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# INTRODUCTION

## Purpose of the book

Juxtaposing the two terms *God* and *modeling* is jarring for most people. The two words seem not to fit together. As the term model is ordinarily used, it has to do with science, engineering, economics, business, and government. In those activities one strives to describe and explain things and relationships *objectively* in *denotative* language that is clear and concise, that refers to observable evidence, that will be widely accepted and understood, and will be useful. Ideally the logic of a model enables quantification and thus makes it easier to verify predictions.

With respect to *God* the book purposely avoids discussion of religious traditions, and deals with God only as an abstract concept and an entity usually believed to be a supernatural being. In any religious tradition God is an entity that has to do with subjective experience: feelings, faith and worship. The nature of God is normally expressed in *connotative* language such as metaphor, myth, poetry and music. These expressions might be called models, but surely they are of a different kind of model from the way this book uses the term. Connotation allows for personal interpretation as to meaning, which is its strength in a human society. Denotation seeks to be precise and unambiguous in meaning, which is its purpose. I purposely make a distinction, though one can cite examples that lie between the poles.

God language seems to lie as far from the language of denotative models in science, engineering, economics, business, and government as one can get. And surely metaphor, myth, poetry, music

and other forms of connotative expression are all very important for enriching our lives. Life would be dull without them.

So does it make any sense at all to try connecting denotative modeling to the subject of God and religion? When it comes to human belief in an entity as something that is real I would contend that it does make sense to examine the challenge. Surely one can try to model the *behavior of people* who profess belief: the activities of worship, prayer, and participation in church activities by giving time, money and creative energies. But it is a different challenge to model God *per se*, to describe and explain what God *is*.

The book will deal with both challenges. Note that I am limiting the discussion to modeling God *per se* and to people's belief in God, so I am avoiding the facts of history and beliefs concerning human prophets such as Jesus and Muhammad.

My approach to these two challenges asks what can be accomplished with respect to God through denotative modeling, which can also be called *scientific modeling*. Scientific modeling means formulating a specific representation of something based on observable evidence and reason. The more of perceived reality that can be lumped together in this formulation the better. Further, It is better if the formulation involves some metric, if the resulting model is robust in its application, if it can find acceptance by many people, and if it is stated concisely to make it unambiguous. The book goes into detail on these modeling attributes.

This approach is clearly in the vein of positivist philosophy. However I do not go so far as to deny acquisition of any knowledge through introspection and intuition, or from metaphorical written or verbal communication (they surely are models of a sort). The important distinction is that metaphorical modeling *intends* to leave interpretation of meaning to the observer, whereas scientific modeling does not.

I believe the modeling approach is different from most writings on the subject of God. On the other hand the emphasis on modeling is consistent with a perspective on reality common in modern physics called *model based realism*. This is emphasized by physicist Stephen Hawking in his recent book *The Grand Design*<sup>1</sup>. This perspective assumes that the only way we know reality is through our models. It says there is no other or any independent test of reality.



Sometimes two or more models are equally predictive of observations, which makes for ambiguity in knowing reality. But that's what we are stuck with.

Reality of course is a subject that has been debated by philosophers through the ages, and there is no intent here to settle the matter of what is "real". Some dictionaries define reality as what actually exists, whether observable or not, as contrasted to what is thought (imagined, felt, dreamed). A different perspective is that we know our world only through our perceptions, which are thoughts. What is clear is that the reality of perceptions and thoughts, though we may try to share them with others, necessarily remain private to a large extent and cannot be observed directly. In contrast, public reality is what is available to be observed by anyone wishing to make the effort. A full discussion of what is real is a matter of semantics and philosophy that cannot be settled here. A later section of the book discusses the question of whether mental function can be modeled. For now we pose as a gold standard of reality what is amenable to denotative or scientific modeling.

Model dependent reality is not a new idea. In 1709 Bishop George Berkeley came close when he asserted that things cannot even exist without being perceived by people.<sup>2</sup> I would prefer to assume that there is some reality "out there", and that we just have a hard time getting at it. (Else what is there to perceive, perception in today's psychology being seen as a cognitive transformation of sensations of *something*?)

So, assuming models are how we know things, and scientific models are more reliably explicit than metaphorical models, the prime questions I am posing are: (1) Can God *per se*, i.e., some common understanding of the *nature* (structure and function) of God, be modeled by anything close to what I call a scientific model? (2) Can different people's acquisition of belief, and their religious practice of belief and worship, be so modeled? Some readers might claim that these two questions are inseparable. However I will conclude this book by arguing no to the first question and yes to the second.

Throughout the centuries theologians have told us that God is a perfect person: all powerful, all knowing and all loving. We are told that God created the universe, that He knows each of us intimately, and He loves us dearly. Accordingly we are expected to accept and

believe in Him, love Him, obey Him, glorify Him. But since ancient times there have been skeptics: What is the evidence that He made the universe? How can He know everything about every particle in the universe? Why do bad things happen to good people? In this writer's opinion there have never been satisfying answers to these questions, and clearly I am not alone. Every child asks them outright. And every adult thinks them, often guardedly, not to offend others or reveal ignorance or skepticism.

What is at issue with regard to religion and belief? First and foremost, *what and where is the evidence* of God? And what constitutes *credible* evidence? Second, what is our *obligation with regard to seeking truth*, as contrasted to just believing without regard for truth? Is "truth" simply conditional upon what is emotionally satisfying, what makes one feel good? Third, how has the biggest force in human history since the enlightenment, namely science, changed how these questions can be approached, or should be approached?

The anthropologist T.M. Luhrmann<sup>3</sup> has observed and interviewed many evangelical churchgoers and found that many of them apparently do not consider belief in God to be necessarily central to their faith, which seems a logical contradiction to the usual definition of the word faith. As one woman Luhrmann cited put it, "I don't believe it but I'm sticking to it". Luhrmann claims that many people do not go to church because they believe, but rather they believe because they go to church. Apparently the social participation activity is what fosters "belief", not any logical basis.

This book cannot deal comprehensively with those issues, which necessarily must confront fundamental questions in the vast literature on philosophy and religion. Rather, the engagement here is done from the narrow perspective of trying to capture for the reader only the essence of salient arguments that bear on the questions being asked about God. This author is a scientist whose primary qualifications are in the explicit representation of the natural world in words, graphics and mathematics. Most of my experience in research and teaching has had to do with modeling what humans believe and do. Models provide the means by which scientists, engineers and managers communicate their ideas to one another, make predictions, make progress in scientific discovery, and apply their findings to benefit people in living their daily lives.

So again: does or can modeling have anything to do with God and religion? Is it best to leave modeling to science and engineering and not muddle the theological waters with techno-gibberish? After all, we have more than two thousand years of history of beautiful sacred texts full of myth and metaphor, which many will claim are means quite capable of dealing with God and the human urge to worship a transcendent being. However, insofar as myth and metaphor may fall short as ways of fully knowing reality, and to the extent that scientific modeling of the observable secular world around us has become more rigorous, it poses a grand challenge. The challenges are (1) to model what people believe God *is or might be* (and is that even possible) and (2) to model people's acquisition and practice of belief in God. And to do so with as much scientific rigor as can be brought to bear. I claim the modeling approach makes a sharp distinction between these two challenges that so often are blurred in people's minds.

With respect to God *per se*, i.e., the *nature* of God, what appears to emerge from the considerations discussed in this book is that there is a shortage of substance in the writings of philosophers and theologians sufficient to constitute any kind of scientific model. More bluntly, *there is nothing there to model*. The book will go to some effort to show that the first modeling challenge appears impossible to meet. With respect to people's acquisition and practice of belief in God, there is plenty of substance available. Studies of many kinds have been done and will continue to be done, but there remains a challenge to formulate better models and make predictions.

If we cannot model God in a credible way, does that mean that God cannot be considered real, and therefore is the practice of religion a complete delusion and waste of people's energy? But this is getting ahead of the story.

## For whom is the book intended and what is included

This book is aimed at anyone interested in science, philosophy, psychology and religion with academic background sufficient to understand the terminology and patience enough to wade through some complex ideas. It seems necessary for the reader to appreci-

ate the distinction between denotative scientific models on the one hand, and connotative metaphysical and theological explanations and religious myth on the other.

Coping with the above issues will require taking a plunge into the methods of science and modeling, presented in Chapter 1. The latter reviews a number of issues regarding what a model is. I offer a novel taxonomy of model attributes, according to which one might assess the quality of a model. There is a review of different types of models in the Appendix. Mostly Chapter 1 addresses the “science of modeling belief”.

Then, in Chapter 2, in order to bridge to the discussion of belief and God, several topics are discussed that imply models of how people come to their beliefs of what is real in the context of ordinary daily activities (as contrasted to religion). This is apart from difficult challenge of formulating a scientific model of God. It is useful to contrast some different perspectives on believing, where potential belief in existence of anything precedes the effort to model (else why model, what would there be to model?). These considerations include trust, virtual reality, a curious historical theory about self-consciousness, and a model of belief formation borrowed from computer science.

Next, Chapter 3 is a review in abbreviated form of what various luminaries throughout history have believed about the existence and nature of God, both pro and con. This review, at least from the writer’s perspective, demonstrates the paucity of compelling arguments for the kind of God we are supposed to believe in. The arguments against belief seem to easily outweigh those in favor.

Chapter 4 then pulls together what has been said about models and belief to offer some demographics about belief and answers the two challenges posed above: (1) what can be modeled about what God *is*, and (2) what can be modeled about how God is worshipped. Finally Chapter 5 is a brief concluding summary of the main points.

Through examples, an Appendix illustrates belief models cast in terms of different languages: words, graphics, logic, and mathematics. In each case I suggest how that model might be stretched to be applied to religion. (Keep in mind that these models were never intended for that purpose). Some of the example models, especially those that require mathematics, the reader can ignore if desired

## Modeling human belief (in God or anything)

All models are representations of human belief, in the sense that they are statements about what the human modeler believes to be true about the relevant objects or events. But this allows for several alternative possibilities, as depicted in Figure 1.

A first distinction is whether the focus of the model is on *state* or *process*. A model can focus on the belief as to the *state* of the objects or events, i.e., exactly *what* is the truth about their existence, structure or function (e.g., *what* is God, as mentioned above). Or it can focus on the *process*: the causal logic of *how* that belief is or was arrived at and/or is exercised (e.g., how people practice religion, how ideas of God are handed down and reinforced within communities).

A second distinction is about the hierarchy of beliefs: who is it that believes what about whom or what. If a model is about inanimate objects or events the relationship is indicated by the line labeled A in Figure 1, emanating from the modeler in the diagram. In contrast, the model can be a specification of what the modeler believes some subject human or group of humans believes. In the diagram B1 indicates the modeler's focus on some subject human(s), while B2 indicates the modeled belief of those subject human(s).

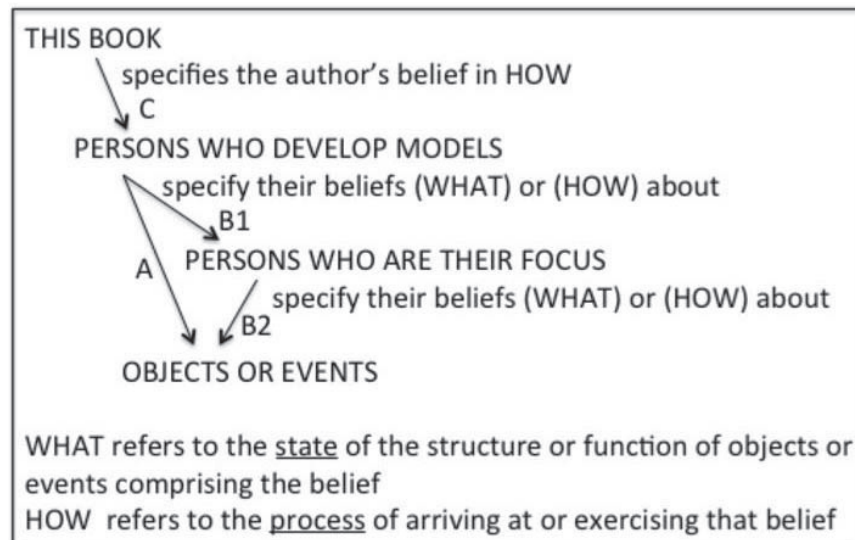


Figure 1. The modeling ladder of beliefs

This book is about modeling human beliefs, so it takes the B1-B2 path. Actually, the book could be said to be a discussion at a still higher level, C, namely what this author believes about hypothetical human modelers who in turn try to model the beliefs of other people.

## Objective and subjective models

A model is a representation of very limited aspects of the thing or events being modeled. In that sense all models are wrong with respect to the full reality of the slice of nature being modeled. Consider a global map of the world. The globe is not the same as the real world. The globe is a very different size. The globe has different colors to identify countries. The world is not colored the same as the globe. The globe shows distances between cities, but the distances are not the same as those of the world. What is the same are the *relative distances* between cities and the *proportionate spatial relations* of rivers and country boundaries. That is all. But as such this model is very useful and aids understanding with regard to those particular attributes.

Increasingly, science and technology as well as government and industry are being driven by models.<sup>4</sup> In physics, for example, our understanding of the universe is largely based on model extrapolations well beyond what we can observe directly, and huge experimental efforts are made to verify the models (e.g., the hunt by particle physicists for the Higgs boson). Social science is definitely progressing, and in the future may well be aided by progress in neuroscience, but has not come close to that level of sophistication in quantitative modeling as used in physical science and engineering.

In all fields of science and technology models serve the function of asserting in a public way what the modeler believes to be true, thereby allowing for criticism and refinement by the relevant community. It may be said that to the extent that we can model we have a basis to form consensus and therefore have useful knowledge. In this sense the usefulness of the model is in forming a belief system about the domain of interest.

As noted above, a scientific model is fully denotative and rational, as contrasted to one that is essentially connotative, such as a novel, a poem, a myth, or an artistic statement (abstract or non-realistic painting, music or dance). A scientific model adheres to strictures of the scientific method (explicated further below), such as having a basis in objects or events that are observed by two or more people (and potentially observable by anyone). It is stated concisely. Often it aspires to generality, implying (or explicitly stating) that the model applies not only to the objects or events observed, but also to things other than the ones used as the basis of the model. Such generality is achieved in science by stating that certain dependent (output) variables are specific functions of certain independent (input) variables, where both sets of variables are well defined and observable to anyone equipped with the required means to measure them.

The quality of any model, but especially a scientific model, depends on the number of variables that can be accommodated simultaneously, the rigor of the measurement process that goes with the variables, the robustness or breadth of applicability of the model, and the degree to which the model is understood, accepted, and applied by the peer community.

There are plenty of examples of where scientific models have failed. Failure typically occurs where there is a rush to apply modeling where it has not been previously tried, and the target problem has not been thought through sufficiently, or the modeler expects too much too fast. An outstanding example is the Wall Street debacle of 2008, where the “quants” employed models to take statistical risks that were much greater than what was warranted, and the result was not pretty. More recently the bond rating agency Standard and Poor was sued by the US government for basing ratings on a proprietary model that was known to be faulty, an action that also helped precipitate the financial crisis of the same period. Normally models are published in the open literature and peer reviewed, but it is a right of any institution to maintain privacy. They do so at their own risk.

The term *simulation* is often used in conjunction with modeling. Simulation, today usually referring to simulation by computer, simply means putting the logic and mathematics in computer soft-

ware form and then running computer trials to test what different inputs to the model produce as outputs. Computer software is a special form of scientific modeling.

Computer scientists like the term *ontology*, which in their domain is defined as meaning “formal representation of knowledge as a set of concepts within a domain, and the relationships between those concepts”<sup>5</sup> (In philosophy ontology means a *theory of being or existence*.) The computer community emphasizes that an ontology is a “specification of a conceptualization”, where the stated purpose of designing ontologies is to share knowledge and make intellectual commitments”. As a practical matter computer scientists are compelled by these formalities to make the various bits of software (they call them “agents”) work together. Thus a common ontology defines the vocabulary with which queries and assertions can be exchanged. Ontological commitments are agreements to use the shared vocabulary in a coherent and consistent manner. The computerized agents sharing a vocabulary need not have the same knowledge (share the same knowledge base). Each may know things the others do not, and is not required to answer all queries that can be formulated in the shared vocabulary. In short, a commitment to a common ontology is a guarantee of consistency, but not a guarantee of completeness. That is a reasonable way to think about models in general, and how people can use models to accomplish useful goals. (In any case the formality makes the computer scientists sound like they know what they are talking about!)

Throughout the book we shall confront the problem of modeling God and modeling people’s exercise of religious belief. *The reader is reminded that the purpose of considering the above details of scientific modeling in its explicit denotative rigor is to draw a contrast with how vague are available characterizations of God, lacking in anything close to scientific rigor.*

## Why model? Why make the effort?

Modeling takes effort. To find the right words, words that have common meanings, to say what needs to be said and say it succinctly, to get the diagram, graph or other image just right so that



it communicates, to do the math correctly if math is appropriate to make the case—all of that takes real effort. Why do it? What's the point?

One instigates a modeling effort for the same reason that one investigates an interesting plant on the hiking trail, makes a note in one's diary of a special personal interaction, or follows up any observation that arouses interest and curiosity. Modeling engenders satisfaction, better ability to share the experience with other people, and the improved likelihood of making some predictions that might be useful later on.

Though individuals can gain insights in various ways, for the scientist modeling is the *sine qua non* for staking public claim to some new insight, or asserting a better way of considering some aspect of the world and communicating it to colleagues. From a crass perspective a model might help get a paper published.

But there is a further, probably more important reason. That is that the very process of modeling forces one to think hard about the slice of nature under consideration, to ask and answer the question of what are the essential features of the structure and function, and to make "If X, then Y" predictions. Committing to a model is tantamount to committing to think hard. It involves putting one's reputation on the line, which surely motivates the thinking process.

So the premise is that by trying to model God and religious belief we can shed light on what we really know about God and religious belief.

## Philosophical perspective

In considering the question of God the modeling approach will appear to take the philosophical perspective of positivism. That is the view that all authoritative knowledge is derived from sensory experience and logical (and mathematical if appropriate) analysis of such data. It is tantamount to saying we know reality only through science. In medieval times many philosophers claimed that reality is known through metaphysical contemplation, though both Aristotle and Aquinas seem to have emphasized the role of sensory experience. Philosopher Auguste Comte later proposed that the scientific method replace metaphysics<sup>6</sup>.

Recent critics of positivism claim that behavioral/social sciences are distinct from natural science with respect to what exists (ontology) and what is justified belief (epistemology). For example sociologist Max Weber would claim that students of history would have to throw out most information, and that “social facts” don’t exist “out there” but are necessarily mediated by human consciousness.<sup>7</sup> This view was even supported by physicist Werner Heisenberg, inventor of quantum mechanics, who commented in 1969.<sup>8</sup>

The positivists have a simple solution: the world must be divided into that which we can say clearly and the rest, which we had better pass over in silence. But can anyone conceive of a more pointless philosophy, seeing that what we can say clearly amounts to next to nothing. If we omitted all that is unclear, we would probably be left with completely uninteresting and trivial tautologies.

I would acknowledge that this book assumes a positivist perspective in talking or modeling denotatively about people or God (i.e., with as much logic and science as can be brought to bear). At the same time I strongly assert that connotative language such as metaphor plays a key role in human communication and thinking. As the Heisenberg comment suggests, it may be more important than denotation in communicating and experiencing what really matters in life.

These two kinds of knowledge are complementary, and they both are amenable to representation in language. But the kinds of language are very different. The denotative one is objective and couched in elements of language that aspire to unambiguous meanings that discourage free interpretation. The connotative one is subjective and difficult to communicate except through words that tend to be ambiguous and understood by different people to mean different things in different contexts.

The above statement makes the denotative/connotative distinction as though it were a clean one, but in reality it is not. There is always some fuzz between categories. In the Appendix I describe *fuzzy logic*, a relatively new approach that wrestles with the linguistic fuzz in an objective way. Thus the modeler’s task of word selec-

tion is always a challenge. That is why mathematics and graphics are so useful for scientific models to augment the words.

Ludwig Wittgenstein (1889-1951), the most respected of modern analytical philosophers, is best known for his thoughts on language, and what he called “language games” in expressing belief. He asserted that religious belief is a different sort of belief than belief based on physical evidence. Most theologians prefer to take this position, and avoid talking about God in the language of science, perhaps for the reason that they can point to nothing physical to observe, and therefore nothing to know in a positivist sense. But they nevertheless tend to talk about God as though He is a person with human-like attributes of knowing, forgiving, judging, condemning, and exerting power on people.

For example they frequently talk about a loving God, and knowing God through the sense of feeling reciprocal love. Do I know that I love my wife? I know that I *feel* love, but I cannot say that I understand love (or hate or any other such abstract idea) in the same way that I understand simple laws of physics, on the basis of which I can model and predict. Furthermore, unlike God as well as abstract words like love, I can physically see and touch my wife, so I *can* model and predict her *behavior*, on the basis of which (I would claim) love evolves. But that is still not the same as understanding and denotatively modeling my love for her in an objective sense. Modeling God is doubly elusive: nothing to observe, posing a challenge even to denotate God’s actions—as well as having to resort to connotative words to describe what God *is*. But though we can’t observe God we *can* observe the *people* who claim to believe.

So God is an idea, a powerful one indeed. One can love the idea that God exists, and can imaginatively “expect” love from God and express love in return. No one can deny that such feelings may be genuine. But one can also love the idea that God is a metaphor for human longing to understand the mystery and wonder of the universe. One can know the *feeling* of love in either case (or fear or some other emotion), but that is a private subjective experience. Is there any other way to know God? Is there something to model beyond a subjective feeling, either about God or about the humans who believe? Is the term God better used as a *metaphor for mystery*, and nothing more?

For now let us hold off on taking the easy path to accept that religion is beyond science. We need to look at the God idea and the people who espouse that idea with all the science and modeling that can be brought to bear, and then ask what can be said rationally. That is the issue I will wrestle with in this book.