as punishment (4) of the out-group. To be clear, both the Secularizing Interpretation and the Cognitive Science of Religion Hypothesis state purported facts about the *change* in the contents of minds of people from the eighteenth century. Though the present article is about a single disaster in eighteenth-century Europe, I illustrate the cross-temporal generality of the Cognitive Science of Religion Hypothesis with texts from earlier times and earlier cultures.

I then explain the Cognitive Science of Religion Hypothesis and then defend it with preliminary textual evidence. *De jure* this article aims to provide preliminary evidence against the Secularizing Interpretation and for the Cognitive Science of Religion Hypothesis. *De facto* what follows is a proof-of-concept, since the article does not formally and quantitatively test these two hypotheses. Multidisciplinary research is never easy to

conduct, but it is easier when methods employed in a study are drawn from, say, history and religion, or from cognitive psychology and social psychology. This article represents an exploratory foray into an unusual form of multidisciplinary cognitive science because the research and methods it draws on come from the cognitive sciences, the social sciences, and the humanities.

## SUMMARY OF PHYSICAL AND GEOPOLITICAL EFFECTS OF THE LISBON EARTHQUAKE

Writers who discuss the Lisbon earthquake often incorrectly report facts about the event and its aftermath. The purpose of this section is to convey, through a range of source materials, facts about the quake as best we know them.

The Lisbon earthquake, the largest documented seismic event to affect Europe (Mezcua et al. 1991), was produced by a thrust fault and caused recorded damages on land in Iberia and northwest Africa. The first shockwave hit Lisbon either at 9:50 a.m. (Mezcua et al. 1991; Degg and Doornkamp 1994), 9:40 a.m. (Sousa 1919; Mullin 1992), or 9:30 a.m. (Kozak and James 1998), fatefully on All Saint's Day, November 1, 1755. At the time, causes of earthquakes were unknown, as the field of seismology had yet to be created. The lack of scientific knowledge about the event generated uncertainty and religious terror, as is apparent in eyewitness testimony (Kendrick 1956).

From research on offshore bathymetry and the morphology of bays and shore features (Andrade 1992), geologists infer that in the Gulf of Cadiz, three tsunami waves reached Lisbon at heights of twenty meters (Chester 2001: 372, Table 4). A four-meter wave reached the Caribbean (Degg and Doornkamp 1994; Chester 2001). Richter values have been estimated as high as 9.5 (Mezcua et al. 1991) and as low as 8.5–8.6 (Teidemann 1991). If 9.5 is accurate, then the Lisbon quake was the world's largest "historic" earthquake at 2.7 gigatons. If 8.5, then the Lisbon quake compares with the largest earthquakes in the twentieth century, namely Chile in 1960 and Alaska in 1964 (Chester 2001: 370). This does not include the Great East Earthquake in Japan, March 2011, which has a revised Richter value of 9.0.

The earthquake's time of origin was to appear to Protestants around Europe as a divinely chosen means to God's ends. At 9:30–10:00 a.m. on All Saints Day, Lisbon's parish churches and cathedrals were crowded. Attendance on this holy day was mandatory for all Roman Catholics in the city. As religious buildings—the tallest in the city—tumbled down, altar candles started fires, "the principal cause of the total ruin of the city"

(Anonymous 1755: 560). Flames were fanned by strong, dry northeasterly winds. Estimates indicate fires lasted between three days (Davis 2002) and more than a week (Sanders and de Boer 2005).

Casualty estimates vary considerably (Oliveira 1986), from ten thousand Lisboans dead (Marques 1976; França 1983; Dynes 2005) to up to one hundred thousand total dead (Degg and Doornkamp 1994). The event showed that nature could strike humanity where its power over nature seemed strongest, the urban city (Buescu 2006: 334). In 1755, Lisbon was the fourth-largest European city after Paris, London, and Naples. Almost all major Lisbon buildings suffered extensive damage due to a combination of the earthquake, waves, and fires. Destroyed were: thirty-five of the forty churches; sixty-five of the seventy-five convents; and thirty-three palaces, the Arsenal, the Royal Library, and the Patriarchal Palace. Of some twenty thousand dwellings housing thirty-eight thousand families, three thousand remained habitable (Maxwell 1995: 24; Chester 2001: 172–174). The historic Baixa area on the north side of the Tagus, the seat of government, with narrow streets and timber-built houses, rested on water-saturated alluvial sediment. This liquefied during the earthquake and lost its bearing strength during the shockwaves. Down the coast, Tavira, sitting on limestone, met with few casualties.

Geological effects of the earthquake, tidal waves, and fires led to extensive political and economic catastrophes. The earthquake enabled Sebastião José de Carvalho e Melo, the first Marquess de Pombal, to assert authority over the governance of Portugal. Losses to Portugal hit forty-eight million Spanish dollars (Nur 2008: 252). This reduced by 10% the wealth of its worldwide seaborne empire (Chester 2001: 172–174). Fear of the empire's dénouement permeated European financial and commodities markets as news spread across the continent. Commodity and stock exchanges crashed in the Netherlands on November 26 and in Hamburg on November 29, when news reached those cities (Horst 2005: 14–15). England became a creditor for Portuguese bills of exchange. This measure failed to prevent fear about the fate of commerce and trade in Lisbon. Catastrophic runs on gold and silver were immediate. The European world was put in a frenzy as international markets destabilized, a lavish, urbane capital city was in ruins, and the lives of hundreds of thousands of survivors were thrown into chaos.

## THE SECULARIZING INTERPRETATION OF THE LISBON EARTHQUAKE IN THE WORDS OF ITS PROPONENTS

Did people believe that God caused the earthquake and its aftermath on purpose? The Secularizing Interpretation suggests that the Lisbon

earthquake and its toll on humans was conceived as a natural evil so horrible that it created cognitive shockwaves through Europe that reduced Christian belief in God as all-good and all-just, ended a popular “optimistic” theology, and raised widespread skeptical doubts as to God’s existence. In order to provide as fair and accurate an account as possible of the Secularizing Interpretation, I make an effort to explain this theory in the words of its proponents. I italicize certain statements of historians in order to emphasize the content of the Secularizing Interpretation that is relevant for making inferences about whether or not these historians affirm or deny that people of the time period believed that the earthquake was (1) caused by God (2) on purpose (3) as punishment (4) of the out-group. This will assist in appreciating the dialectical role of the Cognitive Science of Religion Hypothesis in this article as an explanation of the effects of the Lisbon earthquake that is mutually inconsistent with the Secularizing Interpretation.

Given information summarized in the previous section about the geological, social, financial, and geopolitical effects of the earthquake, historians have long felt a need to comment on it. Many intellectual historians write that the psychological and religious effects of the earthquake mirror in power and scope its other effects. Consider how advocates of the Secularizing Interpretation describe in their own words the effects of the Lisbon earthquake of 1755 (italics below are mine).

Emphasizing the earthquake’s cognitive effects on belief in a moral God, Jürgen Moltmann writes, “Confidence in *the harmony of the world and a gracious ruler of it* was shattered” and the “optimistic conception of the world . . . collapsed” (Moltmann 1983: 565, quoted in Bowden and Richardson 1983). God is no longer conceived to be the creator of a stable divine order on Earth. The Lisbon earthquake “struck the Western world like a thunderbolt, and forever transformed the philosophy of human thought” (Bestermann 1956: 23). It “destroyed a firmly fixed image of the divine order on earth” (Seligo 1958: 21). Though imbued with metaphor, these remarks strongly suggest that these writers believe that the earthquake increased rates of disbelief in the existence of an all-good God. Sometimes this point is put in reference to Alexander Pope’s *Essay on Man*, in which Pope provides a theodicy aiming to “vindicate the ways of God to man” (1994: 46). The Lisbon earthquake, says Neil McKendrick, marked “the end of optimism” (1974: 22). Drawing upon a vision of God as omniscient and omnibenevolent, and humans as small-minded and weak, Pope argues that humans should cognitively submit to a benevolent God and in doing so achieve happiness in trust that God has our best interests in mind.

Following the earthquake, “cheerful optimism and self-assured theodicy in France and Germany ended in skepticism” (Lütgert 1928: 24). The earthquake is “for all of Europe the point in the century on which the Enlightenment turns from optimism to pessimism” (Weinrich 1971: 25). After remarking that “eighteenth-century Europe was marked by two significant events: the Lisbon earthquake and, in intellectual terms, the Enlightenment,” Renee Jeffery adds that “With [the earthquake] the now commonplace distinction between natural and moral evils was established” (2008: 160). Jeffery implies the Lisbon earthquake is conceived as the first “natural evil,” a claim the Cognitive Science of Religion Hypothesis explicitly rejects. This concept from philosophy of religion refers to physical phenomena that result in undeserved pain and suffering for which no agent—human, Satan, or God—is morally responsible. But if God caused the Lisbon earthquake to punish people for sins, then the earthquake is not an unjust, unfortunate natural evil. It is divine justice.

Furthermore, advocates of the Secularizing Interpretation contend that God could no longer be trusted to help humans. Note the immediacy with which this effect is hypothesized to take hold in the minds of Europe in this passage: “From that day onward, the responsibility for our suffering rested entirely with us and on an uncaring natural environment, where it has remained” (Shklar 1990: 51). Theo D’haen affirms the same conceptual point about the effects of the earthquake, but is vague about its timing: “The debate as to where, or with whom, lay the responsibility for the Lisbon catastrophe—God, Man calling upon himself the wrath of God, or Nature—eventually led to the view that *disasters such as that of Lisbon were forms of ‘natural’ evil, beyond the power of man*” (2006: 355–356). As a natural evil, the Lisbon earthquake is produced by blind nature. Thus, D’haen, Judith Shklar, and Jeffery imply that people in the time period believed that God was not regarded as causing the Lisbon earthquake on purpose, let alone causing it on purpose as a punishment.

The most renowned proponent of the Secularizing Interpretation is Susan Neiman. In her award-winning book *Evil in Modern Thought* (2004), she writes that Lisbon’s earthquake “shocked more than any event since the fall of Rome. . . . Since Lisbon, natural evils no longer have any seemly relation to moral evils; hence they no longer have any meaning at all” (Neiman 2004: 240). She adds, “no first-rate thinker proposed new forms of theodicy, in the narrow sense, after Lisbon” (Neiman 2004: 257). Among the cognitive changes to the European Christian mind caused by the earthquake, Neiman writes, “*The sharp distinction between natural and moral evil that now seems self-evident was born around the Lisbon earthquake*” (2004: 3). The Christian’s “world was shattered by the

Lisbon earthquake" (Neiman 2004: 4), and the earthquake caused "intellectual shockwaves" (Neiman 2004: 5).

Neiman makes explicit what others do not: people of the time period began believing that the earthquake was caused by nature rather than God. The earthquake "was the beginning of a modern distinction between natural and moral evil. It is crucial to such a distinction that natural evils have no inherent significance. *They are neither punishment nor sign but part of an order that is, literally, meaningless*" (Neiman 2004: 39). The earthquake "made something impossible" (Neiman 2004: 239), caused an "intellectual disaster" (Neiman 2004: 242), shook "the foundations of faith" and called "*the goodness of Creation into question*" (Neiman 2004: 246).

Some representatives of the Secularizing Interpretation explicitly say the changes were wrought on the minds of commoners and elites alike, and most at least imply this. Neiman, for example, writes that "The earthquake affected the best minds in Europe, but it wasn't confined to them. Popular reactions ranged from sermons to eyewitness sketches to very bad poetry. Their number was so great as to cause sighs in the contemporary press" (2004: 1–2). Remarks from Neiman imply that the earthquake caused people to believe that it was not caused by God, was not caused by God on purpose, and was not caused by God on purpose as a punishment.

These authors imply that the earthquake caused swift, widespread, increasingly secular cognitive change; the earthquake was regarded as a natural evil, for which God was not responsible; and it was not intended by God, let alone intended as a punishment.

## AN EVALUATION OF THE QUALITY AND QUANTITY OF EVIDENCE FOR THE SECULARIZING INTERPRETATION

Susan Neiman's book represents the most complete characterization of the Secularizing Interpretation, and her evidence for it is now considered. She cites elite thinkers as support, especially Immanuel Kant, Johann Wolfgang von Goethe, Jean-Jacques Rousseau, and Voltaire, yet evidence drawn from their work fails to justify Neiman's interpretation.

First, Kant and Goethe make little mention of the Lisbon earthquake in philosophical contexts. Kant (1724–1804) wrote three short treatises about it, but these works of natural philosophy contain no evidence of conceptual shock and cognitive change. In discussions of theodicy, Kant never refers to the earthquake. Goethe (1749–1832) is the exception in this group. In his autobiography, Goethe mentions how profoundly the earthquake affected him as a six-year-old: "By an extraordinary world-event, the calm of the boy's spirit was moved to its depths for the first time. . . . God, the creator of heaven and earth, whom the explanation of the first

article of faith represented to him as so wise and merciful, had proved himself to be in no wise fatherly in giving over righteous and unrighteous to destruction" (von Goethe 1902 [1811–33], 1: 25). Many advocates of the Secularizing Interpretation quote this passage; Neiman herself includes it on the first page of her book (2004: 1).

That the muted shaking caused by an earthquake whose epicenter was two thousand kilometers away can transport a six-year-old to religious depths is *prima facie* improbable. Goethe explicitly asked Bettina Brentano, to whom his mother Elizabeth had told many stories of Goethe's childhood, for any information he could use to supplement his account of the earthquake in his autobiography (Brown 1992: 481–482). It seems significant that he mentions the Lisbon earthquake only twice in (the multiple volumes of) his autobiography. It could be that Neiman's interpretation is correct, and that Goethe was greatly affected and cognitively changed as a result of his experience of the earthquake. But more probable is another interpretation according to which Goethe's poetic recollection of the quake represents an interest in appearing to his readers, and to posterity, as uniquely touched by the *Weltgeist*.

Voltaire's writings provide the best evidence for the claim, a component of the Secularizing Interpretation, that the earthquake produced significant cognitive changes regarding religious belief for people in the mid-eighteenth century. Neiman frequently cites Voltaire's *Poem* and his debate with Rousseau (2004: 1, 4, 39–40, 137–138, 210–211). A cursory reading of Voltaire's *Poem on the Lisbon Disaster* devoid of context appears to support an inference that Voltaire believed that, as a result of the earthquake, God is not good:

But how conceive a God supremely good,  
Who heaps his favours on the sons he loves  
Yet scatters evil with as large a hand?  
What eye can pierce the depth of his designs?  
From that all-perfect Being came not ill:  
And came it from no other, for he's lord:  
Yet it exists. O stern and numbing truth! (Voltaire 1912: 259)

Voltaire presents what appears to be a serious cognitive challenge befalling Christians who witnessed the effects of the earthquake: if God is supremely good, whence natural evil? He explicitly refers to the pain and suffering caused by the Lisbon earthquake. In Chapter 31 of his *Précis du Siècle de Louis XV*, Voltaire singles out the earthquake as the watershed between Europe's past and future, an omen marking the end of peace and the decline of the contagious optimism of the start of the century (Araujo 2006: 318).

Advocates of the Secularizing Interpretation, like Neiman, draw out Voltaire's thinking about the cognitive effects of the Lisbon earthquake from a few interrogative sentences delivered in the form of a poem intended for an audience of nonintellectuals. However, inferring from these sentences that Voltaire himself advocated key components of the Secularizing Interpretation—for example, that God cannot be all-good—appears methodologically dubious for several reasons. First, Voltaire expressed himself in this context poetically rather than discursively. Next, Voltaire's poem raises questions rather than answers them. In addition, elsewhere in the poem, it is not God's existence or goodness Voltaire doubts but only a popular interpretation of God's goodness, Alexander Pope's. Voltaire's dialectical targets—both in *Candide* and in his *Poem*—include Leibnizian philosophical Christianity, Pope's theologically infused optimism, and religious factionalism (see his letter to M. Tronchin, November 24, 1755). Regarding "religious faction," in *Candide*, Voltaire remarks about the evils caused by the Portuguese government, which executed thirty-four people in the aftermath of the Lisbon earthquake, a group composed of mostly Protestant foreigners. He writes,

After the earthquake, which had wrecked three quarters of Lisbon, the wise men of Portugal had identified no more effective method to prevent the rest being destroyed than to hold a fine auto-da-fé to educate the people. It was decided by the University of Coimbra that the spectacle of a few people being burned over a slow fire, accompanied by the most elaborate rituals, was an infallible, if little known, method for preventing earthquakes. ([Voltaire 2000](#): 12–13)

These executions, caused by human beings, are moral evils rather than natural evils. But Voltaire was an idiosyncratic Christian theist *before and after* the quake. The Secularizing Interpretation's advocates show no evidence of Voltaire's *change* of belief on these matters.

Neiman and others often use Rousseau's writings as evidence for the Secularizing Interpretation. Here Rousseau replies to Voltaire's poem by mounting an argument about the origins of the pain and suffering caused by the earthquake:

You must admit . . . that nature had not assembled two thousand six- or seven-story houses there, and that if the inhabitants of that great city had been more evenly dispersed and more simply lodged, the damage would have been far less, and perhaps nil. All would have fled at the first shock . . . but they were set on staying, on stubbornly standing by hovels, on risking further shocks, because what they would have left behind was worth more than what they could take with them. How many unfortunates perished in this disaster for wanting to take, one his clothes, another his papers, a third his money? ([Rousseau 1997](#): 234)

Rousseau writes that poor decision-making in several areas by human beings precipitated the pain and suffering that some people, but not Rousseau, believe was caused either by nature or by God. Death and pain often were not caused directly by the earthquake but were *caused by decisions people made* to return into burning buildings to retrieve (or steal) valuables. By arguing that people's pain and suffering was often caused by their own poor but free decision-making, Rousseau advocates what is called a "free will" theodicy: God cannot be held responsible for such pain and suffering. Furthermore, he explicitly questions the status of the pain and suffering as natural evil, on the grounds that Lisboans chose to live in tall buildings and to endanger themselves through selfish actions in the face of danger. Contrary to the Secularizing Interpretation's use of Rousseau, he preserves a traditional view of God.

Moreover, Rousseau offers two additional theodicies. Both are inconsistent with the Secularizing Interpretation. In his second theodicy—a "greater good" theodicy—Rousseau hypothesizes that, after the earthquake, one can still affirm a traditional God since in our impoverished epistemic positions "we would not be able to tell for sure whether all those deaths in the earthquake were bad in an absolute sense—they might have been relatively good, in that they spared worse sufferings" (1967: iv. l062). The idea here is that God's mercy was present during the destruction since God only killed those who would have experienced even worse suffering. Advocating a third theodicy, Rousseau suggests that God was justly punishing people for not living in nature in accord with God's and, coincidentally, Rousseau's primitivism (LeVay and Sieh 1998: 169). Rousseau suggests a minor change to a catchphrase from Alexander Pope's *Essay on Man*, and this change speaks to the influence the earthquake had on Rousseau's own religious thought. Rousseau writes, "In place of All is good, it perhaps would be better to say, The whole is good, or All is good for the whole" (Voltaire 2000: 109). Rousseau affirms that the world is still good and remains under the benevolent guidance of a good God. This is not consistent with the implications of the Secularizing Interpretation, however. In addition, he appears to believe God is a supernatural punisher, also inconsistent with the Secularizing Interpretation.

Advocates of the Secularizing Interpretation mistakenly use writings of Rousseau, Goethe, Kant, and Voltaire as evidential support for the Secularizing Interpretation. It is no wonder why advocates of the Secularizing Interpretation are drawn to these thinkers: they at least mention the Lisbon earthquake. But these thinkers do not describe the cognitive effects of the Lisbon earthquake as the Secularizing Interpretation suggests that they do. Many other leading figures in the period do not even mention the earthquake. For example, one of the most widely read and prolific

eighteenth-century thinkers, David Hume (1711–1776), never refers to the Lisbon earthquake in his entire corpus, as an electronic search reveals. This is so despite the fact that he is the Enlightenment's most important critic of religion.

## A COMMENT ON THE METHODS USED TO SUPPORT THE SECULARIZING INTERPRETATION

The Secularizing Interpretation emerges from selective attention to writings of a few elite thinkers, and yet it intends to explain non-elites' reactions to the event as well. Basing the Secularizing Interpretation upon writings of elites creates problems for the Secularizing Interpretation, since we have antecedent reasons to infer elite philosophers are more likely than commoners to make a cognitive change from the belief that the earthquake was caused by God on purpose as a punishment to a belief that the earthquake was not caused by God and is instead a natural evil. This is unfortunate and describes a state of affairs in need of methodological reconsideration—on the assumption that these authors are directed at finding out historical truths.

These historians' interpretations are in fact testable and falsifiable, but they are up to now untested. How might we design a proper test of the Secularizing Interpretation? First, since the Secularizing Interpretation posits significant cognitive change in the wake of the earthquake, to test this as a hypothesis, we need evidence of cognitive change from writings in the period *before and after* the event. Ideally, this will include sets of writings by different authors and sets of writings by the same author before and after they experienced or learned about the earthquake. Second, the populations to which the hypothesis applies—elites or commoners—must be specified and operationalized. Third, the timescale of the application of the hypothesis requires clarification. While my collaborators and I refine quantitative techniques for testing hypotheses with literature (see Nichols et al. 2014) and pilot them on large numbers of texts before and after the Lisbon earthquake, we can articulate a competing hypothesis about the Lisbon earthquake. This competing hypothesis—the Cognitive Science of Religion Hypothesis—has two sources of evidence. The first is historical precedent itself, to which we now turn.

## EARTHQUAKES IN THE SOCIAL, POLITICAL, AND COGNITIVE CONTEXT OF EARLY CHRISTIANITY

Analysis of historical earthquakes in predominantly Christian areas provides counterevidence that reduces the probability that the Secularizing

Interpretation represents an accurate assessment of responses to the Lisbon earthquake. This analysis also raises the probability of the Cognitive Science of Religion Hypothesis. Responses to the Lisbon earthquake in Christian literature, like many responses to earthquakes in Christian history—for example, to the 1703 and 1720 earthquakes in Umbria—include frequent reference to the biblical Book of Revelation ([Hanska 2002](#): 158). Biblical discussion of earthquakes and other natural evils is limited. In John’s gospel, Jesus is asked whether a man blind from birth is blind by virtue of his own sin or the sins of his parents. Jesus responds in John 9:3, “neither this man nor his parents sinned; he was born blind so that God’s works might be revealed in him.” Despite this remark, subsequent Christian reflection on natural evil tends not to hold, or not merely to hold, that the reason that natural evils occur is so that God’s works might be revealed. Presumably, this is due to the inscrutability of this remark if taken as the origin of a theodicy, or also because it appears unfair that someone must endure years of suffering so he can be healed ([Young 2000](#): 688). When confronted about the deaths of eighteen people due to the fall of a tower in Siloam, Jesus responds in Luke 13:4–5, “Do you think they were worse offenders than all the others living in Jerusalem? No I tell you; unless you repent you will all perish just as they did.” This remark introduces notions of collective responsibility and guilt, complicating the theodical project ([Chester and Duncan 2010](#): 86). As with these verses, other passages in the New Testament that refer to suffering and pain are interpreted to suggest that the sufferers are guilty. For example, some people fell ill and some died in Corinth due to their scandalous use of the Lord’s Supper (1 Cor. 11:30; see [Travis 2009](#)). This and other biblical events tie together suffering and pain with wrongdoing and punishment by God. But for more significant instruction about psychological and sociological explanations of reactions to natural evils, we turn to Revelation.

Recent biblical scholarship on the New Testament uses sundry sources—literary, epigraphical, archaeological, numismatic—to understand the sociopolitical context and religious significance of seismic events in the Book of Revelation. Revelation mentions five seismic events in total ([Beale 1998](#): 396). Seismic events in the Book of Revelation are portrayed as destroying Asian cities that had special political and religious loyalties to the Roman Empire. The reason why these particular cities were targeted for destruction by divinely appointed earthquakes has to do with tensions between early Christians and the Roman Empire. In particular, early Christians exhibited a great deal of concern about the influence of the imperial cult. According to Leonard Thompson, “the churches of the Book of Revelation were located geographically, organizationally, and

culturally where the imperial cult was most heavily distributed" (1997: 160). Cities, especially Babylon, were regarded as centers of human iniquity and anti-Christian antagonism.

During the reign of Domitian, early Christians interpreted earthquakes as eschatological theophanies—acts directly caused by God through which Christians could understand the impending last times to come. Research on funding for earthquake reconstruction in this seismically active area reveals a Roman tradition that has the appearance of law according to which emperors gave generously to reconstruction efforts in affected cities. We know the city of Tralles by the name "Caesarea" because it was renamed by officials following Augustus' infusion of financial resources for the city's rebuilding after an earthquake in 27 BCE (Murray 2005: 150–152). As nodes in the empire, urban centers were preferentially given aid, which in turn fostered allegiance in these cities to Rome. Symbolic use of this generosity by successive emperors took shape in many forms, such as Augustus' remarks in the *Res Gestae Divi Augusti* and Tiberius' repeated, public pleas before the Senate for aid for earthquake-ravaged cities in Asia Minor. Grateful peoples in the cities of Asia erected grand statues to Roman emperors in appreciation for this aid and intensified their religious devotion to the emperor (Murray 2005: 146).

The writing of Revelation dates to the reign of Domitian (89–96) and/or Trajan (98–117). Evidence for the Roman persecution of Christians during Domitian's reign, though present, appears fragmentary; however, evidence of such persecution during Trajan's reign is plentiful. For Christians, the social and political environment during the composition of Revelation was extremely hostile. Under persecution, or under its impending prospect, the author of Revelation (traditionally understood as John the evangelist) sought an "identity-forming and boundary-maintaining device in a time when sectarian communities are faced with questions as to how they will respond to the demands of the larger social environment" (deSilva 1992: 378). This meant, in part, that Christians sought to maintain "sectarian tension" rather than accommodation (Wilson 1967: 22). John's aspersions against forms of accommodationism between Christians and Greco-Roman society appear in Revelation 2 in his repudiation of the Nicolaitians and "Jezebel." The Nicolaitians advocated for Christian participation in certain religious rituals and meals because only by doing so could they maintain valuable membership in trade guilds, each of which had a patron deity. John's comparison of these groups to Balaam explicitly cues out-group antagonism. In the Old Testament, Balaam signaled Israel's apostasy and its loss of identity as God's chosen people due to the increasing laxity of Israelites' ritual practice, which distinguished the Israelites from others. In this context, in Numbers 25, Israelites are described "playing the

harlot with the daughters of Moab,” that is, they were intermarrying and risked losing their in-group identity.

Similar threats faced Christians at the turn of the first century. Revelation contains John’s condemnation of religious “accommodationism.” Six of the seven cities targeted in John’s apocalypse for destruction by divine earthquakes were regional judicial and assize centers for Rome, “the Great Whore” of Revelation 17 and 18. Five were official homes for altars for the imperial cult, that is, altars for the worship of the Roman emperor. Steven Friesen argues that John singles out these locations as especially worthy of God’s destruction because of their ideological loyalty to Rome (2001: 37). John’s portrayal of God’s wrath upon Rome via the destruction of Roman cities in Asia by theophanous earthquakes can be interpreted from a social-science perspective. In this case, it appears that John’s text portrays competition between two groups. Some biblical scholars lean toward such an interpretation, including Elisabeth Schüssler Fiorenza, who writes that Christianity as portrayed in Revelation “demands unfaltering resistance to the imperial cult because honouring the emperor would mean ratifying Rome’s dominion over all people and denying the eschatological life-giving power of God and Christ” (1985: 24). The eschatological earthquakes foretold by John represent the most awe-inspiring physical events recorded in the Bible since the flood. In Revelation, John portrays God as destroying key Roman cities with earthquakes for moral and religious reasons: punishment of the out-group and purification of the in-group. Asia Minor functions as a battleground for the confrontation between the God of the followers of Jesus and the God of Rome, the Emperor. God is portrayed as targeting the cities most zealous in their devotion to the imperial cult and most important for their infrastructural support of Roman financial domination in Asia.

This historical information significantly reduces the probability of the Secularizing Interpretation while increasing the probability of the Cognitive Science of Religion Hypothesis. This information fits a pattern that provides partial confirmation of retrodictions from a set of theories in cognitive science of religion that ground the Cognitive Science of Religion Hypothesis of the Lisbon Earthquake. This information does so while being drawn from a period over 1600 years from the writing of Revelation and written in cultural, social, and linguistic contexts very different from those during Enlightenment Europe. The text of Revelation indicates four important outcomes regarding early Christian thinking about earthquakes. God is believed to (1) *cause earthquakes*, (2) *intentionally*, (3) *in order to punish*, specifically, (4) to punish members of *an opposing religious or ethnic group*. If we find this pattern of beliefs about earthquakes in the history of Christianity, we have reason to infer that probably the

evolutionary and cognitive sciences can explain components of this response in terms of well-confirmed psychological theories.

## EVIDENCE FROM THE COGNITIVE SCIENCES FOR THE COGNITIVE SCIENCE OF RELIGION HYPOTHESIS

The second source of evidence for the Cognitive Science of Religion Hypothesis of the Lisbon earthquake comes from data marshalled in support of key features of the hypothesis by studies across the cognitive science of religion. The Cognitive Science of Religion Hypothesis as applied to the Lisbon earthquake logically entails that a majority of Protestant religious persons in 1755–56 and thereafter believed that the earthquake was (1) caused by an agent (2) on purpose (3) to punish (4) the out-group. If these claims have a low probability of being true, then the Cognitive Science of Religion Hypothesis is likely false. This section proceeds through a discussion of the reasons drawn from cognitive science on behalf of hypotheses 1 through 4.

Note that the Cognitive Science of Religion Hypothesis of the Lisbon earthquake is something that I propose as *an explanation of religious persons' reactions to events of the earthquake*, rather something directly attributed to religious persons in 1755 CE. The Secularizing Interpretation and the Cognitive Science of Religion Hypothesis are mutually exclusive, an important methodological point. The Cognitive Science of Religion Hypothesis is developed on the basis of several theories in the psychology, sociology, and cognitive science of religion, including Supernatural Punishment Theory, Terror Management Theory, the Just World Hypothesis, Cognitive Dissonance Theory, and others. Consideration of these theories not only frames the hypothesis but also increases its prior probability.

In contrast to the Secularizing Interpretation, the Cognitive Science of Religion Hypothesis retrodicts (1) that Christians would believe that God caused the earthquake and (2) that Christians would believe God caused the earthquake on purpose for a reason. Psychological studies show that humans naturally attribute intention to the origins of natural phenomena, as revealed in Justin Barrett's research on hypersensitive agency detection and Deborah Kelemen's experiments on teleological cognition. Kelemen's lab has tested a number of hypotheses regarding what she calls "promiscuous teleology," the tendency to ascribe purpose to physical events and states of affairs. Data confirm these propensities in children (Kelemen 1999a, 1999b). Children prompted with pictures of physical objects, like storm clouds or sharp rocks, are asked to select among explanations. Results show that they vastly prefer teleological explanations (1999b: 1443). The presence of promiscuous teleology explains the origins of the

“intentional stance” adopted in the context of religious explanations of natural facts (Evans et al. 1996). This has been the subject of a stream of research in the cognitive science of religion since Stewart Guthrie’s *Faces in the Clouds* (1993).

Humans attribute not only intention but moral reasons and purposes to natural events, especially for events of “natural evil.” Support for this claim is found in the few experiments that directly address theodicies (e.g., Furnham and Brown 1992) and in evidence for the Just World Hypothesis (Lerner 1980). According to the Just World Hypothesis, people tend to believe that the world is fair and that things happen for a reason. For example, in Rousseau’s first theodicy, he claims that people who built six-story residential buildings in Lisbon are to blame for their own suffering and death. This represents a textbook example of the psychological tendency discovered in studies of the Just World Hypothesis since this belief cognitively buffers the mental discomfort of knowing that thousands of people died unfairly and in pain. This is easier to accept if these individuals deserved it, as Rousseau implies. People have a need to make meaning in their lives, exert control over external situations and seek explanations for “unfair” or “unjust” events that render them apparently fair. Evidence for this hypothesis has been found in over fifty experiments (Hafer and Bègue 2005). But the world is not just. Like so many who use buffering techniques described by the Just World Hypothesis, Rousseau deceived himself and his readers with this remark. There were no six- or seven-story residential buildings in Lisbon at the time of the earthquake.

Activation of the emotive and cognitive systems that lead to effects predicted by the Just World Hypothesis need not involve any appeal to a deity, but they often do. Ronnie Bulman and Camille Wortman (1977) analyzed reactions of victims to their spinal cord injuries. The most common explanation was that the severe injury was part of God’s plan. Kenneth Pargament and M. S. Sullivan (1981) found that causal attributions to God in the context of health-related situations were greater than to any other source including oneself. In a coding experiment involving interviews with 145 parents of children who had died of cancer or blood disorders, parents appealed to a just God for an explanation of their suffering (Cook and Wimberly 1983). On the basis of the Just World Hypothesis, Kenneth Pargament and June Hahn (1986) confirmed that attributions to God’s will and purpose would be more frequent in unjust situations than in just situations, and attributions to God’s anger more frequent in negative outcome situations. This response pattern reflects a “desire for a controllable just world, one in which an individual’s ability to cope is never exceeded, with God’s help” (Pargament and Hahn 1986: 203). Cognitively biased Just World thinking is not restricted to sufferers of unjust pain and suffering.

This motivated bias makes its way unchecked into contemporary Christian moral philosophy (for example, [Hare 1996](#); see [Nichols 2004](#)).

The Cognitive Science of Religion Hypothesis also implies a third point that Christians believe God intentionally causes earthquakes (3) in order to punish. Supernatural Punishment Theory ([Schloss and Murray 2011](#)), a theory on which the Cognitive Science of Religion Hypothesis presented here is built, is itself constructed upon familiar adaptations for human ultrasociality, including Theory of Mind. Theory of Mind describes the cognitive processes by which we are able to attribute mental states, including intentional mental states, to other agents. Sometimes the agents to whom we attribute mental states do not exist; in such cases, often people regard others as unseen personal causes of events ([Bering 2002](#); [Povinelli and Bering 2002](#)). After language acquisition, humans needed to alter certain self-interested behaviors so as to avoid selfish behavior when it could readily be observed and communicated to others in one's social group. Knowing that we are watched—especially by someone with power—discourages us from cheating, since the watcher can communicate our behavior to others. Implementing Theory of Mind often allows individuals to avoid being detected while they cheat. However, this is inadequate to ensure cooperation with the in-group. Psychologists hypothesize that the cultural selection and transmission of concepts of High Gods, that is, gods who are believed by religious believers to take a moral interest in human behavior, have social intelligence, and have power to punish, is instrumental in solving problems that observably selfish behaviors cause for cooperation in the in-group.

Without reliable mechanisms of punishment, patterns of human cooperation break down ([Trivers 1971](#); [Sigmund et al. 2001](#)). Mere rewards fail to sustain cooperation ([Yamagishi 1986](#); [Fehr and Gächter 2002](#)). Cheating costs in-group members. Punishing cheaters also costs in-group members, which makes punishment a second-order public good ([Yamagishi 1986](#)). The necessity of punishment for the sake of cooperation rises as societies grow in population as kinship-based cooperation decreases in frequency. Mechanisms that enhanced cooperation amongst groups and reduced defection and cheating would have offered individuals in the group fitness advantages. Evolutionary theories of cooperation, including kin-selection, reciprocal altruism, indirect reciprocity, and group selection, do not fully explain the extent to which humans cooperate. The incompleteness of these accounts of cooperation to explain ultrasociality and strong reciprocity ([Fehr and Fischbacher 2003](#); [Henrich et al. 2004](#)) has led to their supplementation with data from the study of cultural evolution. Within this large area, researchers have been drawn to the study of the cultural evolution of religions with High Gods and their effects on

prosocial behavior to better explain human ultrasociality ([Norenzayan 2013](#)).

A recent body of diverse research in fields of anthropology, theoretical biology, experiments in evolutionary psychology, and experiments in cross-cultural psychology shows that religion promotes within-group co-operation ([Wilson 2002](#)). [Azim Shariff and Ara Norenzayan \(2007\)](#) demonstrate cooperation effects using just a scrambled-sentences paradigm. Others suggest correlations between hard-to-fake religious signals and pro-social behavior ([Cronk 1994](#); [Irons 2001](#)). But Supernatural Punishment Theory hypothesizes that the priming of supernatural agencies endowed with *moral concern*, with *strategic knowledge* of human actions, and with *power to punish* “was an effective way to caution oneself against transgressions and thereby avoid ‘real’ worldly retribution by other group members” ([Johnson and Bering 2006](#): 226; see [Johnson 2005](#): 413–414). Religion enhances in-group cooperation through cultural programming with High Gods and mechanisms discussed by Supernatural Punishment Theory.

Recent experimental results confirm that priming of religious concepts correlates with greater self-control in decision-making domains that are theoretically relevant to humans’ evolutionary success ([Rounding et al. 2012](#)). A series of papers by Jesse Bering shows belief in supernatural monitors correlates with increases in self-control regarding moral decision-making and reductions in “cheating” behavior in children ([Bering 2003](#); [Piazza and Bering 2011](#)). But not any god will function in this way. A wrathful, monitoring high god with a concern to punish appears to correlate with the biggest gains in in-group cooperation ([Johnson and Krüger 2004](#)). Dominic Johnson uses the Standard Cross-Cultural Sample of 186 human societies around the globe ([Murdock and White 1969](#)) to establish a series of statistically significant positive correlations between a culture’s adoption of “high gods” and a culture’s adoption of a series of moral behaviors hypothesized by Supernatural Punishment Theory. Cultures with high gods, like eighteenth-century Europe of course, contain individuals who, when compared with individuals from non-High God cultures, are “more compliant with social norms and decisions,” are “more loyal to the local and wider community,” “have centralized enforcement and sanctioning systems,” and are “more willing to contribute to the public good” ([Johnson 2005](#): 425). [Frans Roes and Michael Raymond \(2003\)](#) found that group size correlates with belief in supernatural watchers concerned about the morality of human interactions. Gods of small groups were statistically unlikely to be believed to be omniscient or omnipotent ([Shariff et al. 2010](#): 125).

Belief in High Gods positively correlates with decreases in cheating and with increases in self-monitoring, both of which enhance cooperation *in the in-group*. But evolutionary psychology of religion suggests societies also leverage Supernatural Punishment Theory to foment out-group aggression. Thus, when an earthquake kills tens of thousands of people in the religious out-group, the Cognitive Science of Religion Hypothesis retrodicts that members of the religious in-group will believe that God causes the earthquake on purpose as a punishment (4) of the out-group. Data show that religious persons extend less altruism and more punishment to people known to be members of another religion. Perceived in-group religious membership correlates with the rate at which prosociality is attributed to another person (Widman et al. 2009; see also Ruffle and Sosis 2006; Bulbulia and Mahoney 2008; Tan and Vogel 2008).

Degree of religious conviction strongly predicts intolerance for out-group political and moral views (Powell and Steelman 1982; Smidt and Penning 1982; Eckberg and Blocker 1989). Reviews of the Terror Management Theory literature show that when people are primed with mortality salience, people usually defend or draw on their faith in protective ideologies by derogating people who do not share their ideology or religion. Primed participants also increase their support for violent action against the out-group (see Greenberg et al. 2008). Terror Management Theory suggests that conditions in Lisbon and environs after November 1, 1755, including death and suffering, toppled buildings, floods, and fires, would incubate extreme rates of mortality salience.

Lastly and directly, consider results of a study (Sibley and Bulbulia 2011) called “Faith after an Earthquake: A Longitudinal Study of Religion and Perceived Health before and after the 2011 Christchurch New Zealand Earthquake.” The February 22, 2011, earthquake in Christchurch, New Zealand, occurred as authors were in the middle of data collection for a longitudinal study of religiosity. Authors conclude that “religion became more appealing among those exposed to the Christchurch earthquakes and aftermath, relative to those who were not exposed” (Sibley and Bulbulia 2011: 5). Put in terms of the theories paired in competition here, their observations of *increased* religiosity are expected on the Cognitive Science of Religion Hypothesis, whereas on the Secularizing Interpretation, we might instead expect that the pain and suffering in New Zealand would *decrease* religious believers’ faith in an all-loving, all-good God.

Evidence from this study further decreases the probability of the Secularizing Interpretation and increases the probability of the Cognitive Science of Religion Hypothesis. Psychological effects of biases discussed in this section raise the probability that religious writings about evil and

suffering exhibit significant motivated cognition. This describes work of eighteenth-century Protestants *and* twentieth-century historians responding to the Lisbon earthquake, as well as cognitive contours of twenty-first century analytic philosophy of religion (Draper and Nichols, 2013).

## EVIDENCE FROM EIGHTEENTH-CENTURY TEXTS FOR THE COGNITIVE SCIENCE OF RELIGION HYPOTHESIS

Advocates of the Cognitive Science of Religion Hypothesis would expect confirmation of its hypotheses when data are gathered from texts. The aim of this section is to draw on some of the most widely circulated sermons of the period as evidence for the Cognitive Science of Religion Hypothesis rather than to test these hypotheses against a database of documents. (Formal testing of this hypothesis on a large database of documents written before and after November 1, 1755, is planned once funding is secured.) These sermons include Protestant and Catholic sermons like John Wesley's "Serious Thoughts" (1756b), which went through seven printings in the 1750s alone.

A supernatural punishment-infused interpretation of the Lisbon earthquake often begins with statements about the ability of earthquakes to cause "mortality salience," that is, panic and fear of death, more rapidly and at higher rates than other disasters. Charles Wesley opened his March 8, 1750, sermon "The Cause and Cure of Earthquakes" writing, "Of all the Judgments which the righteous God inflicts on Sinners here, the most dreadful and destructive is an Earthquake. This He has lately brought on our Part of the Earth, and thereby alarmed our Fears, and bid us prepare to meet our GOD!" (1750). Their sudden onset, incomparable physical power, and symbolic terror would be reason enough to believe the effects of earthquakes on religious psychology are uniquely potent.

In John and Charles Wesley's writings after the Lisbon earthquake, we find evidence supporting the four Cognitive Science of Religion hypotheses. Recall that the Secularizing Interpretation implies that we ought instead to expect religious believers after the earthquake to secularize and reduce their belief in an all-good, all-powerful God. Charles Wesley had composed a number of hymns in the wake of a pair of earthquakes that hit Great Britain in Spring 1750. After the Lisbon earthquake, he composed more earthquake hymns and republished the collection in 1756. Hymn 53 invokes elements of the Book of Revelation to convey the punishing action of the earthquake:

The mighty Shock seems *now* begun,  
Beyond Example great,

And lo! the World's Foundations groan  
As at their instant Fate!  
Jehovah shakes the shatter'd Ball,  
Sign of the general Doom!  
The Cities of the Nations fall,  
And *Babel's Hour* is come. ([Charles Wesley 1756a: 10](#))

His brother John wrote late in life to Christopher Hooper about homiletics: “There is no divine visitation which is likely to have so general an influence upon sinners as an earthquake” ([Telford 1931](#), 6: 284). Historians of Christianity conclude that the sweeping growth of Methodism in the mid-eighteenth century is due in large part to the effects of the use of the “earthquake sermon” genre. Methodists in the 1750s and 1760s used “powerful preaching” that gave “free rein to affective responses” and emphasized God’s wrath expressed in terms of death “from disease, from the effects of starvation, from war and from natural disasters like the Lisbon earthquake of 1755” ([Brown 1991](#): 120). As Terror Management Theory has predicted, traumatic events that cue anxiety about mortality and safety effectively heighten the saliency of religious belief.

The Wesleys’ condemnation of nonsupernatural explanations of the earthquake is consistent with explanations drawn from Theory of Mind and “promiscuous teleology.” John Wesley argues in “Serious Thoughts” that “If by affirming, ‘All this is purely natural,’ you mean, it is not providential, or that God has nothing to do with it, this is not true, that is, supposing the Bible to be true. For supposing this, you may descant ever so long on the natural causes of murrain, winds, thunder, lightning, and yet you are altogether wide of the mark, you prove nothing at all, unless you can prove that God never works in or by natural causes. But this you cannot prove” ([1756b: 11](#)). In a passage mocking secular interpretations of the earthquake, he asks, “why should we not be convinced sooner . . . that it is not chance which governs the world? Why should we not . . . acknowledge the hand of the Almighty, arising to maintain his own cause? Why, we have a general answer always ready, to screen us from any such conviction: ‘All these things are purely natural and accidental; the result of natural causes.’ But there are two objections to this answer: First, it is untrue: Secondly, it is uncomfortable” ([Wesley 1756b: 11](#)). It is uncomfortable if God did not cause the earthquake as a punishment, Wesley argues, because this implies that pain and suffering happen to people at random and without their deserving it.

Clearly, say the Wesleys, God caused the earthquake intentionally—in order to punish (out-group) Catholics. In “Serious Thoughts,” John Wesley writes, “And what shall we say of the late Hypothesiss from Portugal? That

several thousand Houses, and many thousand Persons, are no more? That a fair City is now in ruinous Heaps? Is there indeed a God that judges the World? And is He now making Inquisition for Blood? If so, it is not surprising that He should begin there, where so much Blood has been poured on the Ground like Water" (1756b: 4). His inversion of the term "inquisition" would need no explanation to British audiences: by visiting the quake on Lisbon, God condemns the Portuguese Inquisition there. Countless other British Protestant sources sound this alarm (Georgi 2005: 93). To do this, many of them use key Bible verses that are explainable using components of the Cognitive Science of Religion account. Though the Wesleys were the most popular preachers of their day, a thorough review of sermons from before and after the earthquake indicates many others interpreted the Lisbon earthquake in ways explainable by the Cognitive Science of Religion Hypothesis and not the Secularizing Interpretation. It also clearly shows that *not all* British Protestant preachers did so.

But how did the *Portuguese themselves* react to the quake? They too believed that the earthquake was clearly caused by God. T. D. Kendrick, an early historian of the earthquake, writes that compared with Portuguese sermons and pamphlets saying that the earthquake was evidence of God's judgment, "the pamphlets suggesting that the Lisbon earthquake was a natural happening, like eclipses, thunder, rain, or anything else that was alarming or disastrous in man's celestial or terrestrial environment, are far fewer in number. To advocate this view openly was a bold act likely to shock most devout Portuguese people and anger their religious instructors" (1956: 92). Naturalistic, secular interpretations of the event were difficult to communicate and disseminate, but they pop up in small numbers. Juan Luis Roche of Puerto de Santa Maria, Gulf of Cadiz, reported some scientific observations about the effects of the earthquake. Though Roche wrote this under cover of a free-thinking tract that he republished from a Benedictine in Oviedo, he was still rebuked by Dr. Miguel Cabrera of Seville and Miguel de San José, Bishop of Guadix (Kendrick 1956: 103–105). Censorship of those who would have argued that the earthquake was not caused directly by God presents a known confound in testing this hypothesis with historical documents.

The majority of Portuguese and Spanish thinkers who believed the quake to be God's punishment confronted a problem. Unwilling to cut God's intention and action out of the causal process, they did not adopt the English Protestant perspective, as that would amount to a repudiation of Roman Catholicism itself. Instead, they needed to deflect the anomie and anxiety generated by God's judgment, seemingly on and only on them. Cognitive Dissonance Theory retrodicts that in this situation, extreme "buffering" would arise (Festinger et al. 1956). So it did. Some theologians,

like the canon of the cathedral at Seville, Francisco Olazaval y Olavrola, reasoned that the sins of people in the city of Seville brought down God's wrath and that the earthquake was a call to repentance ([Olazaval y Olayzola 1755; Udías 2009](#): 45). Another defender of the supernatural character of the earthquake was Miguel de San José. Like Protestants, he worried people would deny God's role in the disaster. Like the Wesleys and others, he moralizes to the effect that advocacy of the secular, naturalistic interpretation may result in damnation: "to deny or doubt that earthquakes and other disasters are usually the effect of the wrath of God, can be considered as an error in the faith" ([San José 1756; Udías 2009](#): 42). Francisco Javier Gonzales, a friar in the Mimims Order, alights on a convenient trope for the Christian management of cognitive dissonance, one with a very long pedigree in theology and philosophy. God caused the earthquake, on purpose, as a punishment. But it was a punishment for original sin, which all humans inherited from Adam and Eve, and not just for sinful Iberians ([Gonzales 1757](#); see [Udías 2009](#): 45). This is consistent with the Cognitive Science of Religion Hypothesis but not the Secularizing Interpretation.

But Portuguese and Spanish thinkers had two more creative responses to the theological challenge of explaining why the earthquake decimated their own particular Christian group, as opposed to any other. A 1675 book on geophysics by Jose Zaragoza, professor of mathematics at the Jesuit Imperial College of Madrid, inspired the first of these inventive responses. Zaragoza argued that though natural causes are at the source of some earthquakes, "at other times God causes them, or lets the Demon do it, in order to punish men" ([Zaragoza 1675; Udías 2009](#): 42). Attributing the action to Satan implied that God was not necessarily, or not directly, punishing the Portuguese and Spanish. Taking this lead, Pablo Trebnal, an intellectual from Seville, defended this response to the earthquake ([Trebnal 1756; Udías 2009](#): 46). This minority affirms promiscuous teleology and attributes intentions to a supernatural being for the quake, and even affirms that the quake was caused as a punishment on Iberians, but by Satan. This undoubtedly would have called to mind the suffering endured by Job, a biblical allusion that paints Lisboans in a righteous, faithful light. Though presumably the product of cognitive bias and self-deception, this is ingenious dissonance management. Whether God caused the earthquake directly as a punishment on Iberians or not, these authors' remarks are consistent with the Cognitive Science of Religion Hypothesis and inconsistent with the Secularizing Interpretation. Even in the case of Zaragoza and Trebnal, the earthquake is still caused by God, on purpose, as a punishment, though God's agency proceeds through Satan's agency.

Father Gabriel Malagrida, a Jesuit and the leading evangelist of his day, offers a daring theodicy for the quake's destruction. Malagrida published a sermon called "A judgment on the true cause of the earthquake" that appears to reach an even wider audience than did Wesley's "Serious thoughts." Like the Wesleys, Malagrida shows rhetorical subtlety, pausing to repudiate secular interpretations of the earthquake. The causes "are not Stars, not steam, nor exhalations, not Phenomena, not contingency, nor natural causes; but solely our unbearable sins" ([Malagrida 1756](#): 3–4). Physical explanations may be partially true, but their utter irrelevance at preventing future disasters incensed Malagrida. The "devil," he writes, "couldn't invent a dogma that will lead us more to our irreparable ruin" than naturalism and secondary causes ([Malagrida 1756](#): 12). Malagrida goes to great (promiscuously teleological) lengths to preserve God's agency in the earthquake (22) and emphasizes God's role as a supernatural monitor. He writes, "there is God in Heaven, who is continuously watching over our actions" ([Malagrida 1756](#): 9).

The reason he thought God punished Lisbon, killed tens of thousands of Roman Catholics at mass on All Saint's Day, and crippled a Catholic empire is what sets Malagrida apart: *God destroyed Lisbon because Jesuit Lisbon admitted too many out-group Protestants into the city.* Malagrida warily makes this argument with biblical illustrations of occasions on which God is portrayed as purifying the in-group by punishing out-group members who masquerade as in-group members. He cites Ezekiel 6 to attest to God's desires for purity amongst the faithful and for lethal punishment of false worshippers. Citing Leviticus 10, Malagrida uses the story of Nabab and Abihu and God's lethal consumption of them by fire for feigning membership in the in-group to describe Protestant "Heretics" who were burned to death in the fires of Lisbon (26–27). A historian remarks, "The populace of Lisbon, excited by fanatic preachers, believed that the tolerance manifested toward the heretics living in town was one of the causes of their misfortunes" ([Poirier 2006](#): 175). Domingos dos Reis Quita and Father Cermelli, grand inquisitor of Lombardy, join Malagrida in pushing this line ([Buescu 2006](#): 330–31; [Poirier 2006](#): 177). The Cognitive Science of Religion Hypothesis elegantly retrodicts components of the reaction to the quake offered by these Catholic leaders of the in-group of victims of the quake, Catholics.

The antagonism of Portuguese Catholics directed at the tiny minority of out-group Protestants boiled up after the quake and exploded into documented physical violence. Harrowing accounts of English Protestants in Lisbon testify that death by the hands of Lisboan Roman Catholics was no idle fear. One writes, "Since yesterday morning, I have spent the time in anguish and terror, without eating or sleeping . . . I was sweating from

fear, because I figured that the superstitious populace had put into their heads that this sad destiny had been visited on them because of the heretics” (quoted in Poirier 2006: 172). Other Protestant eyewitness reports include tales of violence and of being forcibly baptized into the Roman Catholic faith. Being a member of a minority out-group in a context like this presents massive social and personal costs, just as does being an atheist today (Wright and Nichols 2014).

In the end, by impugning the judgment of civic leadership and the crown, Malagrida’s fate was not much better. Marquis de Pombal imprisoned Malagrida on falsified evidence concerning his involvement in a plot to kill the king. Malagrida was held for years and then gruesomely executed on September 21, 1761.

As stated by its advocates, the Secularizing Interpretation says that the Lisbon earthquake changed people’s religious cognition by prompting them to deny God caused it on purpose and to deny that it was a punishment. Malagrida and the Wesleys, among the most efficient cultural transmitters in the Portuguese and British empires during this period, unambiguously adopt a position about the Lisbon earthquake that is much better explained by the Cognitive Science of Religion Hypothesis because they believe that the earthquake was (1) caused by God (2) on purpose (3) as a punishment (4) on the out-group, or, in Malagrida’s peculiar case, (4) on the in-group for being too friendly with the out-group.

## LIMITATIONS, OBJECTIONS, REPLIES, CONCLUSION

Though the Cognitive Science of Religion Hypothesis avoids several methodological problems, objections remain and merit recognition. The first objection states that turning to sermons to gather data to test the Cognitive Science of Religion Hypothesis is biased. This objection applies to the present preliminary review of sermons by John and Charles Wesley and Gabriel Malagrida, and to any future data set containing sermons for formal testing. Preachers’ religiosity suggests they are disproportionately likely to believe the earthquake was a punishment by a just God. Robert Ingram reports “The *English short-title catalogue* (ESTC) returns 138 works directly concerning the London and Lisbon earthquakes; nearly eighty percent of those were works with a specifically religious orientation. Every one of the published sermons regarding the earthquakes argued that the seismic events were providential warnings from God” (2005: 101). Using preachers’ writings to test the hypothesis will bias the study’s results in favor of the Cognitive Science of Religion Hypothesis.

This is a thoughtful objection, even though there are two reasons to be skeptical about its force. First, based on knowledge of eighteenth-century

British religious culture, it is very likely that the clergy denied hypotheses 1–4 at higher rates than the common citizenry. A close reading of a sampling of sermons in the larger data set written just after the earthquake shows that British preachers' remarks are sometimes *not* well explained by the Cognitive Science hypothesis. Thomas Anguish, vicar of St. Nicholas, Deptford, preached a sermon shortly after the Lisbon earthquake using Luke 8:4–5 about the fall of the tower of Siloam. With it, Anguish warns British Protestants by arguing that God is not punishing Lisboans for their sins: "In our reflections upon the desolations abroad the text gives a caution, not rashly to input them to the greater guilt of the sufferers" (1756: 4). Anguish opts for strong agnosticism about the cause of the quake (6) and empathy, not hostility, for the Lisboans (8). Interpreting the earthquake as something other than divine judgment on Lisbon was not only a live option for Protestants at the time, but an interpretation that receives sustained articulation and defense in sermons by Christian preachers. This increases the probability of the Secularizing Interpretation somewhat. More importantly, it underscores the value of quantitatively testing the literary record to put these hypotheses to the test.

Second, from one of the only other empirically minded studies of literature about the Lisbon earthquake, Robert G. Ingram found that newspaper reports and scientific papers from the period about the earthquake typically described the earthquake in providentialist terms. Of the scientists, "very few did try to offer naturalistic explanations of earthquakes" and even those who did, like Edward Wortley Montagu, acknowledge God's providence at work in his seismic theories involving "subterraneous Fire and Vapours" (Ingram 2005: 101–102). This objection is interesting, and makes an assumption about which experts might disagree, which clearly marks it for testing. But it may be that the bias assumed to affect preachers' interpretations of the earthquake also influences the population at large, just as retrodicted by the Cognitive Science of Religion Hypothesis.

The obvious importance of the objection calls for controls in subsequent formal experimentation. This is why we are coding different genres of text, including sermons, newspaper reports, personal diaries, and scientific articles, for formal testing. In a subsequent multivariate analysis of data from textual content, this step will permit controlling for *genre* and other independent variables including *date* (before or after the earthquake), *religion* (Protestant, Catholic, neither), and more. Statistical testing will reveal whether the change in the ratio of synonyms for "punishment" per hundred words of text in writings by preachers from before

the earthquake to after the earthquake is greater than that ratio across other genres.<sup>1</sup>

Another objection focuses on the fact that this article cited studies done with contemporary human subjects, and argued these data provide valuable information for understanding historical patterns in religious belief and behavior. This assumes that subjects of experiments today and people living in the eighteenth century share key mental systems for cognition and emotion. These include cognitive systems responsible for promiscuous teleology and just world thinking. But, goes this objection, this is controversial or dubious to those who favor a psychology committed to a Lockean *tabula rasa*. In response, first, cross-cultural and cross-temporal differences between groups are undeniable. Yet this does not imply that significant cross-species generalizations about cognition are false. Second, the notion of a Lockean blank slate has been widely discredited by scientists and psychologists (see [Pinker 2002](#)). Prior to considering this objection seriously, further evidence on its behalf and against relevant evolutionary generalizations about our species must be adduced.

To conclude, whether or not the Secularizing Interpretation is true is an empirical question. Whether the Cognitive Science of Religion Hypothesis is true is also an empirical question. Natural disasters, especially earthquakes, provide focal points for the activation and expression of noteworthy psychological functions relevant to religious cognition and emotion. As such, the historical study of disasters offers unique opportunities for interdisciplinary researchers to clarify and test hypotheses in the cognitive science of religion. Sometimes disasters prompt religious cognition and emotion that increase cooperation. Sometimes, as Bosc de la Calmette knew too well, they have the opposite effect and inhibit cooperation and produce out-group antagonism. We have inched closer to a determination of the cognitive, affective, and behavioral effects of the Lisbon earthquake in early modern Europe by construing surrounding literature in terms of two competing interpretations about these effects, which give rise to a mutually inconsistent pair of hypotheses. The Secularizing Interpretation explained reactions to the earthquake in terms of its widespread secularizing effects. The Cognitive Science of Religion Hypothesis explained reactions to the earthquake in terms of cognitive effects according to which God caused the Lisbon earthquake on purpose as a punishment of out-group members. Preliminary assessment of influential historical

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<sup>1</sup>This is an oversimplified example for illustration purposes. The study's actual design is much more complex.

documents increases the probability of the Cognitive Science of Religion Hypothesis and decreases the probability of the Secularizing Interpretation.

## REFERENCES

- |   |  |
|---|--|
| Anguish, Thomas<br>1756                     | A Sermon Preached at St. Nicholas, Deptford, on the Fast Day. London, UK: John Clarke.   |
| Anonymous<br>1755                           | “Letter from Faro.” <i>Gentleman’s Magazine</i> December 25: 560–563.  |
| Araujo, Ana Cristina<br>2006                | “European public opinion and the Lisbon earthquake.” <i>European Review</i> 14:313–319.  |
| Beale, Gregory<br>1998                      | <i>The Book of Revelation. New International Greek Testament Commentary</i> . Grand Rapids, MI: Eerdmans.  |
| Bering, Jesse<br>2002                       | “Intuitive Conceptions of Dead Agents’ Minds: The Natural Foundations of Afterlife Beliefs as Phenomenological Boundary.” <i>Journal of Cognition and Culture</i> 2:263–308. |
| 2003  | “Towards a Cognitive Theory of Existential Meaning.” <i>New Ideas in Psychology</i> 21:101–120.  |
| 2011  | <i>The Belief Instinct: The Psychology of Souls, Destiny and the Meaning of Life</i> . New York, NY: W.W. Norton.  |
| Bering, Jesse and<br>Becky Parker<br>2006   | “Children’s Attributions of Intentions to an Invisible Agent.” <i>Developmental Psychology</i> 42: 253–262.  |
| Bestermann, Theodore<br>1956                | “Voltaire et le désastre de Lisbonne: ou, La mort de l’optimisme.” <i>Studies in Voltaire and the Eighteenth Century</i> 2:7–24.   |
| Bowden, John and<br>Alan Richardson<br>1983 | <i>The Westminster Dictionary of Christian Theology</i> . Louisville, KY: Westminster John Knox Press.   |
| Boxer, Charles<br>1956                      | <i>Some Contemporary Reactions to the Lisbon Earthquake of 1755, Lisbon</i> . Lisbon, Portugal: Universidade de Lisboa, Faculdade de Letras.                                 |
| Brown, Richard<br>1991                      | <i>Church and State in Modern Britain, 1700–1850</i> . London, UK: Routledge.  |

- 1992      "The 'Demonic' Earthquake: Goethe's Myth of the Lisbon Earthquake and Fear of Modern Change." *German Studies Review* 15/3:475–491.
- Buescu, Helena  
2006      "Seeing Too Much: The 1755 Earthquake in Literature." *European Review* 14/3:329–338.
- Bulbulia, Joseph and Andrew Mahoney  
2008      "Religious Solidarity: The Hand Grenade Experiment." *Journal of Cognition and Culture* 8/3–4:295–320.
- Bulman, Ronnie and Camille Wortman  
1977      "Attributions of Blame and Coping in the 'Real World': Severe Accident Victims React to Their Lot." *Journal of Personality and Social Psychology* 35:351–363.
- Chester, David K.  
2001      "The 1755 Lisbon Earthquake." *Progress in Physical Geography* 25/3:363–383.
- Chester, David K. and Angus Duncan  
2010      "Responding to Disasters within the Christian Tradition, with Reference to Volcanic Eruptions and Earthquakes." *Religion* 40:85–95.
- Cook, Judith and Dale Wimberly  
1983      "If I Should Die before I Wake: Religious Commitment and Adjustment to the Death of a Child." *Journal for the Scientific Study of Religion* 22/3:222–238.
- Cronk, Lee  
1994      "Evolutionary Theories of Morality and the Manipulative Use of Signals." *Zygon: Journal of Religion and Science* 29/1:81–101.
- D'Andrade, Roy  
1992      "Schemas and Motivation." In *Human Motives and Cultural Models*, ed. R. G. D'Andrade and C. Strauss, 23–44. Cambridge, UK: Cambridge University Press.
- Davis, L.  
2002      "Portugal: Lisbon, November 1, 1755." *Natural Disasters*, rev. ed. New York, NY: Facts on File.
- Degg, Martin and J. C. Doornkamp  
1994      *Earthquake Hazard Atlas: 7 Iberia (Portugal and Spain) Including the Azores, Balearics, Canary and Madeira Islands*. London, UK: London Insurance and Reinsurance Market Association.
- De Jong, M.  
1955      "Hollandse reacties op de verwoesting vanLissabon in 1755." *Tijdschrift voor Geschiedenis* 68:193–204.

- deSilva, David  
1992 "The Revelation to John: A Case Study in Apocalyptic Propaganda and the Maintenance of Sectarian Identity." *Sociological Analysis* 53/4: 375–395.
- D'haen, Theo  
2006 "On How Not to Be Lisbon If You Want to Be Modern—Dutch Reactions to the Lisbon Earthquake." *European Review: Interdisciplinary Journal of the Academia Europaea* 14/3:351–358.
- Draper, Paul and Ryan Nichols  
2013 "Diagnosing Bias in Philosophy in Religion." *The Monist* 96/3:420–446.
- Dynes, Russell  
2005 "The Lisbon Earthquake of 1755: The First Modern Disaster." In *The Lisbon Earthquake of 1755: Representations and Reactions*, ed. Theodore Braun and John Radner, 34–49. Oxford, UK: Voltaire Foundation.
- Eckberg, D. L. and T. J. Blocker  
1989 "Varieties of Religious Involvement and Environmental Concern." *Journal for the Scientific Study of Religion* 28:509–517.
- Evans, T. David, Francis Cullen, Velmer Burton, Gregory Dunaway, Gary Payne, and Sesha Kethineni  
1996 "Religion, Social Bonds, and Delinquency." *Deviant Behavior* 17/1:43–70.
- Fehr, Ernst and Urs Fischbacher  
2003 "The Nature of Human Altruism." *Nature* 425: 785–791.
- Fehr, Ernst and Simon Gächter  
2002 "Do Incentive Contracts Undermine Voluntary Cooperation?" Working Paper, University of Zurich. <http://dx.doi.org/10.3929/ethz-a-004373338>.
- Festinger, Leon, Henry W. Riecken, and Stanley Schachter  
1956 *When Prophecy Fails: A Social and Psychological Study of a Modern Group That Predicted the End of the World*. Minneapolis, MN: University of Minnesota Press.
- França, J. A.  
1983 *Lisboa Pombalina e o iluminismo*. Lisbon, Portugal: Bertrand.

- Friesen, Steven  
2001      *Imperial Cults and the Apocalypse of John: Reading Revelation in the Ruins.* Oxford, UK: Oxford University Press.
- Murdock, George Peter  
and Douglas R. White  
1969      "Standard Cross Cultural Sample." *Ethnology* 8: 329–369.
- Furnham, Adrian and  
Laurence Brown  
1992      "Theodicy: A Neglected Aspect of the Psychology of Religion." *International Journal for the Psychology of Religion* 2:37–45.
- Georgi, Mathias  
2005      "The Lisbon Earthquake and Scientific Knowledge in the British Public Sphere." In *The Lisbon Earthquake of 1755: Representations and Reactions*, ed. Theodore Braun and John Radner, 81–96. Oxford, UK: Voltaire Foundation.
- Gonzales, F. J.  
1757      *Reflexiones sobre la respuesta a la carta del Yllmo. Doctor Fray Miguel de San Joseph: juicio reflejo sobre la verdadera causa del terremoto fundado en las Escrituras, Padres exposidores, Gentiles y la Razón.* Seville, Spain: Francisco Sanchez Recientes.
- Greenberg, J., S. Solomon,  
and J. Arndt  
2008      "A Basic but Uniquely Human Motivation: Terror Management." In *Handbook of Motivation Science*, ed. J. Y. Shah and W. L. Gardner, 114–134. New York, NY: Guilford Press.
- Guthrie, Stewart  
1993      *Faces in the Clouds: A New Theory of Religion.* Oxford, UK: Oxford University Press.
- Hafer, Carolyn and  
Laurent Bègue  
2005      "Experimental Research on Just-World Theory: Problems, Developments, and Future Challenges." *Psychological Bulletin* 13:128–167.
- Hanska, Jussi  
2002      *Strategies of Sanity and Survival: Religious Responses to Natural Disasters in the Middle Ages.* Studia Fennica, Historica 2. Helsinki, Finland: Finnish Literature Society.
- Hare, John  
1996      *The Moral Gap.* Oxford, UK: Oxford University Press.

- Henrich, Joe, Robert Boyd, Samuel Bowles, Colin Camerer, and Ernst Fehr, ed. 2004 *Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies*. Oxford, UK: Oxford University Press.
- Horst, Gunther 2005 *Das Erdbeben von Lissabon*. Frankfurt, Germany: Fischer Taschenbuch Vlg.
- Ingram, Robert G. 2005 “The Trembling Earth in ‘God’s Herald’: Earthquakes, Religion and Public Life in Britain during the 1750s.” In *The Lisbon Earthquake of 1755 Representations and Reactions*, ed. Theodore Braun and John Radner, 97–115. Oxford, UK: Voltaire Foundation.
- Irons, William 2001 “Religion as a Hard-to-Fake Sign of Commitment.” In *Evolution and the Capacity for Commitment*, ed. R. Nesse, 292–309. New York, NY: Russell Sage Foundation.
- Jeffery, Renee 2008 *Confronting Evil in International Relations: Ethical Responses to Problems of Moral Agency*. Basingstoke, UK: Palgrave Macmillan.
- Johnson, Dominic 2005 “God’s Punishment and Public Goods: A Test of the Supernatural Punishment Hypothesis in 186 World Cultures.” *Human Nature* 16:410–446.
- Johnson, Dominic and Jesse Bering 2006 “Hand of God, Mind of Man: Punishment and Cognition in the Evolution of Cooperation.” *Evolutionary Psychology* 4:219–233.
- Johnson, Dominic and Oliver Krüger 2004 “The Good of Wrath: Supernatural Punishment and the Evolution of Cooperation.” *Political Theology* 5:159–176.
- Kelemen, Deborah 1999a “The Scope of Teleological Thinking in Preschool Children.” *Cognition* 70:241–272.
- 1999b “Why Are Rocks Pointy?: Children’s Preference for Teleological Explanations of the Natural World.” *Developmental Psychology* 35: 1440–1453.
- Kendrick, Thomas 1956 *The Lisbon Earthquake*. London, UK: Methuen.

- Jan Kozak and Charles James 1998 “Historical Depictions of the 1755 Lisbon Earthquake.” Accessed April 2, 2012. Retrieved from <https://nisee.berkeley.edu>.
- Lerner, Melvin 1980 *The Belief in a Just World: A Fundamental Delusion*. New York, NY: Plenum.
- LeVay, Simon and Kerry Sieh 1998 *The Earth in Turmoil: Earthquakes, Volcanoes, and Their Impact on Humankind*. New York, NY: W.H. Freeman and Company.
- Lütgert, Wilhelm 1928 *Die Erschütteründ des Optimismus durch das Erdbeben in Lissabon*. Gütersloh, Germany: Bertelsmann.
- Malagrida, Gabriel 1756 (Manuscript) “Reason of the Real Cause for the Earthquake the Lisbon’s Court Suffered; The First Day of November, 1755,” trans. N. Van Cann. Lisbon, Portugal: Manoel Soares’ Workshop.
- Marques, A. H. de Oliveira 1976 *History of Portugal*. 2nd ed. New York, NY: Columbia University Press.
- Maxwell, Kenneth 1995 *Pombal, Paradox of the Enlightenment*. New York, NY: Cambridge University Press.
- McKendrick, Neil 1974 *Historical Perspectives: Studies in English Thought and Society in Honour of J. H. Plumb*. London, UK: Europa Publications.
- Mezcua, J., J. Rueda, and J. M. Martínez Solares 1991 “Seismicity of the Ibero-Maghrebian Region.” In *Seismicity, Seismotectonics and Seismic Risk of the Ibero-Maghrebian Region*, ed. J. Mezcua and A. Udías, 17–28. Madrid, Spain: Instituto Geográfico Nacional.
- Moltmann, Jürgen 1983 “Theodicy.” In *A New Dictionary of Christian Theology*, ed. A. Richardson and J. Bowden, 564–566. London, UK: SCM Press.
- Mullin, John 1992 “The Reconstruction of Lisbon Following the Earthquake of 1755: A Study of Despotic Planning.” *Planning Perspectives* 7:157–179.
- Murray, James 2005 “The Urban Earthquake Imagery and Divine Judgement in John’s Apocalypse.” *Novum Testamentum* 47/2:142–161.

- Neiman, Susan  
2004      *Evil in Modern Thought*. Princeton, NJ:  
Princeton University Press.
- Nichols, Ryan  
2004      “Moral Motivation and Christian Theism.” *Faith  
and Philosophy* 21:175–194.
- Nichols Ryan, J. Lynn and  
B. G. Purzycki  
2014      “A Science of Science Fiction: Applying  
Quantitative Methods to Genre  
Individuation.” *Scientific Study of  
Literature*, Forthcoming.
- Norenzayan, Ara  
2013      *Big Gods: How Religion Transformed  
Cooperation and Conflict*. Princeton N.J.:  
Princeton University Press.
- Nur, Amos  
2008      *Apocalypse: Earthquakes, Archaeology, and the  
Wrath of God*. Princeton, NJ: Princeton  
University Press.
- Olazaval y Olayzola, F. J.  
1755      *Motivos del terremoto texperimentado el sabado  
dia 1 de Noviembre 1755, con respecto a la ira de  
Dios en la ciudad de Sevilla y remedios para su  
templanza ofrecidos el martes veintisiete de Abril  
en el parroquial del Senor San Julian a el nobili-  
simio Ayuntamiento de dicha ciudad en la fiesta  
de accion de gracias*. Seville, Spain:  
Dr. D. Geronimo de Castilla.
- Oliveira, C. S.  
1986      “Some Quantitative Measurements for  
Calibrating Historical Seismicity.”  
*Proceedings of the 8th European Conference  
in Earthquake Engineering*, vol. 1, 71–78.  
Lisbon, Portugal: Laboratório Nacional de  
Engenharia Civil.
- Pargament, Kenneth and  
June Hahn  
1986      “God and the Just World: Causal and Coping  
Attributions to God in Health Situations.”  
*Journal for the Scientific Study of Religion* 25:  
193–207.
- Pargament, Kenneth I. and  
M. S. Sullivan  
1981      *Examining Attributions of Control across  
Diverse Personal Situations: A Psychosocial  
Perspective*. Paper presented at the meeting of  
the American Psychological Association, Los  
Angeles, CA.

- Piazza, Jared and Jesse Bering 2011 “‘Princess Alice Is Watching You’: Children’s Belief in an Invisible Person Inhibits Cheating.” *Journal of Experimental Child Psychology* 109: 311–320.
- Pinker, Steven 2002 *The Blank Slate: The Modern Denial of Human Nature*. New York, NY: Viking Press.
- Poirier, Jean-Paul 2006 “The 1755 Lisbon Disaster, the Earthquake that Shook Europe.” *European Review* 14: 170–171.
- Pope, Alexander 1994 *Essay on Man and Other Poems*. New York, NY: Dover.
- Povinelli, Daniel and Jesse Bering 2002 “The Mentality of Apes Revisited.” *Current Directions in Psychological Science* 11:115–119.
- Powell, Brian and Lala Steelman 1982 “Fundamentalism and Sexism.” *Social Forces* 60: 1154–1158.
- Roes, Frans and Michel Raymond 2003 “Belief in Moralizing Gods.” *Evolution and Human Behavior* 24:126–135.
- Rounding, Kevin, Albert Lee, Jill A. Jacobson, and Li-Jun Ji 2012 “Religion Replenishes Self-Control.” *Psychological Science* 23:635–642.
- Rousseau, Jean-Jacques 1967 “Letter to Voltaire, 18 August 1756.” In *Correspondence Complète de Jean Jacques Rousseau*, vol. 4, ed. J. A. Leigh, trans. R. Spang, 37–50. Geneva, Switzerland: Voltaire Foundation.
- 1997 *The Discourses and Other Early Political Writings*, ed. and trans. V. Gourevitch. Cambridge, UK: Cambridge University Press.
- Ruffle, Bradley and Rich Sosis 2006 “Cooperation and the In-Group-Out-Group Bias: A Field Test on Israeli Kibbutz Members and City Residents.” *Journal of Economic Behavior and Organization* 60/2:147–163.

- Sanders, Donald and Jelle Zeilinga de Boer 2005 *Earthquakes in Human History: The Far-Reaching Effects of Seismic Disruptions.* Princeton, NJ: Princeton University Press.
- San José, M. 1756 *Respuesta que dio a una carta del doctor Jose de Zevallos en assumpto de varios escritos impresos sobre el terremoto.* Granada, Spain.
- Schloss, Jeffery and Michael Murray 2011 “Evolutionary Accounts of Belief in Supernatural Punishment: A Critical Review.” *Religion, Brain, Behaviour* 1/1:46–66.
- Schüssler Fiorenza, Elisabeth 1985 *The Book of Revelation: Justice and Judgment.* Philadelphia, PA: Fortress Press.
- Seligo, Hans 1958 “Das Große Erdbeben.” *Merian* 12:19–27.
- Shariff, Azim and Ara Norenzayan 2007 “God Is Watching You: Priming God Concepts Increases Prosocial Behavior in an Anonymous Economic Game.” *Psychological Science* 18: 803–809.
- Shariff, Azim, Ara Norenzayan, and Joe Henrich 2010 “The Birth of High Gods.” In *Evolution, Culture, and the Human Mind*, ed. M. Schaller, A. Norenzayan, S. J. Heine, T. Yamagishi and T. Kameda, 119–136. Florence, KY: Psychology Press.
- Shklovskaya, Judith 1990 *Faces of Injustice.* New Haven, CT: Yale University Press.
- Chris Sibley and Joseph Bulbulia 2011 “Faith after an Earthquake: A Longitudinal Study of Religion and Perceived Health before and after the 2011 Christchurch New Zealand Earthquake.” *PLoS One*, 12/7. <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0049648>. Accessed May 18, 2013.
- Sigmund, Karl, Christoph Hauert, and Martin Nowak 2001 “Reward and Punishment.” *Proceedings of the National Academy of Sciences of the United States of America* 98:757–762.
- Smidt, C. and J. M. Pennington 1982 “Religion Commitment, Political Conservatism and Political and Social Tolerance in the United States: A Longitudinal Analysis.” *Sociological Analyses* 43/3:231–246.

- Sousa, F. L. Pereira de  
1919–32      *O Terremoto do 1º de Novembro de 1755 em Portugal e um Estudo Demográfico.* 4 vols. Lisbon, Portugal: Serviços Geológicos de Portugal.
- Tan, Jonathan and  
Claudia Vogel  
2008      “Religion and Trust: An Experimental Study.” *Journal of Economic Psychology* 29: 832–848.
- Teidemann, Herbert  
1991      *Catalogue of Earthquakes and Volcanic Eruptions.* Zurich, Switzerland: Swiss Reinsurance.
- Telford, John  
1931      *The Letters of John Wesley.* London, UK: Epworth Press. <http://wesley.nnu.edu/john-wesley/the-letters-of-john-wesley/>.
- Thompson, Leonard  
1997      *The Book of Revelation: Apocalypse and Empire.* New York, NY: Oxford University Press.
- Travis, Stephen  
2009      *Christ and the Judgement of God: The Limits of Divine Retribution in New Testament Thought.* Rev. ed. Peabody, MA: Hendrickson.
- Trebnal, P.  
1756      “Tratado phisico historico en que hecha una completa relacion del funesto terremoto sobrevenido a Espana y Africa en 1 de Noviembre de 1755, se procura indagar las causas de los terremotos en general y particularmente la del nuestro paragonando con otros muchos notables” (manuscript).
- Trivers, Robert  
1971      “The Evolution of Reciprocal Altruism.” *The Quarterly Review of Biology* 46/1:35–57.
- Udías, Augustín  
2009      “Earthquakes as God’s Punishment in 17th and 18th Century Spain.” In *Geology and Religion: A History of Harmony and Hostility*, ed. M. Kolbl-Ebert, 41–48. London, UK: Geological Society.
- Voltaire  
1912      *Toleration and Other Essays by Voltaire*, ed. and trans. J. McCabe. New York, NY: G.P. Putnam’s Sons. [http://oll.libertyfund.org/index.php?option=com\\_staticxt&staticfile=show.php%3Ftitle=349&Itemid=99999999](http://oll.libertyfund.org/index.php?option=com_staticxt&staticfile=show.php%3Ftitle=349&Itemid=99999999). Accessed April 3, 2014.

- 2000 [1759] "Candide, or Optimism." In *Candide and Related Texts*, ed. and trans. D. Wootton, 1–83. Indianapolis, IN: Hackett Publishing.
- von Goethe, Johann W.  
1902 [1811–33] *Truth and Fiction Relating to My Life*, trans. J. Oxenford. Boston, MA: Simonds and Co.
- Weinrich, Harald  
1971 *Literatur für Leser, Harald Weinrich*, ed. Stuttgart: Kohlhammer.
- Wesley, Charles  
1750 *The Cause and Cure of Earthquakes*. London, UK.
- 1756a *Hymns Occasioned by the Earthquake, March 8, 1750, Pt. I; To Which Are Added an Hymn upon the Pouring Out of the Seventh Vial, Rev. xvi, XVii, etc., Occasioned by the Destruction of Lisbon*. 2nd ed. Bristol, UK: Farley.
- Wesley, John  
1756b *Serious Thoughts Occasioned by the Late Earthquake at Lisbon*. 6th ed. London, UK.
- Widman, David,  
Katherine Corcoran, and  
Rachel Nagy  
2009 "Belonging to the Same Religion Enhances the Opinion of Others' Kindness and Morality." Special Issue: Proceedings of the 3rd Annual Meeting of the North Eastern Evolutionary Psychology Society. *Journal of Social, Evolutionary, and Cultural Psychology* 3/4: 281–289.
- Wilson, Angus  
1967 "Evil in the English Novel." *The Kenyon Review* 29/2:167–194.
- Wilson, David  
2002 *Darwin's Cathedral: Evolution, Religion, and the Nature of Society*. Chicago, IL: University of Chicago Press.
- Wright, Jennifer and  
Ryan Nichols  
2014 "The Social Cost of Atheism: How Perceived Religious Influences Moral Appraisal." *Journal of Cognition and Culture* 14:115–137.
- Yamagishi, Toshio  
1986 "The Provision of a Sanctioning System as a Public Good." *Journal of Personality and Social Psychology* 51:110–116.

- 
- Young, Francis  
2000      "Suffering." In *The Oxford Companion to Christian Thought: Intellectual, Spiritual, and Moral Horizons of Christianity*, ed. A. Hastings, A. Mason, and H. Pyper, 687–689. Oxford, UK: Oxford University Press.
- Zaragoza, Jose  
1675      "Libro III, Proposicion XII, Delmundo subterraneo, De los terremotos y sus causas." In *Esphera en comun, celeste y terraquea*. Madrid, Spain: Juan Martin del Barrio.