

## Computer Modeling in Philosophy

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# Computer Modeling in Philosophy of Religion

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**Abstract:** How might philosophy of religion be impacted by developments in computational modeling and social simulation? After briefly describing some of the content and context biases that have shaped traditional philosophy of religion, this article provides examples of computational models that illustrate the explanatory power of conceptually clear and empirically validated causal architectures informed by the bio-cultural sciences. It also outlines some of the material implications of these developments for broader metaphysical and metaethical discussions in philosophy. Computer modeling and simulation can contribute to the reformation of the philosophy of religion in at least three ways: by facilitating conceptual clarity about the role of biases in the emergence and maintenance of phenomena commonly deemed “religious,” by supplying tools that enhance our capacity to link philosophical analysis and synthesis to empirical data in the psychological and social sciences, and by providing material insights for metaphysical hypotheses and metaethical proposals that rely solely on immanent resources.

**Keywords:** computer modeling, philosophy of religion, theism, atheism, metaphysics, metaethics, scientific study of religion.

## 1 Introduction

This article explores some of the potential implications of the increased use of computational tools in philosophy for one of its most controversial sub-fields: philosophy of religion. The latter is increasingly disenfranchised within the modern secular academy, in part because of the extent to which religious franchises have been the benefactors and beneficiaries of the philosophizing of so many of its practitioners. Religious apologists have dominated this sub-discipline for such a long time, even within some non-sectarian Universities, that many worry it is no longer (if it ever was) really philosophy of religion but rather philosophy *for* religion.

Professional academic positions in philosophy of religion have dwindled markedly in recent decades (even, albeit less so, in church-sponsored colleges and denominational seminaries). Nevertheless, some scholars are working hard to renew this beleaguered discipline and secure its place in the secular academy by exorcising apologetics and incorporating insights from the comparative and scientific study of religion into their philosophical analysis.<sup>1</sup> The success of these efforts depends on the extent to which this sub-field can change its image as a haven for philosophers trying to defend their own in-group’s interpretation of a particular monotheistic religion and define itself clearly as philosophy *of* (i.e., bias-challenging critical

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1 Wildman, “Reforming Philosophy of Religion”; Schilbrack, *Philosophy and the Study of Religions*; Knepper, *The Ends of Philosophy of Religion*; Maitzen, “Against Ultimacy.”

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reflection on, rather than bias-confirming justification of) *religion* (i.e., empirically tractable quotidian beliefs and behaviors related to putative supernatural agents and authorities, rather than the abstract quodlibetal arguments of ecclesiastical and theological elites).

In this article I argue that computer modeling and simulation (CMS) can help buttress these efforts to transform philosophy of religion in at least three ways.<sup>2</sup> First, the process of developing a computational model and designing simulation experiments to test hypotheses presses scholars to be explicit about their assumptions and to seek exceptional conceptual clarity as they articulate their logical or causal claims. Most philosophers welcome this sort of pressure, and some might even view it as a *sine qua non* for philosophy itself. All too often in philosophy of religion, however, scholars operate with inadequately defined or abstract notions of “religion” and fail to acknowledge (or recognize) the theistic *biases* that are shaping their analyses and arguments. The latter is the focus of the first main section of the article.

Another way in which CMS might help to establish the respectability of this sub-field of philosophy within the academy is by providing computational tools for linking its philosophical reflection to empirical findings and theoretical frameworks within the relevant *sciences* that study the mechanisms and dynamics within the complex adaptive systems that constitute and regulate phenomena commonly deemed “religious.” Throughout its history, philosophy (at least its vanguard) has rigorously engaged the most advanced scientific inquiry of its day. All too often, however, philosophy of religion has been in the rearguard, defending traditional theological claims about supernatural agents and authorities until they become so implausible that their reformulation is necessary for the survival of the relevant religious coalition. The second main section of the article provides examples of computational models of religion (and nonreligion) that could facilitate *philosophical* analysis and synthesis in relation to cutting-edge research in the scientific study of *religion*.

A third way in which CMS methodologies can help renew philosophy of religion is by materially informing broader discussions within the classical loci of philosophy. I limit myself in the final main section of this article to an exploration of some of its *metaphysical* and *metaethical* implications (in relation to naturalism and secularism), in part because the epistemological implications of the relative success of CMS within a variety of scientific disciplines have been more widely examined.<sup>3</sup> I conclude by briefly discussing the doubtful future of philosophy of religion and providing a summary of my reasons for recommending that its practitioners explore the possibility of incorporating insights from the computational science of religion into their philosophical reflection.

## 2 Content and context bias in the philosophy of religion

Professional philosophers, like professional scientists, are far less likely to believe in God (or gods) than the rest of the population. The results of the relevant poll on PhilPapers.org, for example, show that 72.8% of responding philosophers accept or lean toward atheism, while only 14.6% accept or lean toward theism.<sup>4</sup> This is rather unsurprising since high levels of intelligence, education, and critical thinking style

<sup>2</sup> Although my focus is on philosophy of religion, in the sense defined above, it is important to note that some apologists have suggested that CMS might be useful for supporting what I am calling philosophy *for* religion (or theology). See, e.g., Donaldson and McConnell, “Simulation as a Method for Theological and Philosophical Inquiry.” The latter acknowledge that the use of CMS tools to study God as an “agent” in an artificial world would be resisted by most theologians, for whom divine action is mysterious and cannot be studied scientifically. However, they fail to acknowledge that their proposals for using CMS in “theological inquiry” beg the question of divine existence and intervention and evade the question of how the variables and behaviors of a supernatural agent could be empirically verified and validated in relation to a computational model. It is not surprising that the few examples of the application of computational tools to “theological” questions do not typically address divine action of the sort that would be of interest to laypeople but deal instead with abstract logical issues such as the validity of various versions of the ontological argument for the existence of a perfect divine being. See, e.g., Benzmüller and Paleo, “The Inconsistency in Gödel’s Ontological Argument”; Kirchner, Benzmüller, and Zalta, “Computer Science and Metaphysics.”

<sup>3</sup> Winsberg, *Science in the Age of Computer Simulation*; Squazzoni, *Epistemological Aspects of Computer Simulation in the Social Sciences*; Humphreys, *Extending Ourselves*; Weisberg, *Simulation and Similarity*; Grim et al., “How Simulations Fail”; Floridi, *Philosophy and Computing*.

<sup>4</sup> Cf. Bourget and Chalmers, “What Do Philosophers Believe?”, 494.

have been shown to correlate with low levels of religiosity.<sup>5</sup> When one analyzes the survey results by focus area, however, it turns out that philosophers of religion are an exception to this rule. In fact, compared to philosophers in general, the ratio of believers to nonbelievers in that sub-field is almost reversed: 72.3% accept or lean toward theism, while only 19.1% accept or lean toward atheism.<sup>6</sup>

Other survey analyses have produced similar results.<sup>7</sup> The same asymmetry was found in the sample of philosophers recently surveyed by De Cruz and De Smedt; 73% of philosophers of religion leaned toward theism, compared to 23.9% of philosophers with other specializations.<sup>8</sup> In a more detailed survey that focused only on philosophers of religion, Wildman and Rohr found that among those in their sample who operated within schools that require assent to a statement of religious faith (to keep their job) 71.5% believed that “philosophy of religion” was either complementary or identical to “theology,” and 0% prized comparison with other religions as a vital component of the philosophy of religion.<sup>9</sup>

All of this suggests that philosophers of religion are more religious than other philosophers, and that religious philosophers of religion are primarily interested in studying and defending their own religion. It is important to note that in the context of this article I am less concerned about the rationality of belief in God or gods than I am in the reasonableness of providing cover within the academy for apologetically oriented philosophical approaches to the study of religion (although these issues are clearly interrelated).<sup>10</sup>

How are we to make sense of this difference between philosophers of religion and philosophers in general? Draper and Nichols argue that both “cognitive biases operating at the nonconscious level” as well as “group influence” and “coalitional features” of religious participation are among the factors contributing to the prevalence of theistic belief among religious philosophers of religion. They note the pervasive role historically played by apologetics in this philosophical sub-field and suggest that this has led to a paradoxical situation for religious philosophers of religion: “[A]pologetists, unlike philosophers engaged in genuine inquiry, seek to justify their religious beliefs (as opposed to seeking to have beliefs that are justified). This implies that their inquiry... is inevitably biased... [T]o obtain justification, one must directly seek, not justification, but truth.”<sup>11</sup> These authors also point to contextual factors that can reinforce (or at least reduce interest in contesting) religious biases among theistic philosophers of religion: it is difficult to think clearly and critically about beliefs the rejection of which would endanger one’s income and livelihood (if one teaches at a religious institution that requires a statement of faith), not to mention one’s relationship to believing spouses, children, parents, and lifelong friends.

The extent to which evolved biases that engender theistic beliefs and behaviors shape arguments within philosophy of religion, and related fields such as “natural theology” that have traditionally overlapped this sub-discipline of philosophy, has been well-documented.<sup>12</sup> Theologians and religious apologists are

5 Lewis, “Education, Irreligion, and Non-Religion”; Hungerman, “The Effect of Education on Religion.”; Ellis et al., “The Future of Secularism.”; Ganzach and Gotlibovski, “Intelligence and Religiosity.”; Lindeman and Svedholm-Häkkinen, “Does Poor Understanding of Physical World Predict Religious and Paranormal Beliefs?”; McLaughlin and McGill, “Explicitly Teaching Critical Thinking Skills in a History Course.”; Stoet and Geary, “Students in Countries with Higher Levels of Religiosity Perform Lower in Science and Mathematics.”; Gervais and Norenzayan, “Analytic Thinking Promotes Religious Disbelief”; Dutton and Van der Linden, “Why Is Intelligence Negatively Associated with Religiousness?”

6 [https://philpapers.org/surveys/results.pl?affil=Target+faculty&areas0=22&areas\\_max=1&grain=coarse](https://philpapers.org/surveys/results.pl?affil=Target+faculty&areas0=22&areas_max=1&grain=coarse).

7 Bourget and Chalmers, “What Do Philosophers Believe?”

8 De Cruz and De Smedt, “How Do Philosophers Evaluate Natural Theological Arguments?” The authors hypothesize that their sampling method was responsible for the relatively high percentage (compared to other surveys) of philosophers in general (those not specializing in philosophy of religion) who leaned toward theism in their survey.

9 Wildman and Rohr, “North American Philosophers of Religion: How They See Their Field.”

10 For a discussion of the former, and an assessment of strategies for debunking or prebunking such beliefs, see Shults, “Can Theism Be Defeated?”; and Shults, “Toxic Theisms?: New Strategies for Prebunking Religious Belief-Behavior Complexes.”

11 Draper and Nichols, “Diagnosing Bias in Philosophy of Religion,” 439. Emphasis added.

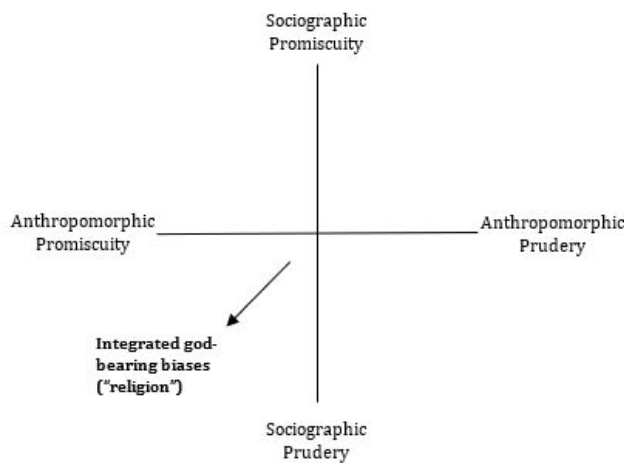
12 De Cruz and De Smedt, “Paley’s iPod”; De Smedt and De Cruz, “The Cognitive Appeal of the Cosmological Argument”; Teehan, “The Cognitive Bases of the Problem of Evil”; Shults, “Can Theism Be Defeated?”; De Cruz and De Smedt, *A Natural History of Natural Theology*.

not immune from the error-producing distortions that are associated with religious belief in general.<sup>13</sup> For example, a recent article entitled “Does Religious Belief Infect Philosophical Analysis?” showed that theists are more likely (than non-theists) to make mistakes about the logical validity of formal arguments when the conclusion has to do with the existence of God.<sup>14</sup>

Understanding why this is the case requires a brief excursion into the bio-cultural scientific study of religion. As we will see below, this excursion is also relevant for understanding the main points of the next two sub-sections of this article, namely, the importance of conceptual clarity when operationalizing variables such as “religion” in computational modeling and the importance of developments in the latter for broader philosophical discussions about metaphysics and metaethics.

It is important to emphasize that all human beings, non-theist philosophers included, have biases. However, empirical research and experimental results from a wide variety of cognitive, psychological, and social scientific disciplines have demonstrated that *theists* tend to be *more* susceptible to two broad types of bias, which I refer to as *anthropomorphic promiscuity* and *sociographic prudery* (see Figure 1). The general claim supported by the convergence of findings in these fields is that “gods” (supernatural agent conceptions) are born in human minds and borne in human cultures as a result of evolved biases that activate *inferences* about hidden human-like forms and *preferences* for distinctive in-group norms. Research also suggests that these theogonic (god-bearing) biases are reciprocally reinforcing, especially when people are confronted with ambiguous or frightening phenomena. Elsewhere I have summarized, analyzed and evaluated much of the empirical evidence and scientific literature upon which this scholarly consensus is based.<sup>15</sup>

The conceptual grid portrayed in Figure 1 does not capture all of the nuances in this literature, but it does serve the heuristic purpose for which it was created: providing a framework for discussing the cognitive and coalitional mechanisms that engender (or enervate) beliefs and behaviors related to putative supernatural agents and authorities. In what follows I briefly outline some of the mechanisms underlying these religious biases, which help to explain where gods come from – and why some people keep them around.



**Figure 1:** The integration of theogonic mechanisms.

<sup>13</sup> Slone, *Theological Incorrectness*; Barlev, Mermelstein, and German, “Core Intuitions About Persons Coexist and Interfere With Acquired Christian Beliefs About God”; Pennycook et al., “Cognitive Style and Religiosity”; van Der Tempel and Alcock, “Relationships between Conspiracy Mentality, Hyperactive Agency Detection, and Schizotypy”; Breslin and Lewis, “Schizotypy and Religiosity”; Davies, Griffin, and Vice, “Affective Reactions to Auditory Hallucinations in Psychotic, Evangelical and Control Groups”; Wlodarski and Pearce, “The God Allusion: Individual Variation in Agency Detection, Mentalizing and Schizotypy and Their Association with Religious Beliefs and Behaviors.”

<sup>14</sup> Tobia, “Does Religious Belief Infect Philosophical Analysis?”

<sup>15</sup> Shults, *Theology after the Birth of God*; Shults, “How to Survive the Anthropocene”; Shults, *Practicing Safe Sects: Religious Reproduction in Scientific and Philosophical Perspective*; Shults et al., “Why Do the Godless Prosper? Modeling the Cognitive and Coalitional Mechanisms That Promote Atheism.”

The horizontal line in Figure 1 represents a continuum on which to indicate the extent to which a person tends to *infer* that some natural phenomena (especially ambiguous or anxiogenic phenomena) are the result of human-like supernatural forces (or “gods” in the general sense, whether animal-spirits and ancestor-ghosts, or deities like Xiuhtecuhtli, Yahweh, or Zeus). The vertical line represents a continuum on which to indicate the extent to which an individual tends to *prefer* the supernaturally authorized norms of the religious coalition with which he or she primarily identifies.

As a result of the natural selection of cognitive biases for *detecting* hidden agents and *protecting* in-groups in early ancestral environments, gods are relatively easily *born* in human minds that are characterized by high levels of mentalizing, schizotypy, and ontological confusion, and relatively easily *borne* in human cultures that are characterized by costly signaling through credibility enhancing religious displays, risk aversion strategies activated by ecological duress, and low levels of existential security.<sup>16</sup>

Those who are anthropomorphically promiscuous and sociographically prudish will somewhat automatically *rely* on appeals to supernatural causes when explaining confusing events and *comply* with the supernatural conventions of their in-group when inscribing the social field. From the perspective of scientific disciplines such as cognitive science, evolutionary psychology and cultural anthropology, “religion” can be understood as the result of aggregates of these two types of evolved biases (which, of course, must be further fractionated within the relevant disciplines). In other words, religiosity – as operationalized by many scientists within these fields – is the outcome of the confluence of these reciprocally reinforcing content and context biases.

I will come back in sections 3 and 4 to the upper right quadrant of the conceptual framework represented in Figure 1, in which the god-dissolving mechanisms of naturalism and secularism are integrated and explore some of the implications for the future of philosophy of religion in the academy. As we will see, being conceptually clear about precisely what we mean by “religion” – and “nonreligion” – is both necessary (for the sake of formalizing theory) and productive (for the task of explaining data) when studying such phenomena through computer modeling. My main point at this stage, however, is that even before we get around to applying CMS methodologies, the scientific literature that informs the models described below exerts pressure on philosophers of religion to become more self-critical about the religiously salient content and context biases that play a unique role in their discipline.

### 3 Computational modeling of (non)religion

This brings us to another way in which CMS can have an impact on philosophy of religion. The bulk of the discussion in this field focuses on abstract notions such as the possibility of divine action or the ontological status of divine ideas, rather than on concrete beliefs and actual ritual practices aimed at appeasing or accessing axiologically relevant supernatural agents. In other words, the bulk of what happens under the disciplinary label in question is philosophy of *theology* rather than philosophy of *religion*. Granted, theological reflection is a part of religion, but this sub-field of philosophy has focused almost entirely on the quodlibetal arguments of religious elites and has mostly ignored the quotidian beliefs and behaviors of religious folk.

How could computer modeling help? By providing techniques for integrating theoretical insights from multiple disciplines in the scientific study of religion within conceptual architectures that can be implemented in computer models and drive simulation experiments within (more or less religious) artificial societies. CMS introduces new tools for thinking and methodologies that can enable philosophers to make

<sup>16</sup> See, e.g., Norenzayan, Gervais, and Trzesniewski, “Mentalizing Deficits Constrain Belief in a Personal God”; Lindeman, Svedholm-Häkkinen, and Lipsanen, “Ontological Confusions but Not Mentalizing Abilities Predict Religious Belief, Paranormal Belief, and Belief in Supernatural Purpose”; Włodarski and Pearce, “The God Allusion: Individual Variation in Agency Detection, Mentalizing and Schizotypy and Their Association with Religious Beliefs and Behaviors”; Henrich, “The Evolution of Costly Displays, Cooperation and Religion”; Lanman and Buhrmester, “Religious Actions Speak Louder than Words”; Bulbulia, “Spreading Order”; Norris and Inglehart, “Are High Levels of Existential Security Conducive to Secularization?” These are only some of the characteristics of religious minds and religious cultures; for a fuller discussion, see Shults, *Practicing Safe Sects*.



their arguments more concrete and more explicitly tied to empirical data.<sup>17</sup> In the case of philosophy of religion, this means tying arguments to theories and data about how human beings imaginatively engage in shared rituals with the contingently embodied, human-like, coalition-favoring intentional forces of their own religious in-group.

In this section I briefly describe two computational models of religion and suggest ways in which they might encourage and inform philosophical reflection on religion. However, it is important to emphasize that these models are part of a growing wave of interest in applying computational methods to social science in general and the scientific study of religion in particular. In recent years, CMS techniques have been used to simulate a wide range of religious phenomena, including the persistence of religious regionalism, the role of costly signaling in religious groups, the dynamics of imagistic and doctrinal religious rituals, the transmission of religious violence in the Radical Reformation, the emergence of priestly elites in large-scale cooperative societies, the role of cooperation style and contagious altruism in proselytizing religions, the function of belief in supernatural punishment in the evolution of religion, the impact of religious variables on civilizational shifts during the Neolithic and Axial Age, and the relationship between religiosity and mortality salience.<sup>18</sup>

The first computational model I highlight here aims to simulate the emergence of mutually escalating religious violence (MERV).<sup>19</sup> The causal architecture of this model is informed by three social psychological theories that have shed light on the role of religion in fostering anxiety and antagonism between groups. Research guided by terror management theory (TMT) shows that mortality salience can easily amplify the tendency to look for supernatural agents (as causes of, or protection from, frightening or confusing phenomena) and the tendency to participate in worldview reinforcing, religious in-group rituals. In other words, death awareness can intensify anthropomorphic promiscuity and sociographic prudery. The latter were among the key variables that constituted the characteristics of the simulated agents in the model.

The environmental parameters and behavioral interaction rules within MERV's architecture also took into account insights from research on social identity theory (SIT), which has demonstrated how value laden social differentiations can lead individuals to view their own group more positively than out-groups, which can increase intergroup tension and the chances of conflict and violence. Identify fusion theory (IFT) was the third main theory informing the construction of MERV. Research guided by this theory indicates that the more blurring (or fusion) there is between an individual's personal and social identity, the more likely he or she will be to kill or die for the group (or the group's beliefs). The variable dependencies within MERV are illustrated in Figure 2.

At initialization, the agents in MERV are assigned to one of two groups (majority and minority), and the relevant religious and other variables are distributed normally in the population. Parameters such as group size and environmental threat levels are set, and the agents then interact over time within the spatial constraints of the model in accordance with behavioral interaction rules and social network influences guided by the theories mentioned above. Based on research on the types of hazards to which humans most commonly react with anxiety, this model was designed to simulate four types of threats: contagion, social, natural, and predation. Simulation experiments were able to "grow" the *macro*-level patterns of reciprocal conflict between religious groups from the *micro*-level behaviors and interactions of religiously heterogeneous agents.

<sup>17</sup> Grim, "Modeling Epistemology."

<sup>18</sup> Iannaccone and Makowsky, "Accidental Atheists?"; Wildman and Sosis, "Stability of Groups with Costly Beliefs and Practices"; Whitehouse et al., "The Role for Simulations in Theory Construction for the Social Sciences"; Matthews et al., "Cultural Inheritance or Cultural Diffusion of Religious Violence? A Quantitative Case Study of the Radical Reformation"; Dávid-Barrett and Carney, "The Deification of Historical Figures and the Emergence of Priesthoods as a Solution to a Network Coordination Problem"; Roitto, "Dangerous but Contagious Altruism: Recruitment of Group Members and Reform of Cooperation Style through Altruism in Two Modified Versions of Hammond and Axelrod's Simulation of Ethnocentric Cooperation"; Lane, "Strengthening the Supernatural Punishment Hypothesis through Computer Modeling"; Shults and Wildman, "Simulating Religious Entanglement and Social Investment in the Neolithic"; Shults et al., "Multiple Axialities"; Shults et al., "Modeling Terror Management Theory: Computer Simulations of the Impact of Mortality Salience on Religiosity."

<sup>19</sup> For technical details, see Shults et al., "A Generative Model of the Mutual Escalation of Anxiety Between Religious Groups" and the supplemental materials available at <https://github.com/SimRel/Merv1.0>.

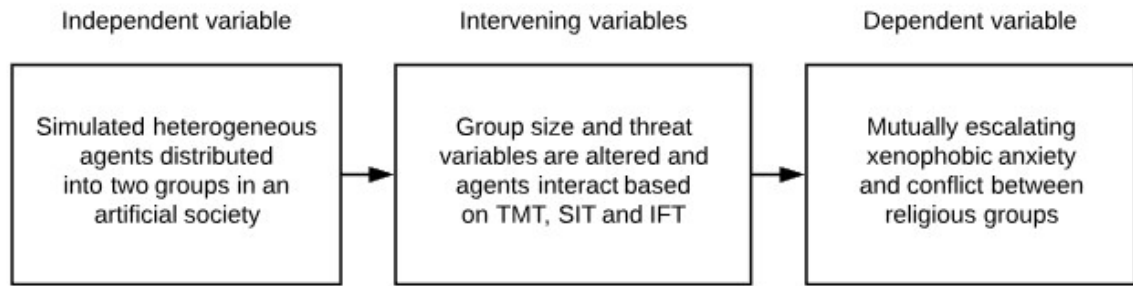


Figure 2: Variable dependencies within MERV.

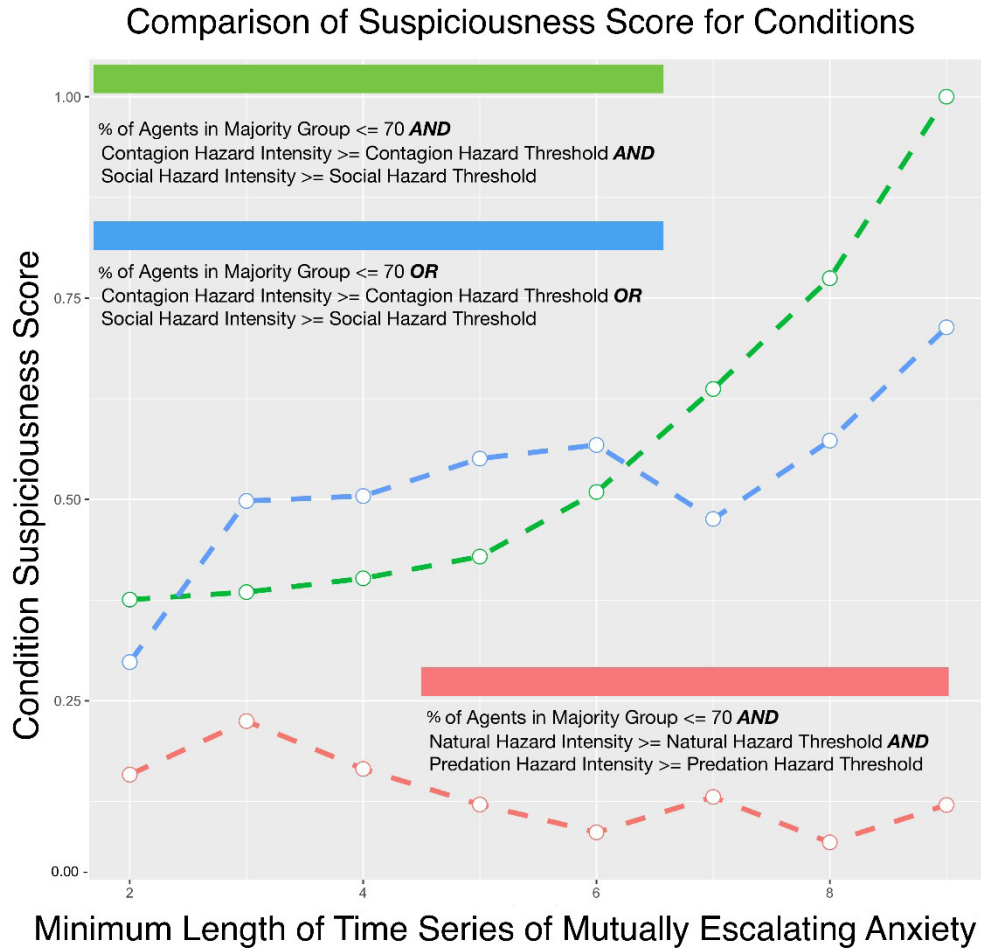
Exploring the parameter space of the model revealed the conditions under which mutually escalating religious xenophobia would most likely emerge: when the majority group was  $\leq 70\%$  of the population and the intensity of contagion and social hazards met or exceeded the average tolerance for these hazards in the population (see Figure 3). The combination of these conditions produces an environment in which agents in the majority and the minority groups regularly encounter agents from the other group within a specified radius; out-group members are then perceived as social and contagion threats. Because agents of both group types are likely to experience these hazards in such a simulated environment, anxiety increases on both sides, which in turn produces intervals of mutual escalation.

Figure 3 also portrays the scores of two other (somewhat similar) conditions, neither of which provided as effective an explanation for mutually escalating anxiety between religious groups. The blue line indicates the suspiciousness score<sup>20</sup> of the following condition [(% of Agents in Majority Group  $\leq 70$ ) OR (Contagion Hazard Intensity  $\geq$  Contagion Hazard Threshold) OR (Social Hazard Intensity  $\geq$  Social Hazard Threshold)]. Because this line does not consistently increase with the minimum length of the escalating anxiety intervals, it does not strictly distinguish between *mutually* escalating intervals and other escalating intervals. The red line indicates the suspiciousness score of the condition [(% of Agents in Majority Group  $\leq 70$ ) AND (Natural Hazard Intensity  $\geq$  Natural Hazard Threshold) AND (Predation Hazard Intensity  $\geq$  Predation Hazard Threshold)]. Comparing the scores of the red line to the green line shows the extent to which the intensity and threshold of social and contagion hazards in the model are more responsible than natural and predation hazards for creating mutually escalating xenophobic anxiety.

Trace validation analysis of the model yielded a relatively simple explanation for the emergence of this phenomenon: it is most likely to occur when agents are distributed into two groups that are not too different in size, and agents from both groups encounter social and contagion hazards at levels of intensity that meet or exceed their thresholds. Under these conditions, agents will encounter members of out-groups regularly and perceive them as threats, leading to the mutual escalation of anxiety between the groups. While this may seem unsurprising in retrospect, it is important to keep in mind that the MERV model was able to generate this macro-level phenomenon from the behaviors and interactions of agents at the micro-level, lending plausibility to the empirically and theoretically informed causal architecture driving the simulation experiments.

My second example is a computational model of *non-religion* whose causal architecture was designed to simulate decreases in religious belief and affiliation, which could be interpreted as proxies for the expansion of the acceptance of naturalistic modes of explaining the world and secularistic ways of organizing pluralistic social fields within a population. The agent characteristics and social interaction rules of the Non-Religiosity Model (NoRM) are informed by empirical findings and theoretical developments in cognitive science, sociology, and economics (and other disciplines) that are relevant for understanding the

<sup>20</sup> The “suspiciousness” scores shown in Figure 3 are an aggregate of correlation and coverage measures for each of three different sets of conditions. A suspiciousness value of 1.0 would indicate that the condition is *only* true in intervals of mutually escalating anxiety and true in *all* cases of mutually escalating anxiety. For details, see Appendix A in the supplemental materials at: <https://github.com/SimRel/Merv1.0>.



**Figure 3:** Conditions for mutual escalation of anxiety (a proxy for conflict).

causes and consequences of declining religiosity at the population level.<sup>21</sup> In other words, NoRM explores the conditions under which – and the mechanisms by which – *anthropomorphic prudery* and *sociographic promiscuity* spread in human minds and cultures (Figure 4).

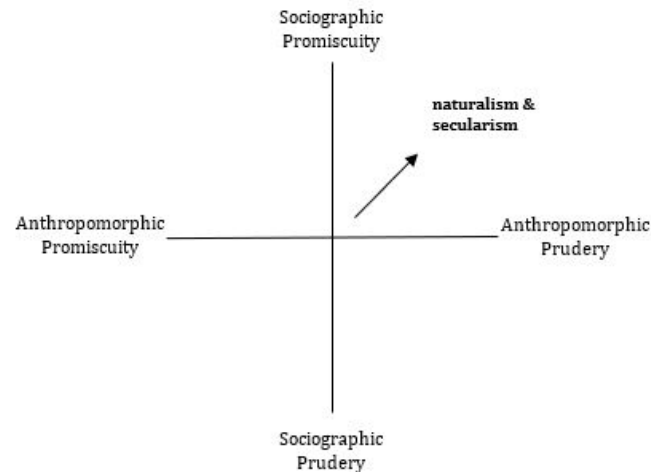
Anthropomorphic prudes have learned how (or were born with personality traits that enable them) to resist the temptation to interpret ambiguous phenomena as caused by invisible intentional forces. This capacity to contest religious *content* biases is typically strengthened by scientific and humanist education.<sup>22</sup> The sociographically promiscuous are more open to cultural intercourse with out-group members aimed at discovering norms that can be shared without appealing to any supernatural authority. This capacity for contesting religious *context* biases is more common in populations characterized by economic and existential security.<sup>23</sup>

<sup>21</sup> For technical details, see Gore et al., “Forecasting Change in Religiosity and Existential Security with an Agent-Based Model” and the supplemental materials available at <https://github.com/rossgore/JASSS-Special-Issue>.

<sup>22</sup> For examples of research demonstrating the negative correlation between religiosity and education/critical thinking/intelligence see the citations in footnote 5 above, and further discussion in Shults, *Practicing Safe Sects: Religious Reproduction in Scientific and Philosophical Perspective*, chapters 1 and 12.

<sup>23</sup> Here the construction of the computational architecture was informed by sociological research on the correlation between perceived security and non-religiosity (or secularization) at the population level; see, e.g., Inglehart and Welzel, *Modernization, Cultural Change, and Democracy*; Norris and Inglehart, *Sacred and Secular*; Norris and Inglehart, “Are High Levels of Existential Security Conducive to Secularization?”





**Figure 4.** Naturalism and secularism as theolytic (god-dissolving) mechanisms.

NoRM was able to simulate the expansion of naturalism and secularism within contemporary societies. As indicated in Figure 5, agents were assigned varying levels of education and existential security at initialization (and linked together in social networks constrained by homophily parameters). This assignment was based on data from the International Social Survey Programme (ISSP) and the Human Development Index (HDI). The cognitive architecture of the simulated agents in NoRM was based on the construction and comparison of structural equation models (based on new statistical analyses of the ISSP) that disclosed the most plausible causal connections among the key religious variables derived from exploratory and confirmatory factor analysis (belief in God, supernatural belief, religious formation, and religious attendance), shifts in which can be impacted by changes in education and existential security.

Simulation experiments were constructed to study the conditions under which – and the mechanisms by which – religiosity and existential security were altered in the model’s population. Two of the findings are especially relevant for our purposes here. First, results from the NoRM experiments demonstrated that the extent to which all three (alterable) religiosity variables changed in the model was strongly influenced by the educational level of the social networks within which the simulated agents were embedded. In other words, religious practice, belief in supernatural agents, and belief in God all decreased as agents interacted with more educated agents in the model (across levels of existential security). This result provided an initial validation of the behavioral architecture guiding agent interactions, and complements other findings related to the effect of education (and related variables) on religiosity.

A second and stronger sort of validation emerged from a different set of experimental results (see Figure 6). NoRM was calibrated by testing its capacity to predict the (real-world) shifts in religiosity that occurred within 11 countries (chosen for the adequacy of their ISSP response data and HDI information) during a 10-year period (1990-2000). This model was then used to predict shifts in existential security and religiosity in 22 countries (now including 11 other countries not involved in the calibration stage) over a different 10-year period (2000-2010). NoRM was able to predict the changes in the relevant variables up to three times more accurately than linear regression analysis (its nearest competitor). Here too it is important to emphasize that the macro-level shifts at the population level were not programmed into the model; rather, they emerged from the micro-level agent behaviors and social network interactions of the simulated agents (initialized based on the parameterized data from each country). This strengthens the plausibility of claims that education and existential security are mechanisms that ratchet up non-religion within contemporary societies.

What does any of this have to do with philosophy of religion? Here I want to highlight some of the *methodological* implications that these sort of developments in CMS could have for this sub-discipline. The first is a general implication: modeling and simulation techniques provide new tools for thinking and new computational capacities for analysis and synthesis that can be used in virtually every field of philosophy.

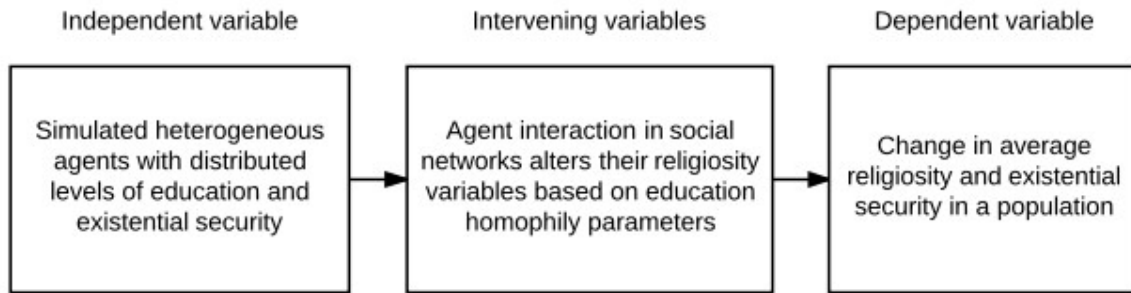


Figure 5: Variable dependencies within NoRM.

The second is more specific to philosophy of religion. Scholars in the latter commonly utilize vague definitions of “religion” related to a sense of transcendence, the binding force of cultural norms, or the capacity for meaning-making – or simply fail to define their subject matter at all. This makes it relatively easy for apologists or theologians to dominate the field by keeping the focus on abstract ideas and possible worlds that have little to do with the idiosyncratic beliefs and causally opaque practices that characterize actual religious minds and cultures.

A third implication has to do with what we might call methodological atheism or (at least) methodological naturalism and secularism. Today, most philosophers (just like other reflective academics) have learned how to contest biases associated with anthropomorphic promiscuity and sociographic prudery – at least when they are making philosophical arguments. In other words, they do not appeal to supernatural agents or authorities when providing warrants for their philosophical claims. They do not insert “gods” into their construction or critique of hypotheses about the existential conditions or evaluative criteria for human knowing, acting and being (epistemology, ethics, and metaphysics). What criteria should one use for evaluating claims about the grounds for – and dynamics of – human rationality, morality, and causality? What makes these modes of human engagement possible or actualizable?

The majority of contemporary philosophers offer non-religious answers to these kinds of questions, i.e., *naturalistic* answers that are intended to be empirically tractable or at least intersubjectively and intercommunally contestable in *secularistic* contexts. Theistic philosophers of religion, on the other hand, typically offer answers that directly or indirectly appeal to the putative revelation of an empirically intractable and inherently mysterious intentional force that allegedly communicates with (at least some of) the intellectual and priestly elite of *their own* religious coalition. Given the way in which god-bearing biases can amplify superstition and segregation, and the general consensus that expunging these sorts of bias from one’s thinking and writing is a desideratum for philosophers and, indeed, for scholars in any discipline, it is not unreasonable to expect that the renewal of philosophy of religion will require its participants to more explicitly promote anthropomorphic prudery and sociographic promiscuity.

## 4 Modeling, metaphysics, and metaethics

In this section I highlight some of the *material* implications of the relative success of CMS tools for philosophy in general, and for philosophical reflection on religion in particular. As mentioned in the Introduction, the link between computer modeling and epistemology has received more attention from philosophers of science than issues related to ontology and ethics and so I limit myself here to some brief comments on these latter two classical philosophical loci.

First, as *religious* philosophers of religion like to point out, accepting the importance or even necessity of *methodological* naturalism in science does not require philosophers (or scientists) to affirm *metaphysical* naturalism (or atheism). It is true that the latter is not entailed by the former, but after centuries of watching trans-communally verifiable naturalistic explanations consistently outperform idiosyncratic and parochial supernaturalistic interpretations of the causes of events, it is not surprising that one finds the burden of



Figure 6: Comparison of NoRM predictions and ISSP data for 22 countries.

proof increasingly being shifted onto theologians and religious philosophers. Every successful scientific endeavor contributes to the growing implausibility of “religion” (in the sense defined above) in the spheres of public and general academic discourse.

The successful development and deployment of computer modeling technologies and simulation tools, however, has something specific to contribute in the sphere of philosophical discourse on metaphysics. The rise of CMS has accelerated the “reversal of Platonism,” by which I mean the dissolution of the myth of transcendence that has surreptitiously shaped the bulk of western thought, a myth whose dominance allowed theistic content and context biases to run naked and unchallenged in (most of) philosophy and (all of) theology for over two millennia.<sup>24</sup> Plato was certainly not alone in privileging notions of idealized transcendence in philosophy, but his formulations have had a profound influence on the way in which most western metaphysicians have tried to explain the existential conditions for actual entities or events.

Up until the last couple of centuries, the majority of philosophers operating in the wake of the west Asian axial age have posited the existence of some kind of (more or less) anthropomorphic, eternally transcendent Being whose character is somehow relevant for organizing and orienting the temporal lives of human beings who (more or less) resemble It (the Form of the Good, the Unmoved Mover, the Divine Creator, etc.). Despite its apparent philosophical sophistication, this approach remains an expression of the naturally evolved bias toward interpreting ambiguous events or phenomena (in this case, “all things”) as caused by some person-like Force. In this sense, philosophers within these traditions have still been anthropomorphically promiscuous (albeit less so than *hoi polloi*). Belief in unchanging transcendent causes (such as Platonic Ideas or the monotheistic notion of a divine Mind or Will) among philosophers and theologians flourished within a thought world overshadowed and regulated by the categories of *substance*, *stasis*, and *sameness*.

Today, however, most philosophers (and virtually all scientists) prefer working with *relational*, *dynamic* and *differential* concepts. For computer scientists, especially those engaged in modeling and simulation, this means exploring dynamic relations among variables in complex systems. But how is this relevant for *metaphysics*? As Manuel DeLanda explains in *Philosophy and Simulation*, the development and success of CMS technologies (e.g., cellular automata, neural nets, multi-agent modeling) have shown that it is possible to account for the emergence and behavior of complex entities or “assemblages” by describing the *immanent* intensive processes that actually generate them and simulating such processes in computational models.<sup>25</sup> In DeLanda’s use of the term, an *assemblage* is an emergent whole that is irreducible and decomposable.<sup>26</sup> Every actual assemblage is an *individual singularity* whose properties are the product of a historical process. Every assemblage is actualized in relation to a *universal singularity* whose real, mechanism-independent, structured possibility space defines the tendencies and capacities of the assemblage. Finally, every assemblage is part of a *population* with distributed variables whose alteration is conditioned by *parameters* such as (de)territorialisation and (de)coding.

The fact that computer models can simulate the emergence of assemblages (from thermodynamic systems to organisms to societies) suggests that the morphogenesis of the latter can be explained by referring to resources and mechanisms immanent to the world of matter and energy, without any need for postulating transcendent essences, types, or creators. There are no gods in the machine. We no longer need *Deus ex machina* explanations to make sense of the emergence of new forms. Moreover, the successful application of mathematical developments in group theory to the simulation of topological events in computer models suggests we do not even need them to make sense of the emergence (or even the existence) of any forms at all.<sup>27</sup> This has rather obvious implications for philosophers of religion, especially those focused on defending theistic interpretations of the origin, order, or orientation of the cosmos. The successful application of CMS methodologies provides warrant for – and demonstrates the explanatory power of – an anthropomorphically prudish metaphysics of immanence.

<sup>24</sup> For a fuller treatment of this issue, see Shults, “Modeling Metaphysics: The Rise of Simulation and the Reversal of Platonism,” and Shults, *Iconoclastic Theology*.

<sup>25</sup> DeLanda, *Philosophy and Simulation*.

<sup>26</sup> DeLanda, *A New Philosophy of Society*; DeLanda, *Assemblage Theory*.

<sup>27</sup> For a defense of this claim, see DeLanda, *Philosophy and Simulation*; DeLanda, *Intensive Science and Virtual Philosophy*.



Philosophers of religion are running out of excuses for not embracing metaphysical naturalism. They are also running out of excuses for not embracing what I have elsewhere called metaphysical secularism.<sup>28</sup> Here we turn our attention toward some of the *metaethical* implications of developments in computer modeling and social simulation. Today most people in pluralistic, western, democratic societies – including (non-fundamentalist) theistic philosophers of religion – are *methodological* secularists. That is, even if they are religiously affiliated, they typically accept that the organization and regulation of the social field (at least in the legal and public spheres) should not be authorized solely or even primarily by appeals to norms that are allegedly revealed by the supernatural agents ritually engaged by a particular religious in-group.

Increasingly, however, people (and especially young people) in these contexts are adopting *metaphysical secularism*: explicitly eliminating supernatural authorities from their list of ontological inventory items, and so from the list of resources available for constructing and maintaining social norms. In other words, more and more folks are secular in their metaethics: the way in which they think about the conditions for acting sensibly in society and the feasibility of pragmatic strategies for coordinating social forces involves no reference to transcendent supernatural authorities.

Wesley J. Wildman and I have proposed a metaethical framework for guiding conversations among CMS professionals about the ethical assumptions and implications of their work.<sup>29</sup> The first element of this framework is explicitly *philosophical* and addresses the metaethical debates between proponents of deontological and teleological (or consequentialist) approaches to ethics about “the right” and “the good,” and the relation between them. The textbook example of the deontological approach is Kant’s Categorical Imperative, which unites the right and the good and grounds both in the moral law of a transcendent divine being. The textbook example of the teleological approach is Mill’s Utilitarianism, which distinguishes between the good (well-being for the greatest number of people) and the right (actions whose consequences promote that goal). Insofar as the construction of computational architectures for social simulation are always purposeful, most modelers (*qua* modelers) seem to be naturally drawn toward consequentialism.

Computer scientists may not always spell out the metaethical implications of their work, but the capacity of CMS techniques to simulate the emergence and expansion of norms, including “ethical” or “unethical” behaviors (e.g., altruism or violence),<sup>30</sup> in a population of agents lends some warrant to moral non-realism or amoralist philosophy.<sup>31</sup> In other words, just as emergent assemblages can be explained without appealing to transcendent supernatural beings so emergent norms can be explained without appealing to transcendent supernatural authorities.

Our metaethical framework also includes an explicitly *scientific* element. We argue that it makes sense to think about the conditions and criteria for ethical behavior in light of knowledge gained from the bio-cultural sciences that study the evolution of human morality. As a hyper-social species, we humans survive and thrive by cooperating and coordinating within groups. The basic claim here is that some traits that fostered these sorts of “altruistic” behaviors or “moral” dispositions were naturally selected in the early ancestral environment because they improved inclusive fitness and are now part of our phylogenetic inheritance. As we saw in section 2 above, among these traits was the tendency to prefer the supernaturally authorized norms of the religious coalition that constitutes and regulates the social context in which one is raised. Believing that uncooperative behaviors could be punished by animal-spirits, ancestor-ghosts, or monotheistic deities helped keep cheaters and freeloaders in line even when they thought none of their actual affines were watching.

Unfortunately, the dark side of in-group altruism is out-group antagonism and so it is not surprising that religious beliefs and behaviors can ratchet up intergroup conflict and slow down psychologically and

<sup>28</sup> Shults, *Theology after the Birth of God*.

<sup>29</sup> Shults and Wildman, “Ethics, Computer Simulation, and the Future of Humanity.” See also Shults, Wildman, and Dignum, “The Ethics of Computer Modeling and Simulation.”

<sup>30</sup> See, for example, Mascaro et al., *Evolving Ethics*; Haynes et al., “Engineering the Emergence of Norms”; Troitzsch, “Can Lawlike Rules Emerge without the Intervention of Legislators?”; Lemos et al., “A Network Agent-Based Model of Ethnocentrism and Intergroup Cooperation”; Conte, Andrighetto, and Campenni, *Minding Norms*; Xenitidou and Edmonds, *The Complexity of Social Norms*; Elsenbroich and Gilbert, *Modelling Norms*.

<sup>31</sup> For a recent defense of the latter, see Marks, *Hard Atheism and the Ethics of Desire*.



sociologically salutogenic developments in modern cultures. Scientific knowledge about the evolution of our moral equipment can inform our metaethical reflections about the best way to organize the intersecting social fields of our contemporary global context.

This brings us to the third element of our metaethical framework, which highlights the *practical* import of the first two elements. The philosophical element is practical insofar as it focuses our attention on the pragmatic value of consistent consequentialist ethical reasoning that does not evade responsibility by defending normative proposals with appeals to allegedly transcendent moral realities. The scientific element is practical insofar as it reminds us to take account of the limitations as well as the capacities of the moral equipment bequeathed to us by millions of years of natural selection and reinforced by social entrainment. Attending to each of these elements more carefully in our metaethical reflections can help us avoid – or at least mitigate – moral evasion and moral confusion.

As we have seen, CMS provides us with tools and techniques that can facilitate such reflection by rendering more tractable the complex adaptive ethical systems within which we behave and interact. What does this mean for philosophy of religion? By including appeals to the general or special revelation of transcendent supernatural agents as grounds or guidance for ethics, theist philosophers of religion foster both moral evasion and moral confusion. If philosophers of religion can embrace metaphysical secularism and promote sociographic promiscuity (like most of their philosophical and scientific peers), they have a unique opportunity to use their subject-matter expertise to unveil the implicit tribalism and parochialism of religious ethics and, by incorporating insights from the bio-cultural sciences, to contribute materially to conversations in neighboring sub-disciplines such as moral psychology and political philosophy.

## 5 Conclusion

In this article, I have argued that CMS has enormous potential for transforming the practice of philosophy of religion in the secular academy. After briefly describing the content and context biases that have traditionally shaped this sub-field of philosophy, and providing examples of computational models that illustrate the explanatory power of conceptually clear and empirically validated causal architectures informed by the bio-cultural sciences, I outlined some of the most obvious material implications of these developments for metaphysical and metaethical discussions in philosophy more broadly and philosophy of religion in particular. What will happen to the latter if, as intimated in the call for papers for this special issue, CMS continues to have a profound impact on philosophy throughout the 21<sup>st</sup> century?

It seems to me that the future of philosophy of religion is in doubt. I mean this in two senses. First, it is doubtful whether this philosophical sub-field will thrive (or even survive) as an academic discipline over the next few decades. It is deeply fractured and is danger of falling apart or fading away within contemporary western universities. Such a loss would not necessarily be devastating. Disciplinary boundaries are constantly overlapping, dissolving and reforming, and philosophical reflection on religion would certainly carry on (and perhaps intensify) in other academic fields. On the other hand, there might be good theoretical or even pragmatic reasons for carving out and maintaining professional academic space dedicated to philosophical reflection on these issues.

Second, I mean that if philosophy of religion is to survive (and even thrive) within the academy its representatives and stakeholders must do what the members of every other sub-discipline in philosophy have done: acknowledge and even highlight the dubitability of claims that refer to supernatural agents and appeal to supernatural authorities. Like scholars in every other field in the modern academy, most philosophers carry out their intellectual tasks without inserting “gods” into their explanatory hypotheses and without relying on special pleading references to “revelation” to which only their in-group has access. If philosophy of religion has a future as a coherent and generative discipline, it is one in which there is no place for confessional apologetics. The latter is not philosophy *of* religion, but philosophy *for* religion (or philosophy *co-dependent* on the religious coalition to which the apologist belongs), and therefore has no place in the secular academy.

How can CMS help? In at least three ways: by facilitating conceptual clarity about the role of biases in the emergence and maintenance of phenomena commonly deemed “religious,” by supplying tools that enhance our capacity to link philosophical analysis and synthesis to empirical data in the psychological and social sciences, and by providing material insights for metaphysical hypotheses and metaethical proposals that rely solely on immanent resources. We can begin to imagine a future in which a robustly naturalistic and secularistic philosophy of religion contributes alongside other disciplines to the production of new knowledge about our world and to the construction of new pragmatic solutions to the global challenges facing human societies.

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## References

- Barlev, Michael, Spencer Mermelstein, and Tamsin C. German. “Core Intuitions About Persons Coexist and Interfere With Acquired Christian Beliefs About God.” *Cognitive Science* 41 (2017): 425-454. <https://doi.org/10.1111/cogs.12435>.
- Benzmüller, Christoph, and Bruno Woltzenlogel Paleo. “The Inconsistency in Gödel’s Ontological Argument: A Success Story for AI in Metaphysics.” In *Proceedings of the Twenty-Fifth International Joint Conference on Artificial Intelligence*, 936-942. AAAI Press, 2016.
- Bourget, David, and David J. Chalmers. “What do philosophers believe?” *Philosophical studies* 170, no. 3 (2014): 465-500.
- Breslin, Michael J., and Christopher A. Lewis. “Schizotypy and Religiosity: The Magic of Prayer.” *Archive for the Psychology of Religion* 37, no. 1 (2015): 84-97. <https://doi.org/10.1163/15736121-12341300>.
- Bulbulia, Joseph. “Spreading Order: Religion, Cooperative Niche Construction, and Risky Coordination Problems.” *Biology & Philosophy* 27, no. 1 (2012): 1-27. <https://doi.org/10.1007/s10539-011-9295-x>.
- Conte, Rosaria, Giulia Andrighetto, and Marco Campenni. *Minding Norms: Mechanisms and Dynamics of Social Order in Agent Societies*. Oxford University Press, 2014.
- Dávid-Barrett, Tamás, and James Carney. “The deification of historical figures and the emergence of priesthoods as a solution to a network coordination problem.” *Religion, Brain & Behavior* 6, no. 4 (2016): 307-317.
- Davies, Martin F., Murray Griffin, and Sue Vice. “Affective Reactions to Auditory Hallucinations in Psychotic, Evangelical and Control Groups.” *British Journal of Clinical Psychology* 40, no. 4 (2001): 361-370. <https://doi.org/10.1348/014466501163850>.
- De Cruz, Helen, and Johan De Smedt. *A Natural History of Natural Theology: The Cognitive Science of Theology and Philosophy of Religion*. Cambridge, MA: The MIT Press, 2014.
- De Cruz, Helen, and Johan De Smedt. “How do philosophers evaluate natural theological arguments? An experimental philosophical investigation.” In *Advances in religion, cognitive science, and experimental philosophy*, edited by Helen De Cruz and Ryan Nichols, pp. 119-142. London: Bloomsbury Academic (2016).
- De Cruz, Helen, and Johan De Smedt. “Paley’s iPod: The Cognitive Basis of the Design Argument within Natural Theology.” *ZYGON*, 2010. <https://doi.org/10.1111/j.1467-9744.2010.01120.x>.
- De Smedt, J., and H. De Cruz. “The Cognitive Appeal of the Cosmological Argument.” *Method & Theory in The Study Of Religion* 23, no. 2 (2011): 103-122. <https://doi.org/10.1163/157006811X567715>.
- DeLanda, Manuel. *A New Philosophy of Society: Assemblage Theory and Social Complexity*. London: Continuum, 2006.
- DeLanda, Manuel. *Assemblage Theory*. Edinburgh University Press, 2016.
- DeLanda, Manuel. *Intensive Science and Virtual Philosophy*. London: Bloomsbury Publishing, 2013.
- DeLanda, Manuel. *Philosophy and Simulation: The Emergence of Synthetic Reason*. London: Continuum, 2011.
- Donaldson, Steve, and Melanie McConnell. “Simulation as a Method for Theological and Philosophical Inquiry.” *Theology and Science* 13, no. 3 (2015): 354-370. <https://doi.org/10.1080/14746700.2015.1053763>.
- Draper, Paul, and Ryan Nichols. “Diagnosing Bias in Philosophy of Religion.” *The Monist* 96, no. 3 (2013): 420.
- Dutton, Edward, and Dimitri Van der Linden. “Why Is Intelligence Negatively Associated with Religiousness?” *Evolutionary Psychological Science*, 2017, 1-12.
- Ellis, Lee, Anthony W. Hoskin, Edward Dutton, and Helmuth Nyborg. “The Future of Secularism: A Biologically Informed Theory Supplemented with Cross-Cultural Evidence.” *Evolutionary Psychological Science*, 2017, 1-19.

- Elsenbroich, Corinna, and Nigel Gilbert. *Modelling Norms*. Dordrecht: Springer, 2014.
- Floridi, Luciano. *Philosophy and computing: An introduction*. London: Routledge, 2002.
- Ganzach, Yoav, and Chemi Gotlibovski. "Intelligence and Religiosity: Within Families and over Time." *Intelligence* 41, no. 5 (2013): 546-552. <https://doi.org/10.1016/j.intell.2013.07.003>.
- Gervais, Will M., and Ara Norenzayan. "Analytic Thinking Promotes Religious Disbelief." *Science (New York, N.Y.)* 336, no. 6080 (2012): 493-96. <https://doi.org/10.1126/science.1215647>.
- Gore, Ross, Carlos Lemos, F. LeRon Shults, and Wesley J. Wildman. "Forecasting Changes in Religiosity and Existential Security with an Agent-Based Model." *Journal of Artificial Societies and Social Simulation* 21 (2018): 1-31.
- Grim, Patrick, Robert Rosenberger, Adam Rosenfeld, Brian Anderson, and Robb E. Eason. "How simulations fail." *Synthese* 190, no. 12 (2013): 2367-2390.
- Grim, Patrick. "Modeling Epistemology: Examples and Analysis in Computational Philosophy of Science." *Proceedings of the Spring Simulation Conference*, Society for Modeling & Simulation International, 2019, 1-12.
- Haynes, Chris, Michael Luck, Peter McBurney, Samhar Mahmoud, Tomáš Vitek, and Simon Miles. "Engineering the Emergence of Norms: A Review." *The Knowledge Engineering Review* 32 (2017). <https://doi.org/10.1017/S0269888917000169>.
- Henrich, Joseph. "The Evolution of Costly Displays, Cooperation and Religion: Credibility Enhancing Displays and Their Implications for Cultural Evolution." *Evolution and Human Behavior* 30, no. 4 (2009): 244-260. <https://doi.org/10.1016/j.evolhumbehav.2009.03.005>.
- Hungerman, D. M. "The Effect of Education on Religion: Evidence from Compulsory Schooling Laws." *Journal Of Economic Behavior & Organization* 104 (2014): 52-63. <https://doi.org/10.1016/j.jebo.2013.09.004>.
- Iannaccone, Laurence R., and Michael D. Makowsky. "Accidental atheists? Agent-based explanations for the persistence of religious regionalism." *Journal for the Scientific Study of Religion* 46, no. 1 (2007): 1-16.
- Inglehart, Ronald, and Christian Welzel. *Modernization, Cultural Change, and Democracy: The Human Development Sequence*. Cambridge University Press, 2005.
- Kirchner, Daniel, Christoph Benzmüller, and Edward N. Zalta. "Computer Science and Metaphysics: A Cross-Fertilization." *ArXiv Preprint ArXiv:1905.00787*, 2019.
- Knepper, Timothy. *The ends of philosophy of religion: Terminus and telos*. New York: Springer, 2013.
- Lane, Justin. "Strengthening the supernatural punishment hypothesis through computer modeling." *Religion, Brain & Behavior* 8, no. 3 (2018): 290-300.
- Lanman, Jonathan A., and Michael D. Buhrmester. "Religious Actions Speak Louder than Words: Exposure to Credibility-Enhancing Displays Predicts Theism." *Religion, Brain & Behavior*, 2015, 1-14. <https://doi.org/10.1080/2153599X.2015.1117011>.
- Lemos, Carlos M., Ross J. Gore, Laurence Lessard-Phillips, and F. LeRon Shults. "A Network Agent-Based Model of Ethnocentrism and Intergroup Cooperation." *Quality & Quantity*, 2019, 1-27.
- Lewis, James R. "Education, Irreligion, and Non-Religion: Evidence from Select Anglophone Census Data." *Journal of Contemporary Religion* 30, no. 2 (2015): 265-272. <https://doi.org/10.1080/13537903.2015.1025556>.
- Lindeman, Marjaana, and Annika M. Svedholm-Häkkinen. "Does Poor Understanding of Physical World Predict Religious and Paranormal Beliefs?" *Applied Cognitive Psychology* 30, no. 5 (2016): 736-742. <https://doi.org/10.1002/acp.3248>.
- Lindeman, Marjaana, Annika M. Svedholm-Häkkinen, and Jari Lipsanen. "Ontological Confusions but Not Mentalizing Abilities Predict Religious Belief, Paranormal Belief, and Belief in Supernatural Purpose." *Cognition* 134 (2015): 63-76. <https://doi.org/10.1016/j.cognition.2014.09.008>.
- Maitzen, Stephen. "Against Ultimacy." In *Renewing Philosophy of Religion: Exploratory Essays*, edited by Paul Draper & J.L. Schellenberg, 48-62. Oxford University Press, 2018.
- Marks, Joel. *Hard Atheism and the Ethics of Desire: An Alternative to Morality*. New York: Springer, 2016.
- Mascaro, Steven. *Evolving Ethics: The New Science of Good and Evil*. Imprint Academic, 2010. <http://hdl.handle.net/2027/inu.30000127033425>.
- Matthews, Luke J., Jeffrey Edmonds, Wesley J. Wildman, and Charles L. Nunn. "Cultural inheritance or cultural diffusion of religious violence? A quantitative case study of the Radical Reformation." *Religion, Brain & Behavior* 3, no. 1 (2013): 3-15.
- McLaughlin, Anne, and Alicia McGill. "Explicitly Teaching Critical Thinking Skills in a History Course." *Science & Education* 26, no. 1 (2017): 93-105. <https://doi.org/10.1007/s11191-017-9878-2>.
- Norenzayan, Ara, Will M. Gervais, and Kali H. Trzesniewski. "Mentalizing Deficits Constrain Belief in a Personal God." *PLoS ONE* 7, no. 5 (2012). <https://doi.org/10.1371/journal.pone.0036880>.
- Norris, Pippa, and Ronald Inglehart. "Are High Levels of Existential Security Conducive to Secularization? A Response to Our Critics," In *The changing world religion map*, pp. 3389-3408. Springer: Dordrecht, 2015.
- Norris, Pippa, and Ronald Inglehart. *Sacred and Secular: Religion and Politics Worldwide*. 2 edition. Cambridge: Cambridge University Press, 2011.
- Pennycook, Gordon, James Allan Cheyne, Nathaniel Barr, Derek J. Koehler, and Jonathan A. Fugelsang. "Cognitive Style and Religiosity: The Role of Conflict Detection." *Memory and Cognition* 42, no. 1 (2014): 1-10. <https://doi.org/10.3758/s13421-013-0340-7>.

- Roitto, Rikard. "Dangerous but contagious altruism: recruitment of group members and reform of cooperation style through altruism in two modified versions of Hammond and Axelrod's simulation of ethnocentric cooperation." *Religion, Brain & Behavior* 6, no. 2 (2016): 154-168.
- Schilbrack, Kevin. *Philosophy and the Study of Religions: A Manifesto*. Wiley-Blackwell Manifestos. John Wiley & Sons, 2014.
- Shults, F. LeRon. "Can Theism Be Defeated? CSR and the Debunking of Supernatural Agent Abductions." *Religion, Brain & Behavior*, 2015, 14-20. <https://doi.org/10.1080/2153599X.2015.1107251>.
- Shults, F. LeRon. "How to Survive the Anthropocene: Adaptive Atheism and the Evolution of Homo Deiparensis." *Religions* 6, no. 2 (2015): 1-18. <https://doi.org/10.3390/rel6020724>.
- Shults, F. LeRon. *Iconoclastic Theology: Gilles Deleuze and the Secrecion of Atheism*. Edinburgh University Press, 2014.
- Shults, F. LeRon. "Modeling Metaphysics: The Rise of Simulation and the Reversal of Platonism." *Proceedings of the Spring Simulation Conference*, Society for Modeling & Simulation International, 2019, 1-12.
- Shults, F. LeRon. *Practicing Safe Sects: Religious Reproduction in Scientific and Philosophical Perspective*. Leiden: Brill Academic, 2018.
- Shults, F. LeRon. *Theology after the Birth of God: Atheist Conceptions in Cognition and Culture*. Radical Theologies. New York: Palgrave Macmillan, 2014.
- Shults, F. LeRon. "Toxic Theisms?: New Strategies for Prebunking Religious Belief-Behavior Complexes," in press.
- Shults, F. LeRon, Ross Gore, Carlos Lemos, and Wesley J. Wildman. "Why Do the Godless Prosper? Modeling the Cognitive and Coalitional Mechanisms That Promote Atheism." *Psychology of Religion and Spirituality* 10, no. 3 (2018): 218-28.
- Shults, F. LeRon, Ross Gore, Wesley J. Wildman, Christopher Lynch, Justin E. Lane, and Monica Toft. "A Generative Model of the Mutual Escalation of Anxiety Between Religious Groups." *Journal of Artificial Societies and Social Simulation* 21, no. 4 (2018): DOI: 10.18564/jasss.3840.
- Shults, F. LeRon, Justin E. Lane, Saikou Diallo, Christopher Lynch, Wesley J. Wildman, and Ross Gore. "Modeling Terror Management Theory: Computer Simulations of the Impact of Mortality Salience on Religiosity." *Religion, Brain & Behavior* 8, no. 1 (2018): 77-100.
- Shults, F. LeRon, Wesley J. Wildman, Justin E. Lane, Christopher J. Lynch, and Saikou Diallo. "Multiple Axialities: A Computational Model of the Axial Age." *Journal of Cognition and Culture* 18, no. 5 (2018): 537-564.
- Shults, F. LeRon, and Wesley J. Wildman. "Simulating religious entanglement and social investment in the neolithic." In *Religion, History and Place in the Origin of Settled Life*, edited by Ian Hodder. University of Colorado Press (2018): 33-63.
- Shults, F. LeRon, and Wesley J. Wildman. "Ethics, Computer Simulation, and the Future of Humanity." In *Human Simulation: Perspectives, Insights, and Applications*, edited by Saikou Diallo, Wesley J. Wildman, F. LeRon Shults, & Andreas Tolk. Berlin: Springer, in press.
- Shults, F. LeRon, Wesley J. Wildman, and Virginia Dignum. "The Ethics of Computer Modeling and Simulation." In *2018 Winter Simulation Conference (WSC)*, 4069-4083. IEEE, 2018.
- Slone, D. Jason. *Theological Incorrectness: Why Religious People Believe What They Shouldn't*. Oxford University Press, 2007.
- Squazzoni, Flaminio, ed. *Epistemological aspects of computer simulation in the social sciences*. Springer, 2009.
- Stoet, Gijsbert, and David C. Geary. "Students in Countries with Higher Levels of Religiosity Perform Lower in Science and Mathematics." *Intelligence* 62 (2017): 71-78. <https://doi.org/10.1016/j.intell.2017.03.001>.
- Teehan, John. "The Cognitive Bases of the Problem of Evil." *The Monist* 96, no. 3 (2013): 325.
- Tobia, Kevin Patrick. "Does Religious Belief Infect Philosophical Analysis?" *Religion, Brain & Behavior* 6, no. 1 (2016): 56-66. <https://doi.org/10.1080/2153599X.2014.1000952>.
- Troitzsch, Klaus G. "Can Lawlike Rules Emerge without the Intervention of Legislators?" *Frontiers in Sociology* 3 (2018): <https://doi.org/10.3389/fsoc.2018.00002>.
- Van Der Tempel, Jan, and James E. Alcock. "Relationships between Conspiracy Mentality, Hyperactive Agency Detection, and Schizotypy: Supernatural Forces at Work?" *Personality and Individual Differences* 82 (2015): 136-141. <https://doi.org/10.1016/j.paid.2015.03.010>.
- Weisberg, Michael. *Simulation and similarity: Using models to understand the world*. Oxford University Press, 2012.
- Whitehouse, Harvey, Ken Kahn, Michael E. Hochberg, and Joanna J. Bryson. "The role for simulations in theory construction for the social sciences: Case studies concerning divergent modes of religiosity." *Religion, Brain & Behavior* 2, no. 3 (2012): 182-201.
- Wildman, Wesley J. "Reforming Philosophy of Religion for the Modern Academy." In *Reconfigurations of Philosophy of Religion: A Possible Future*, edited by Jim Kanaris, 253-69. Albany, NY: SUNY Press, 2018.
- Wildman, Wesley J., and David Rohr. "North American Philosophers of Religion: How They See Their Field," 133-153, in Draper, Paul, and John L. Schellenberg, eds. *Renewing philosophy of religion: exploratory essays*. Oxford University Press, 2017.
- Wildman, Wesley J., and Richard Sosis. "Stability of groups with costly beliefs and practices." *Journal of Artificial Societies and Social Simulation* 14, no. 3 (2011): 1-25.
- Winsberg, Eric. *Science in the age of computer simulation*. University of Chicago Press, 2010.

- Włodarski, Rafael, and Eiluned Pearce. "The God Allusion: Individual Variation in Agency Detection, Mentalizing and Schizotypy and Their Association with Religious Beliefs and Behaviors." *Human Nature* 27, no. 2 (2016): 160-172. <https://doi.org/10.1007/s12110-016-9256-9>.
- Xenitidou, Maria, and Bruce Edmonds, eds. *The Complexity of Social Norms*. Berlin: Springer, 2014.