THE BASIS OF BELIEF:
THE COGNITIVE AND CULTURAL FOUNDATIONS OF SUPERNATURAL BELIEFS

by

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Abstract

In this dissertation I explore the relative roles of cognition and culture play as the foundations of religious and supernatural belief. On the cognitive side, theories of religion have postulated several cognitive biases that predispose human minds towards supernatural belief. However, to this date, very little empirical evidence exists to show how these hypotheses preform in predicting actual religious beliefs. I explore these biases and how they interrelate to support supernatural beliefs using individual difference measures across several large samples from Canada, the US, the Czech Republic and Slovakia. On the cultural side, I look at how different theories of secularization and the CREDs theory of cultural learning support supernatural belief and religious practice. I compare these effects of culture to the effects of cognition and find that cognitive biases support supernatural belief generally, but these effects are stronger for paranormal beliefs than religious ones and are almost non-existence for religious practice. Religious belief and practice are largely supported by social and cultural factors. Finally, I compare religious and non-religious participants to spiritual but not religious (SBNR) participants to further break down the differences between religious and non-religious supernatural beliefs and religious practice. I find that the SBNR are more like the religious than the non-religious but can still be identified as a unique group in terms of cognition and culture.

Preface

All of the work presented in this dissertation was conducted in the MECC lab at the University of British Columbia, Point Grey campus. The University of British Columbia's Research Ethics Board approved all projects and associated methods were approved by [certificates # H12-01325 and #H14-00320].

A version of Chapter 2 has been published [Willard, A. K., & Norenzayan, A. (2013). Cognitive biases explain religious belief, paranormal belief, and belief in life's purpose. *Cognition*, *129*(2), 379–391]. I was responsible for the conceptual design of the study, data collection and analysis, as well as manuscript composition. Ara Norenzayan was the supervisory author on this project and was involved throughout the project in project planning and writing the manuscript. Part of this manuscript was used in Chapter 1, section 1.3.

The projects presented in Chapter 3 and 4 were done in collaboration with Lubomir Cingl and Ara Norenzayan. For chapter 3, both collaborators were involved in concept formation of the study. Lubomir Cingl participated in the design of the questionnaires and data collection. I was responsible for composition of the manuscript. Ara Norenzayan was the supervisory author on this project and was involved throughout the project.

For chapter 4, Ara Norenzayan and I were involved in concept formation of the study. I was responsible for the conceptual design of the study, and analysis, as well as manuscript composition. Lubomir Cingl aided in the data collection. Ara Norenzayan was the supervisory author on this project and was involved throughout the project in project planning and writing the manuscript.

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Chapter 1:   Introduction

Virtually all cultures known in human history have harbored some type of supernatural beliefs—beliefs that extend beyond a naturalistic description of the world.[1] In most of these cultures specific rituals and complex traditions have built up around these supernatural beliefs to form religions. Though religions take on a multitude of forms constructed through culture, they appear to exist everywhere. There is something about belief in the supernatural that is instinctual in humans, and the rituals and practices of religions seem to be the natural extension of these beliefs.

Many scholars have suggested that the tendency for people to create and then believe in supernatural concepts is a natural to humans and a byproduct of adaptive cognitive abilities (Atran, 2002; Atran & Norenzayan, 2004; Barrett, 2004; Bloom, 2007; Boyer, 1994; 2008; Guthrie, 1993). This idea, that the human mind is predisposed to supernatural ideas, is supported by the observation that people everywhere create, maintain, and believe in supernatural concepts (Boyer, 2001). Yet despite this observation, organized religions are on the decline in some parts of

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[1] Supernatural concepts are probably not separate from the conception of the 'natural' world within most cultures. Rather, these concepts are considered part of the natural world. Never the less, I need a word to describe this type of concept, and supernatural is the most suitable despite this caveat. By 'beliefs that extend beyond a naturalistic description of the world' I mean the use of agent based causal reasoning rather than mechanistic causal reasoning when mechanistic is more appropriate. I am also referring to the belief in non-scientific invisible forces that affect individuals lives, such as karma, which may or may not be based in agent based reasoning.

the world today. Scandinavia and other parts of Europe contain only a minority of religious believers, and the number continues to decrease (Voas, 2008; Zuckerman, 2008).

How do we reconcile these two observations? Part of the answer may lie in what people are doing when they leave their traditional religion. In places where large numbers of people have rejected institutional religion, other types of supernatural beliefs have become increasingly popular (Fuller, 2001; see Roof, 1993; 1999; Stark & Bainbridge, 1985). As religious beliefs decline, alternative supernatural beliefs seem to replace them in at least some proportion of the population.

1.1 Separating Belief from Practice

To understand the basis of supernatural and religious belief, it is important first to understand what these two terms mean, how they overlap, and when and where they do not overlap. Religion is a term notoriously difficult to define (Hill et al., 2000; see Pargament, 1999), and I am not going to tackle that problem here. Rather, I would like to specify how I will use these terms in the pages that follow. In this dissertation the term 'religion' operationalized as a set of specific cultural practices, usually rituals, that surround a set of specific supernatural beliefs (see Shariff, Purzycki, & Sosis, 2014). Religious beliefs—which can be conceptually separated from religious practice—are the set of supernatural beliefs that are endorsed by a specific cultural tradition. The content of the rituals, practices, and beliefs that make up a religion will differ from culture to culture. In this dissertation 'religion' is most commonly referring to 'Christianity'. Though minorities of other

religious groups exist in all of my samples, the vast majority of religious participants in every study are Christian.

When I discuss supernatural beliefs, I mean beliefs that use mentalistic or other non-natural invisible forces to explain objects, events, or even more generally, causation (Atran, 2002; Barrett, 2000; see Barrett & Keil, 1996; Boyer, 2008; Kelemen, 2004). Religious beliefs are a type of supernatural beliefs, but the broader category of supernatural beliefs involves everything from the belief in ghosts and ESP to the sense that things always happen for a reason. The natural tendency towards supernatural belief does not assume a natural tendency towards belonging to any specific religion or even engaging in a ritual practice—though supernatural belief and ritual practice are clearly related. When scholars talk about an intuition towards religion, by my terminology what they really mean is an intuition towards supernatural beliefs more generally. There is something about how humans perceive and process information from the world that leads them to adopt all sorts of supernatural beliefs, not just the ones found in religions. How these beliefs gain ritual practices and get canonized into religions is a separate process of cultural learning.

How one chooses to label these different concepts is not important, but the conceptual distinction is. If one chooses to define all supernatural belief as religious, that is fine, but the distinction between beliefs that are culturally and institutionally supported and enforced by religions—what I am calling 'religious beliefs'—are

conceptually distinct from those that are not—such as belief in the paranormal.[2] This first group, religious beliefs, has additional causal pressure that may be absent, or largely absent, from the paranormal beliefs. Types of cultural learning and additional cultural pressures such as punishing people who violate social norms could easily wash out any effects of the intuitions that would otherwise lead people to hold supernatural beliefs. That is to say, people will adopt culturally enforced religious beliefs even when they do not find them intuitive. This is unlikely to be true of paranormal beliefs. In places were religious beliefs are not strongly enforced by a society, intuitions towards supernatural belief should still have an effect in predicting who is and is not a believer. This would be manifest in who joins and leaves religion. People who are low in these intuitions should be more likely to convert away from religion, and those who are high should be more likely to convert to religion.

It has been recorded and debated in the literature that some religions, especially small-scale religions, focus more on practice than belief (Cohen, Siegel, & Rozin, 2003; Purzycki & Sosis, 2011; Shariff et al., 2014). Some religions consider proper ritual practice as the primary area of concern in religion, rather than the strength of an individual's belief. At the same time, the growing trend towards the 'spiritual but not religious', gives an example of a group of people who abandon traditional religious practices, and often stand up against them (see Roof, 1993; 1999), but do not give up their supernatural beliefs (Fuller, 2001; Voas, 2008).

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[2] The category of supernatural beliefs that exist outside of organized religion extends far beyond just paranormal beliefs. I use this term only because this is what I measured in the studies that follow. Other concepts like non-religious spirituality will likely also fall into this category.

These two ideas, that religious practice can exist without enforcing belief, and belief can exist without religious practice, suggest that practice and belief are separate phenomena.

This separation does not exclude the idea that belief in supernatural concepts or agents will increase a person's motivation to participate in a religious practice, or that people tend to create ritual practices around their beliefs and form religions. All this separation suggests is that we cannot talk about religion and supernatural belief interchangeably because they do not always refer to the same thing. The cognitive and cultural learning mechanisms that lead to the adoption of religious practice may be different from those that make people more prone supernatural belief. Further, belief and practice may be differently impacted by religious decline and the secularization of societies.

This dissertation will explore some of the reasons for the ubiquity of religion and supernatural belief. Much of the work outlined here focuses on exploring the individual differences in underlying cognitive tendencies that lead to supernatural beliefs and how these differences can answer important questions about belief. At the same time, I have paid attention to the role that context and culture have played in supporting or extinguishing specific religions and religious beliefs.

Understanding both the underlying cognitive and cultural processes that lead to belief and the cultural strategies that maintain them is necessary if we are to understand why supernatural beliefs exist, why they persist, and more generally how religions rise and fall. These mechanisms may additionally account for why some types of beliefs are more compelling than others. Ultimately, understanding

supernatural cognition will give us a better understanding of human minds and how they function in relation to the culture and environment in which they live. Religion is central to many people's lives, and religion is an important piece in understanding the puzzle of human psychology more broadly.

1.2   The Cognitive Basis of Religious Belief

Most of the prominent cognitive theories of supernatural belief are centered on how we perceive minds. Our ability to perceive and reason about other people's minds, or Theory of Mind (ToM; see Baron-Cohen, 1995; Baron-Cohen, Leslie, & Frith, 1985; Leslie, 1994; Leslie, Friedman, & German, 2004), is at the core of our abilities to live in groups, to learn from others, and accumulate culture. Group living and the ability to create cultures requires humans to be able to understand the goals and motivations of others and to recognize that those goals and motivations may be different from their own (Herrmann, Call, Hernández-Lloreda, Hare, & Tomasello, 2007; Tomasello, Carpenter, Call, Behne, & Moll, 2005).

A variety of evolved capacities go into this ability to help efficiently process social cues. Humans have evolved a keen ability to read faces for clues to the emotional and mental states of others (Baron-Cohen, 1995), and are attentive to gaze direction or any movement that indicate an intention or goal from a very young age (Hood, Willen, & Driver, 1998; S. C. Johnson, Slaughter, & Carey, 1998; Scaife & Bruner, 1975). Infants understand that certain motion cues are cues of agency (R. Gelman, Durgin, & Kaufman, 1995; Rakison & Poulin-Dubois, 2001; Scholl & Tremoulet, 2000) and recognize humans as a special source of agency (Guajardo & Woodward, 2004). Infants' ability to reason about agents is so complex that it even

encompasses the basic moral tenets of harm and fairness (Hamlin & Wynn, 2011; Hamlin, Wynn, & Bloom, 2007). We also have additional capacities for reasoning about mental states once they have been cued (Apperly & Butterfill, 2009; Apperly, Samson, & Humphreys, 2005).

Still, the existence of ToM itself does not explain why we create supernatural minds. Reasoning about supernatural minds requires something that goes beyond the functions traditionally associated with ToM, such as the ability to live socially and learn from others. Supernatural minds require us to create new minds where minds do not exist. To explain gods and ghosts, our ToM abilities needs to overestimate the number of minds in the world. This is not as simple as noticing things that might be agents; we go further, giving them a set of desires and motivations that compel us to try to understand and interact with them.

The cognitive science of religion has put forward several basic mechanisms that can lead to supernatural beliefs (Barrett, 2004; Barrett & Keil, 1996; Bloom, 2007; e.g. Guthrie, 1996; Kelemen, 2004). I focus on a handful of specific processes throughout this dissertation: anthropomorphism, dualism, teleology, and mentalizing. I will outline each of these theories here and briefly explain how they may relate to supernatural belief.

Anthropomorphism

One of the oldest, and most well known cognitive theories locates the basis of religious belief in anthropomorphism (Barrett, 2000; 2004; Feuerbach, 1957; Guthrie et al., 1980). One version of this theory states that believers conceptualize gods and other supernatural agents by projecting human-like mental states onto

them (discussed below under "Mentalizing"). Another version of this idea focuses on the human tendency to project human-like characteristics onto all types of non-human things—from clouds, chairs and automobiles to pets and gods (e.g. Barrett, 2004; Guthrie, 1993; Hume, 1981). Guthrie and others argue that this tendency to detect humans everywhere leads to the belief that human-like beings exist everywhere, giving rise to, for example, animistic beliefs that the world is infused with gods, spirits, and ghosts (Guthrie, 1996). The theoretical logic behind this claim is that the costs and benefits of agency detection are asymmetric; seeing agents everywhere helps us avoid being surprised by a hidden agent. The cost to seeing agents where there are none is small compared to the cost of not seeing an agent when there is one present—especially when that agent has the potential to harm or kill us (Barrett, 2000; 2004; Guthrie, 1996).

Empirical work in psychology investigating anthropomorphism has taken a different perspective. Rather than showing that projecting human-like agency onto the world is promiscuous and automatic, research has demonstrated this tendency to be selective (Waytz, Gray, Epley, & Wegner, 2010b) and motivated (Epley, Waytz, Akalis, & Cacioppo, 2008b). Studies have shown that people do not always see human minds in non-human entities and objects; they do so when they are lonely and want human companionship (Epley, Akalis, Waytz, & Cacioppo, 2008a), or when an entity behaves uncharacteristically and its behavior cannot be reliably predicted using other conceptual frameworks (Waytz, Morewedge, Epley, Monteleone, et al., 2010c). This research outlines, in particular, the potential situations in which we would project human minds onto non-human entities; but the relationship between

mind–perception and conceptualizations of God has only been explored in a small set of studies (e.g. H. M. Gray, Gray, & Wegner, 2007; Schjoedt, Stodkilde-Jorgensen, Geertz, & Roepstorff, 2009). In addition, there is now extensive evidence that there are dispositional differences in anthropomorphic tendencies, such that some people are chronically more likely to anthropomorphize than others (Waytz, Cacioppo, & Epley, 2010a).

This idea of motivated reasoning when we think about minds seems closer to how people think about and interact with supernatural minds. If people are using supernatural minds to explain things like events or causal forces, it is unclear how belief in this type of agency is cued (but see Newman, Keil, Kuhlmeier, & Wynn, 2010). Such belief seems to come out of a motivation for explanation rather than an automatic reaction to some visual cue of agency. Further, when people think about the minds of gods they often think strategically (i.e. considering what gods know and how this information can impact their lives) (Purzycki, 2013; Purzycki & Sosis, 2011). For example, a morally concerned god may punish you for doing something non-normative or otherwise displeasing to that god.

Dualism

Mind-body dualism refers to the intuition that minds are separate from bodies (Bloom, 2005; Damasio, 1994). According to this theory, minds are seen as a non-physical substance that can be related to but not reliant on bodies, opening up the possibility of minds existing without bodies. In a sense, the ability to think dualistically is a necessary condition for understanding concepts such as ghosts and spirits or any other disembodied supernatural agent (Bloom, 2007).

As an intellectual concept, the idea that the mind and body are separate is most commonly attributed to Descartes, but according to Damasio (1994) it originates in the structure of the brain. One of the unique characteristics of human cognition is the ability to represent and reason about others people's minds (Herrmann et al., 2007). With this ability, it seems that even young children develop the intuition that what makes up a mind is independent of the physical body and therefore subject to different rules (C. N. Johnson & Wellman, 1982).

Until recently, the empirical evidence for dualistic intuitions was limited. Only a few empirical studies have looked at dualism and have only used children in western settings (C. N. Johnson, 1990; Kuhlmeier, Bloom, & Wynn, 2004; Lillard, 1996). A few recent studies have offered more support for dualism as a common human tendency, showing dualistic thinking in North American and Fijian children, (Chudek, McNamara, Birch, Bloom, & Henrich, 2013) in rural Madagascar (Astuti & Harris, 2008), and in Ancient Chinese texts (Slingerland & Chudek, 2011). These cross-cultural findings support the idea that dualistic thinking may be a human universal, which in turn allows its hypothesized relationship to supernatural beliefs to support the universality of the potential for such beliefs.

Teleology

Religious beliefs may also be rooted in teleological thinking, which is the tendency to see things in the world as having an overarching purpose and having been intentionally made for that purpose (Kelemen, 1999; Kelemen & DiYanni, 2005). This tendency is theorized as a byproduct of 'artifact cognition'. Part of our ability to understand artifacts—such as a hammer—is the capacity to see artifacts as

designed by agents with specific goals and motivations. This ability is sometimes referred to as 'promiscuous' when it is extended to things that were not made for any purpose. For example, children have the intuition that lions exist so that we can visit them at the zoo, clouds are for raining, and mountains are for climbing (Kelemen, 2004).

This tendency, commonly found in children (Kelemen, 1999), is suppressed among science-educated adults unless when they are under time pressure (Kelemen & Rosset, 2009; Kelemen, Rottman, & Seston, 2013). It is also exaggerated in people with Alzheimer's (Lombrozo, Kelemen, & Zaitchik, 2007). These two additions suggest that it is not only a common human tendency, but also one that is always just under the surface of our more carefully reasoned thoughts. The tendency to see the world and things in the world as purposeful leads to the possibility of seeing one or more agents as having created the world. Therefore, promiscuous teleology makes us 'intuitive theists' (Kelemen, 2004; Kelemen & DiYanni, 2005).

Mentalizing

All of the above cognitive tendencies have a clear common feature: they require some mentalizing ability. There has been some speculation about the relationship between metalizing and religious belief (Atran, 2002; Atran & Norenzayan, 2004; Barrett, 2004; Bloom, 2007; Boyer, 2001), but limited empirical work has been conducted. Mentalizing, or Theory of Mind, is the tendency to infer and think about the mental states of others. The key idea is that to interact with person-like supernatural beings, such as a personal God, spirits, or ghosts—core features of many religions—believers must try to understand the wishes, beliefs,

and desires of these beings. Conceptualizing them requires some mentalizing abilities. Consistent with this, neuro-imaging studies found that among Christian believers in the US (Kapogiannis et al., 2009) and in Denmark (Schjoedt et al., 2009), thinking about or praying to God activates brain regions associated with Theory of Mind.

A recent effort went further, investigating whether individual differences in mentalizing are associated with belief in a personal God (Norenzayan, Gervais, & Trzesniewski, 2012). If mentalizing is required for belief in a personal God, then poor mentalizing skills would be expected to render religious belief less intuitive, leading to lower levels of belief. Indeed, research shows that the autism spectrum, which is characterized by selective deficits in Theory of Mind, is associated with lower levels of mental state attributions to God (K. Gray, Jenkins, Heberlein, & Wegner, 2011). Consistent with this line of reasoning, individual differences in mentalizing predicted religious belief; moreover, the autism spectrum, as expected, inversely predicted belief in God, and mentalizing skills were found to mediate this effect (Norenzayan et al., 2012).

1.3   The Influence of Context and Culture

Though the cognitive foundations of supernatural thought may be universal, religions, and the supernatural beliefs that exist in them, are vastly different across cultures. I suggested in the previous section that some of the reason why people have these beliefs is due to a set of cognitive tendencies. *What* people believe, on the other hand, is largely due to their culture. Simple put, if the majority of your culture

believes in Zeus you are far more likely to also believe in Zeus then the Shiva or Kali

or the Abrahamic God (Gervais & Henrich, 2010). Yet, there is far more to the

relationship between religion and culture than this. Much of *why* people believe may

also be determined by their culture. Social institutions that make people feel safe

and secure, reducing existential anxieties, can reduce people's motivation to engage

with religious belief (Atran & Norenzayan, 2004; Norris & Inglehart, 2004).

Additionally, religions employ various cultural learning mechanism that can

transmit and promote belief (e.g. Henrich, 2009; Henrich & Boyd, 1998; Henrich &

Gil-White, 2001). Without these mechanisms, specific religious traditions would

disappear, even among people who find supernatural beliefs intuitive.

Existential Anxiety

The existential anxiety hypothesis suggests that, as cultural institutions grow

and deal with many of the problems people in large societies face, religion becomes

less important to people. Beliefs such as the immortality of the soul and divine

reward and punishment help people deal with fear of harm (K. Gray & Wegner,

2010) and fear of death (Jong, Halberstadt, & Bluemke, 2012; Norenzayan & Hansen,

2006; Vail, Arndt, & Abdollahi, 2012). These sorts of beliefs give people a sense of

order to the world and help them feel a sense of control, which reduces feelings of

anxiety (Kay, Gaucher, McGregor, & Nash, 2010a; Kay, Gaucher, Napier, Callan, &

Laurin, 2008; Kay, Moscovitch, & Laurin, 2010b).

Religions also provide institutions and communities that look after people

when they are sick and in need. As other non-religious institutions start to reduce

these anxieties through modern medicine, science, education, and social safety nets,

the importance of religious belief declines (Norris & Inglehart, 2004). A consequence of this theory is that if religion makes people feel more secure, religion may cause a discrepancy between perceived security and actual security. For any given level of actual threat within in a culture, those who are religious may feel more secure than those who are not due to the sense of protection and control religion gives.

Credibility Enhancing Displays (CREDs)

As religious institutions become less important in a society, people may stop displaying their belief through their actions. They may stop regularly participating in rituals or giving resources to religious institutions. This impacts a second theory of culture's influence on religion: how people learn what to believe in the first place. Both ritual participation and resource allocation can be considered credible displays of belief (CRED; Henrich, 2009). A CRED is a hard to fake behavior that can reliably convey the content of another's mind. Humans have evolved to be expert social learners, but this capacity to learn from others brings with it the opportunity for exploitation. CREDs offer a way to judge if a person is giving true information or not. Since cheating is a constant possibility, we should be sensitive to any cue to the authenticity of social information, especially behaviors that are potentially costly and not otherwise verifiable. CREDs are one such cue.

Ritual behaviors function as CREDs. By displaying commitment to religion through ritual practices, onlookers will see the ritual participants as being truthful in their declaration of belief. Onlookers will see these beliefs as more plausible, and even to adopt them themselves. Within Christianity, actions like going to church or

paying tithes are credible displays of belief. Without these displays, new generations

may be less likely to adopt the specific belief systems of their parents, increasing the

rate of religious decline in society (see Lanman, 2012).

1.4   Individual Difference

The cognitive biases mentioned above, or even the cultural learning

mechanisms, can be conceptualized as a presence/absence or as a continuous trait.

A trait like dualism could relate to supernatural belief only in terms of a presence or

absence; people either see minds as separate from bodies or not, and therefore are

supernatural believers or not. Cognitive traits can often be thought about in both

ways. For example, ToM is often discussed in terms of a pass or fail of the false belief

test, but can also be though about in terms of strengths and deficits. When we talk

about adults' ToM, this is generally what we mean. Some people are better than

others at representing and thinking about other people's minds. In adults, we

measure ToM on a continuous scale.

Traits such as dualism can also be thought about in terms of this sort of

continuous scale. Even if everybody has the intuition that minds and bodies are

separate, this intuition may be stronger in some people than in others. This could

manifest in the level of anxiety people experience at the idea that their entire mental

life and consciousness arise from a lump of gray flesh. Some people may be fine with

this idea; others may find it extremely disconcerting. There is evidence that all of the

cognitive tendencies I mentioned previously can be considered as a scale rather

than an all-or-nothing trait. This means that people vary in the extent to which they

experience and express these tendencies; these individual differences are measurable in terms of magnitude.

Cultural variables, such as exposure to CREDs and anxiety alleviated by secular institutions, can similarly be measured in terms of magnitude and individual differences. Looking at individual difference for both cognitive tendencies and cultural practices allows me to correlate these factors with religious and other types of supernatural beliefs and practices across large populations. This, in turn, allows me to look at how these traits, tendencies, and beliefs relate to each other in the real world—not just in the lab. Still, since this type of research is based on correlations, causal direction cannot be determined. Though methods can be used to strengthen the argument for causation, like the path analyses and natural experiments used in the studies that follow, it is never a definitive case. This lack of causal direction is why experimental methodologies are the gold standard of psychological research.

At the same time, experiments are only as good as the theoretical predictions that support them. Although the cognitive science of religion has a number of theories explaining how these cognitive tendencies *should* be related to religious belief, almost no experimental work exists that supports any of these theories. Experimental tests of these theories are difficult because the theories themselves are vague. 'Religion' when it refers to practice and belief is too broad a topic for the precise operational definitions required for a clean experimental design. Even limiting ourselves to 'supernatural agents' ignores the large and potentially important difference between how people think about something like ghosts and how they think about an omnipotent god. Before the cognitive science of religion

can expect much progress and success with experimental methods, it must first have access to clearer theoretical boundaries between variables. This is precisely where an individual difference approach to these problems offers a solution. By looking at patterns and relationships across large datasets, I can better assess how these variables fit together and begin to form a more complete understanding of the complex processes that make up supernatural and religious belief.

1.5   Summary of Chapters

Chapter 2 looks at how individual differences in mentalizing, dualism, anthropomorphism, and teleology collectively relate to supernatural belief. This chapter uses structural equation modeling to map out the relationships between all of these variables in a single model. An additional measure, looking at cultural exposure to Christianity, was added to the second sample to look at some of the cultural impact of living in a religious society. This chapter is based on a published paper (Willard & Norenzayan, 2013).

Chapter 3 focuses on a combination of cognitive and cultural mechanisms as predictors of religious and other supernatural beliefs in the Czech Republic and Slovakia. Despite a shared history, similar languages and a common geography, the Czech Republic is a largely atheistic society, while Slovakia has a Christian majority. This allows me to compare across several different types of theories—cognition, social institutions, and cultural transmission—to explain this difference. This study includes all the cognitive traits and replicates the model presented in Chapter 2, plus an additional series of questions assessing perceived social and economic

security and CREDs. I examine which of these variables explain the most variance in religious belief, religious practice, and paranormal beliefs above and beyond basic demographic variables. With a set of regression analyses I demonstrate that cognition explains belief but not religious practice and that cultural variables explain practice better than they explain belief.

Chapter 4 sets out to create a cognitive and belief profile of the "spiritual but not religious" (SBNR). Cognitive tendencies, I will argue, can identify these people as different from religious and non-religious participants. I look at data from the Czech Republic and Slovakia and compare it to the USA. With the aid of these data, I examine the similarity and differences in cognition and belief among the SBNR, the religious, and the non-religious. While patterns of belief vary according to both group and country, cognitive tendencies show marked variance across groups, but not country, suggesting that belief is somewhat determined by country of origin, but cognition is not. In this chapter, I also look at the effects of upbringing on patterns of belief and find that how people were raised still impacts their current belief, even after accounting for the impact of their current group affiliation. Non-religious and SBNR who were raised religiously look different then those who where not. Finally, the cognitive variables are used to predict which participants have converted from one group to another.

Chapter 2: Cognitive Biases of Supernatural and Religious Belief

2.1 Introduction

Religion is an important part of the lives of billions of people around the world and a cross-culturally recurrent aspect of both minds and cultures. Over the past decade, several theories have emphasized that the natural basis of religious belief and experience is found in cognitive biases that are byproducts of brain functions (Atran & Norenzayan, 2004; Barrett, 2000; 2004; Bloom, 2007; Boyer, 2001; 2008; Kelemen, 2004). These theories converge, together suggesting that belief in supernatural agents such as gods and spirits, and related phenomena emerges from a set of interrelated cognitive biases, such as perceptions of agency and mentalizing, mind-body dualism, and teleological intuitions. Equipped with these cognitive biases, human minds gravitate towards religious and religious-like beliefs and intuitions.

Despite the plausibility and influence of these theories, there has been limited empirical research directly testing the connection between specific cognitive biases and various religious beliefs. Moreover, cognitive theories have not been formally modeled in a unifying conceptual framework that assesses how various cognitive biases, taken together and in relation to each other, explain religious belief. These were the main goals of the present study.

I took an individual difference approach to examine whether variation in religious and related beliefs could be explained by variation in several interrelated

cognitive biases and intuitions that have been theorized to underlie religious belief. Previous work has found variation in religious belief to be related to a number of key individual differences in conscientiousness and agreeableness dimensions of the Big Five (Piedmont & Wilkins, 2005; Saroglou, 2002; Saroglou, Buxant, & Tilquin, 2008), as well as in forgiveness (McCullough, Bono, & Root, 2005; McCullough, Carter, DeWall, & Corrales, 2012), and in self regulation (McCullough & Willoughby, 2009). My approach is also grounded in an individual difference method, but it focuses on the role of cognitive biases in religious belief. Consistent with cognitive theories (Atran & Norenzayan, 2004; Barrett, 2000; Boyer, 2001), recent research has found that religious belief is rooted in intuitive processes and that, conversely, religious disbelief can arise from analytic cognitive tendencies that block or override these intuitive processes. In one series of studies, Shenhav, Rand & Green (2012) found that individual differences in intuitive thinking predict more belief in God, controlling for several relevant demographic and psychological variables such as education level, relevant personality dimensions, and general intelligence.

Pennycook, Cheyne, Seli, Koehler, and Fugelsang (2012) replicated and extended these individual difference findings, further showing that skepticism in the face of purportedly religious or paranormal phenomena is less prevalent among intuitive thinkers, holding constant potentially confounding factors. In a series of experiments that agree with these mostly correlational findings, Gervais & Norenzayan (2012), as well as Shenhav et al. (2012) found that inducing analytic processing temporarily decreased religious belief.

Taken together, these findings suggest that religious belief is anchored in intuitive cognitive biases, but they do not specifically pinpoint which particular intuitive processes are at the root of religious belief; neither do they reveal the specific pathways by which these intuitive processes encourage religious belief. The present study addressed these gaps in current knowledge.

2.1.1 Overview of the Present Study

The cognitive tendencies we investigated were mentalizing, anthropomorphism, mind-body dualism and teleological thinking. Rather than investigating each cognitive tendency in isolation, an important strength of the current research was to build a path model to examine how these tendencies mutually interact to predict different but related types of belief—in particular, belief in God, paranormal belief, and belief in life's purpose. With this method, we examined several interrelated hypotheses. 1) I tested for the hypothesized direction of these relationships—that these cognitive tendencies are theorized to lead to supernatural belief, and not the other way around. 2) I tested the underlying relationship between cognitive biases and beliefs, investigating whether the previously established path from mentalizing to belief in God (as well as other supernatural beliefs) goes through other cognitive intuitions, namely teleology and mind-body dualism. 3) I tested whether these cognitive biases explain other supernatural beliefs, such as belief in paranormal phenomena and belief in life's purpose. 4) I included in my model a measure of cultural exposure to religion (operationalized as the proportion of religious adherents that lived in the same US county as the participant), to compare the relative effects of intuitive cognitive

biases to effects due to cultural transmission of religious beliefs. 5), Finally, I tested the generalizability and robustness of my findings by testing my model in two large independent samples, and across ethnic and gender lines.

2.1.2   Cognitive Theories of Religious Belief

Very little work has explored the relationship between religious belief and individual differences in mentalizing abilities. It seems clear that the ability to attribute human minds to non-human entities and objects, and the tendency to think of minds as separate from bodies both hinge on the ability to understand minds. Similarly, the ability to see minds is required to understand the motivation behind artifacts created by those minds. These cognitive tendencies, in turn, are expected to increase the odds of belief in mindful supernatural agents.

2.1.3   The Role of Cultural Learning in Religion

Of course, religious beliefs are not just an outcome of cognitive biases; they are also influenced by cultural learning. Growing up and living in a religious community increases the odds of being a believer, influences the particular religious beliefs one commits to, and explains the psychological impact of those beliefs (Cohen, 2009; Cohen & Hill, 2007; Gervais, Willard, Norenzayan, & Henrich, 2011). However, researchers in the cognitive science of religion have often argued that culture's role is limited and that cognitive biases are doing most of the work (Atran, 2002; Barrett, 2004; 2008; Bering, 2006; 2011; Bering, McLeod, & Shackelford, 2005). Therefore, I included a variable that reflects cultural exposure to religion (proportion of religious adherents in the participant's local community) to

investigate the relative contributions of cognitive and cultural influences on religious belief, with the important caveat that only one cultural variable was considered, limiting my ability to make strong inferences about cultural learning processes in religious beliefs.

2.1.4   Religious Belief

I measured belief in the conventional personal God found in the Abrahamic religions and two related types of beliefs: paranormal belief and belief in life's purpose. Unlike the culturally endorsed belief in God, paranormal beliefs such as beliefs in extra-sensory perception and ghosts are less influenced by institutionalized religion. Belief that life has an overarching purpose may betray some underlying teleological intuition, and it has been argued that even atheists cannot shake the intuition that there is a transcendental intentionality or purpose underlying human life (Bering, 2002; 2003b). At the same time, it is a belief that is reinforced by Christian beliefs, for example, Protestant ideology (Weinstein & Cleanthous, 1996). I measured this construct to examine to what extent this belief is related to belief in God, and to what extent it is related to cognitive biases above and beyond any relationship to belief in God.

To recapitulate, the present study tested a conceptual model that predicts belief in religious agents, in paranormal events, and in life's purpose from individual level tendencies towards certain cognitive biases as well as cultural exposure to religion. Given that mentalizing appears to underlie the other cognitive biases, I tested a model that starts with mentalizing, leading to anthropomorphism, mind-body dualism, and teleology, which in turn informs all three of the above-stated

beliefs. Given that there is scant empirical research about this topic, I was interested to know exactly which pathways from cognitive biases to the different beliefs would emerge. I also tested several alternative models against the data, including a reverse causation account that would argue that religious beliefs encourage cognitive biases rather than the other way around.

2.2   Method

2.2.1   Participants

I used two samples to allow me to test for replicability, robustness, and generalizability. Sample 1 consisted of 492 undergraduate psychology students at a large Canadian university with a religiously and ethnically diverse population. Sample 2 consisted of 920 adult Americans collected though Amazon's Mechanical Turk (see Table 2.1).

In both samples, the survey was hosted by the Survey Monkey website and was completed by the participants on a computer. The survey completed on Mechanical Turk contained slightly fewer questions (due to the removal of a second anthropomorphism measure) than the student sample. I took steps to ensure data quality (Buhrmester, Kwang, & Gosling, 2011). For example, four nonsense questions were placed throughout the survey to ensure that our participants were paying attention. Participants who failed to answer any of these four questions correctly were removed before analysis (as a result, 13 participants were removed from the student sample and 95 from the Mechanical Turk sample).

Table 2.1 - Demographic Characteristics of Participants

Demographic Dimension	Canadian Student Sample	American Adult Sample
Age		
Minimum (years)	18	18
Maximum (years)	41	81
Mean (years)	20.5	34.7
Gender		
Male (%)	23	34
Female (%)	77	66
Religious Affiliation		
Christian (%)	30.8	50.3
Buddhist (%)	6.2	1.8
Sikh (%)	2.8	0.3
Muslim (%)	2.2	0.7
Jewish (%)	1.6	2.0
Spiritual but not religious (%)	0.8	13.3
Other religious (%)	0.2	0.3
Not religious (%)	53.8	30.0
Ethnicity		
Caucasian (%)	28.3	81.6
Asian (%)	68.4	5.7
Hispanic (%)	0.7	4.7
African origin (%)	0.2	4.5
Other (%)	2.4	3.4

2.2.2   Materials

Predictor Variables

Anthropomorphic tendencies: I employed the previously validated "Individual Differences in Anthropomorphism Quotient" (IDAQ) to measure anthropomorphism (Waytz, Cacioppo, & Epley, 2010a). This scale measures the tendency to project human like mental states such as consciousness, free will and emotions onto machines, nature and animals (e.g., To what extent does the ocean have

consciousness? To what extent do cows have intentions?). I also used a second measure of anthropomorphism in my student sample, having participants rate natural scenes such as mountains and volcanoes using anthropomorphic (conscious, angry) or non-anthropomorphic (large, high) concepts (see Norenzayan, Hansen, & Cady, 2008) (Student Sample α=.92). I did not include this measure in the adult sample because the results from the two different anthropomorphism measures produced identical results (measures combined α=.89).

Dualism. I measured dualism with Stanovich's (1989) "Dualism Scale". This scale was chosen because it has no content that could be interpreted as overtly religious in nature (e.g., "The 'self' I introspect about controls both the mind and the brain" and "Mental processes are the result of activity in my nervous system(R)"). The single item question dealing with afterlife beliefs was removed from the scale. I used a subset of 10 dualism items in the student sample, but returned to the complete scale in the adult sample to get a more reliable measure (Student sample α = .68; Adult sample α=.83).

Teleology. There is no existing scale to measure individual differences in teleological intuitions. Therefore, I used a series of statements created by Kelemen and Rosset (2009) to test adult teleological tendencies in experimental tasks (e.g., Earthworms tunnel underground to aerate the soil; The sun makes light so that plants can photosynthesize). These statements were originally used to examine the influence of time pressure on teleological thinking. Levels of agreement were recorded using a seven point Likert scale (Student sample α = .91; Adult sample α=.86).

Mentalizing. I used the "Empathy Quotient" to measure mentalizing (Baron-Cohen & Wheelwright, 2004). We chose this measure because it has been used extensively to detect individual differences in adult mentalizing tendencies, including perspective taking, interest in others' beliefs and desires, and understanding emotions (e.g., I often find it difficult to judge if someone is rude or polite (R); I am good at predicting how someone will feel.). This measure is well suited to assess aspects of mentalizing most likely to be related to the belief in God, as has been shown before (e.g. Norenzayan et al., 2012). Other adult mentalizing tasks based on false belief or beliefs different from one's own (see Apperly, Back, Samson, & France, 2008; Birch & Bloom, 2007) are less relevant to supernatural beings, because gods are less likely to have false beliefs (Knight, Sousa, Barrett, & Atran, 2004) and people seem to attribute beliefs to God that they themselves hold (Epley, Converse, Delbosc, Monteleone, & Cacioppo, 2009).

3.2 Outcome Variables

Belief in God. I measured belief in God using three questions (I believe in God, I believe in a divine being who is involved in my life, There is no god or higher power in the universe) (Student sample α = .85; Adult sample α=.93). These three items have good construct validity, as they correlate highly with other measures of religious belief, such as Intuitive belief in God (r(916)=.84, $p<.001$) (Gervais & Norenzayan, 2012) and the "Spiritual Well Being Scale" (r(916)=.86, $p<.001$) (Bufford, Paloutzian, & Ellison, 1991).

Life's Purpose. I created a 3-item measure to assess this construct, with one reverse-scored item (Things in my life happen for a reason; There is a discernable

purpose to the events of my life; Many things that happen to me are random or coincidental) (Student sample α = .74; Adult sample α=.78). These items were chosen to reflect the type of intentionally-driven purpose that has been discussed previously in the cognitive science of religion literature (see Bering, 2002; 2003a). In addition, I created this 3-item scale rather than using existing scales (Crumbaugh, 1968) so as to avoid conflating belief in life's purpose with deficits in meaning and depressive or suicidal tendencies (e.g., "With regard to suicide, I have: thought of it seriously as a way out (1) — never given it a second thought (7).") Both Belief in God and Life's Purpose were measured on an 8 point Likert scale.

Paranormal Belief. We adapted the paranormal belief scale (Tobacyk, 2004). I removed the religiosity and the extraordinary creatures subscales before administering the scale to my participants. The religiosity subscale was removed because it offered confounds with my belief in God measure, and the extraordinary creatures subscale was removed because it was based on largely culturally bound creatures (e.g., the Loch Ness monster and the Yeti) which may have been unfamiliar to our participants, and because these creatures may or may not be seen as being supernatural. They are only 'extraordinary' because they don't exist, not because they have any supernatural powers or relevance (e.g., Some individuals are able to levitate (lift) objects through mental forces; Astrology is a way to accurately predict the future.)(Student sample α = .93; Adult sample α=.95).

Cultural Exposure to Religion. In the adult American sample, but not the student sample, I compiled information about the percentage of religious adherents in each person's local area. I did this by collecting postal codes from each

participant and matching them with county-level religious adherence from a large

database of religious variables (www.thearda.com). It has been argued that an

individual's claimed church attendance is often inflated, and actual attendance data

gives estimates lower than US national estimates based on self-report attendance

(Brenner, 2011; Hadaway, Marler, & Chaves, 1993; Hout & Greeley, 1987). To

overcome this issue, I relied on a non-self-report measure of church adherence

supplied by churches in each county. Adherence numbers are made up of church

members and their children, and those who regularly attend services. Other work

has similarly used church attendance records as a reliable, though imperfect

estimate of attendance (see Finke & Stark, 2005). I chose this measure because

membership in a church could be considered a credible display of religious

commitment (Henrich, 2009). In turn, exposure to such displays is theorized to

cause greater levels of belief.

2.3   Results

2.3.1   Rationale for Statistical Analyses

The theorized path model was fit to the data using the statistical program

EQS (Bentler, 2006). A path model was used because it allows me to test all the

hypothesized relationships simultaneously and thus model each relationship while

accounting for the variance and covariance associated with all other relationships

(see Ullman & Bentler, 2012). This method allows me to test specific relationships

between multiple independent variables and dependent by including some paths

and excluding others (e.g. excluding the direct relationship between mentalizing

and belief in God) without running multiple tests that could inflate type-I error. An

expected covariance matrix is created from the model and compared to the

covariance matrix of the raw data. All straight lines in the model represent direct

predictions (regression coefficients), whereas the curved arrows are correlations

between the residuals of these relationships. These arrows represent the remaining

relationships between the variables that are not represented in my theoretical

structure. All models were tested using a X^2 test of fit. This test is the most

conservative test of fit, in that it assumes that the model can account for all variance

in the sample. A non-significant test means the model fits the data by demonstrating

that the residual difference between the variance accounted for by the model and

the total variance in the sample does not differ significantly from zero. Models fit

estimates were obtained by full information maximum likelihood estimations

(FIML; see Bentler, 2006; Enders, 2001) to deal with a small amount of missing

data. The Yuan-Bentler robust chi-square test (Yuan & Bentler, 2000) was used to

deal with some non-normality in the data (normalized estimate = 4.45).

2.3.2   Sample 1

The model fit the data (Yuan-Bentler X^2(4, N=492)=6.80, p=.15; CFI=.99;

RMSEA=.04; See Fig. 2.1). The model we predicted accounted for the relationships

found in the data, suggesting that cognitive biases do predict religious belief,

paranormal belief and life's purpose. Correlations and standard deviations for this

sample can be found in Table 2.2. When assessing individual paths, several paths

were found to not be significant. These non-significant paths mostly came from the

mentalizing measure. Despite being non-significant, these paths mediate the direct

relationship between mentalizing and religiosity and are required for model fit. As

mentalizing is a key part of our model, we chose to leave it in the model and

retested this with an adult sample (sample 2; means and standard deviations for

both samples can be found in Table 2.3).

Table 2.2 – Correlation matrix, student Canadian sample; N=492 (reliabilities in the diagonal).

	Mental	Dualism	Teleo	Anthro	Anthro pic	God	Para.	Purpose
Mentalizing	(.87)							
Dualism	.07	(.68)						
Teleology	.05	.26**	(.91)					
Anthro	-.08	.15*	.15*	(.86)				
Anthro pic	-.08	.27**	.27**	.47**	(.92)			
God Belief	.10†	.41**	.20**	.10†	.14*	(.85)		
Paranormal	-.03	.43**	.18**	.36**	.44**	.31**	(.93)	
Purpose	.11†	.49**	.29**	.13†	.19**	.62**	.37**	(.74)
SD	7.82	.80	1.23	1.3	1.44	1.78	1.11	1.50

†$p<.10$, *$p<.05$, **$p\le.01$. Scale alphas on diagonal. All p-values calculated with a

Bonferroni correction.

Table 2.3 - Mean and standard deviations for both samples.

	Student Sample		Adult Sample	
Measure	Mean	SD	Mean	SD
Mentalizing	22.62	7.82	22.14	8.90
Anthropomorphism	3.79	1.33	3.37	1.23
Dualism	3.83	.81	3.83	.75
Teleology	4.34	1.23	4.90	1.11
God Belief	4.86	2.11	5.55	2.62
Paranormal Belief	3.05	1.11	2.99	1.31
Purpose	4.85	1.55	5.04	1.67

When comparing these two samples, it is worth noting that although the means for mentalizing between the two samples are not significantly different (Mdiff= .48, $t(1113.24)=1.05$, $p=.29$), the variance of the student sample was significantly lower than that of the adult sample ($F(1406)=12.66$, $p<.001$). It is also worth noting that, within the student sample, our Asian population scored significantly lower on this measure than our Caucasian participants (Mdiff=4.12, $t(478)=5.45$, $p<.001$). This low variance among psychology students on this measure may make it difficult to detect an effect that is actually present, especially if the variance we are getting is in part due to how different ethnic groups answer these questions and not related to our variables of interest.
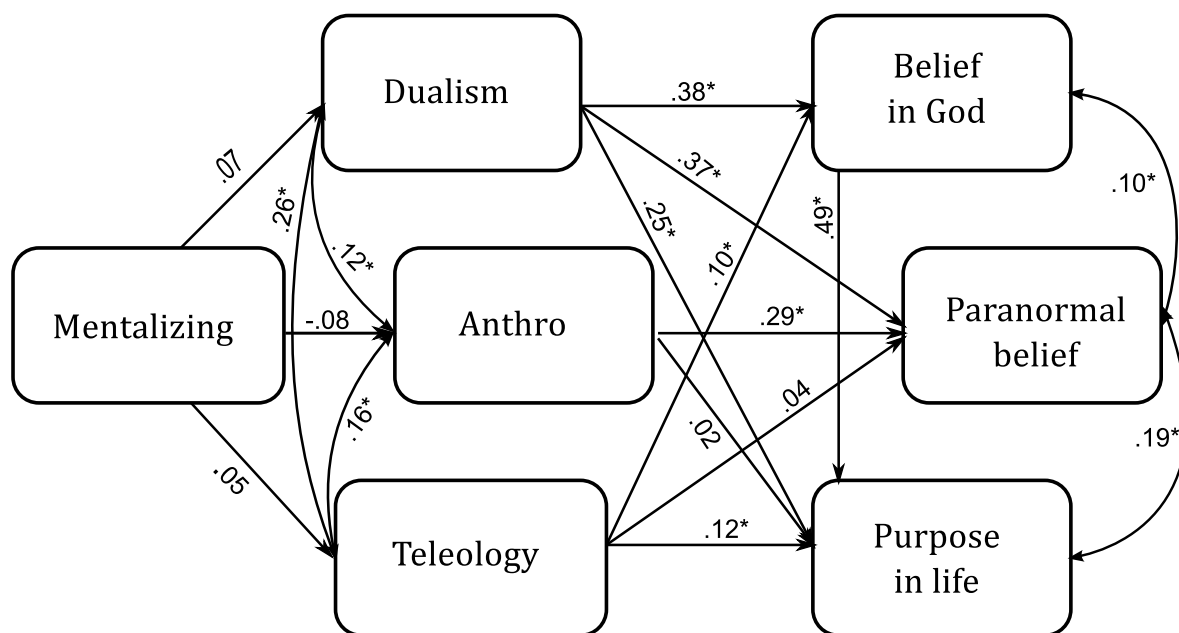
Figure 2.1: Student Sample using the IDAQ scale as a measure of anthropomorphism. Yuan-Bentler X^2(4, N=492)=6.71, $p=.15$; CFI=.99; RMSEA=.04.). *$p<.05$.

Based on this difference between Asian (n=335) and Caucasian (n=146) students on our mentalizing measure, I decided to conduct a two-groups test to verify that the pattern of our findings was the same in both groups. This model fit even after constraining all error variances and covariances, and all regression paths to be equal in each group (Sattora-Bentler X^2(30)= 14.64, p=.99), suggesting that the model does not fit differently in the two ethno-cultural groups, which in turn suggests that our model generalized across these two ethno-cultural groups.

Given influential theories that place the origin of religious belief in anthropomorphism, it was surprising that the path from anthropomorphism to belief in God was non-significant. One might wonder whether this null result is a reflection of any problems with the IDAQ – a particular measure of anthropomorphism (Waytz, Cacioppo, & Epley, 2010a). Given that this is a validated scale with good predictive power, I find this unlikely. However, in order to rule out this possibility, I fit this model a second time using the alternative, task-based visual measure of anthropomorphism (Norenzayan et al., 2008), with a moderate-to-high correlation with the IDAQ r(490)=.47, p<.001. I found similar fit results that confirmed the previous findings with the IDAQ (Yuan-Bentler X^2(4, N=492)= 6.19, p=.19; CFI=.99; RMSEA=.03)(see Fig. 2.2), suggesting that the null finding regarding anthropomorphism is not an artifact of the particular measure I used. I am not the first to question the theorized relationship between anthropomorphism and belief in God (see Bulbulia, 2004; Lisdorf, 2007; McKay & Dennett, 2010; Weingarten & Chisholm, 2009). Still, this is only a preliminary finding on this topic.
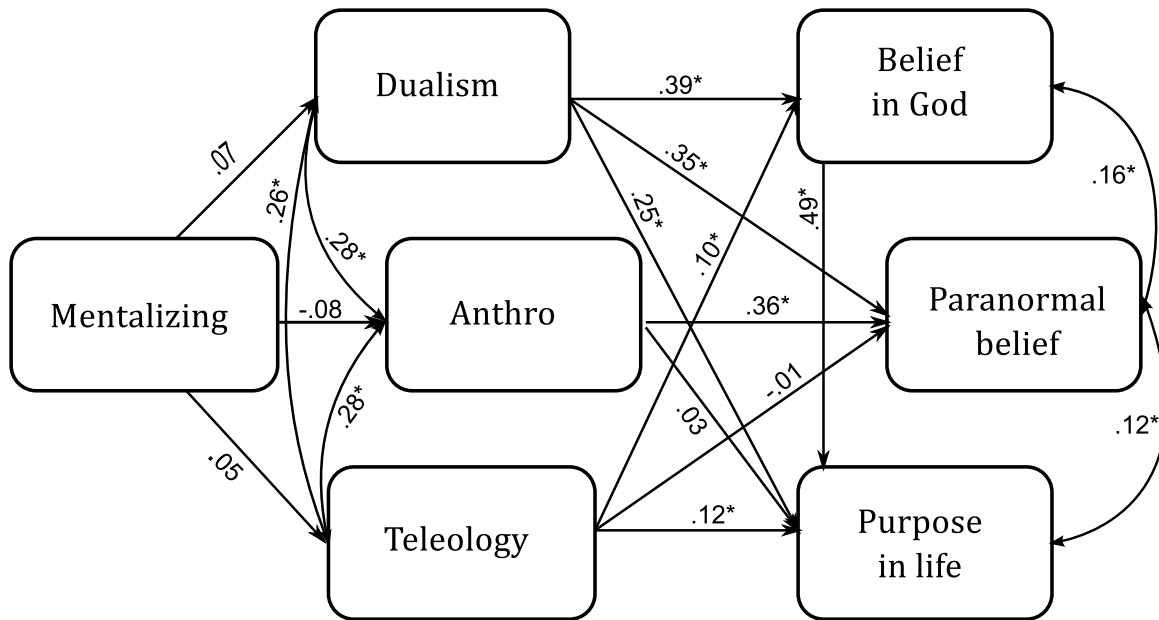
Figure 2.2: Student Sample with anthropomorphic pictures measure. Yuan-Bentler X^2(4, N=492)=6.19, p=.19; CFI=.99; RMSEA=.03). *p<.05.

2.3.3   Sample 2

The model proposed with sample 1 was fit to data in sample 2, and was found to fit (Yuan-Bentler X^2(4, N=920)=8.25, p=.08; CFI = .99; RMSEA=.034) (See Fig. 2.3). Correlations and standard deviations for this sample can be found in Table 2.4.

Table 2.4 – Correlation matrix, adult American sample; N=920 (reliabilities in the diagonal).

	Mentalizing	Dualism	Teleology	Anthro	God	Para.	Purpose	Adher.
Mentalizing	(.90)							
Dualism	.12*	(.83)						
Teleology	.15**	.22**	(.86)					
Anthro	.09	.09	.11*	(.85)				
God Belief	.10*	.42**	.12**	.05	(.93)			
Paranormal	.12**	.33**	.19**	.31**	.29**	(.94)		
Purpose	.14**	.39**	.18**	.14**	.62**	.33**	(.78)	
Adherents	-.01	.04	.001	-.08	.10*	-.04	.04	---
SD	8.89	.76	1.12	1.23	2.62	1.31	1.67	16.44

*$p<.05$, **$p\leq.01$. Scale alphas on diagonal. All p-values calculated with a Bonferroni correction

It has been noted that that females are, on average, more religious than males (Walter & Davie, 1998). Consistent with this, in my sample, females scored significantly higher than males on all outcome variables (see Table 2.5). Because of this, I wished to see if this model is equivalent in both genders. This was not tested in the student sample because the large ratio of females to males caused the model to not be identified (i.e. failed to find a solution). Using a two-group model in our larger adult sample (308 males, 609 females, 2 missing), I found that the model fit even after constraining all error variances and covariances, and all regression paths to be equal in each group (Yuan-Bentler $X^2(30)=16.61$, $p=.98$). This suggests that the path model had similar explanatory power in both men and women, despite the fact that, on average, women scored higher than men on religious variables, supporting previous findings (Norenzayan et al., 2012; Roth & Kroll, 2007; Stark, 2002).
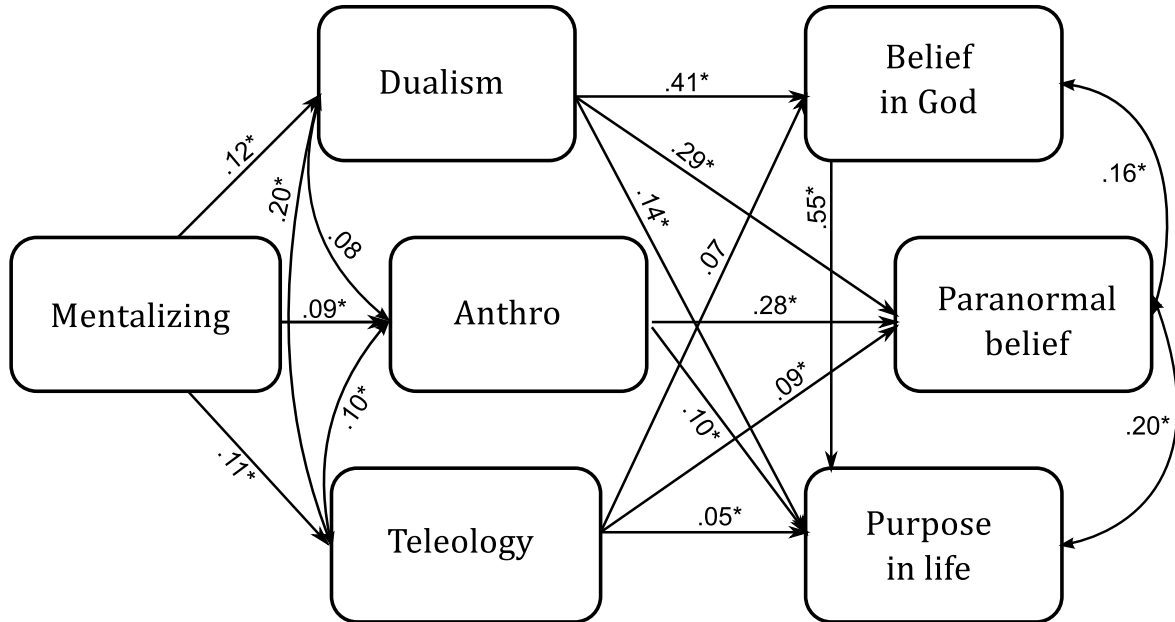
Figure 2.3: Adult American Sample. (Yuan-Bentler X^2(4, N=920)=8.25, p=.08; CFI = .99; RMSEA=.03). *p<.05.

Table 2.5 – Male and female mean differences, adult sample.

	Anthro	Teleology	Dualism	Mentalizing	Paranorm	Purpose	Religiosity
Male	3.14	4.70	3.68	19.09	2.63	4.58	4.61
Female	3.48	5.00	3.90	23.67	3.18	5.27	5.31
t-test	t(915)=4.01, p<.001	t(915)=3.79, p<.001	t(915)=4.09, p<.001	t(914)=7.59, p<.001	t(915)=6.03, p<.001	t(914)=5.99, p<.001	t(914)=4.45, p<.001

Finally, I tested for the effect of cultural learning on religious belief. I added the percentage of religious adherents living in a person's county as an additional predictor variable (based on postal codes provided by participants). As expected, living in an area with greater religious attendance increased the odds of believing in God, largely independently of the influence of the cognitive biases. The only

exception was anthropomorphism. I needed to include a path from the proportion of religious adherence to anthropomorphism (a negative relationship) (λ= -.09, p<.05) for the model to fit (Yuan-Bentler X^2(9)=10.80, p=.29; CFI=.99; RMSEA=.02)(see Fig. 2.4).

2.3.4 Preliminary Summary

To summarize, I found that individual differences in mentalizing tendencies encouraged mind-body dualism, teleology, and anthropomorphism (albeit weakly); dualism, and to a lesser extent teleology in turn led to belief in God, belief in paranormal events, and belief in life having an underlying and possibly transcendental purpose. Although the relationships between mentalizing and the other cognitive biases are significant in the adult sample but not the students one, theoretical predictions and previous research leads me to conclude this is likely to be a sample issue rather then an issue with the model. This is further supported by a significant difference in the variance of this measure between the two samples. Anthropomorphic tendencies failed to predict belief in God, but they did predict paranormal belief, and, to a much lesser extent, belief that life has a purpose. This model was robust to ethno-cultural variation present in our sample, and appeared in both men and women. However, so far we have not addressed possible alternative models that could explain the data. I now turn to several such plausible alternatives and examine whether they better explain our results than the current model under consideration. We did this using the adult American sample that had a

large sample size, allowing for statistical power to test alternative competing models.
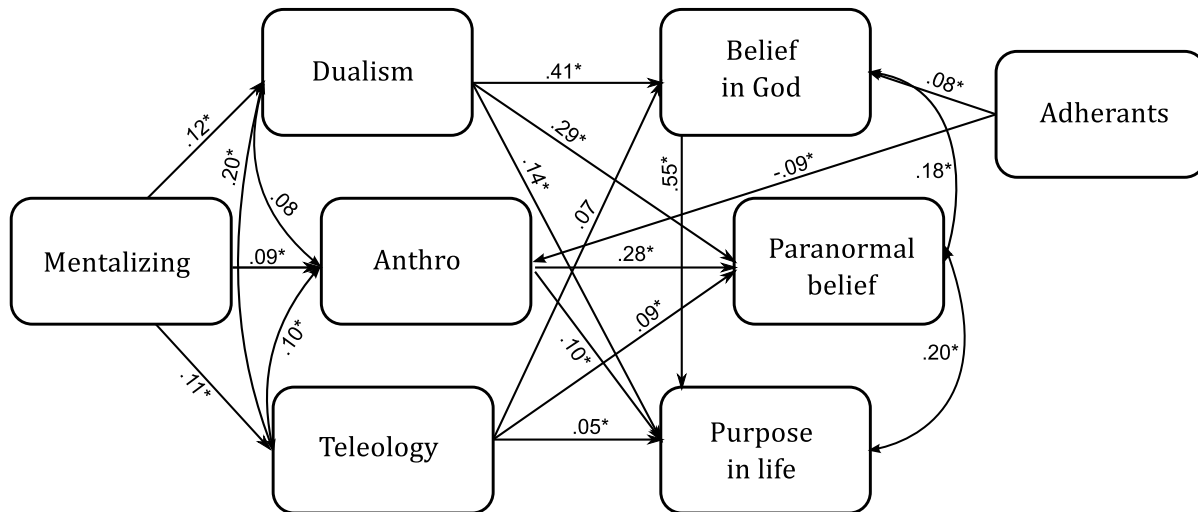
Figure 2.4: Adult American Sample, with the percentage of religious adherents in local area (county level) as an additional variable. (Yuan-Bentler $X^2(9)$=10.80, p=.29; CFI=.99; RMSEA=.02). *p<.05.

2.3.5 Alternative Models

Reverse causation: An obvious criticism of any cognitive hypothesis of religious belief studied with correlational methodology is reverse causation: religious engagement may intensify cognitive tendencies rather than the other way around. In this latter view, people are prone to anthropomorphizing the world, seeing minds as separate from bodies, and engaging in teleological thinking, because of the religious beliefs they hold. I tested this reverse-causation hypothesis by reversing the model. I tested whether belief in God, life's purpose and paranormal belief could be encouraged by mentalizing, and in turn leading to teleological

thinking, anthropomorphism and dualism. This model did not fit the data (Yuan-Bentler $X^2(4)=21.38$, $p<.001$, CFI=.99, RMSEA=.07) (see Fig. 2.5). Similarly, when I switched belief in God to lead to all other variables, that model did not fit the data either, even after enough errors were correlated (based on the largest residuals) to match the original model's degrees of freedom (Yuan-Bentler $X^2(4)=21.68$, $p<.001$, CFI=.98, RMSEA=.07).

Additional Paths: I tested whether mentalizing contributes to religious belief directly. In other words, I explicitly tested the idea that the relationship of mentalizing to the outcome measures is mediated by its relationship to dualism, anthropomorphism and teleology. A chi-squared difference test was conducted after adding in a direct path from mentalizing to belief in God. However, the model fit was not significantly improved ($X^2(1)=1.90$, $p=.17$). The model fit did not improve when adding a direct path between mentalizing and life's purpose ($X^2(1)= 3.25$, $p=.07$) nor when both extra paths were added together ($X^2(2)= 5.06$, $p=.08$). These analyses suggest that dualism and teleology indeed mediate the path from mentalizing to religious belief.

Purpose causing belief: It might be argued that believing in life's purpose comes first, which then encourages people to seek God. This alternative was also tested but did not receive support. Switching the direction of the relationship between life's purpose and belief in God to make purpose predict belief in God caused the model to no longer fit the data (Yuan-Bentler $X^2(4)=11.38$, $p=.02$, CFI=.99, RMSEA=.06).
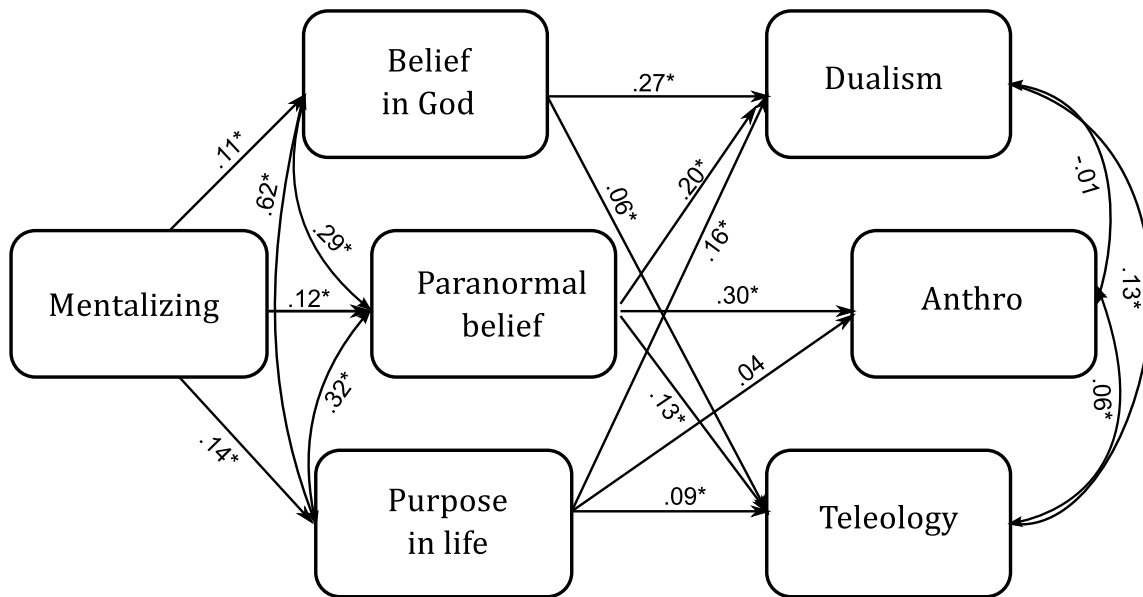
Figure 2.5: Reverse Causation Model, Adult American Sample, (Yuan-Bentler $X^2(4)$=21.38, p<.001, CFI=.99, RMSEA=.07)

2.4   Discussion

This research contributes to our current understanding of the cognitive tendencies that underlie supernatural belief in several important ways. First, my analysis suggests that the relationships are directional, going from cognitive biases to beliefs and not the other way around. The addition of the religious adherence measure strengthens this directionality argument. The proportion of religious adherents in an individual's county predicted belief in God, but it did not predict greater levels of dualism or teleology, implying that cognitive biases and cultural learning independently (and probably interactively) contribute to religious belief—they are in no way mutually exclusive explanations. Interestingly, the proportion of religious adherents in one's community predicted anthropomorphism negatively, suggesting that high rates of Christianity in a community might actually suppress

anthropomorphic tendencies. Neither of these relationships is particularly strong and should be treated with caution. Moreover, this cultural measure has its limitations. It does not account, for example, for those who have recently moved to an area and might, therefore, be relatively unaffected by levels of religiosity in that neighborhood, nor does it account for how much a person interacts with the religious adherents in their county. Still, I do find a relationship in the direction we would predict from cultural explanations (Gervais et al., 2011; Henrich et al., 2006). Greater exposure to religious attendance predicts more belief in God.

2.4.1   Dualism as a Key Intuition Underlying Religious Beliefs

Of the cognitive biases I included in this model, dualism emerged as the strongest predictor of all three beliefs in both samples. I found a significant relationship to life's purpose, even beyond the indirect relationship through religious belief. Dualism is, theoretically, a necessary condition to belief in any disembodied supernatural being (Bloom, 2005; 2007). This includes gods, ghosts, spirits, and the soul. The more strongly people believe minds and bodies as separate, the more likely they are to find these types of beings intuitively plausible. The relationship between dualism and life's purpose is less straightforward. It is possible that the belief that the mind is separate from the body allows people to see minds, and therefore intention, everywhere (see Bering, 2002; 2003a). Dualism may also infuse life with greater meaning to the extent that it encourages the belief that a part of one's self is not identical with the body and, therefore, may continue to exist after bodily death.

2.4.2   The Role of Anthropomorphism

Anthropomorphism, operationalized as the tendency to project human-like

attributes to non-human entities, was not related to belief in God in my model. In the

adult sample, it was not related to belief in God even in a zero-order correlation.

This may be surprising given theories that argue that anthropomorphism and

hyperactive agency detection are underlying features of all supernatural belief

(Barrett, 2000; 2004; 2008; Guthrie, 1993; 1996). It is less surprising when one

considers that the religious conviction of most of our sample is Christian or living in

a majority-Christian culture. In Christianity, and in Abrahamic religions in general,

God is anthropomorphized in the important sense that God has human-like mental

characteristics. God doesn't fit into the template of animism in the Christian

tradition; he is super-human, not human-like. He is a mega-mind without the frailty

of a human body and without basic human needs, like hunger or feelings (H. M. Gray

et al., 2007). Perhaps more importantly, the negative relationship between the

proportion of local religious adherents and anthropomorphism suggests that

Christian believers may actually suppress the tendency to anthropomorphize the

world. This is possibly due to the prohibition of animistic tendencies in Christian

(and more broadly, Abrahamic) folk theology, in which attributing human-like

mental states to non-humans, such as seeing spirits in mountains or trees, goes

contrary to religious teachings, and in some instances is considered idolatry.

Despite the lack of any relationship between anthropomorphism and belief in

God, anthropomorphism still played an important role in other types of beliefs.

Anthropomorphism predicted paranormal belief. Paranormal beliefs may be more

influenced by individual differences in this dimension because they are less strongly regulated by religious institutions (at least in the West). For North Americans, belief in astrology and ESP are not culturally sanctioned the way that belief in God is. Rarely are people ousted from their family and community for questioning the accuracy of divination or the plausibility of astral projection. It is possible that these types of beliefs are closer to our supernatural intuitions about the world. People may naturally be superstitious and prone to believing in some supernatural concepts, but may not passionately commit to God without additional cultural support (Gervais et al., 2011).

2.4.3 Teleology

Teleology was a predictor of all three beliefs, but it was the weakest one. Though not all the paths from teleology are significant, they are all necessary for model fit. There are several possible reasons for why these links are so weak. It may be that teleology, as an over-extension of artifact cognition, really doesn't influence supernatural beliefs all that much, or it could be that our measure of this trait did not quite capture all that I intended it to. It is hard to rule this second option out, as this measure has not been validated as an individual difference construct. Nevertheless, my results are consistent with recent findings (Kelemen et al., 2013), showing that teleological thinking is related to belief in God and belief in spiritual Gaia-type beliefs in Mother Nature. At this point, no hard conclusions can be made on the role of teleology, other than that our measure does appear to be capturing at least some of the variance in religious and paranormal belief.

2.4.4   Life's Purpose and Belief in God

The sense that there is some underlying purpose to life has been argued to be a residual of supernatural belief among the non-religious. Though many people have managed to stop believing in God, the sense that there is some purposeful intentionality behind life remains entrenched (Bering, 2002; 2003b; Slingerland, 2008). My results do not contradict this claim, but they do suggest a somewhat more complex picture. Although our cognitive biases remain predictors of purpose above and beyond the variance predicted by belief in God, belief in God remains the strongest predictor. Further, the model no longer passed the test of fit when we reversed this relationship to have belief in purpose lead to belief in God. This suggests that much of the variance in belief in life's purpose comes from belief in God. The remaining relationships with my cognitive biases could be seen as an intuition towards purpose above and beyond what is encouraged by belief in God, or it could be something left over from growing up in a largely Protestant Christian culture. Going beyond a Christian sample may make it possible to determine which of these views is accurate. Regardless, it does not seem to be the case that purpose is another sort of intuition that leads to belief in a supernatural power. Rather, belief in God appears to lead to a greater sense that there is a purpose to life.

2.4.5   Limitations and Future Directions

The quest for what explains religious belief and disbelief is an important and understudied area of psychological research. My findings provide empirical support for the idea that naturally emerging cognitive tendencies predispose human minds

towards religious beliefs. A particular strength of our findings is my assessment of the interactions of a converging set of cognitive biases in a single theoretical model, which explained several types of supernatural beliefs. Yet, there are several limitations to the current findings. My results are correlational, and although based on path analyses that assessed alternative models (including reverse causation) that found them to be lacking, I cannot conclusively claim causality without further experimental work. Additionally, I relied on mostly self-report measures of cognitive biases that have their limitations. These measures yielded good results, but future research can further advance this work by using non-self-report measures. Moreover, additional work needs to be done to determine both what cognitive traits lead to belief as well as how belief is culturally transmitted within a community and through generations. To really appreciate the complexity of this question, we must recognize that all supernatural beliefs are not identical and may not develop in the same way. Christianity, like other world religions, has a long cultural tradition behind it and upholding it. To truly comprehend what causes supernatural beliefs it is important to examine beliefs, or even superstitions, that have less institutional force behind them as well as full-fledged religious belief.

Chapter 3:   Secularization and the Spiritual Marketplace in the Czech Republic and Slovakia

3.1   Introduction

The modern west has experienced levels of wealth and freedom never before seen in human history. People live longer, have more then they ever have before, and in many places these changes in the human condition have coincided with a widespread decline in religious participation (Norris & Inglehart, 2004). This decline has not gone unnoticed by social scientists, leading to a number of theories that attempt to account for this phenomenon. Understanding the reasons people leave—or don't leave—a religion they were raised in can shed light on many of the cultural and social reasons religions rise and fall, as well as why individuals gain or lose religious belief. These factors work in addition to the cognitive foundations explored in the previous chapter. Understanding the role they play both separately and in tandem with cognition is an important piece of the puzzle of religious beliefs.

In this chapter, I examine several different theories of religiosity and secularization and looked at how they apply to the case study of the Czech Republic and Slovakia. These two countries were chosen because of their similar histories, cultures, languages and geographic location, but striking religious differences. The Czech Republic is a predominantly atheistic country, and Slovakia is a predominantly religious country. I explore and compare how various theories account for the variance in religiosity within and between these two countries. This offers a unique opportunity to explore the possible antecedents of religiosity and

secularization in a real world setting while controlling for many potentially

confounding factors.

One of the earliest of these theories is the secularization theory (see Berger,

1967; Durkheim, Cosman, & Cladis, 1912; Martin, 1968; Weber, 1904; Wilson, 1966)

which claims that engines of modernization, industrialization, urbanization and

education drive the inevitable decline of religious belief (Hadden, 1987; also see

Stark, 1999). As societies develop, the people in those societies come to see religious

concepts as less plausible and begin to leave religion *en masse* in favor of more

secular belief systems, like science. This theory was held with such certainty in the

1960s that it led a prominent sociologist, Peter Berger (1968), to claim in the *New

York Times*, that "[by] the 21st century, religious believers are likely to be found only

in small sects, huddled together to resist a worldwide secular culture". Notably,

Berger recanted this belief later in light of the evidence to the contrary (Berger,

1999). More recently, these ideas have been adopted by the New Atheists to support

a belief in our supposedly inevitable secular future (see Dawkins, 2006); these

claims have not been well supported by research.

Though secularization theory has persisted in its appeal, a quick look at the

world today suggests that the decline of religion is not as inevitable as past theorists

have suggested. Though some modernized countries, such as those in Scandinavia,

have become largely non-religious, others, like the USA, have seen only modest

decline (Zuckerman, 2008). Overall, the percentage of religious people in the world

does not seem to be decreasing (Norris & Inglehart, 2004; Stark, 1999). Even among

scientists, often lauded as the most analytic and therefore least religious among us,

religious beliefs are not uncommon and do not seem to be declining. In 1919, a study was conducted on the religious beliefs of American scientists. In 1996 the survey was replicated and published in *Nature* (Larson & Witham, 1997). The original 1919 survey found that 41.8% of scientists that believed in a personal God. The 1996 survey found that 39.3% of scientists that believed in a personal God. The passing of 80 years showed a negligible and non-significant decrease of 2.5% in the number of scientists who believed in God. A more recent Pew Research poll conducted in 2009 found that 33% of American scientists believed in God and a further 18% believed in a universal spirit or a higher power. Even among scientists, religious beliefs do not seem to be declining at any notable rate, at least not in the USA.

Still, the secularization theory is not entirely without merit. There is evidence to support the contention that modernization and education are related to a decrease in religiosity, albeit with some variation in these effects (see Gruber & Hungerman, 2008; Hungerman, 2014; McCleary & Barro, 2006).[6] What has been most criticized about the theory is its view of secularization as a unilateral force that leads to the inevitable decline of religious belief (Hadden, 1987; Stark, 1999). This idea has been critiqued as overly functionalistic, ignoring the role of spiritual feelings and emotions; it also ignores the substantial body of evidence that shows that religion is not declining with modernization everywhere (Norris & Inglehart, 2004).

Inevitable secularization has been replaced by a broader theory of secularization that takes the role of religious emotions into account (Gorski, 2000;

2003; Sommerville, 1998; 2002). The new aim of these theories has become to explain the variation. One prominent branch of this work, put forward by Norris and Inglehart (2004), is the existential anxiety hypothesis. In this theory, religion plays a prominent role in helping us deal with our existential fears of death, disease and destitution. But as societies modernize and create institutions such as welfare, education and socialized healthcare, our need for religion as a coping mechanism declines. Our existential anxieties are kept at bay by institutions that decrease our chances of dying in the street. Religion, therefore, should decline in places that look after their population with strong secular institutions.

An alternative to the secularization theory is the religious marketplace theory. This theory, originally championed by Stark and Bainbridge (1985), claims that the apparent decline of religious belief is an illusion. Rather than belief disappearing in the modern world, a wider market of alternative beliefs systems, including new religious movements and cults, is replacing traditional religious beliefs in Western culture. The secularization of institutions, especially the separation of church and state and the movement towards religious freedom, allow alternative supernatural beliefs to flourish. The decline we see is caused by people leaving a specific religious group for a wider range of options, many of which contain complex supernatural beliefs, but are explicitly considered 'not religious' by believers (see Roof, 1993). Many of the 'atheistic' countries still have high rates of religion-like beliefs, but these beliefs do not conform to the traditional religious beliefs of those countries (Fuller, 2001). Further, this apparent decline in belief is exaggerated by an overestimate of past religiosity (Stark, 1999). In many places,

modernization has paralleled an increase in religiosity, not a decline. In the USA, for example, religious attendance has nearly tripled since the country's founding (Finke & Stark, 2005), and many Islamic countries have become *more* religious with modernization and education rather than less (Ahmad, 1991; Mutlu, 1996).

The foundation of the marketplace theory—that some people will always remain supernatural believers even if a particular religion declines—parallels the branch of the cognitive science of religion that claims religious belief to be a natural part of being human (Atran & Norenzayan, 2004; Barrett, 2004; Bloom, 2005; Kelemen, 2004). This perspective—that religion is a byproduct of our innate cognitive functions and therefore intuitive—also claims that, even with the decline of religious belief, few people become non-believers in the truest sense of the word (see Geertz & Markússon, 2010). Though the strong version of this—that atheism cannot exist—has been criticized (see Gervais et al., 2011; Norenzayan & Gervais, 2012), individual difference in these tendencies would account for the steady prevalence in supernatural believers through time. Importantly, we can expect that these cognitive biases will be better predictors of non-religious supernatural beliefs then religious ones. People may adopt or dismiss religious beliefs for cultural reasons unrelated to their intuitions towards these beliefs. Other supernatural beliefs will have less specific cultural pressures on them.

A third way to explain why religion would decline in some countries and not in others is through cultural evolution and cultural transmission (Gervais et al., 2011). Humans have evolved as a cultural species: we expertly pay attention and learn culture from those around us (Henrich & Boyd, 1998; e.g. Henrich & Gil-White,

2001). At the same time, the long-term maintenance of cultural traditions requires mechanisms that ensure high-fidelity transmission from one generation to the next. If we look at religious traditions as cultural practices that develop and change over time, religions will change or disappear when the fidelity of transmission is decreases. Put simply, a religion declines when the beliefs and practices of that religion fail to be reliably transferred to new members of a culture.

There are several mechanisms of cultural transmission that are likely to play a part in maintaining a religious tradition. I have chosen to focus on one in particular, credibility enhancing displays (CREDs; Henrich, 2009). The CRED theory suggests that any new member of a culture (e.g. a child or an immigrant) will be more likely to adopt the beliefs and practices of this culture if members of that culture behave in a way that makes those beliefs and practices seem important and sincere. Behavioral displays, such as going to church, paying tithes, or sacrificing livestock, give a sense of dedication, and therefore credibility, to a person's beliefs. A bystander will recognize that it is unlikely that any person willing to give a portion of their income each month to the church is anything but truthful in their belief. If the bystander is exposed to enough of these displays, the bystander will come to see this belief as important and maybe worthy of their own sacrifice. Simply put, seeing people make sacrifices for their religion increases the chance that a new member of society adopts those beliefs and maintains them throughout their lifetime. The decline in belief happens when people are no longer exposed to credible displays of belief.

Like so many competing theories with plausible arguments on all sides, each of these theories are right to some degree. The idea of rational thought leading to declines in religiosity has some support in the psychological literature. Recent findings have shown that people who are better analytic thinkers are less religious on average, and that making people think analytically reduces their ratings of their own religiosity (Gervais & Norenzayan, 2012; Shenhav et al., 2012). Though this relationship appears to be a real one, it is not yet clear if it contributes to the decline in supernatural belief overall or just to specific beliefs that are harder to reconcile with a scientific worldview. Further, there is compelling evidence that as other institutions take over services once provided by the church and remove anxieties that used to be the domain of religious belief, religion does decline (Norris & Inglehart, 2004).

The marketplace theory, paired with the idea that the high religiosity of the past has been exaggerated, offers up a different set of possibilities: that some people will always hold some type of supernatural beliefs within in a society and what changes is only what they believe in. This fits well with both cognitive theories of religion and an increasing body of research within the cognitive science of religion. It supports the proposition that supernatural belief is a natural part of being human. There is something at once intuitive and appealing in these beliefs. Though the number of people that follow a specific set of traditions and beliefs can be pushed around by culture, some number of people will remain supernatural believers, regardless of the religious traditions that surround them (Willard & Norenzayan, 2013).

3.1.1   The Czech Republic and Slovakia

When people talk about atheistic countries and large-scale religious decline, they are frequently referring to the religious decline in Europe (Froese, 2004; Norris & Inglehart, 2004; Zuckerman, 2008). Though the decline in parts of Europe, especially Scandinavia, is indeed noteworthy, the overall decline has been inconsistent, leaving some countries predominantly atheistic, while others maintain a religious majority. Much ink has been spilled explaining these differences (see Gorski, 2003). The Czech Republic and Slovakia fall on either side of this secular/religious divide. The Czech Republic boasts the title of the least religious country in Europe, with only 14% of the population claiming to be religious. Slovakia on the other hand has a Christian majority, with 76% of the population claiming to be religious.

The Czech Republic and Slovakia offer a unique opportunity to test the role of each of the previously mentioned theories of secularization. These two countries share similar recent histories, cultures, languages, and institutions. They were the same country from 1918 to 1993, when they peaceably split into two separate republics. Soviet communists ruled both countries between 1945 and 1989. Despite this, their religious trajectories in the past half-century have differed dramatically. Notably, the Czech republic seems to be the outlier in the region; both Poland and Hungry are similar to Slovakia in that they maintained high levels of religious belief after the fall of communism. The similarities between Czech republic and Slovakia, paired with their enduring difference in religious belief, make them an ideal natural experiment for testing theories of religious belief.

3.1.2   Historical and Cultural Difference

The Czech Republic and Slovakia do have some basic demographic differences. The Czech Republic is more urban, has a higher population density, and is somewhat wealthier with a more educated population than Slovakia. Slovakia also has a higher unemployment rate than the Czech Republic. Though some of these things, especially urbanity and education, have been related to declines in religious belief (see Albrecht & Heaton, 1984), the differences here are not large enough to account for the vast difference in religiosity (Froese, 2005). What is more, the Czech republic is by no means the wealthiest or the most urban country in Europe, yet is still boasts rates of disbelief that are much higher than its more developed neighbors, making this an unlikely cause of the difference.

There are also some important historical differences between these two countries. During their rule, the communist regime actively suppressed both public and individual religiosity and tried to substitute it with the party-oriented Marxist ideological propaganda. Religion played only a minor role in public life during this time, and two generations in both countries had limited exposure to religion and religious rituals. However, in Slovakia and Poland, the Roman Catholic Church served as a symbol of opposition and sanctuary against the oppressing regime. This tie with national identity and resistance caused the church to gain in importance and credibility during the communist oppression. This was manifest in the religious revivals in these two countries in the 1990s. In contrast, the Czech Republic showed only a minor temporary increase after the fall of the iron curtain, and has continued

to decline in recent years (Hamplova & Nespor, 2009; Lužný & Navrátilová, 2001; Minarik, 2014; Nešpor, 2004)

The reason for this difference may be rooted in more distant history. Participation in the Catholic Church declined after protestant Hussite rebellions in 15th century. The Catholic Church took hold once again in the 17th century, and the Czech land became a truly Catholic nation once again (Hamplova & Nespor, 2009). During the crucial formation period of the Czech nation in the 18th century, the historical period of the Hussite rebellion was the glorified as part of the national revival gradually shifting the public perception on the Catholic institutions as being the tools of Hapsburgs' manipulation and oppression. Church membership was perceived as a corrupt relic of medieval ages. The new Czech identity was mostly based on nation, social class and scientific worldview. After Czechoslovakia gained independence in 1918, about 1.5 out of 13.5 million of members of Catholic Church abandoned it.

Despite this historical skepticism of the Catholic Church, as late as 1950, 76.4% of Czechs considered themselves Catholic and 93.9% belonged to a religious group (Hamplova & Nespor, 2009)(Fig. 3.1). At the same time, the history of skepticism may explain some of why the communist oppression of religion had such a different impact in ongoing religiosity in the Czech Republic than it did in either Slovakia or Poland. The Czech people did not see Catholicism as an important part of who they were as a nation. Still, even in 1991, shortly after the fall of communism, 43.7% of Czechs claimed a religious affiliation in the nation census. This suggests that a larger portion of adult Czechs today were raised in religious households or

their parents were raised in religious households, and most of the abandonment of religious institutions has happened in the past 65 years or less.

Change in Christian Adherants Over Time
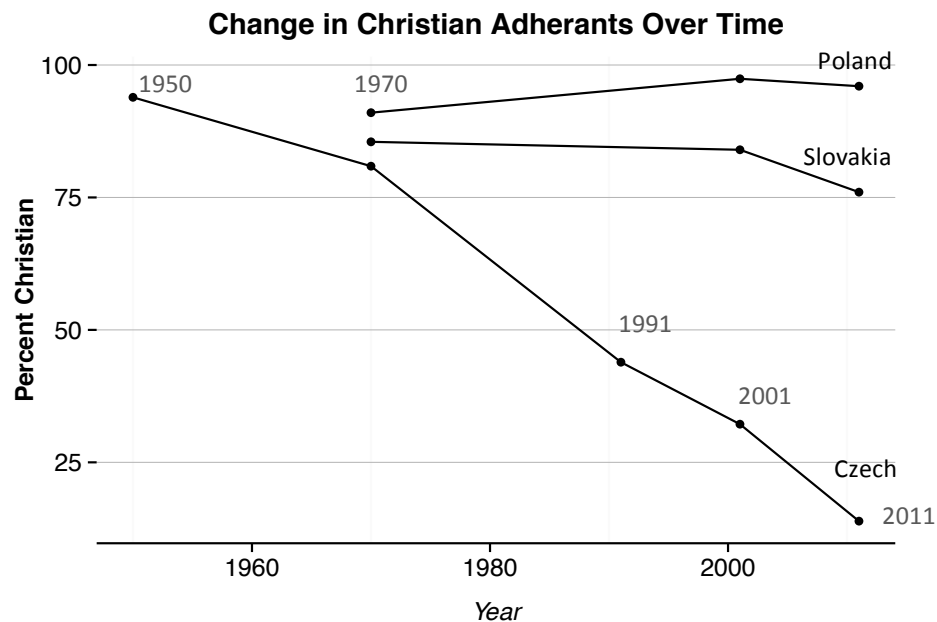
Figure 3.1: Percentage of Religiously affiliated based on census data from 3 countries. The data from 1970 is an estimate from the World Christian Encyclopedia (D. Barrett, 2001).

3.1.3   Current Research

Whatever the potential historical impacts on the religious difference in the Czech republic and Slovakia, this difference can be exploited to assess the explanatory power of different theories of religiosity and religious decline. I collected data in both the Czech Republic and Slovakia and used these samples to examine evidence for the previously mentioned theories of secularization. I used individual difference measures relevant to each theory to evaluate which of these theories would best explain the religious differences between these two countries, as well as the individual variance in religious beliefs and practices within them. This allows me to explore these theories in two ways. First, I can look at which sets of

predictors best explain the secularization of the Czech Republic; second, I can address questions about which sets of variables explain the most variance in religious belief overall. The analysis is split into five sections, each addressing a different theory:

Analysis 1

In the first analysis section, I assessed the role of the cognitive biases explored in the previous chapter in predicting different types of beliefs. I assess both the country level difference in these cognitive biases and the amount of over all variance in belief these biases explain. I expected these biases to be more predictive of paranormal belief then religious belief, and more predictive of religious belief then religious practice. People participate in religion and hold religious beliefs for other reasons then how intuitive they find these beliefs. This should lessen the strength of intuition as a predictor. Any country level difference would suggest that the cognitive biases are learned via exposure to culture and environment rather then based in based in our core cognitive functions. Since these biases are considered based in our core cognitive functions (Barrett, 2004; Boyer 2008; Kelemen, 2004), a country level difference was not expected. In this analysis, I replicated the path model from the previous chapter to show that the same set of relationships apply to this new sample. Second, I assessed how much variance in belief in God and paranormal belief is accounted for by these cognitive biases. This allowed me the compare the relative predictive power of cognitive biases on each type of belief. Finally, I looked at how these variables predict the practice of religion.

Analysis 2

In the second analysis section, I assessed the impact of government institutions, such as social safety nets like healthcare and welfare, and perceptions of these institutions, on religious belief. If strong secular institutions can account for a decline in existential insecurity, and therefore the religious difference in these two countries, then there should be a large country level difference in either institutions or the perception of institutions. Since the secular institutions in these two countries are quite similar, it is unlikely that this will play much of a role. Still, it is how strong people think these institutions are, and how much they worry about them failing, that should be doing most of the work. The perception questions included in the study were meant to capture this. In addition to looking at the country level difference, I assessed how much variance these variables predict in belief in God, paranormal belief and religious practice.

Analysis 3

The third analysis section looks at the role of credibility enhancing displays in supernatural belief and religious practice. The CREDs scale looks at childhood exposure to credible displays of religious belief. As with the previous sections, I assessed the country level difference in this scale as well as how much variance it can explain in belief and practice. Based on the historical summary above, I expected CREDs to play an important role in predicting current religious beliefs. To assess if it is CREDs specifically, rather than just being raised religiously, that account for this difference, I included an additional analysis that looked at only those who were raised religiously and used CREDs to predict who would still be religious as an adult.

Analysis 4

Finally, in analysis four, I looked at all these variables in a single model to see if all theories remain relevant when tested together. These are not mutually incompatible theories, so I expect their effects to be additive in nature. Analyzing them in a single regression allows me to test this directly.

3.2   Methods

Data from both samples was collected as self-report questionnaires. This data was collected on behalf of the researchers by the Czech branch of IPSOS market research firm. The questionnaires were translated into Czech and Slovakian by a bilingual researcher familiar with the theories and scales aided by a professional translator, and then back translated into English. Any inconsistencies in the back translation were corrected. Additional country and district level data was gathered from census and other government agencies. Measures were presented in a randomly generated order. All belief and religion questions came at the end of the survey after all other measures were completed. Demographic variables were collected by IPSOS separately.

I will briefly describe the belief measure here, since they are used as dependent variables in all of the analysis sections below. The predictor variables used in each analysis section will be described at the beginning of that section.

3.2.1   Belief and Practice

Belief in God: Belief in God was measured with the same three-question scale used in the previous chapter ($\alpha = 0.71$).

Religious Participation: This included rating of church attendance, prayer, and religiosity (α = 0.92).

Paranormal belief: Paranormal belief was measured using the revised paranormal belief scale (Tobacyk, 2004). The religiosity subscale was removed because it overlapped with the other belief measures. The mystical animals subscale was also removed due to its cultural specificity (α = 0.94).

Life's Purpose: Life's purpose was measured using the same three-question scale used in the previous chapter (α = 0.69).

Affiliation: In the previous chapter, affiliation data was collected based on church membership reported by churches. In the current sample, the affiliation by area measure came from the Czech and Slovakia censuses and based on self-report church membership.

3.2.2   Participants

Two representative samples were collected by IPSOS from their paid subject pool, one in the Czech Republic (N = 1010) and one in Slovakia (N = 1012). Both the Czech and Slovakia sample consist of 50% females and have a mean age of 40.6 years (*sd* = 13.23) and 41.3 years (*sd* = 13.22) respectively.

3.2.3   Religious Profiles of the Two Countries

As expected, the Slovakian sample rates far higher in religious belief than the Czech sample (Czech: M = 2.89, SD = 1.48; Slovakia: M = 4.12, SD = 1.58; Welch $t(1917.60)$ = -19.02 $p < 0.001$, d = -0.85). Both samples hold similar levels of paranormal beliefs (Czech: M = 3.32, SD = 1.16; Slovakia: M = 3.24, SD = 1.13; Welch

t(2001.06) = 1.58 *p* = 0.11, *d* = 0.07) and life's purpose (Czech: M = 4.30, SD = 0.95;

Slovakia: M = 4.36, SD = 0.93; Welch *t*(1999.09) = -1.61 *p* = .11, *d* = -0.07). Though

only 17% of the Czech sample said they were religious, 40% claimed to believe in 'a

spiritual life force'. A further 15% believed God to be 'within them'. Only 8%

believed explicitly in a personal God (see Fig 1). This suggests that, though the Czech

Republic is a largely non-religious country, the Czech people still hold a substantial

number of supernatural beliefs. They are 'atheistic' only in the sense that they tend

to not believe in a personal god, but not in the sense that they believe in nothing at

all.

Types of Belief

Czech Slovakia
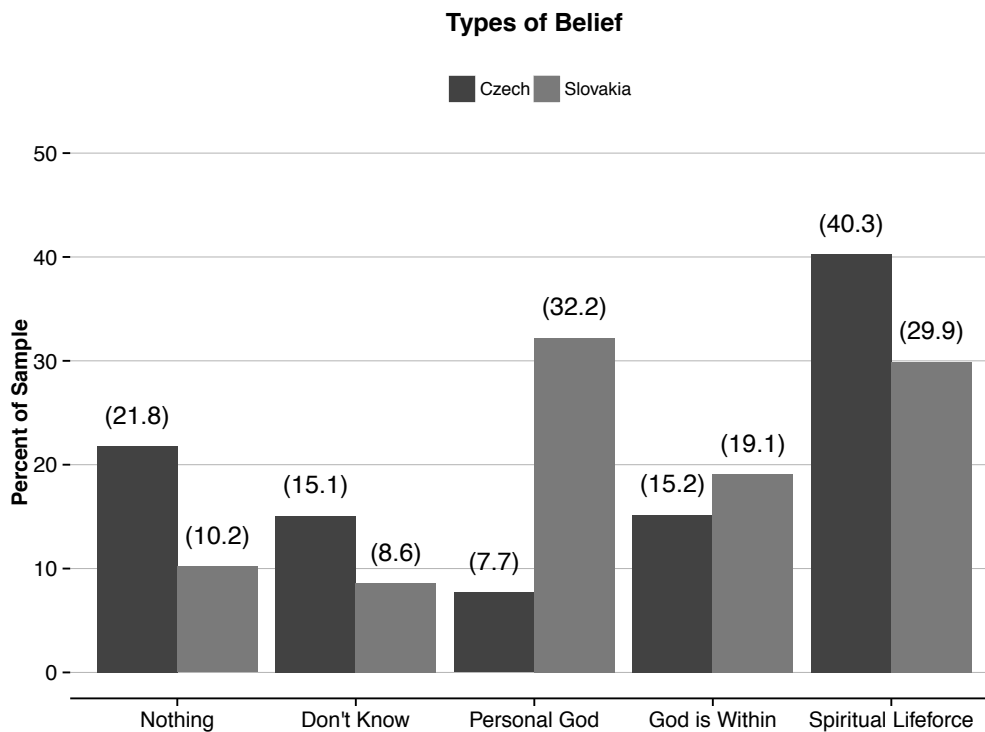
Figure 3.2: Percentage of participants from each country for each type of belief, based on forced choice answers. Percentages are in parenthesis.

3.3 Analysis 1: Cognitive Biases as a Basis for Belief

The previous chapter explored the relationship between cognitive biases and belief with a path model (also see Willard & Norenzayan, 2013). I replicated that model here. I focused on the final model, which included a measure of affiliation in the participants' county as a predictor. In addition, I ran a second model using country as a proxy for affiliation to test for country level differences in this effect.

The path model tests how these cognitive biases are related to supernatural belief, but does not answer questions about how much of that belief is explained by these variables. To test this, I ran a set of three regression models, one for belief in God, one for paranormal belief, and the last for religious practice. The base model contained only relevant demographic variables (country, age, gender, marital status, number of children, income bracket, level of education, and size of town). This model assessed how much variance is explained by these demographics alone. Since this first model contains variables such as urbanization and education, it should explain a substantial portion of the variation in supernatural belief if the secularization theory is correct. The marketplace theory suggests that this may be true of traditional religious beliefs, but not of supernatural beliefs overall. With these demographic shifts comes a greater degree of religious freedom, and people abandon traditional beliefs when other beliefs become available to them.

Model 1 includes a measure of analytic thinking. Previous work has shown that higher levels of analytic thinking leads to a decline in religious belief (Gervais & Norenzayan, 2012; Pennycook et al., 2012; Shenhav et al., 2012). I looked at the effects of analytic thinking, both alone and as a part of model 2. In model 2, I added

dualism, anthropomorphism, teleology, and mentalizing. Comparing the adjusted R^2 values of these three models allowed me to estimate how much, if any, additional variance analytic thinking and the cognitive biases explained over the base model. Analytic thinking remained in this third model to see if lower levels of analytic thinking skills can account for the effects of these cognitive biases.

I looked at these models in terms of three separate dependent variables: belief in God, paranormal belief, and religious practice. If cognitive biases predict supernatural belief generally, rather than religious belief specifically, then these cognitive biases should have more explanatory power in predicting paranormal belief than belief in God. Belief in God is often a specific institutionally sanctioned belief. Many people may believe in God because of how they were raised or the religiousness of their surrounding culture rather than an intuitive appeal of the concept itself. In both the Czech Republic and Slovakia, cultural and historic circumstance may strongly determine this belief regardless of a participant's intuitions towards the supernatural. Paranormal beliefs are also determined by culture, but have less institutional control. Even if someone has the intuitive sense that there is an agent-like regulation of the world, they are unlikely to come up with a system like astrology without cumulative culture. Still, the adoption of these beliefs is much more flexible. In either a highly religious or a highly non-religious society, religious belief may come with far greater social consequences. This freedom of choice in paranormal belief should allow an individual's intuitions to have a larger impact on belief. Cognitive biases should have little or no impact on

the practice of religion, and any relationship that does exist should disappear when belief in God is controlled for.

3.3.1 Materials

Anthropomorphism: I measured anthropomorphism with the Individual Differences in Anthropomorphism Quotient (IDAQ) (Waytz, Cacioppo, & Epley, 2010a)(α = 0.87).

Dualism. I used Stanovich's (1989) Dualism Scale to measure dualism (α = 0.77).

Teleology. I used a series of statements created by Kelemen and Rosset (2009) to test teleology (α=0.92).

Mentalizing. I used the Empathy Quotient to measure mentalizing (Baron-Cohen & Wheelwright, 2004)(α=0.87).

3.3.2 Results

3.3.2.1 Path Model

The model was fit with the Lavaan package in R (Rosseel, 2012) using a full information maximum likelihood (FIML) method to deal with a small amount of missing data. The model was replicated across both countries (Yuan-Bentler X^2(9, N = 1916) = 97.38, p < 0.001; CFI = 0.95; RMSEA = 0.07; Fig. 3.2), but the fit was only modest. After looking for additional unspecified variance, I found an additional correlation between the error values of mentalizing and purpose (λ = 0.16, z= 6.86, p < 0.001). Including this puts the fit at a much more acceptable level (Yuan-Bentler X^2(8, N = 1916) = 58.48, p < 0.001; CFI = 0.97; RMSEA = 0.05). This addition does not change the hypothesis or conclusion of previous work in any substantial way. The

final model presented in the previous chapter had a non-significant X^2, suggesting an excellent fit. Though I did not replicate this level of fit here, a high level of fit is indicated by all other fit indices. The X^2 test of fit is less likely to fit with increases in samples size (the sample size is almost doubled here), making it a highly conservative test of fit and the model presented here is a good fit by both the RMSEA and the CFI.

Importantly, I replicated the finding that living in an area with high religious affiliation increases religiosity but decreases anthropomorphism. This effect can also be found by replacing the affiliation measure with a dummy code representing "Country" (Czech = 0; Slovakia = 1). This is unsurprising given that most of the variance seen in the adherents measure was found between, rather than within, the two countries (see Fig. 3.4). People living in Slovakia are more likely to believe in God ($\lambda = 0.33$, $z = 16.63$, $p<0.001$) and less likely to anthropomorphize ($\lambda = -0.12$, $z = -5.50$, $p<0.001$) when compared to people in the Czech Republic. Average anthropomorphism was higher in the Czech Republic (mean = 2.87, SD = 1.15) than Slovakia (mean = 2.60, SD = 1.17; Welch $t(1978.991) = 5.20$, $p < 0.001$, $d = 0.23$). There is no significant difference between countries in any other cognitive bias.
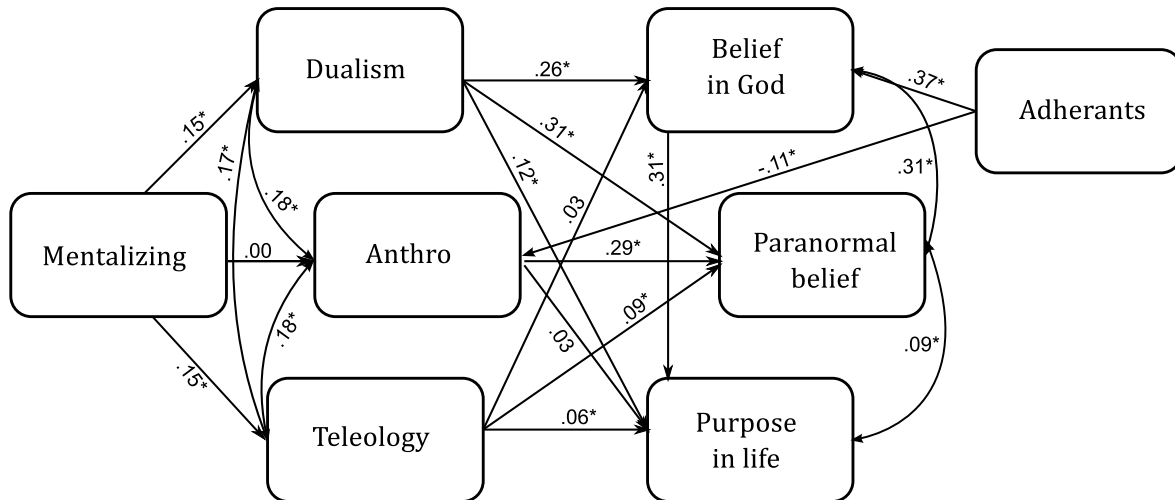
Figure 3.3: The path model across both countries. Yuan-Bentler X^2(9, N = 1916) = 97.38, $p <$ 0.001; CFI = 0.95; RMSEA = 0.07. This is a modest fit. When an additional relationship is included between mentalizing a purpose (λ = .16, z= 6.86, p <0 .001), improves the fit (Yuan-Bentler X^2(8, N = 1916) = 58.48, $p <$ 0.001; CFI = 0.97; RMSEA = 0.05).
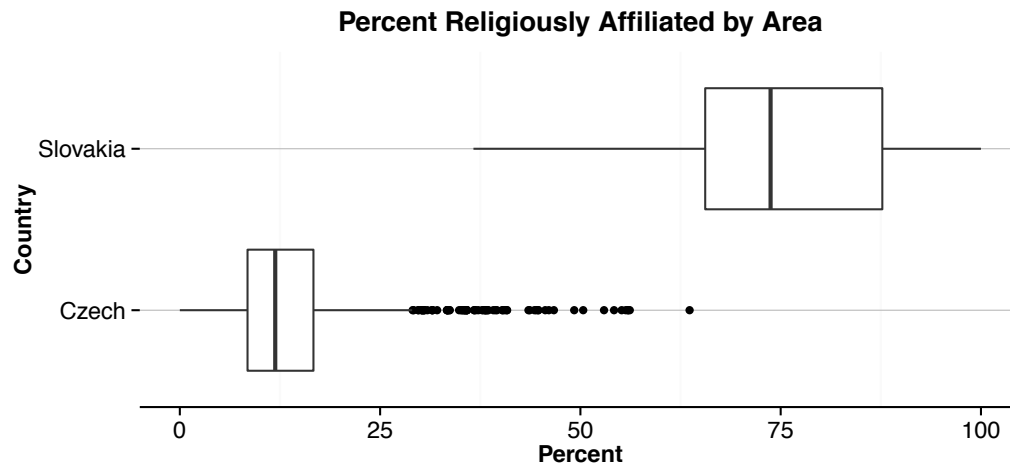
Figure 3.4: The percentage of people who are religiously affiliated in the local district of each participant.

3.3.2.2 Regression Analysis

In addition to country, age (in decades), and gender, shown in each table, the base model included marital status, number of children, income, education and size of place (population density). Marital status, income bracket, education level, and

population density were all collected as categorical variables (e.g. income between €20,000 - €39,999 per year) and included as dummy codes. Since this required each category to be its own variable, there were a total of 23 variables in the base model. The regional rates of affiliation were excluded because the high covariance with country produced multicolinearity effects. The demographic only base model accounts for 14% of the variance in belief in God and 17% of the variance in religious practice, but only 4% of the variance in paranormal belief (see Table 3.1).

Analytic thinking was added in model 1. The findings show that as people get better at analytic thinking they are less likely to adopt paranormal beliefs (β = -0.15), and less likely to engage in religious practices (β = -0.08), but there was no effect for belief in God (β = -0.01). There was also a small difference in amount of variance explained by model 1 over the base model for paranormal belief only (ΔR^2 = 0.02, F(5, 1815) = 32.53, p < 0.001, partial η^2 = 0.02). When the cognitive bias variables were added in model 2, I found a significant difference between the base model and model 2 in belief in God (ΔR^2 = 0.08, F(5, 1811) = 37.97, p < 0.001, partial η^2 = 0.09), paranormal belief (ΔR^2 = 0.21, F(5, 1811) = 105.38, p < 0.001, partial η^2 = 0.22) and religious practice (ΔR^2 = 0.03, F(5, 1811) = 17.34 p < 0.001, partial η^2 = 0.05). The only cognitive predictor that predicted religious practice was dualism (β = 0.17), but this effect disappears if belief in God is controlled for (β = 0.002, 95% CI: -0.03 to 0.04).

Table 3.1: Cognitive Biases Predicting Belief and Practice. The base model contains only demographic variables; model 1 contains both demographic variables and analytic thinking; model 2 contains all variables in model 1, plus the cognitive bias variables.

	Base Model			Model 1			Model 2		
		95% CI			95% CI			95% CI	
	B(SE)	lower	upper	B(SE)	lower	upper	B(SE)	lower	upper
God									
Intercept	-0.40 (016)*	-0.71	-0.08	-0.40 (0.16)*	-0.72	-0.08	-0.42 (0.17)*	-0.76	-0.09
Slovakia	0.58 (0.05)***	0.49	0.68	0.58 (0.05)***	0.49	0.68	0.56 (0.05)***	0.47	0.65
Age	-0.03 (0.02)	-0.07	0.02	-0.03 (0.02)	-0.07	0.02	-0.01 (0.02)	-0.05	0.03
Female	0.17 (0.05)***	0.07	0.27	0.17 (0.05)***	0.07	0.27	0.11 (0.05)*	0.02	0.20
Analytic				-0.01 (0.02)	-0.06	0.04	0.03 (0.02)	-0.02	0.08
Mentalizing							0.09 (0.02)***	0.05	0.14
Anthro							0.05 (0.02)*	0.01	0.09
Dualism							0.25 (0.02)***	0.20	0.29
Teleology							0.02 (0.02)	-0.03	0.06
	Adj. R² =0.14,			Adj. R² =0.14,			Adj. R² = 0.22,		
	$F(23, 1816) = 13.70, p < 0.001$			$F(24, 1815) = 12.23, p < 0.001$			$F(28, 1811) = 19.89, p < 0.001$		
Paranormal									
Intercept	0.18 (0.19)	-0.18	0.56	0.24 (0.17)	-0.10	0.57	-0.04 (0.15)	-0.29	0.34
Slovakia	-0.02 (0.05)	-0.12	0.08	-0.04 (0.05)	-0.14	0.06	-0.02 (0.05)	-0.11	-0.07
Age	-0.04 (0.02)	-0.08	0.01	-0.06 (0.02)	-0.11	0.01	0.02 (0.02)	-0.06	0.02
Female	0.23 (0.05)***	0.13	0.33	0.19 (0.05)***	0.08	0.29	0.11 (0.05)**	0.02	0.21
Analytic				-0.15 (0.03)***	-0.20	-0.10	-0.06 (0.02)*	-0.10	-0.01
Mentalizing							0.05 (0.02)*	0.004	0.09
Anthro							0.29 (0.02)***	0.25	0.33
Dualism							0.29 (0.02)***	0.25	0.33
Teleology							0.07 (0.02)**	0.02	0.11
	Adj. R² = 0.04,			Adj. R² = 0.06,			Adj. R² = 0.26,		
	$F(23, 1816) = 4.74, p < 0.001$			$F(24, 1815) = 5.97, p < 0.001$			$F(28, 1811) = 23.82, p < 0.001$		
Religious Practice									
Intercept	-0.30 (0.16)†	-0.61	0.01	-0.30 (0.16)†	-0.61	0.01	-0.34 (0.16)*	-0.65	-0.04
Slovakia	0.69 (0.05)***	0.60	0.79	0.68 (0.05)***	0.59	0.78	0.67 (0.04)***	0.58	0.77
Age	-0.01 (0.02)	-0.05	0.04	-0.003 (0.02)	-0.05	0.04	0.01 (0.02)	-0.04	0.05
Female	0.11 (0.05)*	0.01	0.20	0.09 (0.05)†	-0.001	0.19	0.06 (0.05)	-0.03	0.16
Analytic				-0.08 (0.02)***	-0.13	-0.03	-0.05 (0.02)*	-0.10	-0.003
Mentalizing							0.03 (0.02)	-0.01	0.07
Anthro							0.04 (0.02)	-0.01	0.08
Dualism							0.17 (0.02)***	0.12	0.21
Teleology							0.01 (0.02)	-0.03	0.06
	Adj. R² = 0.17,			Adj. R² = 0.18,			Adj. R² = 0.21,		
	$F(23, 1816) = 18.03, p < 0.001$			$F(24, 1815) = 17.8, p < 0.001$			$F(28, 1811) = 18.47, p < 0.001$		

Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001. Additional control variables included in models: number of children, marital status, education, income, and size of place.

Since there is a substantial difference in belief in God between the Czech Republic and Slovakia, I ran the base model and model 2 predicting belief in God for each country separately (Table 3.2). There are a few differences in how these

variables predict belief between these two countries. Most notably,

anthropomorphism is a predictor of belief in God in the Czech sample. This is not the

case in the Slovak sample and is not the case in previous samples from North

America (see previous chapter). When I looked only at the participants in the Czech

republic who claimed to be religious (n=176), I again found no relationship (β = -

0.004, 95% CI: -0.13 to 0.12). This positive relationship seems to be driven by the

remaining non-religious participants (n=770; β = 0.14, 95% CI: 0.09 to 0.20). Since

these cognitive variables seem to predict belief but not practice, I did not look at

religious practice in this analysis.

Table 3.2: Cognitive biases predicting belief in God within country. The base model contains only demographic variables; model 2 contains both demographic variables and cognitive bias variables.

	Base Model			Model 2		
		95% CI			95% CI	
	B(SE)	lower	upper	B(SE)	lower	upper
Czech Republic - God						
Intercept	-0.60 (0.23)**	-1.06	-0.15	-0.76 (0.22)	-0.67	-0.04
Age	-0.01 (0.03)	-0.08	0.05	0.02 (0.03)	-0.04	0.05
Female	0.15 (0.07)*	0.02	0.29	0.10 (0.07)	-0.02	0.17
Analytic				0.05 (0.03)	-0.04	0.06
Mentalizing				0.06 (0.03)*	0.05	0.14
Anthro				0.13 (0.03)***	-0.01	0.07
Dualism				0.23 (0.03)***	0.21	0.30
Teleology				-0.04 (0.03)	-0.02	0.07
	Adj. R^2 = 0.05,			Adj. R^2 = 0.14,		
	F(22, 887) = 3.07, p < 0.001			F(27, 882) = 6.51 p < 0.001		
Slovakia - God						
Intercept	0.43 (0.24)	-0.04	0.90	0.51 (0.23)*	0.06	0.95
Age	-0.04 (0.03)	-0.10	0.03	-0.04 (0.03)	-0.10	0.03
Female	0.17 (0.07)*	0.03	0.31	0.09 (0.07)	-0.04	0.22
Analytic				0.02 (0.04)	-0.05	0.09
Mentalizing				0.13 (0.03)***	0.07	0.19
Anthro				-0.02 (0.03)	-0.08	0.05
Dualism				0.26 (0.03)***	0.20	0.32
Teleology				0.08 (0.03)*	0.01	0.14
	Adj. R^2 = 0.02,			Adj. R^2 = 0.13,		
	F(22, 907) = 2.01, p = 0.004			F(27, 902) = 5.96, p < 0.001		

Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001. Additional control variables included in models: number of children, marital status, education, income, and size of place.

3.3.3   Discussion

Comparing across the regression models gives a picture of the relative importance of different groups of predictors in predicating different types of belief. Belief in God and paranormal belief are both predicted by these models, but both the pattern and relative strength of prediction differ. First, demographics predict far more of the variance in belief in God and religious practice then paranormal belief.

This is largely due to the country level difference in these variables. When I looked at belief in God in the two countries separately, the variance explained by the demographics alone is similar to that of paranormal belief (Czech = 4% and Slovakia = 2%). Where a person lives is the strongest demographic predictor of belief in God in this sample, but has no effect on paranormal belief.

When the demographic model (base model) is compared to the cognitive model (model 2), the prediction that cognitive biases explain more variance in paranormal belief (21 pp[1]) than belief in God (8 pp) is supported. Belief in God, in this sample, is strongly related to specific Christian religious beliefs. Cultural pressure in a country with high number of believers may push people to adopt or abandon religious beliefs regardless of how intuitive they find them. Paranormal beliefs, on the other hand, have less specific cultural pressure on them. People are freer to adopt or not adopt these beliefs depending on their intuitions. When I looked at religious practice, dualism remained significant but the additional variance explained was only 3 pp. The dualism effect disappears if I add belief in God into the model. This implies that cognitive biases are only predicting supernatural belief and have little or no additional affect on a person's tendency to adopt religious practices.

The lack of country level differences in any cognitive bias other than anthropomorphism (discussed below) gives some support to the theoretical causal direction of these variables. If belief in God was the root of these cognitive tendencies, then there would be a corresponding country level difference in

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[1] pp = percentage points.

cognitive biases. Instead, the similar level of these cognitive biases in both countries

suggests that these variables are largely unaffected by changes in religious beliefs.

This cannot rule out the possibility that there is a third variable causing both these

cognitive biases and religious belief.

The one cognitive variable that does differ between countries is

anthropomorphism, but it is higher in the less religious country. The path analysis

replication confirms the finding that anthropomorphism is not related to belief in

God, thought this cannot be generalized past majority Christian countries at this

time. This suggests that being religious (or at least Christian) actually reduces, or

perhaps suppresses, the tendency to anthropomorphize. Similar to the argument

made for religious belief above, paranormal belief cannot account for this country

level differences. Though paranormal belief could cause the similarly in dualism

between the two countries, for paranormal belief to be causing the difference in

anthropomorphism, paranormal belief would have to be substantially higher in the

Czech Republic than Slovakia, and this is not the case. Overall, this analysis makes

the case that individual differences in these cognitive biases are a foundation for

individual differences in supernatural belief.

3.4   Analysis 2: Institutional Trust and the Existential Anxiety Hypothesis

Though the predictive ability of cognitive biases and the maintenance of

some supernatural beliefs in the Czech Republic lend support to the marketplace

hypothesis, these factors cannot account for the massive decline in religiosity in the

past 65 years. For this, I turn to other secularization theories. One potential

explanation for this decline is the Czech Republic's strong secular institutions. As secular institutions replace many of the roles of religious institutions, and systems like welfare and healthcare assuage basic fears, the importance of religion in people's lives declines (Norris & Inglehart, 2004).

One immediate problem with this hypothesis in these countries is that both the Czech republic and Slovakia have very similar institutions (Froese, 2004). Relatedly, both countries have a Gini Coefficient of 2.6, making them a tie for the fourth highest level of income equality in the world (after Denmark, Sweden and Norway). The similarity in institutions between these two countries suggests that the strength of institutions is unlikely to explain the religious difference. Their high global ranking in terms of the income equality and strength of their secular institutions suggests that both countries should be equally non-religious.

Focusing on the reduction in existential anxieties that comes with strong secular institutions gives a slightly different explanation. If it is specifically the reduced anxiety associated with strong institutions that causes the decline in religiosity, then this decline will be based on individuals' perception of the strength of their institutions and how much they worry about them failing (Norris & Inglehart, 2004). Even in a place with high levels of institutional support, peoples may differ in how much they believe these institutions really look out for them. A person who thinks that the welfare and healthcare systems will not support them when they are in need may still use religion to decrease the existential anxiety these beliefs produce, even if these beliefs are entirely unfounded.

In this section, I looked at the effects of both actual institutions and the perception of institutions on religious belief in these two samples. First, I looked at county level difference in perceptions of institutional support. There must be sizable county level differences feelings of insecurity for these variable to explain the county level difference in religiosity. As with the cognitive biases above, I compare a model that includes these institution and perception of institution to a base model of demographic variables to see how much additional variance these variables explain. Though there are no specific predictions of the existential anxiety on non-religious supernatural beliefs, I analyzed the effects on paranormal beliefs as well as belief in God and religious practice. If there is an effect here, it will suggest that the existential anxiety hypothesis affects the prevalence of supernatural belief more generally, not just religious belief.

3.4.1 Materials

I measured people perceptions of insecurity in the following categories. Each category was measured using 3 questions (see Appendix A). *Financial insecurity* assesses participant's fears of not having enough money or becoming destitute ($\alpha=0.84$). *Physical insecurity* assesses feelings of personal safety and fear of crime ($\alpha=0.76$). *Social insecurity* assesses fears about social services, such as welfare and healthcare failing ($\alpha=0.76$). *Inequality* assesses perceptions and feelings about the gap between the rich and poor ($\alpha=0.79$). *Trust* assesses participant's trust in other people in their society ($\alpha=0.64$).

Additional data on institutions was collected for each participant's district from census and other government data. Levels of unemployment, as well as crimes, number of doctors and number of social facilities per 1000 people were collected for each participant's local district. These variables give an objective assessment of institutional support at a local level.

3.4.2 Results

Though there are some significant country level differences in the perception of insecurity variables, all the effects are negligible ($ds<0.20$, see Table 3.3). Due to the high level of similarity between Czech and Slovakia, these variables cannot explain the country level difference, but they may still explain individual level differences across the two countries. The difference in actual institutions is greater, especially unemployment with a $d=1.04$, but the inclusion of these variables into the regression models does not reduce the country level difference in religiosity or religious practice (see Table 3.4). These institutional differences should be compared with some caution, as slight differences in how these variables are measured in each country may slightly bias these results (i.e. how doctors or social facilities are counted).

Table 3.3: Means and effect sizes of mean differences between countries for all insecurity variables.

	Czech Mean (sd)	Slovakia Mean (sd)	Cohen's d	d 95% CI	
				lower	upper
Financial Insecurity	4.59 (1.47)	4.55 (1.51)	0.02	-0.07	0.11
Physical Insecurity	3.65 (1.39)	3.53 (1.35)	0.09	0.004	0.18
Social Insecurity	2.35 (1.23)	2.45 (1.26)	-0.08	-0.16	0.01
Inequality	5.31 (1.08)	5.23 (1.08)	0.05	-0.04	0.14
Trust	3.73 (0.93)	3.91 (0.87)	-0.19	-0.28	-0.11
Unemployment	8.40 (2.94)	13.05 (0.58)	-1.04	-1.13	-0.95
Doctors	3.21 (1.39)	3.46 (2.47)	-0.12	-0.21	-0.04
Crime	2.36 (1.20)	1.61 (0.85)	0.71	0.67	0.81
Social Facilities	0.31 (0.08)	0.24 (0.09)	0.76	0.67	0.86

I looked at how the perception of insecurity affected each of the three dependent variables (religious participation, belief in God and paranormal belief), controlling for actual district level institutions (Table 3.4). Both perceptions of physical insecurity and insecurity of social services were significantly and positively related to religious participation. Still, the amount of overall variance these variables account for compared to the base model is minimal ($\Delta R^2 = 0.03$, $F(5, 1874) = 14.73$, $p < 0.001$, partial $\eta^2 = 0.04$). If I look at the effects of these variables of belief in God, only trust is significant ($\beta = 0.06$, 95% CI: 0.02 to 0.11), and the increase in variance explained is extremely small ($\Delta R^2 = 0.006$, $F(5, 1874) = 2.8$, $p = 0.02$, partial $\eta^2 = 0.007$). The effects of perceived security on paranormal belief are more apparent. Despite this, the additional variance explained by these variables is once again small ($\Delta R^2 = 0.03$, $F(5, 1874) = 10.67$, $p < 0.001$, partial $\eta^2 = 0.03$). Among the institutional variables, unemployment was a significant predictor of religious participation. Since this variable is a percentage, this means that for one standard deviation change in religious participation, the unemployment rate increases by

0.01%. Crime rate is significant for paranormal belief. This variable can be

interpreted as an increase of 0.06 crimes per 1000 people for a one standard

deviation increase in paranormal belief. Both of these effects are small.

When I look at these effects in each country separately, some country specific

effects do emerge (Table 3.4). Most notably, the effects of the perception variables

predicting paranormal belief are only found in Slovakia, not the Czech republic.

Similarly, the effect of crime rate predicting paranormal beliefs also appears to be

specific to Slovakia. It is unclear what would cause this difference.

Table 3.4: Perceptions of Insecurity and institutions predicting practice and belief. Each model represents a different DV (religious practice, belief in God, and paranormal belief). Table is split into three sections by country (both countries, Czech Republic, Slovakia).

	Religious Practice			God			Paranormal		
		95% CI			95% CI			95% CI	
	B(SE)	lower	upper	B(SE)	lower	upper	B(SE)	lower	upper
	Both Countries								
Intercept	-0.39 (0.20)†	-0.78	0.002	-0.37 (0.21)†	-0.78	0.04	-0.08 (0.22)	-0.50	0.34
Slovakia	0.64 (0.06)***	0.51	0.75	0.53 (0.06)***	0.42	0.66	-0.07 (0.06)	-0.19	0.06
Age	-0.01 (0.02)	-0.06	0.03	-0.03 (0.02)	-0.08	0.01	-0.06 (0.03)*	-0.11	-0.01
Female	0.11 (0.05)*	0.02	0.21	0.17 (0.05)***	0.07	0.26	0.20 (0.05)***	0.10	0.30
Financial Insec.	-0.00 (0.02)	-0.05	0.05	0.01 (0.03)	-0.04	0.06	0.09 (0.03)**	0.03	0.14
Physical Insec.	0.05 (0.02)*	0.01	0.10	0.02 (0.02)	-0.03	0.07	0.08 (0.03)**	0.03	0.13
Social Insec.	0.14 (0.02)***	0.10	0.19	0.03 (0.02)	-0.01	0.08	0.07 (0.02)**	0.02	0.12
Inequality	-0.03 (0.03)	-0.08	0.02	-0.004 (0.02)	-0.05	0.04	-0.07 (0.03)**	-0.12	-0.02
Trust	0.04 (0.02)†	-0.001	0.09	0.06 (0.02)**	0.02	0.11	0.05 (0.02)*	0.001	0.10
Unemployment	0.01 (0.005)*	0.003	0.02	-0.01 (0.01)	-0.004	0.02	0.01 (0.005)†	-0.00	0.02
Doctors	-0.02 (0.02)	-0.06	0.02	-0.01 (0.02)	-0.05	0.03	0.03 (0.03)	-0.01	0.07
Crime	0.02 (0.03)	-0.03	0.08	-0.01 (0.03)	-0.07	0.04	0.06 (0.03)*	0.003	0.12
Social Facilities.	-0.14 (0.25)	-0.63	0.33	-0.06 (0.25)	-0.55	0.44	-0.05 (0.26)	-0.57	0.47
	Adj. R^2 = 0.20,			Adj. R^2 = 0.14,			Adj. R^2 = 0.07,		
	F(32, 1807) = 15.90, $p < 0.001$			F(32, 1807) = 10.36, $p < 0.001$			F(32, 1807) = 5.51, $p < 0.001$		
	Czech Republic								
Intercept	-0.58 (0.25)*	-1.08	-0.09	-0.61 (0.30)*	-1.18	-0.03	0.04 (0.32)	-0.60	0.68
Age	-0.02 (0.03)	-0.08	0.04	-0.02 (0.03)	-0.10	0.04	-0.07 (0.03)*	-0.15	-0.003
Female	0.04 (0.06)	-0.07	0.16	0.17 (0.07)*	0.03	0.30	0.19 (0.08)*	0.04	0.34
Financial Insec.	0.01 (0.03)	-0.05	0.07	0.01 (0.04)	-0.06	0.08	0.07 (0.04)†	-0.01	0.15
Physical Insec.	0.03 (0.03)	-0.03	0.08	-0.004 (0.03)	-0.07	0.06	0.03 (0.04)	-0.04	0.10
Social Insec.	0.15 (0.03)***	0.10	0.21	0.08 (0.03)*	0.01	0.14	0.07 (0.04)†	-0.00	0.14
Inequality	-0.03 (0.03)	-0.09	0.02	-0.01 (0.03)	-0.06	0.08	-0.04 (0.04)	-0.11	0.04
Trust	0.05 (0.03)†	-0.002	0.10	0.08 (0.03)*	0.02	0.14	0.07 (0.03)†	-0.00	0.13
Unemployment	0.01 (0.01)	-0.01	0.03	0.01 (0.01)	-0.01	0.03	0.03 (0.01)*	0.002	0.06
Doctors	0.05 (0.04)	-0.03	0.13	0.04 (0.05)	-0.05	0.13	0.11 (0.05)*	0.01	0.22
Crime	0.00 (0.04)	-0.08	0.08	-0.09 (0.04)*	-0.17	-0.001	0.01 (0.05)	-0.09	0.10
Social Facilities.	-0.02 (0.35)	-0.71	0.68	0.12 (0.41)	-0.68	0.92	-0.60 (0.45)	-1.49	0.29
	Adj. R^2 =0.08,			Adj. R^2 =0.06,			Adj. R^2 =0.07,		
	F(31, 878) = 3.47, $p < 0.001$			F(31, 878) = 2.84, $p < 0.001$			F(31, 878) = 3.12, $p < 0.001$		
	Slovakia								
Intercept	0.53 (0.33)	-0.11	1.17	0.44 (0.31)	-0.17	1.06	-0.51 (0.31)†	-1.11	0.09
Age	0.002 (0.04)	-0.07	0.07	-0.04 (0.03)	-0.12	0.03	-0.05 (0.03)	-0.12	0.02
Female	0.17 (0.07)*	0.02	0.31	0.15 (0.07)*	0.01	0.30	0.18 (0.07)*	0.04	0.32
Financial Insec.	-0.01 (0.04)	-0.08	0.07	-0.01 (0.04)	-0.08	0.07	0.07 (0.04)*	0.001	0.15
Physical Insec.	0.08 (0.04)*	0.02	0.16	0.05 (0.04)	-0.03	0.12	0.15 (0.04)***	-0.01	0.12
Social Insec.	0.12 (0.04)***	0.05	0.19	-0.02 (0.03)	-0.08	0.05	0.06 (0.03)†	-0.14	-0.03
Inequality	-0.02 (0.04)	-0.09	0.06	-0.01 (0.04)	-0.08	0.06	-0.10 (0.03)**	-0.06	0.04
Trust	0.04 (0.03)	-0.04	0.10	0.05 (0.03)	-0.03	0.11	0.03 (0.03)	-0.04	0.10
Unemployment	0.01 (0.02)	-0.005	0.02	0.003 (0.01)	-0.01	0.02	0.01 (0.01)	-0.003	0.02
Doctors	-0.02 (0.03)	-0.08	0.03	-0.02 (0.03)	-0.07	0.03	0.004 (0.03)	-0.05	0.06
Crime	0.001 (0.04)	-0.08	0.09	0.02 (0.04)	-0.06	0.10	0.11 (0.04)**	0.03	0.19
Social Facilities.	-0.41 (0.38)	-1.17	0.34	-0.28 (0.36)	-1.00	0.43	0.28 (0.36)	-0.43	0.98
	Adj. R^2 =0.07,			Adj. R^2 =0.02,			Adj. R^2 =0.09,		
	F(31, 898) = 3.41, $p < 0.001$			F(31, 898) = 1.58, $p = 0.02$			F(31, 898) = 3.83, $p < 0.001$		

Note: †$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Additional control variables included in models: number of children, marital status, education, income, and size of place.

3.4.3   Discussion

Perception of insecurity impacts the strength of religious practice and belief, at least in a small way. People who feel safe in their environment and feel like their secular institutions will look after them are less likely to participate in religion, but this doesn't seem to affect their belief in God. When participants feel unsafe they do seem more likely to hold paranormal beliefs, but all of these effects are very small. Among the perception variables, only the effect of social insecurity on religious participation, and the Slovakia-specific effect of physical insecurity on paranormal belief, were greater than β =0.10.

There are several things that may have led to such small effects in this sample, the most obvious being the high level of social services in both of these countries. Both countries have universal health care and relatively low crime rates. The lack of variance on these variables reduces the ability to detect effects that might be present in a more diverse sample. Examining a more diverse set of societies may lead to quite different conclusions. Another possibility is the actual effectiveness of religion in reducing anxieties. If religion is effective in reducing feelings of insecurity, then religious participants should show less anxiety then would be expected given their environment. Again, a greater diversity of cultures would be needed to test this. Regardless of why these effects are small, I can conclude that neither perceptions nor the realities of safety and security can account for the religious differences between these two countries.

3.5   Analysis 3: Cultural Transmission

The final theory I will evaluate, cultural transmission, is the theory most likely to explain the country level difference in religiosity. Though an individual's intuitive sense of the supernatural or the functional roles religion may play in making a person feel safe in the world might play some part in determining levels of belief, what should ultimately determine if a person is religious or not is how well they learned these beliefs and practices from others (Gervais et al., 2011). New members of society learn what to believe and the importance of belief from a combination of their parents and their broader social network. At the same time, only some small set of all cultural practices are transmitted with high fidelity from one generation to the next. Part of what will determine what stays or what goes in a culture is how well new individuals in a society learn its beliefs and practice. In terms of religiosity, people in both the Czech Republic and Slovakia will learn what to believe, and how important it is to believe it, from those around them.

I looked at credibility enhancing displays (CREDs) as a mode of cultural transmission (see Henrich, 2009). According to this theory, part of what determines the strength by which religious and other cultural practices and beliefs are transmitted is sincere behavioral displays of that practice/belief. This is especially important for beliefs and practices that cannot be verified with direct experience. For example, if someone says that smoking will make you feel more relaxed, it is easy to verify that belief by testing the theory yourself. Smoke, and see how you feel. On the other hand, if someone tells you that smoking is bad for your health, there is no way to verify this with direct personal experience (at least not immediately). You

have to decide the truth of this based on some other criteria. One way to do this is based on the actions of people around you. If everyone you know stops smoking, you should be more inclined to adopt the belief that smoking is bad for your health. This is not the only way that beliefs are transmitted, but it may be an important one for religious beliefs. Religious beliefs are the unverifiable kind. Religious sacrifice and rituals can function as a way of signaling the truth and importance of a belief, and they can therefore increase the likelihood that observers will adopt the same beliefs and behaviors.

As with the previous two sections, I looked at the country level difference and individual difference across the whole sample. I once again compared how much variance is explained by CREDs above and beyond the base model. Second, I looked only at participants who were raised in religious households and used CREDs to predict who would remain religious as an adult and who would not. This analysis looks at the effects of religious displays above and beyond just being raised in a religious household on the fidelity of belief transmission.

3.5.1   Material

To measure CREDs I used the CREDs scale (Lanman & Buhrmester, n.d.). This scale consists of five questions about exposure to parents' religious displays when participants were children (e.g. "To what extent did your parents or caregivers engage in religious volunteer or charity work?"; "Overall, to what extent did your parents or caregivers make personal sacrifices for religion?"). I combined these with

ratings of childhood church attendance for an overall variable of exposure to credible belief displays in childhood (α=0.92).

3.5.2 Results

Participant's perceptions of their parents' religiosity were highly related to the CREDs variable (r = 0.83). Because of this, parental religiosity could not be included in the regressions. There was also a large country level difference in CREDs (d=-0.97, 95%CI: -1.06 to -0.87) and a strong relationship to both religious practice and belief. With this effect, I was able to see if the CREDs variable mediated the country level difference in religiosity. I found a partial mediation for the county level difference in both religious participation and belief in God (Fig. 3.5).
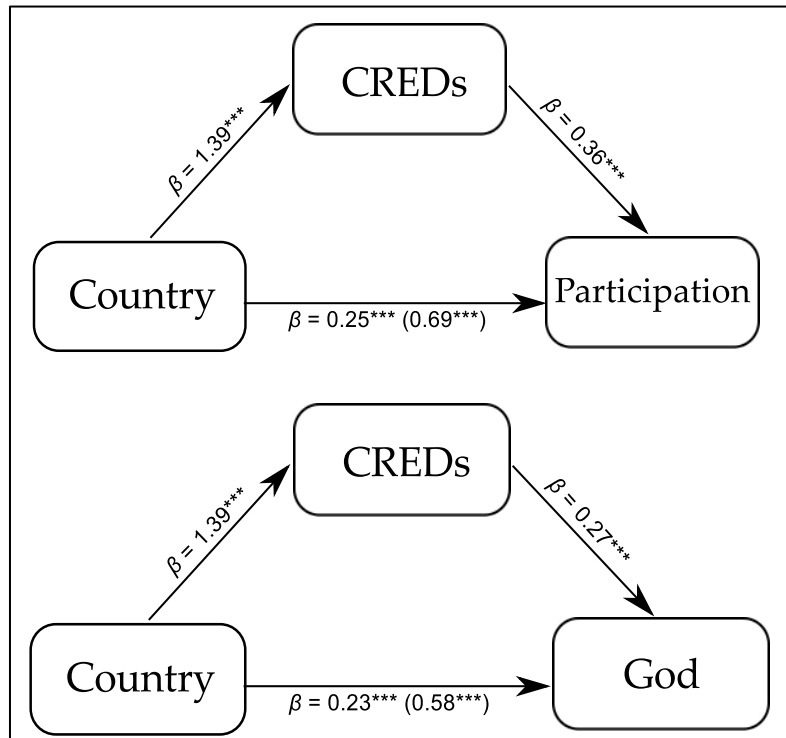
Figure 3.5: CREDs mediation of religious participation and belief in God. Non-mediated betas are in parenthesis. Sobel's test of mediation for participation: z = 16.59, p < 0.001; God: z = 14.23, p < 0.001.

Across the whole sample, CREDs were strong predictors of current religious participation and current belief in God (Table 3.5). The addition of this variable accounts for a substantial amount the variance explained (religious participation: ΔR^2 = 0.25, $F(1, 1816)$ = 781.11 p =<0.001, partial η^2 = 0.30; God: ΔR^2 = 0.15, $F(1, 1818)$ = 392.39, p =<0.001, partial η^2 = 0.18). Though CREDs are a significant predictor of paranormal belief, this effect is small, explaining very little additional variance (Paranormal: ΔR^2 = 0.02, $F(1, 1824)$ = 32.13, p =<0.001, partial η^2 = 0.02).

Table 3.5: CREDs predicting practice and beliefs. Each model represents a different DV (religious practice, belief in God, and paranormal belief).

	Participantion			God			Paranormal		
		95% CI			95% CI			95% CI	
	B(SE)	lower	upper	B(SE)	lower	upper	B(SE)	lower	upper
Intercept	-0.27 (0.15)†	-0.55	0.02	-0.41 (0.16)*	-0.23	-0.09	0.18 (0.19)	-0.18	0.55
Slovakia	0.25 (0.04)***	0.16	0.34	0.23 (0.05)***	0.14	0.33	-0.14 (0.05)**	-0.25	-0.03
Age	-0.06 (0.02)**	-0.09	-0.02	-0.07 (0.02)***	-0.11	-0.03	-0.06 (0.02)*	-0.10	-0.01
Female	0.12 (0.04)**	0.05	0.20	0.18 (0.04)***	0.10	0.27	0.23 (0.05)***	0.13	0.33
CREDs	0.32 (0.01)***	0.30	0.34	0.25 (0.01)***	0.22	0.27	0.08 (0.01)***	0.06	0.11
	Adj. R^2 = 0.42, $F(23, 1816) = 59.52, p < 0.001$			Adj. R^2 =0.29, $F(23, 1816) = 33.48, p < 0.001$			Adj. R^2 =0.06, $F(23, 1816) = 6.06, p < 0.001$		

Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001. Additional control variables included in models: number of children, marital status, education, income, and size of place.

Finally, since the previous analysis cannot separate CREDs from being raised religiously, I used a multinomial logistic regression to look at the impact of CREDs on the tendency to remain religious among those who were raised religiously ($N = 921$) as a stricter test of the CREDs hypothesis. CREDs significantly predicted the tendency to remain religious as an adult (Table 3.6). Although participants who are currently SBNR do have higher ratings of CREDs then the non-religious (SBNR: M = 2.80, SD = 1.52; Non-religious: M = 2.04, SD = 1.29; Welch $t(1091.83) = 9.04$, $p < 0.001$, $d = 0.54$), this effect is not significantly different from the non-religious when demographics are controlled for. These effects remain when the two countries are analyzed separately.

Table 3.6: CREDS predicting the probability of remaining religious or becoming SBNR using multinomial logistic regression.

	B(SE)	Odds	95% CI	
			lower	upper
Religious				
Intercept	-0.19 (0.54)	0.82	0.32	2.10
Slovakia	0.83 (0.28)**	2.30	1.33	3.95
Age	0.07 (0.10)	1.08	0.88	1.31
Female	0.98 (0.26)***	2.68	1.59	4.54
CREDs	0.45 (0.09)***	1.57	1.31	1.89
SBNR				
Intercept	-0.92 (0.54)	0.40	0.14	1.15
Slovakia	0.23 (0.31)	1.26	0.68	2.33
Age	0.21 (0.11)†	1.24	0.99	1.55
Female	0.75 (0.30)*	2.11	1.17	3.83
CREDs	0.13 (0.11)	1.14	0.92	1.90

Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001.
Additional control variables included in models:
number of children, marital status, education, income,
and size of place.

3.5.3   Discussion

The exposure to religious rituals and parental religious commitment as a

child accounts for more variance than any other variable in our model. An important

caveat is that ratings of the strength of parents' religiosity and reports of their

credible displays of religiosity are highly correlated, and cannot be statistically

separated. Never the less, the results show that this is not just about being raised in

religious households. Even when I look at only the participants who were raised

religiously, those who recall their parents making more credible displays of

religious belief are more likely to have maintained their religiosity as adults. The

strong relationships between CREDs and ratings of parents' religiosity should be

expected if CREDs has an impact on how sincere or true observers view the

displayer's beliefs. Making sacrifices for ones religion should convince other people

that one holds strong beliefs about that religion.

The concept that more people are exposed to religious commitment as a child the more religious people are as an adult may not be surprising to many readers. Yet, it is an often overlooked relationship in the cognitive science of religion. High fidelity transmission of religious belief from one generation to another is the most important factor in maintaining religious belief over time. This analysis suggest that anything that reduces displays of religious belief in one generation may impact the religiosity in the next generation to a much greater extent then institutional change or cognitive biases. Further, this effect is not specific to only religious practice, but also to religious belief. Being exposed to religious displays increased the chances of both believing in God and remaining religious throughout life.

Cultural transmission functions as a mechanism of change, but in this case it is not the distal cause. Something like existential insecurity could function as this explanation. If increases in feelings of security have a small impact on religious participation in one generation, even if there is no impact on levels of religious belief, this decline in participation may substantially decrease the participation and belief of the next generation. At the same time, this idea of cultural transmission as a mechanism allows for a much larger spectrum of potential causes above and beyond the secularization theories I have discussed above. Single unique events in history can set off this type of change, not just species-wide psychological effects like those produced by changes in levels of education and existential security.

In the case of the Czech Republic, a long history of skepticism of the Catholic Church combined with the communist restriction of religious practice may have been the spark that precipitated declining religiosity. The history of skepticism of

the Catholic Church as an institution made the Czech people much more accepting of the ban on religious activities put in place by the communists than the people in Slovakia or in other surrounding countries. The lack of religious displays this ban caused may have led to subsequent generations of Czechs to be brought up in an environment with no religious CREDs, which in turn taught them that religious belief was unimportant. With this, an increasing proportion of society became non-believers. Slovakia, on the other hand, saw the ban on religious activities as an affront to their national and individual identity. In this case, participation in religion may have become an exaggerated display, associated with higher consequences and, therefore, higher credibility.

Even if this turns out not to be a complete explanation of the religious differences between the Czech Republic and Slovakia, it illustrates how a historical event (and the range of reactions to that event) can significantly impact the secularization process or its opposite. Though other causal factors certainly come into play, when the fidelity of transmission from one generation to another (aided significantly by CREDs) declines, this may accelerate the secularization process or lead to an increase in conversion from one form of religious belief to another.

3.6   Analysis 4: Combined Model

All of these variables separately predict belief and religious practice, but do they do so independently? In my final analysis, I combine all the predictors into one model to see if the relevant predictors remain the same and how much variance is predicted.

3.6.1   Results

With all the variables in the model (Table 3.7) the amount of variance

explained above the base mode is 27 pp for religious practice (ΔR^2 = 0.27, F(11,

1805) = 79.62, p =<0.001, partial η^2 = 0.33), 20 pp for belief in God (ΔR^2 = 0.20, F(1,

1805) = 51.67, p =<0.001, partial η^2 = 0.24), and 23 pp for paranormal belief (ΔR^2 =

0.23, F(1, 1805) = 51.46, p =<0.001, partial η^2 = 0.24).

Table 3.7: All variables predicting religious practice and belief. Each model represents a different DV (religious practice, belief in God, and paranormal belief).

	Practice			God			Paranormal		
		95% CI			95% CI			95% CI	
	B(SE)	lower	upper	B(SE)	lower	upper	B(SE)	lower	upper
Intercept	-0.30 (0.13)*	-0.56	-0.04	-0.40 (0.14)**	-0.68	-0.12	-0.004 (0.15)	-0.30	0.29
Slovakia	0.25 (0.04)***	0.17	0.34	0.25 (0.05)***	0.16	0.34	-0.07 (0.05)	-0.17	0.02
Age	-0.06 (0.02)**	-0.10	-0.02	-0.06 (0.02)**	-0.10	-0.01	-0.02 (0.02)	-0.06	0.03
Female	0.09 (0.04)*	0.01	0.17	0.13 (0.04)**	0.04	0.21	0.10 (0.05)*	0.02	0.19
CREDs	0.30 (0.01)***	0.28	0.32	0.23 (0.01)***	0.20	0.25	0.03 (0.01)*	0.004	0.06
Financial Insec.	-0.002 (0.02)	-0.04	0.04	0.00 (0.02)	-0.04	0.04	0.05 (0.02)*	0.003	0.10
Physical Insec.	0.02 (0.02)	-0.02	0.06	-0.01 (0.02)	-0.05	0.03	0.05 (0.02)*	0.001	0.09
Social Insec.	0.07 (0.02)**	0.03	0.11	-0.02 (0.02)	-0.06	0.02	0.02 (0.02)	-0.03	0.06
Inequality	-0.03 (0.02)	-0.07	0.01	-0.01 (0.02)	-0.05	0.03	-0.07 (0.02)**	-0.12	-0.03
Trust	0.02 (0.02)	-0.02	0.06	0.03 (0.02)	-0.01	0.07	0.02 (0.02)	-0.02	0.07
Analytic	-0.03 (0.02)	-0.05	0.01	0.04 (0.02)†	-0.003	0.08	-0.05 (0.02)†	-0.09	0.00
Mentalizing	0.03 (0.02)	-0.01	0.06	0.08 (0.02)***	0.04	0.12	0.05 (0.02)*	0.01	0.10
Anthro	-0.01 (0.02)	-0.05	0.02	0.03 (0.02)	-0.01	0.07	0.27 (0.02)***	0.23	0.31
Dualism	0.11 (0.02)***	0.07	0.15	0.20 (0.02)***	0.16	0.24	0.28 (0.02)***	0.24	0.32
Teleology	-0.004 (0.2)	-0.04	0.03	0.01 (0.02)	-0.03	0.05	0.06 (0.02)**	0.02	0.11
	Adj. R^2 = 0.44,			Adj. R^2 = 0.34,			Adj. R^2 = 0.27,		
	F(34, 1805) = 43.64, p <0.001			F(34, 1805) = 28.83, p <0.001			F(34, 1805) = 20.82, p <0.001		

Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001. Additional control variables included in models: number of children, marital status, education, income, and size of place.

3.6.2   Discussion

There is little change in the relevant predictors when all the variables are

included in a single model. This suggests that each of these theories do function as

independent predictors of religious practice, belief in God, and paranormal belief.

Overall, these models explain 44% of the variance in religious practice, 34% of the

variance in belief in God, and 27% of the variance in paranormal belief. The

difference in belief in God and religious practice between the Czech Republic and

Slovakia remains significant in this model, suggesting there is something that this

model does not account for. This may be something indistinguishable from country,

such as the influence of national identity. The identity of Slovakia as a Catholic

country may in it self serve as a credible display of belief. Alternatively, there may

be some other predictors of religiosity that I have failed to account for in this study.

3.7 General Discussion

All of the theories talked about in this chapter appear to be part of this

package we call "religion" in these two countries. Each contributes something

different to explaining belief and practice in the Czech Republic and Slovakia. I will

sum them each in turn:

Cognitive biases: The theories around the cognitive basis for religious belief suggest

that religion is natural (Barrett, 2007; Bloom, 2007; Kelemen, 2004). Based on the

research presented here, this idea may need to be amended slightly. Supernatural

beliefs do seem to be partially based in the extension of mental state reasoning to

things without minds, but this may have only a small impact on whether or not a

person adopts a particular set of religious beliefs. A much more important predictor

of religiosity seems to be the culture in which a person lives. These cognitive biases

do predict other sorts of supernatural beliefs (those that are less attached to specific

religious traditions). This supports the marketplace theory, in the sense that people

are not becoming non-believers. Some proportion of society maintains some type of

supernatural beliefs. When cultural pressures to be a member of a specific religion decline, those thus prone to supernatural belief are likely to leave religion with the rest of their culture, but maintain some set of alternative supernatural beliefs.

Existential anxiety: The existential anxiety hypothesis suggests that as secular institutions replace religious ones in helping us to deal with our existential anxieties, religious beliefs start to decline. I found only slight influence of this in my sample, but this is likely due to a lack of variance and not reflective of the impact of this theory more broadly. Still, even if this theory does explain broad trends, it can only account for a small part of the story in the Czech Republic and Slovakia. Specifically, it cannot account for the high level of religiosity in Slovakia, despite the high levels of security. What broad theories like this do not reflect is the inherent social nature of people. In the quest to find singular theories that can explain these complex processes, the social sciences can often miss the important role of culture and how much we, as humans, learn from others.

Cultural transmission: Humans learn much of how to behave and what to believe from the broader culture in which they live. Religious traditions are no exception. Of all the variables I assessed, CREDs—parents' participations in religion and religious attendance as a child—were the strongest predictors of current religious belief. Additionally, CREDs were the only variable that could even partially explain the gap in religiosity between these two remarkably similar countries.

Religious traditions, secularization trends, or any other composite cultural institution or process, are made up of complex systems of cause and effect. This

paper serves as an illustration of one such system. No single theory can account for the processes we see. Before we can even talk about secularization, we first have to understand what specific processes we are talking about. Are we talking about the decline in supernatural belief or the decline of a single religious tradition? Unless we are defining religion as a single tradition, such as Christianity, or even Catholicism the decline of religion is too broad a term to be meaningful. When we include in our scope religion practices and religious belief generally, the vagueness of the definition of religion starts to cause problems. Some religions are belief centric; others put more emphasis on practice. Regardless of what type of religion one is looking at, looking at these two things separately and more systematically can only make our research (and us as researchers) stronger.

Chapter 4: "Spiritual But Not Religious": cognition and conversion in understanding alternative beliefs.

4.1 Introduction

In many parts of the secularizing world, such as Northern Europe and the west coast of the United States and Canada, traditional organized religion is giving way to yoga studios, spiritual retreats, and healing crystals. The idea that spirituality without religion is resonating with a growing populace is seen in best-selling authors and gurus like Deepak Chopra, Eckhart Tolle, and Paolo Coelho. Is there a particular psychological profile that sets this movement apart from traditional religion on one hand and non-religious populations on the other? Can these people be identified as a separate category from the religious based on the cognitive tendencies explored in the previous chapters? Are these non-religious but spiritual people in Europe different from those in North America?

A growing number of people in North America and elsewhere describe themselves as spiritual but not religious (henceforth, SBNR) (Bender, 2010; 2012; Fuller, 2001; Roof, 1993). According to a *Newsweek* poll, 30% of Americans identified as 'spiritual but not religious' in 2009, up from 24% in 2005 (*Newsweek*, 2009). A recent newspaper poll of Canadians found that, amongst those who claimed to be atheist and agnostics, 27% still describe themselves as 'spiritual' (Todd, 2014). Related to this is the growth of so-called "religious nones" or "unchurched" Americans and Canadians, the majority of whom report believing in God but do not affiliate with any religious tradition or attend religious services (Fuller, 2001). As of 2012, 87% of people in the USA reported believing in God, but

only 59% claim to be a member of a church or other religious institution, and only

30% claim to go to church every week (Gallup poll, 2012). The SBNR phenomenon is

also found in many parts of Europe, where opinion polls show consistently low (and

declining) rates of religiosity but considerable rates of alternative supernatural

beliefs (Voas, 2008). This growing class of believers that do not claim affiliation with

an organized religious group has been the subject of substantial media scrutiny and

public discussion over the last few years (e.g. BBC, 2014; Davis, 2014; de Castella,

2013; Oppenheimer, 2014), but, at least so far, psychologists have not given this

phenomenon much attention.

It seems that many people in North America and Europe are turning away

from organized religion in favor of a private spirituality (Marler & Hadaway, 2002;

Roof, 1999). Moreover, according to Marler and Hadaway (2002), 71% of Americans

see the concept of spirituality as something clearly distinct from religiousness, and

only 2.6% of participants thought these two terms should be considered entirely

overlapping concepts. This suggests that, at least in the popular imagination,

spirituality and religiosity are seen to be discrete approaches to faith. Further work

on this front has been conducted by Saucier and Skrzypińska (2006) who found

evidence for 'spiritual' and 'religious' to have distinctive traits among American

adults and correspond with different belief correlates and personality profiles (also

see Lindeman & Aarnio, 2006).

The rise of the SBNR in the general population has attracted some

sociological attention (e.g. Bender, 2010; 2012; Fuller, 2001; Roof, 1993; 1999).

However, very little empirical work has been done on SBNR people within the

discipline of psychology and the cognitive science of religion (an exception being

Saucier & Skrzypińska, 2006).

4.1.1   Why Study the SBNR?

According to these recent polls somewhere between one quarter and one

third of Americans, and similarly sizable proportions of populations in Canada and

parts of Europe, consider themselves SBNR. Therefore, the SBNR are a

demographically significant group that is important to understand in its own right.

As more and more individuals describe themselves as SBNR, several questions arise.

Who are the SBNR and in what ways are they similar to and different from people

who are traditionally religious? How do they compare to nonbelievers? Relative to

religious believers and nonbelievers, what sort of beliefs do SBNRs gravitate

towards, and what kind of psychological profile characterizes these beliefs?

The study of SBNR is also important for theoretical reasons. While neither

term has a widely agreed upon definition (see Bender, 2012), it has been suggested

that 'spiritual' refers to the individual experience of the supernatural, whereas

'religion' represents an institutional approach that is less concerned with individual

personal experience (Pargament, 1999; see Roof, 1993).[2] The SBNR, with their

presumed focus on the primacy of individual experience, offer an opportunity to

look into forms and types of supernatural belief that may be overlooked in the focus

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[2] Pargament (1999) aptly points out some of the dangers in the common practice of defining religion as institutional and spirituality as individual. Firstly, that religion seems to also be concerned with this spiritual realm and can't be defined entirely by its institutions. Secondly, that this indivualization and privatization are taking place in a culture where individualization and privatization are held in great esteem. This dichotomy may not exist beyond the west.

on organized religions in the exploration of supernatural belief. This idea of individual experience should be more closely tied to the cognitive then cultural basis of supernatural belief, but the cognitive basis of spirituality may be somewhat different then that of religiosity. In the previous two chapters, I have found differences in how these cognitive biases predict belief in God, and paranormal belief. Spirituality is another way to test potential differences in types of belief.

A third reason to study SBNRs is that this group may reflect supernatural intuitions and beliefs that are not subject to strong cultural norms and pressures within conventional religious traditions. As Adam Cohen (2009) has argued, religions draw on, and in turn influence, the dominant cultural traditions of their societies. Yet, the SBNR are a subpopulation that has rejected, to some degree, many of the culturally dominant institutions and religious beliefs (Roof, 1993; 1999). Nevertheless, I argue, they do not lack the intuitions that support belief in the supernatural. Although some SBNRs certainly bind together, forming communities and ritual practices supporting their beliefs (Bender, 2010; Fuller, 2001), their practices are in important respects outside of the mainstream of traditional religions, which often makes them the target of skepticism or hostility from the latter. This brings us to two pivotal psychological foundations of religious beliefs: cultural learning mechanisms that influence how ideas get transmitted across minds and cognitive biases that support a suite of supernatural intuitions. Studying the SBNR allows me to further separate the impacts of cognitive biases and cultural learning on supernatural beliefs.

4.1.2   The Importance of Cultural Learning in Supporting Religious Beliefs

The idea that there is some set of universal underlying cognitions that support supernatural belief comes from the observations that supernatural belief thrives in human societies, existing in some form in all societies for all of known history. It seems that there is something about supernatural belief that humans find deeply intuitive. At the same time, these supernatural beliefs take an almost immeasurably wide variety of shapes and forms and levels of commitment. Even if there is something basic about human cognition that pushes people towards supernatural belief, much of what we believe is also deeply shaped by cultural experiences (Gervais et al., 2011; Norenzayan & Gervais, 2013). Though people everywhere may have some core intuitions towards the supernatural, cultural learning strategies cue people to 1) ascertain whether religious belief is normatively acceptable, important and meaningful, and 2) trust particular beliefs among myriad possibilities supported by these intuitions. These cultural learning strategies and pressures mean that even people whose intuitions towards the supernatural are weak can (and often do) acquire religious beliefs though cultural learning (e.g. Henrich, 2009).

Differences in normative acceptability of specific beliefs across cultures can be created and maintained by cultural learning strategies (Chudek & Henrich, 2011). When strongly established cultural norms are in place, people may develop a narrower range of beliefs and experiences of the supernatural than people left to create belief systems largely their own. If we wish to explore and understand the underlying cognitive components of supernatural beliefs, then we may benefit from

studying a demographic group that has been exposed to less explicit cultural

pressures towards a specific type of supernatural belief than the traditionally

religious folks. Relatedly, certain intuitions towards the supernatural may play a

less central role in religious beliefs, on average, when strong cultural mechanisms

are in place that work against these intuitions (see previous chapter). Religions

teach a *type* of belief, which constrains adherents' beliefs. Christianity, for instance,

has explicit teachings against animism, and living in a Christian society has

previously been linked to lower anthropomorphic tendencies (Willard &

Norenzayan, 2013).

4.1.3   Current Research

This chapter has two primary goals: First, to create a profile of cognitive

traits (discussed in the previous two chapters) and beliefs for the SBNR and

compare them to the religious and non-religious. These latter two groups have been

well explored in the literature, and several hypotheses have been developed around

them. I tested some of these hypotheses and their relationships to this third group,

the SBNR, in samples from North America and Europe. Since both are supernatural

believers, the SBNR should be more similar to the religious than the non-religious in

terms of their underlying tendencies to overuse mental state reasoning. Second, I

looked at how similar the SBNR are across three countries, the USA, the Czech

Republic, and Slovakia, in terms of these cognitive profiles and the types of belief

they hold. I expect that beliefs will differ even when cognitive tendencies hold. With

these differences I will assess the impact of cognition, cultural learning, and

upbringing on current belief and conversion.

This chapter is divided into four separate analyses, each focused on a

different hypothesis:

Analysis 1 examines the relationship between cognitive biases and affiliation as

SBNR, religious, and non-religious. I predicted that SBNR will be cognitively similar

to religious participants, showing similar level of the ToM based cognitive biases

(mentalizing, dualism and anthropomorphism), despite being 'not religious'. I also

expected that these effects are similar in all three samples. Unlike beliefs

themselves, the cognition that underlies these beliefs should be consistent across

cultures.

Analysis 2 looks at the cultural difference in the patterns of belief for these three

groups across the Czech Republic, Slovakia and the US. I expect that belief will differ

across these three countries to a greater extent then the cognitive biases listed

above, despite them all having historical roots in the same religious beliefs (i.e.

Christian). I predict belief will be be more influenced by cultural learning then

cognition and therefore show greater variability across different cultural settings.

Analysis 3 looks at how participants' self-reported childhood affiliation predicts

current beliefs. I explored the hypothesis that how people were raised (religiously,

SBNR, or not religious) has an impact on what they believe as adults, regardless of

what they believe now. Childhood exposure to beliefs can be predicted to have some

long-term impact and that what participants' currently believe, as much of culture is

learned in childhood. This would suggest that at least some of the cultural

component of beliefs is fixed in childhood, and impacts adults' perceptions of belief.

Analysis 4 investigates how cognitive biases predict conversion from one group to

another since childhood (e.g., from non-religious to SBNR). Those high in these ToM

based cognitive traits should be more likely to be either religious or SBNR, and with

those low in them becoming non-religious, regardless of their relative upbringings.

4.2   Methods

4.2.1   Participants

My samples consisted of 1013 (58% female) Americans recruited through

Amazon's Mechanical Turk, 1010 Czechs (50% female) and 1012 Slovakians (50%

female) recruited through IPSOS Czech Republic's paid subject pool[3] (see Table 4.1).

I took several steps to ensure high data quality following recommended guidelines

for online data collection. In the American sample, four nonsense questions were

placed throughout the survey to ensure that participants were paying attention, as

well as two trick questions near the end of the survey (Buhrmester et al., 2011)[4].

Participants who failed to answer any of these questions correctly were removed

before analysis (63 participants whose responses did not pass quality check, were

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[3] This is the same sample used in the previous chapter.
[4] Questions have been raised recently as to the quality of M-Turk for experimental samples. Many of the people who participate via M-Turk have done dozens of studies. Though I am sensitive to these concerns, I only collected survey data here. There is no experimental manipulation and little worry about demand characteristics regarding how participants understood the purpose of the study. Still, it is clear from the demographic presented in table 4.1 that the M-Turk sample is not entirely representative of the US population. There are more females then males and more people are non-religious then the population as a whole.

removed from an original sample size of 1076). No one was removed from the Czech

and Slovakian data. These three samples were used because of their religious

differences, Slovakia being the most religious and Czech being the least, and because

each country has a sizable proportion of SBNR (Fig. 4.1).

Table 4.1: Demographics

Demographic Dimension	USA	Czech	Slovakia
Age			
Minimum (years)	18	18	18
Maximum (years)	82	65	65
Mean (years)	32.3	40.6	41.3
Gender			
Male (%)	42	50	50
Female (%)	58	50	50
Religious Affiliation (type)			
Religious (%)	24.9	17.5	61.8
SBNR (%)	34.3	36.0	21.7
Non-religious (%)	40.8	46.5	16.5
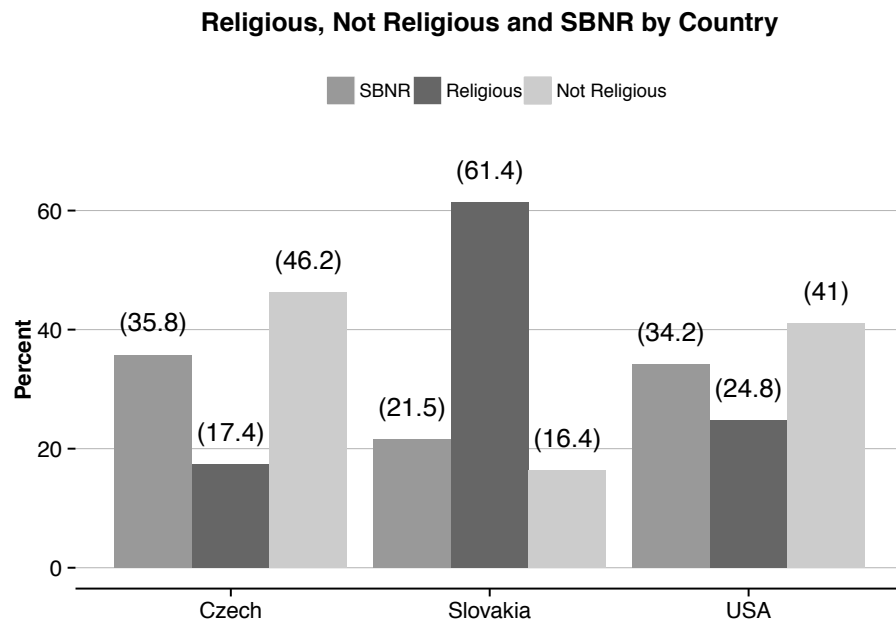
Figure 4.1: Religious group by country. Percentage of sample in parenthesis.

4.2.2 Materials

In the USA, the survey was conducted using the online software from surveymonkey.com. Both the Czech and Slovakian samples were collected by IPSOS's survey system. A bilingual translator translated the surveys into Czech and Slovakian and then translated the responses back into English. Inconsistencies were then taken to a professional interpreter for clarification. All belief and demographic questions were asked at the end of the survey, after all other measures. Teleology was not collected in the US sample and therefore has not been included in these analyses.

4.2.3 Measures

Mentalizing (EQ)

I used Baron-Cohen's (2004) Empathy Quotient to measure mentalizing (USA α=0.90; Czech: α=0.87; and Slovakia: α=0.87).

Dualism

I used Stanovich's (1989) dualism scale (USA: α=0.85; Czech: α = 0.76; Slovakia: α = 0.75).

Anthropomorphism (IDAQ)

I used Waytz, Cacciopio & Epley's (2010a) Individual Differences in Anthropomorphism Quotient (IDAQ; USA: α=0.84; Czech: α = 0.85; Slovakia: α = 0.89)

Affiliation

I asked participants to categorize their supernatural belief in one of three ways: religious, spiritual but not religious, or non-religious (i.e. I consider myself to be: religious/spiritual but not religious/non-religious). I also asked how participants were raised using these same categories. Two additional questions asked participants to rate how religious they were and how spiritual they were on a 10-point scale.

Supernatural Belief

I measured supernatural belief in two different ways. I measured belief in God using the three questions seen in previous chapters (USA: α=0.93; Czech: α=0.70; Slovakia: α=0.75). I also looked at other types of supernatural belief using the paranormal belief scale (Tobacyk, 2004). Before administering the scale, I removed the religiosity subscale to make sure we were measuring something separate from religiosity. I also removed the mystical creatures subscale, because of its cultural specificity (USA: α=0.96; Czech: α=0.93; and Slovakia: α=0.94).

Analytic Thinking and Anti-Science Beliefs

Previous research has linked analytic thinking to religious disbelief (Gervais & Norenzayan, 2012; Shenhav et al., 2012). Similarly, religious participants tend to score lower on analytic thinking measures than the non-religious. I wanted to see if this relationship held true for SBNR participants and control for it in some of our analysis. This gives me some insight into whether this relationship is about supernatural belief in general or religious belief more specifically. I used the Cognitive Reflection Task which consists of three questions designed to have both

incorrect intuitive answers and correct analytic answers (Frederick, 2005) to evaluate analytic thinking abilities. I also measured anti-science belief as an additional non-religious belief system that has been related to religious belief (e.g. "I don't believe science can answer most questions about the world" and "I trust that scientific findings are, for the most part, correct." (R); see Appendix A)(USA: α=0.86; Czech: α=0.67; and Slovakia: α=0.68).

4.3   Analysis 1: Predicting Group Affiliation from Cognitive Biases

In analysis 1, I looked at how the cognitive biases for supernatural belief predict participants' self-categorizations as religious, SBNR, or non-religious.

4.3.1   Results

To establish validity for participants' categorizations as religious, SBRN, and not religious, I used a multinomial logistic regression to predict these categories from ratings of religiosity and spirituality. SBNR participants were set as the comparison group (intercept) and religious and not religious participants were compared to them. All predictor variables were standardized, so odds could be interpreted as the odds of being religious or non-religious rather than SBNR for a one standard deviation change in a predictor variable. Age in decades, gender (females = 1, males=0), education, and income were included as controls. Across all three samples, ratings of religiosity positively predicted being religious over SBNR (Odds: 14.33, 95%CI: 10.83 to 18.96), and ratings of spirituality negatively predicted being religious over SBNR, suggesting that high rating of spirituality are more related to being SBNR than religious when religiosity is controlled for (Odds:

0.69, 95%CI: 0.51 to 0.93). Ratings on both measures negatively predicted being not

religious (religious: Odds: 0.39, 95%CI: 0.29 to 0.53; spiritual: Odds: 0.11, 95%CI:

0.08 to 0.14).

I again used a multinomial logistic regression with SBNR as the comparison

category to evaluate how cognitive biases predicted group membership. All

predictor variables were standardized. I found that higher scores on dualism and

lower scores on mentalizing predicted being religious over SBNR (Table 4.2). Lower

scores on dualism, anthropomorphism, and mentalizing predicated being non-

religious over SBNR. Analytic thinking scores were lower in the religious than the

SBNR, but no difference was found between the non-religious and the SBNR across

the three samples. The SBNR were significantly higher in analytic thinking than the

non-religious in the Slovakian sample.

Table 4.2: Cognitive biases predicting belief in each country using a multinomial logistic regression. SBNR participants are the comparison group. Each model represents a different country, or a combination of all countries.

	USA				Czech				Slovakia				All data			
			95% CI Odds				95% CI Odds				95% CI Odds				95% CI Odds	
	B(SE)	Odds	Lower	Upper	B(SE)	Odds	Lower	Upper	B(SE)	Odds	Lower	Upper	B(SE)	Odds	Lower	Upper
Religious																
Intercept	0.33 (0.39)	1.39	0.65	3.00	-0.69 (0.36)†	0.50	0.25	1.01	2.10 (0.36)***	8.13	3.97	16.61	0.14 (0.22)	1.25	0.77	1.76
EQ	-0.11 (0.10)	0.89	0.75	1.06	-0.21 (0.10)*	0.81	0.67	0.98	-0.13 (0.09)	0.87	0.74	1.03	-0.15 (0.05)**	0.86	0.79	0.95
Dualism	0.37 (0.10)***	1.44	1.18	1.76	0.24 (0.11)*	1.27	1.02	1.57	0.23 (0.09)*	1.26	1.06	1.51	0.26 (0.06)***	1.30	1.16	1.45
Anthro	-0.03 (0.08)	0.97	0.82	1.15	-0.10 (0.10)	0.90	0.75	1.09	-0.04 (0.09)	0.96	0.80	1.14	-0.07 (0.05)	0.93	0.85	1.03
Analytic	-0.14 (0.09)	0.87	0.73	1.04	-0.09 (0.10)	0.92	0.75	1.12	-0.23 (0.09)**	0.79	0.66	0.94	-0.15 (0.05)**	0.86	0.77	0.96
Age	-0.20 (0.08)**	0.82	0.71	0.95	0.02 (0.07)	1.02	0.89	1.18	-0.18 (0.07)*	0.83	0.72	0.96	-0.11 (0.04)**	0.90	0.82	0.97
Female	-0.27 (0.19)	0.77	0.53	1.10	-0.11 (0.21)	0.89	0.59	1.36	0.16 (0.19)	1.17	0.81	1.71	-0.02 (0.11)	0.98	0.79	1.21
Czech													-0.31 (0.15)*	0.74	0.55	0.99
Slovakia													1.57 (0.15)***	4.79	3.58	6.40
Not Religious																
Intercept	1.76 (0.36)***	5.82	2.87	11.79	0.88 (0.27)**	2.41	1.40	4.17	1.35 (0.46)**	3.88	1.58	9.50	-1.38 (0.20)***	2.89	2.66	5.94
EQ	-0.22 (0.08)**	0.80	0.68	0.94	-0.38 (0.08)***	0.68	0.58	0.80	-0.22 (0.12)†	0.80	0.63	1.01	-0.29 (0.06)***	0.75	0.68	0.83
Dualism	-0.60 (0.09)***	0.55	0.46	0.65	-0.32 (0.08) ***	0.73	0.62	0.86	-0.34 (0.11)**	0.72	0.57	0.88	-0.44 (0.05)***	0.64	0.58	0.71
Anthro	-0.23 (0.08)**	0.80	0.68	0.94	-0.17 (0.08)*	0.84	0.72	0.99	-0.15 (0.12)	0.86	0.68	1.10	-0.19 (0.05)***	0.83	0.75	0.92
Analytic	0.08 (0.08)	1.08	0.92	1.27	-0.01 (0.08)	0.99	0.84	1.16	-0.23 (0.12)*	0.79	0.63	0.99	-0.02 (0.05)	0.98	0.89	1.08
Age	-0.36 (0.07)***	0.70	0.60	0.80	-0.11 (0.06)†	0.89	0.79	1.01	-0.29 (0.10)**	0.75	0.62	0.91	-0.23 (0.04)***	0.80	0.73	0.86
Female	-0.40 (0.17)*	0.67	0.48	1.93	-0.34 (0.17)*	0.71	0.51	0.99	-0.26 (0.26)	0.77	0.46	1.27	-0.37 (0.10)***	0.69	0.56	0.85
Czech													0.09 (0.15)	1.09	0.84	1.42
Slovakia													-0.37 (0.15)*	0.69	0.51	0.95

Note: †*p*<0.10, **p*<0.05, ***p*<0.01, ****p*<0.001. Additional control variables included: education and income.

A second analysis was run predicting participants' ratings of "religious" and "spiritual" with these cognitive biases. Both regressions were run across all three samples, controlling for country level difference. The "spiritual" regression included "religious" as a predictor (and vice versa) to account for the relationship between these two variables. Findings were consistent with the previous analyses (see Table 4.3).

Table 4.3: Cognitive biases predicting ratings of "spiritual" and "religious" across all three countries. Each model includes the DV of the other model as a control for the relationship between DVs.

	Spiritual			Religious		
		95% CI Odds			95% CI Odds	
	β (SE)	Lower	Upper	β (SE)	Lower	Upper
Intercept	-0.21 (0.78)	-1.74	1.32	1.26 (0.79)	-0.29	2.81
EQ	0.17 (0.02)***	0.14	0.21	-0.07 (0.02)***	-0.11	-0.04
Dualism	0.11 (0.02)***	0.08	0.14	0.09 (0.02)***	0.06	0.12
Anthro	0.03 (0.01)*	0.004	0.06	0.01 (0.01)	-0.02	0.04
Analytic	0.01 (0.02)	-0.02	0.04	-0.06 (0.02)***	-0.09	-0.03
Age	0.08 (0.01)***	0.06	0.10	-0.001 (0.01)	-0.02	0.02
Sex	0.10 (0.03)***	0.04	0.16	-0.04 (0.03)	-0.11	0.02
Czech	-0.13 (0.05)*	-0.23	-0.02	-0.30 (0.05)***	-0.41	-0.20
Slovakia	-0.17 (0.05)**	-0.27	-0.06	0.17 (0.05)**	0.07	0.29
Religious	0.55 (0.02)***	0.52	0.58	---	---	---
Spiritual	---	---	---	0.56 (0.02)***	0.53	0.60
	Adj. R^2=0.43, F(28, 2883)=79.66***			Adj. R^2=0.42, F(28, 2883)=75.14***		

Note: †$p<0.10$, *$p<0.05$, **$p<0.01$, ***$p<0.001$. Additional control variables included: education and income.

4.3.2   Discussion

SBNR participants showed a different cognitive profile from religious and non-religious participants, but these differences are more pronounced between SBNR and non-religious participants than between SBNR and religious ones. This suggests that the 'not religious' part of SBNR has more to do with the relationship

towards organized religions than it does with the intuitions about the supernatural (see Roof, 1993; 1999). Dualism is the notable exception to this; religious participants score significantly higher on this dimension than SBNR participants. This is consistent with previous findings (Willard & Norenzayan, 2013).

Higher mentalizing scored increases the odds participants were SBNR rather than religious. Though this difference is not large (one standard deviation change on EQ decreases the odds of being religious by 18%), it not trivial either. This finding suggests that the SBNR *think* they are better at knowing other's minds—the EQ is a reflective measure—than either the religious or non-religious. Whether this belief is based on self-enhancement or is a real difference in ability remains to be tested. If the difference is verified, it may suggest that the impact of thinking about and understanding the minds of other people—rather than use this ability to interpret non-mentalistic phenomenon—may have a more important role to play in alternative beliefs than traditional ones in the Western world. According to work by Saucier and Skrzypińska (2006) spirituality is not related to greater extroversion, suggesting that the SBNR are not simply more outgoing than their religious and non-religious counterparts. This difference could also be related to why people choose to be SBNR rather than adopting a more traditional belief system, rather than be specific to beliefs themselves. People who are higher in mentalizing may be more likely to adopt an alternative system of belief.

Non-religious participants, though, appear to be less prone to any of these intuitions. These differences are not accounted for by differences in analytic thinking. Though previous research has shown that analytic thinking is related to

lower religious belief (see Gervais & Norenzayan, 2012; Pennycook et al., 2012;

Shenhav et al., 2012), the relationship between belief and these cognitive biases

holds independent of this tendency. In the USA and Czech Republic, the SBNR are

not markedly different from the non-religious on this analytic thinking task. In

Slovakia, the SBNR score significantly higher in analytic thinking than the non-

religious. Any negative relationship between analytic thinking and religiosity does

not seem to extend to supernatural believers more generally. This is consistent with

research that demonstrates people can and do use natural and supernatural causal

reasoning together without conflict (Legare & Gelman, 2008; Legare, Evans,

Rosengren, & Harris, 2012), and suggest that the relationship to analytic thinking

may have something to do with the specifics of Christianity rather than the adoption

of supernatural explanations.

Finally, the patterns of prediction are very similar across all three samples.

Though the magnitude and significance differs somewhat, all findings are trending

in a similar way across these three populations. Further, when I looked at people's

ratings of spirituality or religiosity, while controlling for ratings of the other, I found

results consistent with this interpretation. This gives credence to the idea that these

findings are not country specific and may be generalizable, at least across educated,

Western samples. Across both analyses and all three countries, the SBNR have some

traits that make them psychologically distinguishable from both the religious and

the non-religious.

4.4 Analysis 2: Differences in Supernatural Beliefs

In analysis 2 I address questions surrounding how these supernatural belief groups are affected by their culture of origin. Even if the SBNR, religious, and non-religious are similar in terms of the cognitive biases I explored above, it should be expected that participants' country of origin affects the specificity of what they believe. I focus on three different types of beliefs: belief in God, paranormal belief, and anti-science beliefs. The previous chapter suggested that there is little difference between the religious and the non-religious in paranormal beliefs in the Czech Republic and Slovakia. I have looked at if this relationship holds in the American sample.

Anti-science beliefs appear to be flourishing among the religious in the USA, at least according to the news media (Gatehouse, 2014; Gleick, 2011; Otto, 2012). Still, cross-cultural and developmental research has suggested that natural, or scientific, and supernatural beliefs are often and easily held at the same time (Legare et al., 2012; Legare & Gelman, 2008). By looking across three countries, I have tested if this effect is a result of American culture, or something specific to religious or supernatural belief. Further, by looking at the SBNR, I have assessed if this difference is about religion specifically or supernatural belief more generally. If the SBNR do not hold the same anti-science beliefs as the religious, this would suggest that it is something about religion specifically rather than being a characteristic of supernatural believers more generally.

4.4.1 Results

I used a set of regression analyses with dummy codes to compare affiliation

groups to evaluate differences in belief. Age in decades, gender (females = 1,

males=0), education, and income were included as controls. For this set of

regressions, non-religious participants were set as the comparison group, and both

religious and SBNR participants were compared to them. All dependent variables

were standardized and centered to a mean of 0. Each β is the standard deviation

difference in the DV in a category compared to the intercept, except age, which

should be read as standard deviations in the DV per decade of age. I looked at the

interaction between country and affiliation group to assess how these beliefs differ

by group and country.

Unsurprisingly, religious and SBRN were higher on belief in God, paranormal

belief and anti-science views then non-religious participants, controlling for country

level differences (see Table 4.4). Both the Czech and Slovakia samples were higher

in paranormal belief and anti-science belief than the American sample overall, but

this was not the case with belief in God. Rather, I found country specific effects here.

In the American sample, both the religious and SBNR have higher ratings of belief in

God than their Czech or Slovak counterparts. It is only the non-religious who show

no country level differences (Fig. 4.2).

In the country x group interactions, the SBNR in both Czech and Slovakia rate

paranormal belief lower that would be expected based on the differences between

the SBNR and non-religious seen in the American sample (Czech: β = -0.31; Slovakia:

β = -0.38). Anti-science views showed a similar result. The difference between both

SBNR and religious compared to the non-religious is less pronounces in the Czech

Republic and Slovakia than in the American sample (Czech: SBNR β = -0.26, religious

β = -0.60; Slovakia: SBNR β = -0.34, religious β = -0.71).

Table 4.4: Group differences in belief. Each model represents a different DV (belief in God, paranormal belief, and anti-science beliefs). The top section is looks are interaction with affiliation groups. The second section looks at interactions between ratings of spirituality and religiosity controlling for country level differences.

	God			Paranormal			Anti Science		
	β (SE)	Lower	Upper	β (SE)	Lower	Upper	β (SE)	Lower	Upper
	Group								
Intercept	-0.78 (0.68)	-2.13	0.55	-2.02 (0.68)**	-3.34	-0.69	-2.09 (0.57)***	-3.22	-0.96
SBNR	1.57 (0.05)***	1.48	1.67	0.94 (0.07)***	0.81	1.07	0.56 (0.06)***	0.45	0.67
Religious	2.13 (0.05)***	2.03	2.24	0.48 (0.07)***	0.34	0.63	0.96 (0.06)***	0.83	1.07
Czech	0.07 (0.06)	-0.04	0.18	0.59 (0.08)***	0.44	0.74	1.47 (0.06)***	1.34	1.60
Slovakia	0.04 (0.07)	-0.10	0.17	0.46 (0.09)***	0.28	0.65	1.44 (0.08)***	1.28	1.59
Age	0.03 (0.01)*	0.004	0.05	0.004 (0.01)	-0.02	0.03	0.02 (0.02)	-0.01	0.03
Female	0.08 (0.03)**	0.02	0.13	0.17 (0.04)***	0.10	0.24	0.17 (0.03)***	0.11	0.23
SBNR*Czech	-0.81 (0.07)***	-0.94	-0.67	-0.31 (0.09)***	-0.48	-0.12	-0.26 (0.08)***	-0.41	-0.10
Relig.*Czech	-0.75 (0.08)***	-0.91	-0.59	0.14 (0.11)	-0.07	0.35	-0.60 (0.09)***	-0.77	-0.42
SBNR*Slov.	-0.77 (0.08)***	-0.93	-0.60	-0.38 (0.11)***	-0.60	-0.16	-0.34 (0.10)***	-0.53	-0.15
Relig*Slov.	-0.56 (0.08)***	-0.72	-0.41	0.07 (0.11)	-0.14	0.28	-0.71 (0.09)***	-0.89	-0.54
	Adj. R^2 = 0.56,			Adj. R^2=0.19,			Adj. R^2=0.41,		
	F(29, 2928)=132.60***			F(31, 2947)=24.04***			F(31,2952)=67.89***		
	Spiritual & Religious								
Intercept	-0.41 (0.65)	-1.68	0.86	-0.57 (0.90)	-2.34	1.20	-1.98 (0.78)*	-3.51	-0.44
Spiritual	0.36 (0.02)***	0.33	0.40	0.35 (0.02)***	0.31	0.40	0.19 (0.02)***	0.15	0.22
Religious	0.49 (0.02)***	0.46	0.53	0.04 (0.02)	-0.01	0.08	0.12 (0.02)***	0.08	0.16
Age	-0.01 (0.01)	-0.03	0.01	-0.02 (0.01)	-0.04	0.01	-0.001 (0.01)	-0.02	0.02
Female	0.09 (0.02)***	0.04	0.14	0.14 (0.03)***	0.08	0.21	0.17 (0.03)***	0.12	0.23
Czech	-0.16 (0.04)***	-0.24	-0.08	0.61 (0.06)***	0.50	0.73	1.33 (0.05)***	1.24	1.43
Slovakia	-0.07 (0.04)†	-0.15	0.01	0.45 (0.06)***	0.33	0.56	1.16 (0.05)***	1.07	1.26
Spirit*Relig.	-0.07 (0.01)***	-0.10	-0.05	-0.10 (0.02)***	-0.13	-0.06	0.01 (0.02)	-0.02	0.04
	Adj. R^2 = 0.24,			Adj. R^2=0.24,			Adj. R^2 = 0.43,		
	F(26, 2923) = 38.67***			F(26, 2922) = 37.13***			F(26, 2925) = 87.26***		

Note: †$p<0.10$, *$p<0.05$, **$p<0.01$, ***$p<0.001$. Additional control variables included: education and income.

Again, these differences can be reassessed based on individual ratings of how

spiritual and how religious participants are, controlling for country level

differences. A second set of regressions was run across all three beliefs using

spiritual and religious ratings, and the interaction between them, as predictors

rather than group affiliation. Both beliefs in God and anti-science beliefs are

independently predicted by ratings of religiosity and spirituality (see Table 4.4).
Paranormal belief is only predicted by spirituality, not religiosity. There is a
significant negative interaction between religiosity and spirituality for both belief in
God and paranormal belief. This means that ratings of spirituality become weaker
predictors the more religious someone is (Fig 4.3). This effect is much more
pronounced for paranormal beliefs than belief in God.

Belief by Affilation Group and Country
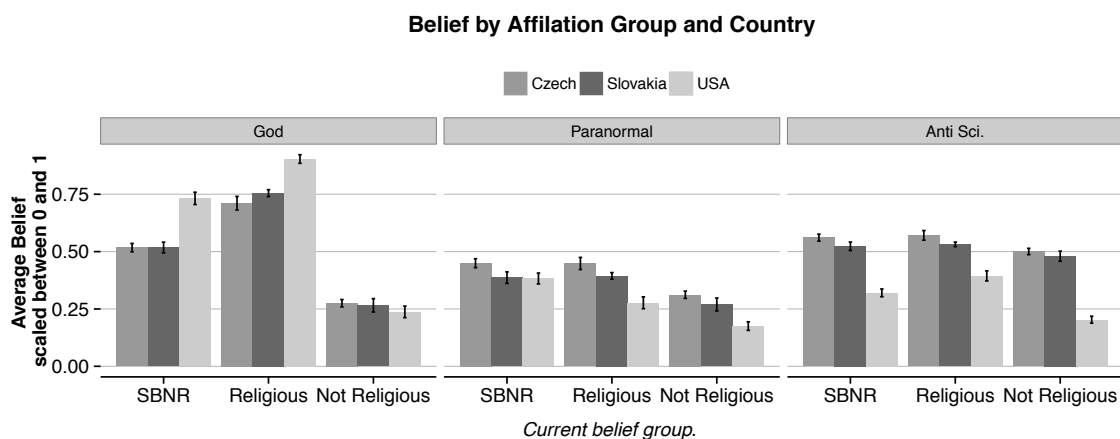
Figure 4.2: Belief ratings within each country. Error bars are 95% confidence intervals.

A   **Religiosity and Spirituality Predicting Paranormal Belief**
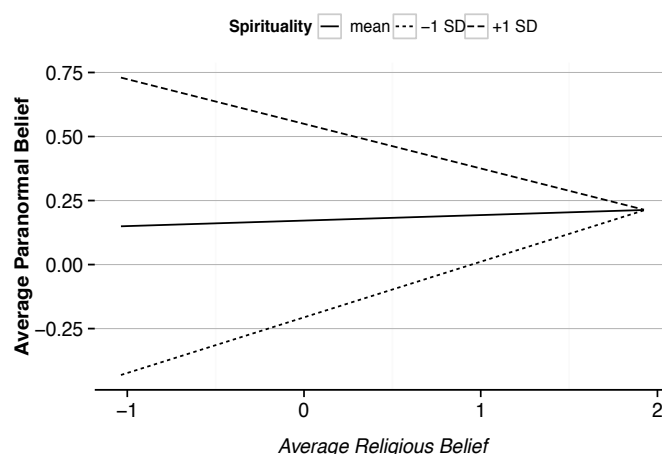
B   **Religiosity and Spirituality Predicting Belief in God**
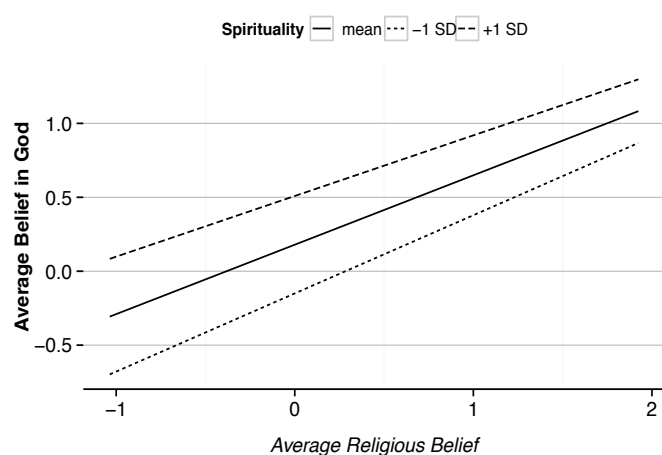
Figure 4.3: Religion and spirituality interaction plots. A predicts paranormal belief; B predicts belief in God.

4.4.2   Discussion

Despite the 'not religious' in 'spiritual but not religious', the SBNR participants do not lack supernatural beliefs. They remain higher than the non-religious on both belief in God and paranormal beliefs. SBNR participants do have a lower belief in God on average than the religious, but they rate themselves as

equivalent or higher, on average, in paranormal beliefs. In the American sample only, the SBNR are noticeably higher in paranormal belief than the religious (see Fig 4.2). The most pronounced difference between these cultural groups is in belief in God. Both the SBRN and the religious in the American sample claim a stronger belief in God than either the Czech or Slovakia sample.

There are several possibilities that may explain these differences. It may be due to the different makeup of the religious group between these countries. The religious participants in the Czech Republic and Slovakia are primarily Catholic, where the American sample is mostly Protestant. Catholics may have a greater tolerance for paranormal beliefs than the Protestants. Another possibility is that group differences are more divisive in the USA than they are in either the Czech Republic or Slovakia. American culture and media may promote larger differenced between the religious, SBNR and the non-religious, causing more divisions between groups.

The anti-science measure suggests that American SBNR people sit somewhere between religious and non-religious participants on this dimension. Religious participants are significantly higher on anti-science, suggesting the tendency to be against science may have as much to do with the specific teaching of religion (in this case, Christianity) than a conflict between scientific beliefs and supernatural beliefs more generally (see Legare et al., 2012). The Czech and Slovakian samples have higher rates of anti-science belief than the Americans overall, and show a much smaller difference in their ratings between groups. This may seem surprising to those who are familiar with prevalent anti-evolution

sentiments in the USA (Newport, 2014). The anti-science questions asked in these questionnaires look at attitudes towards science generally and the belief in science as a suitable tool to describe the natural world, rather then questions specific to evolution. Regardless, across all samples, the religious and SBNR have higher anti-science beliefs than the non-religious, but the difference is far more pronounced in the USA. Cultural climate does have a substantial impact here. This, and the fact that ratings of spirituality are related to anti-science beliefs above and beyond religiosity ratings, suggests that this effect is not specific to religion, and there may be some conflict with supernatural beliefs more generally. Still, it may not be the case that supernatural and scientific reasoning are at odds, but, rather, that those with a supernatural perspective of the world feel science is unnecessary to explain the world in which they live. A greater variety of beliefs and cultures would be necessary to make any strong conclusions here. Again, these effects may be specific to the Western world.

The differences in cognitive biases explored in analysis 1 are remarkably consistent across cultural groups, yet we still see a country level difference not only in the level of belief, but also in the pattern of belief. The tendency towards these beliefs may be based in cognition, but the specific content of each belief and how these beliefs are expressed is largely determined by culture. Religion is a form of culture (Cohen, 2009; Cohen & Hill, 2007), and despite the 'naturalness' of supernatural beliefs, cultural differences in how these beliefs manifest adds important variance to these beliefs, even if broad trends remain the same.

4.5   Analysis 3: Effects of Upbringing and Conversion on Current Beliefs

The existence of some differences in belief between the SBNR and the religious allowed me to test how culture affects the learning of supernatural beliefs. I used participants' categorizations of their upbringing (religious, SBNR and non-religious) to predict their current beliefs. If cultural exposure to different religious cultures is a strong predictor of how religious beliefs are expressed (e.g., Cohen, 2009) and a great deal of cultural information is learned in childhood (see Cheung, Chudek, & Heine, 2011), then childhood learning should have some residual impact on adult beliefs, even if a person is no longer part of that religious tradition.

Across all three countries, belief in God had the largest difference between groups. With this in mind, the most pronounced impacts on upbringing should be in this area. In addition to a difference in the affiliation category, there is an additional country level difference in belief. If the country in which one lives impacts the differences in belief between groups, those differences should also appear based on upbringing. Specifically, if American religious participants have lower paranormal beliefs than the SBNR, this difference should be apparent based on upbringing. Further, this should not be the case in either the Czech Republic or Slovakia, where this difference is not present.

4.5.1 Results

Regressions included dummy codes for current affiliation group and how individuals were raised (religious, SBNR, or non-religious). Two models were run. In the first, how participants were raised was interacted with current group affiliation. This shows how upbringing affects the beliefs on those who have converted to a different group as adults, compared with non-converts. A second model was run, interacting upbringing and country, while controlling for current belief affiliation. This shows any country level difference in the effects of upbringing. Though these models can be run together with a three-way interaction term, these terms become difficult to interpret. Both models control for age in decades, gender (female = 1), income and education. Variables are centered to a mean of 0 and dummy codes are used to compare religious and not religious to SBNR.

Model 1 looks at the interaction between upbringing and current belief across all three samples (Table 4.5). We found a negative effect of being raised religiously across all three beliefs (God: β=-0.20; Paranormal: β=-0.17; Anti science β=-0.18). Since the non-religious are our comparison group, this means that participants who are raised religiously but have since become non-religious are less likely to believe in God and the paranormal and are less likely to have anti-science beliefs than participants who have always been non-believers. On the other hand, participants who were raised religiously and are now SBNR are more likely to believe in God than SBNR people who converted from the ranks of the non-religious (β=0.47). This same effect was found to be marginally significant for those who were raised

religiously and have remained religious (β=0.16). Participants who were raised religiously and are now SBNR had somewhat higher anti-science beliefs (β=0.17).

Model 2 looks at how these effects differ across the three countries. I found that being raised religiously or SBNR increased belief in God over the non-religious in the USA. There was a significant interaction with how one was raised and both the Czech sample (raised SBNR: β=-0.39; raised religiously: β= -0.28) and the Slovakian sample (raised SBNR: β=-0.41; raised religiously: β= -0.32). The difference in belief in God for those raised religiously or SBNR and those raised not religiously is smaller for participants from the Czech Republic and Slovakia than for the American participants, regardless of current affiliation.

For participants in the US, being raised religiously significantly decreased the tendency to believe in the paranormal (β= -0.19). There were no significant interactions with country; still, the direction and size of the coefficients for both the Czech republic and Slovakia suggest that this effect is only found in the USA. If we analyze the countries separately, we find that the effect is over twice the size and only significant in the US sample (Czech: β= -0.09 95% CI: -0.26 to 0.08; Slovakia: β= -0.09 95% CI: -0.30 to 0.10; USA: β= -0.20** 95% CI: -0.35 to -0.06).

How one was raised had no significant effects on anti-science views, except in Slovakia. Those who were raised religiously and lived in Slovakia were less likely to hold anti-science beliefs than those who were raised religiously and live in the US (β= -0.24). These models contain no information about migration—the country in which participants currently live may not have been the same one in which they were raised. A conservative interpretation should reflect this.

Table 4.5: How participants were raised predicting current belief. Each model represents a different DV (belief in God, paranormal belief, and anti-science beliefs).

	God			Paranormal			Anti Science		
	β (SE)	Lower	Upper	β (SE)	Lower	Upper	β (SE)	Lower	Upper
Interactions by country									
Intercept	0.80 (0.71)	-2.18	0.58	-1.87 (0.68)**	-3.21	-0.54	-0.19 (0.58)***	-3.07	-0.78
SBNR	1.08 (0.03)***	1.02	1.15	0.73 (0.04)***	0.65	0.83	0.42 (0.04)***	0.35	0.50
Religious	1.76 (0.04)***	1.68	1.83	0.62 (0.05)***	0.52	0.71	0.59 (0.04)***	0.50	0.67
Raised SBNR	0.31 (0.07)***	0.17	0.46	0.12 (0.10)	-0.07	0.31	-0.06 (0.08)	-0.22	0.11
Raised Rel.	0.16 (0.05)**	0.06	0.26	-0.19 (0.07)**	-0.32	-0.05	-0.03 (0.06)	-0.14	0.09
Czech	-0.22 (0.06)***	-0.11	-0.10	0.42 (0.08)**	0.27	0.58	1.23 (0.07)***	1.10	1.36
Slovakia	-0.21 (0.08)**	-0.36	-0.07	0.29 (0.10)**	0.09	0.48	1.24 (0.09)***	1.07	1.41
Age	0.03 (0.01)**	0.01	0.05	0.01 (0.01)	-0.02	0.03	0.01 (0.01)	-0.01	0.04
Female	0.09 (0.03)**	0.03	0.14	0.17 (0.04)***	0.10	0.23	0.17 (0.03)***	0.11	0.23
Raised SBNR*Czech	-0.39 (0.09)***	-0.57	-0.21	-0.18 (0.12)	-0.42	0.06	0.01 (010)	-0.20	0.21
Raised Rel.*Czech	-0.28 (0.08)***	-0.43	-0.13	0.12 (0.10)	-0.07	0.32	0.03 (0.09)	-0.14	0.20
Raised SBNR*Slov.	-0.41 (0.11)***	-0.63	-020	-0.10 (0.15)	-0.39	0.18	-0.17 (0.12)	-0.41	0.08
Raised Rel.*Slov.	-0.32 (0.08)**	-0.39	-0.07	0.13 (0.10)	-0.07	0.34	-0.24 (0.10)**	-0.41	-0.06
	Adj. R^2 = 0.54, F(18, 2837) = 169.50***			Adj. R^2 = 0.20, F(18, 2862) = 40.68***			Adj. R^2 = 0.41, F(20, 2856) = 102.00***		
Interactions by group									
Intercept	-0.59 (0.70)	-1.97	0.78	-1.89 (0.68)**	-3.23	-0.56	-1.85 (0.58)**	-2.99	-0.71
SBNR	0.88 (0.04)***	0.78	0.97	0.72 (0.06)***	0.60	0.85	0.35 (0.05)***	0.25	0.46
Religious	1.72 (0.07)***	1.58	1.87	0.64 (0.10)***	0.44	0.83	0.50 (0.08)***	0.33	0.66
Raised SBNR	0.01 (0.08)	-0.15	0.17	0.09 (0.11)	-0.11	0.30	-0.10 (0.09)	-0.27	0.09
Raised Rel.	-0.20 (0.05)***	-0.30	-0.10	-0.17 (0.07)*	-0.30	-0.03	-0.18 (0.06)**	-0.29	-0.07
Czech	-0.38 (0.05)***	-0.48	-0.29	0.46 (0.06)***	0.34	0.58	1.21 (0.05)***	1.10	1.31
Slovakia	-0.40 (0.05)***	-0.50	-0.31	0.36 (0.06)***	0.24	0.48	1.05 (0.05)***	0.95	1.15
Age	0.02 (0.01)*	0.004	0.05	0.01 (0.01)	-0.02	0.03	0.01 (0.01)	-0.01	0.03
Gender	0.08 (0.03)**	0.03	0.14	0.17 (0.04)***	0.10	0.23	0.17 (0.03)***	0.11	0.23
SBNR*Raised SBNR	0.16 (0.10)	-0.03	0.35	-0.11 (0.13)	-0.37	0.14	0.07 (0.11)	-0.14	0.28
Rel.*Raised SBNR	-0.07 (0.14)	-0.36	0.22	0.08 (0.19)	-0.30	0.46	-0.08 (0.17)	-0.41	0.24
SBNR*Raised Rel.	0.47 (0.07)***	0.33	0.62	0.11 (0.09)	-0.08	0.30	0.17 (0.08)*	0.01	0.33
Rel*Raised Rel.	0.16 (0.09)†	-0.01	0.33	0.03 (0.12)	-0.20	0.26	0.16 (0.10)	-0.04	0.36
	Adj. R^2 = 0.54, F(20, 2918) = 171.10***			Adj. R^2 = 0.20, F(20, 2851) = 35.85***			Adj. R^2 = 0.41, F(20, 2856) = 102.00***		

Note: †p<0.10, *p<0.05, **p<0.01, ***p<0.001. Additional control variables included: education and income.

4.5.2 Discussion

Upbringing does have some impact on adult belief across these three samples. Interestingly, the most consistent effects we found were among those who converted away from religion, becoming non-believers. Among the non-religious, those who were raised religiously were lower on all three beliefs across all three samples. There are two ways to interpret this: Either these participants are

overcompensating for past belief by rejecting these beliefs strongly, or only those who are least prone to belief resist the cultural pressures of their upbringing and become non-religious. On the other side, participants who were raised religiously but are now SBNR look more like the currently religious. These participants hold stronger beliefs in God and are more anti-science then the SBNR who where not raised religiously. This suggest that being raised in a religious household does have some lasting impact on belief, even for those who no longer prescribe to the practices of their religion.

When I looked at country level differences I find further support for this idea. In Analysis 2 I found that Religious people in the American sample were less likely to hold paranormal beliefs than the SBNR participants. This was not the case in either the Czech Republic or Slovakia. This suggests that there is a separation of these types of beliefs in the USA that is not present in the other samples. If we expect that the beliefs one learns in childhood leave an imprint on adult beliefs, then we should expect people who are currently SBNR but were raised religiously should have less paranormal beliefs than those were not raised religiously. Further, this effect should only be present in the USA. This is exactly what I found; among the SBNR, those raised religiously in the USA hold lower paranormal beliefs than other participants.

These analyses lend support to the idea that even if the cognitive processes that increase the likelihood of participant holding beliefs across all samples, the *content* of those beliefs is something people learn and much of this learning takes place in childhood. Since all three of these countries are Western and Christian, this

can be considered a minimal case. Even in very similar cultures, cultural differences have a significant impact.

4.6 Analysis 4: Cognitive Biases and Conversion

In the previous two sections, I have looked at how cognitive biases relate to different belief groups and how upbringing impacts current beliefs. In my final analysis, I have brought these two together and look at how cognitive biases predict conversion from one group to another. If the effects of mentalizing, dualism and anthropomorphism are related to supernatural beliefs, then people lower in these traits should be more likely to become non-religious, even if raised religiously. Conversely, those high in these traits should adopt supernatural beliefs even if they are raised non-religiously.

4.6.1 Results

A majority of participants, across all three samples, have remained in the same religious, SBNR, or non-religious category they were born into (see Table 4.6). Still, far more people converted to being SBNR (20.54%) then either religious (4.63%) or non-religious (12.54%). Conversion was the most common in the USA and the least common in Slovakia.

Table 4.6: Rates of conversion, as percentage of sample total
and of those raised in each category

	Czech		Slovakia		USA		ALL	
	% total	% raised	% total	% raised	% total	% raised	% total	% raised
Non converts	67.40%		75.02%		45.75%		62.69%	
Not Rel. to Rel.	3.98%	6.41%	2.49%	15.43%	3.06%	11.83%	3.18%	9.16%
Not Rel. to SB.	17.50%	28.20%	4.38%	27.16%	6.72%	25.95%	9.53%	27.48%
Rel. to Not Rel.	2.68%	13.85%	4.98%	6.89%	21.54%	35.55%	9.76%	19.23%
Rel. to SB.	4.57%	23.59%	9.85%	12.63%	18.58%	30.67%	11.02%	21.71%
SB. to Not Rel.	2.98%	16.76%	2.19%	13.58%	3.16%	23.70%	2.78%	17.64%
SB. to Rel.	1.29%	7.26%	1.79%	11.11%	1.28%	9.63%	1.46%	9.24%

Total converts: to SBNR = 20.54%; to Religious = 4.63%; to Not Religious: 12.5%

To look at the effects of cognitive biases on conversion, I split our data into three groups based on how participants were raised (i.e. raised religious, SBNR or non-religious). In each of these samples, I used a multinomial logistic regression to predict the movement from one group to another based on the cognitive biases (Table 4.7). For participants who were raised religiously (*N*=1534), lower scores on all the cognitive biases, higher analytic thinking, and being male predict being non-religious as an adult across all three samples. Lower dualism scores and higher analytic thinking predict being a SBNR adult. Both conversion groups show a significant effect of age. Those who become SBNR are older than those who remain religious, and those who become non-religious are younger.

For the participants raised in non-religious households (*N*=1048), higher scores on mentalizing and dualism predict being currently religious adults. Higher scores on mentalizing, dualism and anthropomorphism, as well as being female, predict being a SBNR adult. A higher proportion of those raised as non-religious

convert to SBNR in the Czech Republic than those in the USA. This same relationship is marginal in Slovakia.

Finally, there are only a couple of significant effects for those raised SBNR (N=429). Those who have converted to religion are younger on average, and those who score lower on dualism are more likely to be non-religious. Since only a few participants in any of our samples were raised SBNR, and fewer still converted away from being SBNR, these findings should be interpreted with some caution.

Table 4.7: Multinomial logistic regression predicting conversion from cognitive biases. Each model predicts conversion in a different sample (participants raised religiously, participants raised not religiously, and participants raised SBNR), and uses people who did not convert as the comparison (i.e. in the sample of people raised religiously, those who are still religious as adults are the comparison category). Each section represents a different conversion group (SBNR, religious, or non-religious).

	Raised Religious				Raised Non-religious				Raised SBNR			
	B(SE)	Odds	95% CI Odds Lower	Upper	B(SE)	Odds	95% CI Odds Lower	Upper	B(SE)	Odds	95% CI Odds Lower	Upper
SBNR												
Intercept	-0.99 (0.31)**	0.63	0.46	0.88	-1.81 (0.32)***	0.16	0.09	0.31	---	---	---	---
EQ	0.15 (0.09)†	1.15	0.99	1.35	0.43 (0.09)**	1.54	1.29	1.85	---	---	---	---
Dualism	-0.18 (0.08)*	0.82	0.71	0.96	0.32 (0.08)***	1.38	1.17	1.62	---	---	---	---
Anthro	0.02 (0.08)	0.99	0.86	1.15	0.16 (0.08)*	1.18	1.01	1.37	---	---	---	---
Analytic	0.20 (0.07)**	1.19	0.86	1.37	0.09 (0.08)	1.09	0.93	1.29	---	---	---	---
Age	0.14 (0.77)*	1.13	1.02	1.26	0.03 (0.06)	1.03	0.91	1.16	---	---	---	---
Sex	-0.03 (0.15)	1.03	0.77	1.37	0.56 (0.17)***	1.75	1.26	2.43	---	---	---	---
Czech	-0.70 (0.26)**	0.37	0.22	0.63	0.53 (0.24)*	1.69	1.06	2.61	---	---	---	---
Slovakia	-1.55 (022)***	0.18	0.12	0.28	0.50 (0.30)†	1.65	0.91	3.00	---	---	---	---
Religious												
Intercept	---	---	---	---	-2.79 (0.50)***	0.06	0.02	0.16	-0.29 (0.77)	0.75	0.16	3.39
EQ	---	---	---	---	0.48 (0.13)***	1.62	1.25	2.10	0.16 (0.19)	1.17	0.81	1.68
Dualism	---	---	---	---	0.60 (0.14)***	1.82	1.39	2.38	0.06 (0.20)	1.06	0.72	1.56
Anthro	---	---	---	---	-0.04 (0.12)	0.95	0.75	1.22	0.10 (0.17)	1.11	0.80	1.53
Analytic	---	---	---	---	-0.17 (0.13)	0.84	0.64	1.10	0.27 (0.18)	1.32	0.92	1.87
Age	---	---	---	---	0.10 (0.19)	1.10	0.91	1.34	-0.50 (0.16)**	0.60	0.44	0.83
Sex	---	---	---	---	0.43 (0.26)†	1.54	0.93	2.55	-0.27 (0.37)	0.76	0.37	1.58
Czech	---	---	---	---	-0.30 (0.36)	0.73	0.36	1.50	0.14 (0.55)	1.15	0.39	3.41
Slovakia	---	---	---	---	0.66 (0.40)†	1.69	0.88	2.71	1.44 (0.56)**	4.22	1.42	12.54
Not Religious												
Intercept	0.84 (0.34)*	2.31	1.18	4.49	---	---	---	---	0.10 (0.56)	1.10	0.35	3.41
EQ	-0.05 (0.09)	0.94	0.79	1.14	---	---	---	---	-0.17 (0.16)	0.85	0.62	1.15
Dualism	-0.86 (0.09)***	0.42	0.35	0.51	---	---	---	---	-0.52 (0.14)***	0.59	0.45	0.78
Anthro	-0.27 (0.11)**	0.76	0.62	0.93	---	---	---	---	-0.06 (0.14)	0.94	0.71	1.24
Analytic	0.25 (0.08)**	1.29	1.10	1.51	---	---	---	---	-0.06 (0.15)	0.94	0.70	1.25
Age	-0.22 (0.07)**	0.80	0.69	0.92	---	---	---	---	-0.29 (0.11)*	0.75	0.60	0.94
Sex	-0.42 (0.15)*	0.66	0.47	0.93	---	---	---	---	-0.42 (0.29)	0.66	0.38	1.15
Czech	-1.25 (0.31)***	0.29	0.16	0.53	---	---	---	---	-0.20 (0.41)	0.82	0.37	1.82
Slovakia	-2.35 (0.25)***	0.10	0.06	0.17	---	---	---	---	0.16 (0.45)	1.18	0.49	2.84

Note: †*p*<0.10, *p*<0.05, **p*<0.01, ***p*<0.001. Additional control variables included: education and income.

4.6.2 Discussion

A larger percentage of my sample has converted to SBNR then any other group. This supports the idea that the SBNR are a growing demographic group. Interestingly, across all three countries the largest proportion of converts was coming from the ranks of the non-religious. If becoming SBNR was just a step towards becoming non-religious, then we should not see this trend. For SBNR to be a stepping-stone, people should be converting from religious to SBNR and from SBNR to non-religious, rather than converting from non-religious to SBNR. Previous work has suggested that the one personality trait that differentiates the spiritual from the religious is openness to experience (Saucier & Skrzypińska, 2006). Something about being SBNR may suggest an innovative, individualistic, or adventurous nature, and there may be some constitution of traits that causes people to innovate in terms of supernatural traditions. This is an idea worthy of further research.

These analyses support our more general hypothesis that there are core cognitive biases that predispose people towards supernatural belief. Participants who were raised religiously who were also low in dualism and anthropomorphism and high in analytic thinking were more likely to have left their religion as adults. This same effect is found in the opposite direction (those raised non-religious becoming religious), but this time it is dualism and mentalizing that is doing the work. Though no causal direction can be derived from this analysis, the pattern of relationships is consistent with theoretical perspectives.

There are several limitations in interpreting this data. The first is inherent in using current cognitive states to predict past actions. It is entirely possible that people are changing their cognitive profiles to reflect their current belief states. Though much of the evidence presented here and in the previous chapters suggests a causal direction from cognitive biases to supernatural beliefs, no such causal pattern can be conclusively derived from correlational data. What I can firmly say is cognitive profiles predispose, in measurable and predictable ways, an individual to categories of belief—this is true regardless of their upbringing.

4.7   General Discussion

The Psychological Underpinnings of SBNR

The proportion of people in North America who identify as SBNR is growing; they are becoming an increasingly important subset of American believers (Bender, 2010; 2012; Fuller, 2001; Roof, 1999). There are similar trends in other secularizing societies such as Canada and Europe. As a growing demographic and social phenomenon worldwide, the SBNR are poorly understood, yet the impact of this group is being felt in many aspects of social and political life. Additionally, this phenomenon offers an opportunity to investigate the cognitive origins and persistent tendencies towards supernatural belief beyond what we see in traditional religious believers.

In this chapter I have outlined several lines of evidence supporting the idea that supernatural belief is, in part, driven by cognitive tendencies rooted in mentalizing (Willard & Norenzayan, 2013). SBNR participants look similar to religious participants on these cognitive tendencies, but differ significantly from the

non-religious in other ways. Though SBNR participants see themselves to be 'non-religious', they endorse alternative supernatural beliefs that are also driven by the same cognitive biases that underpin more conventional religious beliefs. They have rejected organized religion, but have not shaken the intuitions that anchor supernatural beliefs. At the same time, they do not look exactly like their religious counterparts. They are lower in dualism and higher in mentalizing. Though it is unclear what the basis of these differences are, or what the causal relationship is, they do tell us that the SBNR are a psychologically identifiable group, worthy of further research.

The consistency of these relationships across three different samples from three different countries suggests these are stable differences, at least in the Western world. Further research into the SBNR would benefit from a broader cultural sample and a comparison to non-world religions (religions other than Buddhism, Hinduism, and the Abrahamic traditions) and smaller tribal traditions. The world religions have developed sets of cultural beliefs and practices which help to alleviate some of the problems of living in large groups (Norenzayan, 2013; Norenzayan et al., 2015). They may have moved beyond the intuitive basis of supernatural belief in ways that smaller religious traditions have not.

The SBNR as a group are important to our understanding of religion and supernatural belief because they allow for some separation between religious and non-religious supernatural belief. Though the cognition may be the same, the content is clearly quite different. This difference also allows us to infer that some belief patterns are established in childhood. The subtle cultural differences that

exist in Western Christian-based traditions are seen in adults, even when those adults have changed from one group to another. Echoes of childhood exposure to certain types of beliefs remain.

The ability of cognitive biases to predict conversion is further support for the idea that these cognitions are a foundation of religious belief. When an individuals intuitions clash with their upbringing are more likely to leave their childhood group for another group. Overall, the findings on conversion suggest that the SBNR in all three of these societies is growing and the religious are declining. More people are converting to the SBNR then are leaving and more people are converting away from religious then are converting too. This would need to account for relative birth rate before population level claims can be made, but it does suggest an interesting transition in supernatural belief in the West. More and more people are embracing belief without embracing religion.

Chapter 5:   Conclusion

Throughout this dissertation, I have discussed the role of ToM-based cognitive biases as a foundation of supernatural belief. I have argued that individual differences in these tendencies lead to individual differences in the susceptibility to supernatural beliefs: People who tend towards the use of mental state reasoning to explain non-mentalistic phenomenon also tend to endorse the supernatural. I have also argued that this phenomenon is specific to supernatural belief and does not necessarily extend to the adoption of religious practices. Supernatural beliefs are separable from the rituals that often surround them, and the psychological foundations for these two categories are very different.

Religious rituals are culturally based and unlike anthropomorphism, dualism, and teleology, often serve a clear societal function. There is currently no evidence that anthropomorphism, dualism, or teleology have any prosocial function in and of themselves. The beliefs they promote may, through the process of cultural evolution, evolve into beliefs that help enforce normative behaviors (Norenzayan, 2013; Norenzayan et al., 2015), but it is not clear that this function is inherent in intuitions themselves. They simple increase the probability that individuals will hold supernatural belief. They do not determine how those beliefs are used within a cultural context. Religious rituals can serve as a way to promote group bonds and loyalty (e.g. Sosis & Alcorta, 2003; Whitehouse, 2004), promote prosocial behavior (e.g. Wiltermuth & Heath, 2009; Xygalatas et al., 2013), and transmit belief to new members of a society (e.g. Henrich, 2009; Lanman, 2012). These functions have

evolved within cultures to serve these social purposes (Gervais et al., 2011; Norenzayan, 2013; Norenzayan et al., 2015). The group level benefits of religion come out of the cultural evolution of complex religious traditions, not the tendency to adopt supernatural belief.

I have also distinguished between supernatural beliefs that are part of a specific religious tradition and those that are not. Throughout this dissertation, I often have made an effort, for the sake of clarity, to distinguish between cognitively based beliefs and culturally based belief. More accurately, the relationship between any specific belief and its cultural setting should be thought of as a sliding scale. Within any culture, certain beliefs are considered more important, or less optional, then others. These beliefs are obligatory, and we should expect them to be highly culturally determined. People who are part of a strongly religious culture will be likely to adopt the supernatural beliefs of that culture regardless of how intuitive they find those beliefs. Supernatural beliefs that an individual can adopt or not adopt with little cultural consequence will be more determined by an individual's intuitions.

At the same time, just because some portion of the population is prone to supernatural thinking and supernatural beliefs, this does not mean they will adopt any specific set of religious beliefs. Religious traditions exist because they have been supported and reinforced by cultural learning. Cognitive biases for belief will make it more likely that certain categories of belief, such as the belief in supernatural agents, exist across cultures, but without cultural bolstering, these beliefs will be more akin to superstitions and ghost stories than a complex tradition like

Christianity. How one decides to fit 'religion' as a term into this framework is not

important. If a person wants to call all supernatural belief religious, that is fine, but

the division between beliefs that are culturally enforced and those that are not (or

less so) is worthy of our recognition and consideration.

In the introduction to this dissertation I suggested that these types of large-

scale correlational studies can help us better to understand these relationships and

this, in turn, can help us create better theories. In what follows, I will briefly

summarize each of the concepts I have discussed above, expanding on the

implications including possible future avenues of research. I begin with the

cognitive biases:

5.1   Mentalizing

The idea that mentalizing is an underlying component to understanding Gods

and ghosts is a strong prediction. Understanding and reasoning about the minds of

supernatural agents necessarily requires the ability to understand and reason about

minds. Still, this relationship may not be as straightforward as we think. The path

models presented in chapters 2 and 3 show that the relationship between

mentalizing and supernatural belief is mediated by the other cognitive biases. The

ability to think about minds is not directly related to supernatural belief; rather, it is

the tendency to extend mental state reasoning above and beyond the ability to think

about other people's minds that leads to supernatural belief.

Despite this theoretical link, it is worth noting that the relationship between

mentalizing and the other biases is weak across all models. One possible reason for

this comes from how mentalizing is measured across these experiments. The

empathy quotient (Baron-Cohen & Wheelwright, 2004) and other adult measures of ToM measure the accuracy, or perceived accuracy, with which people use mental state reasoning to understand other people's minds. It is not clear that this is the variable of interest when seeking an explanation for supernatural thought. More likely candidates are the *frequency* with which people use mental state reasoning and the *tendency* to use it as an explanation for non-mentalistic phenomena.

Gods and ghosts are not like people. They don't have facial features or body language from which a person can *accurately* derive their mental states. Baron-Cohen's foundations of gaze-following and shared attention do not apply here, nor does the ability to read facial expressions or body language (see Baron-Cohen, 1995). Gods and ghosts are not physically present in the world. When people are inferring God's mental states they are not using cues from a tangible agent. They are extrapolating mentalistic explanations from events or objects in the world, or perhaps from their own state of mind. I will talk more about this below.

Though mentalizing may be only indirectly related to belief, it may still predict whether one is a certain type of believer. In Chapter 4, I found a relationship between mentalizing and being spiritual but not religious (SBNR). High ratings of mentalizing may have something to do with why people choose the SBNR path in the first place, rather than be entirely about the beliefs they hold. Though Chapter 4 shows that the SBNR hold similar intuitions towards supernatural belief as the religious, the question of what makes people choose to be SBNR rather that maintaining a more traditionally religious set of beliefs remains largely unanswered (Bender, 2012; Saucier & Skrzypińska, 2006). Until researchers can adequately

answer this question, some of these relationships and how they relate to this additionally category of supernatural believers will remain a mystery.

5.2 Anthropomorphism

Of all the cognitive biases I talked about in this dissertation, anthropomorphism is the most consistently theoretically related to supernatural and religious belief (Barrett, 2004; Feuerbach, 1957; Guthrie, 1993; Hume, 1981). Anthropomorphism, as it was measured in this dissertation, is the propensity to use mental state reasoning to understand nonhuman objects and entities. This variable may capture the frequency and tendency of mental state reasoning more adequately than the mentalizing measure I used. Because of this, anthropomorphism should be—at least theoretically—more strongly related to reasoning about the mental states of supernatural agents.

The empirical evidence paints a more complex picture. Anthropomorphism, across all samples and countries, is reliably related to paranormal beliefs, but not to belief in God (chapters 2 and 3). There are a few things to note here. The first and most important, all theses samples come from predominantly Christian or historically Christian societies. This lack of relationship to belief in God may be specific to Christianity. This perspective is supported by findings from the Czech sample in Chapter 3. In the Czech sample, I did find a modest relationship between anthropomorphism and the belief in God, but this relationship is entirely driven by the sizable non-religious population. Those who did not consider themselves religious but were high in anthropomorphism were more likely than those low in anthropomorphism to believe in God. Those who were religious replicated the

findings of the American, Canadian and Slovak samples, showing no relationship at all between anthropomorphism and belief in God. This suggests that the relationship (or lack of) is not about belief in God itself, but belief in God for members of a predominantly Christian society.

I have previously explained this relationship as being, at least potentially, due to Christianity's explicit teaching against imbuing everything with a mind of its own. Another related explanation is that having a single God whose mind is responsible for everything that happens in the world removes the need to anthropomorphize anything else. Work by Waytz et al. (2010c) suggests that people are motivated to anthropomorphize when they cannot explain an event with other types of causal reasoning. People imbue objects, such as computers and cars, with mental sates when they perform erratically and unpredictably (Epley et al., 2008b). We're all familiar with this idea: my computer crashed because it has a mind of its own; my car has broken down because I called it bad names when it stalled at the traffic light.

All this comes from a more general need to have some sort of understanding and control over the world (Kay, Whitson, Gaucher, & Galinsky, 2009; White, 1959). Agency serves as an ultimate causal force because it is internally motivated and something we all intuitively understand. If your computer crashes because it *wants* to crash, then you have an understandable explanation that guides both your current and future behavior ("I'll just leave it alone for a bit. It just needs some space right now, and I should really be nicer to it in the future"). This type of explanation give us a sense of effectiveness in and control over the world (Epley, 2014). There is

no need to pursue the sometimes impossibly complex set of mechanical and computational causes that would be otherwise be needed to explain why your computer is malfunctioning or your car won't run.

An omnipotent God offers an ultimate agentic cause for the things and events that are important in your life. It may no longer be necessary to give minds to nature, objects, or machines when belief in God makes just such a causal explanation cognitively available (see Kay et al., 2008).

As with all of these biases, to really understand the relationship between anthropomorphism and supernatural beliefs, it is necessary to look at a wider range of religions and beliefs. It is quite likely that anthropomorphism would be as highly related to other non-Christian religious beliefs as it is to paranormal beliefs. If other large religions, such as Hinduism and Buddhism, were to show a strong relationship to anthropomorphism, we could conclude that this null relationship is specific to Christianity. Moreover, looking at additional religious groups may also allow us to tease out the role that causal reasoning plays in this relationship. Both Hinduism and Buddhism use the non-agentic system of karma as a type of causal explanation, but do not explicitly forbid imbuing things in the world with minds. This offers a possibility to separate these two explanations. If anthropomorphism is entirely about explanations, then strong karma beliefs should make anthropomorphism less appealing in the same way an omnipotent God does. On the other hand, if the lack of relationship is about explicit teaching against anthropomorphism, anthropomorphism should still be quite prevalent among those who believe in karma.

5.3   Dualism

The strongest relationship I found between any of the cognitive biases and religious belief (or, more specifically, the belief in God) was with dualism. Dualism, like anthropomorphism, plays a clear theoretic role in supernatural belief. The concept that the mind is something separate from, and not reducible to, the body is necessary for the belief that minds can exist separately from physical forms in ghosts and gods (Bloom, 2005; 2007). Unlike anthropomorphism, dualism is strongly related to the belief in God. Again, I only looked at this among Christian believers, but I suspect that further research would show that this relationship extends to other religions as well. A growing body of research shows dualism to be a basic intuition separate from any specific set of beliefs. Small children do it readily (Chudek et al., 2013), and it is seen in ancient China which not yet had contact with Western thought (Slingerland & Chudek, 2011).

Still, the strength of the relationship between dualism and belief in God may have some roots in Christian belief. If anything, dualism's relationship with belief in God is stronger then it's relationship with paranormal belief. This is counter to the hypothesis that cognitive biases should be more strongly related to non-religious beliefs than they are to supernatural ones. Christianity may be promoting dualistic thinking. One way this could be happening is through soul beliefs. This idea, that there is a part of us, a soul, that exists separately from our material bodies, is grounded in dualistic thinking (Preston, Ritter, & Hepler, 2013). Since soul beliefs are an important fixture in Christianity, it makes sense that Christianity would promote dualistic thinking. Christianity's constant reminders that there is a non-

physical part of us that will live forever should prime believers with steady reminders of a dualistic worldview.

Soul beliefs are hardly unique to Christianity. Still, the focus of Christian belief on life in the next world rather then this one might make Christians rely more on dualistic thought than other supernatural believers. Again, this is a testable hypothesis. If this is the case, variation in how much different religions emphasize a soul should correspond with differences in the strength of dualistic intuitions.

This is not to suggest that being Christian or believing in souls causes dualism and not the other way around. I would suggest, instead, that this is a feedback relationship. Individuals have intuitions towards mind-body dualism and this causes them to hold certain types of supernatural beliefs more readily. Once those beliefs have coalesced across a whole population and become a religious tradition, we should expect that beliefs and practices promoted by that tradition feedback on the underlying thought patterns of the people who hold those beliefs. It is clear that dualism cannot come entirely from Christian beliefs, as it is seen in entirely non-Christian places, but that does not mean that the content of specific beliefs in Christianity will have no impact on the relationship between dualistic thought and supernatural beliefs.

5.4   Teleology

Teleology was the weakest of the cognitive biases I explored in this dissertation. As I mentioned in Chapter 2, this may have more to do with how I measured it than the actual relationship of teleology and supernatural belief as constructs. Theoretically, the link seems quite sound. The belief that everything has

a purposes leads people to see the world as full of intentional actions and increases the likelihood that people will believe in a designer behind a world full of designs (Kelemen, 2004). Further, other empirical work has found links between teleology and supernatural beliefs (Banerjee & Bloom, 2014b; 2014a; Kelemen & DiYanni, 2005).

Another possible problem with teleology and how it has been examined in this dissertation is the problem of whether or not teleology *requires* mental state reasoning. Teleology is based in artifact cognition (Casler & Kelemen, 2007; Kelemen, 1999). People extend their understanding of artifacts as being made with an intended purpose to objects in the natural world. This idea—that this purpose-based reasoning comes out of the ability to infer the intended use of objects—clearly requires the ability to identify goals and intentions, but not necessarily the ability to reason about mental states. These are not the same thing. Identifying something as having goals is the process of identifying agents and is a quick reaction to even the most basic stimuli (see Heider & Simmel, 1944). The process reasoning about an agent's (or non-agent's) mental states is a much slower and more effortful process. It is one that requires the appropriate motivation (Apperly & Butterfill, 2009; Butterfill & Apperly, 2011).

To better understand what I mean by this, picture yourself on a crowded bus. There are lots of people getting on and off the bus. The process of deciphering the basic goals—such as who want to get on or off the bus—based on movements is fairly immediate and effortless. Now, imagine trying to decipher what each of those people is thinking during this process. Interpreting each person's mental states

beyond their immediate goals of getting on or off the bus involves a great deal more effort. This is the difference between a goal (someone getting off the bus), and a motivation (why are they getting off the bus, what are they thinking). You could try to reason about the mental states—the motivations and the content of a persons mind—for any person on the bus, but chances are you could not do this for more than a few people at a time. Further, you would be unlikely even to try to decipher what someone is thinking unless a person was behaving erratically or was somehow important to you (i.e. a friend). Identifying the intention to get off the bus can be done automatically and without effort; thinking about mental states behind those intentions is much more arduous and often unnecessary. All of this tells us that we can see intentions without seeing minds (e.g. Csibra, Gergely, Biro, Koós, & Brockbank, 1999; Gergely & Csibra, 2003).

It is possible that we identify events and objects in our life as purposeful without having to engage in the more effortful process of mental state reasoning. We can even see intention in events—such as paying for bad deeds of the past—without ever thinking about a mind that arbitrates these intentions. Processes like karma can be used in the place of an omnipotent mind to make sense of and offer a sense that we as individuals have some control over the world (through our deeds). According to this view, events, both good and bad, are penance or reward for past good or bad deeds (even past-life deeds). This is not to suggest that we never use mental state reasoning to decipher life events or to understand objects as purposeful; rather, this relationship is not automatic, and probably only happens when we are actually motivated to do so. Still, the underlying intuition that

everything is purposeful is always present (e.g. Kelemen et al., 2013; Lombrozo et al., 2007).

A system like karma is a candidate for an entirely non-mentalistic supernatural belief. It is almost certainly based on this intuition that things happen for a reason, but it subverts the need for elaboration with mental states because it offers another type of causal explanation. This type of non-mentalistic supernatural belief may exist as an entire category of supernatural beliefs that I have not yet touched on in this dissertation. I will do so here, briefly.

5.5   Supernatural Causal Reasoning

The possibility that we can reason about intentions or purposes without reasoning about minds suggest that mentalizing may not have a monopoly on intuitions that lead to supernatural belief; other types of causal reasoning may also have a role to play. As I have mentioned previously, the use of mental state reasoning in supernatural belief is likely motivated by a need to understand and have some sort of control over the world. If this is the underlying function of supernatural intuitions, then non-mentalistic forces could just as easily underlie supernatural beliefs as mentalistic ones, so long as they still give people a sense of understanding and control. There are plenty of examples of non-mentalistic supernatural forces, such as karma, *mana* (Keesing, 1984; MacClancy, 1986), and even luck (Pritchard & Smith, 2004), that appear on the surface to serve this function without mental states.

We seem to intuitively believe that good things happen to people who do good things and bad things happen to people who do bad things (Callan, Ellard, &

Nicol, 2006; Furnham, 2003; Lerner, 1980), but it is unclear why this apparently widespread belief exists in the first place. In addition to the teleological explanation offered above, some researchers have suggested that this belief is based in innate beliefs about fairness (Baumard & Boyer, 2013; Baumard & Chevallier, 2012). This seems unlikely because intuitions about what constitutes fairness differ quite a bit around the world (Henrich et al., 2010a). It could also be based in something like an intuitive understanding of indirect reciprocity.

Indirect reciprocity is the use of reputations to decide who you should trust (Boyd & Richerson, 1988; Trivers, 1971). You are better off trading with people who have good reputations and avoiding those who have bad reputations. Reputations are based on the distributed memory of the community regarding past behaviors. Doing something the community considers bad damages your reputation, which means that the community punishes the wrongdoer or denies cooperation. Simply put, our understanding that there are consequences to our actions when dealing with other people could extend to supernatural causes.

This is more clearly seen in witchcraft beliefs then karmic beliefs, but both may have similarly intuitive foundations. Around the world, misfortunes are attributed to witches, curses, or the evil eye. In parts of South Africa, people believe that the source of an illness can be curses brought on as retributions for past offences against others, or making others jealous (see Legare & Gelman, 2008). Similarly, in medieval England, not being generous to a beggar could cause any number of bad things to happen if that beggar turned out to be a witch (Thomas, 1970). Witchcraft functions as a way to make sense of random misfortune by

assigning retribution to the supernatural. Importantly, that person does not have to be known in advance (see Evans-Pritchard, 1937). People speculate and search for withes after the fact for an explanation of their misfortunes.

Karmic beliefs, on the other hand, do not require another person. They are based entirely on the acts and deeds of an individual. Outcomes are an automatic response to past actions. Karma, like luck, is a quality you have, not a retributive act of another mind. Still, it seems to be based on a similar reasoning system to witchcraft beliefs: the wicked and the just alike are given their just deserts.

Since so much of the psychological and cognitive research on supernatural beliefs has focused on supernatural agents, karma and witchcraft beliefs have been largely left unexplored. We know very little about them psychologically. Considering that close to 1.4 billion people belong to karma-based religions and witchcraft beliefs are prolific around the world, this is a gap in the research that urgently needs to be filled.

5.6   The Cultural Basis of Belief

These cognitive biases provide at least a partial answer to one of the most frequently asked questions pertaining to religion: why is it found everywhere? A complete answer to this question represents an important piece of the puzzle that is religion and supernatural beliefs, but even a complete answer to this particular question would not solve the larger puzzle entirely. Most of what we think of when we think of religion is created by, and spread through, culture. Cognitive biases can only explain broad categories of belief, but they cannot explain the specific content of any belief. Supernatural agent concepts may exist because of cognitive biases, but

who those agents are, what they can do, and what they care about are culturally

determined (see Purzycki & Sosis, 2011). Further, culture makes up a vast majority

of what we see in any type of supernatural beliefs, not just religious ones. In Chapter

3, I showed that a sizable proportion of the variance in the endorsement of

paranormal beliefs could be explained by cognitive biases. This means that *why*

people believe has a lot to do with their intuitions, but this tendency to believe

should not be confused with the content of those beliefs. The specifics of how people

express their intuitions remain contingent on the culture in which they were raised.

Religions, as cultural traditions, are subject to the same learning mechanisms

and selection forces as all culture. This means they will be transmitted in the same

way as clothing styles, norms of polite behavior, or any other part of a culture.

Religion offers nothing unique in this sense. People learn religion from those around

them, and like any other part of culture, they will be more likely to adopt the

religious beliefs of the majority, and even more likely to adopt the beliefs of

prestigious people within that majority.

Even CREDs are not a learning mechanism unique to religion (Henrich,

2009). CREDs make up a general mechanism of cultural learning, one that helps to

explain a problem inherent with religious belief: how does one judge the truth and

importance of a belief when you have no objective way of verifying it? This problem

exists widely and is not unique to the culture of religion; it is prevalent in non-

religious culture as well. Dietary restrictions, any type of medicine, and beliefs about

etiquette are only some of the things that fall into this category. People adopt these

beliefs without fully understanding their truth or utility. We prepare food in a

certain way or avoid certain things at certain times because we have learned to do so from others. The more studious others around us are about following these practices, the more credible the information becomes. We are more likely to adopt these practices when they are credibly displayed by others. Behavioral displays offer a way of weeding out the things that are culturally important from those things that are not. They not only tell us what to believe, but how strongly to believe it.

5.7   Implications for the Cognitive Science of Religion

The implications of this research for the cognitive science of religion are twofold. First, this research suggests that the intuitions underlying supernatural belief are important, but have limited explanatory power. They do—as has been previously theorized—promote supernatural beliefs in those who hold them, but these beliefs will not necessarily be a part of any religious tradition. Further, different types of supernatural beliefs may be affected differently by these intuitions. Most notably, we should expect intuitions to predict supernatural beliefs when those beliefs are not strongly enforced by culture.

The second, and I would suggest more important, implication to the cognitive science of religion is the influence of cultural learning. Religions are cultural in nature and cultural learning plays a major role in determining who is and is not religious as well as the content of a persons religious beliefs. Though intuitions are important they may be less important then culture and cultural learning mechanisms in explaining belief in any particular religion. The cognitive science of religion would be behooved to pay more attention to the role of cultural learning in their exploration of the foundations of religious beliefs.

5.8   Butterfly Collecting

In almost every section of this chapter I have talked about how these theories could be tested across a broader spectrum of belief, using the diversity of religious beliefs that exist throughout the world to form a more complete model of religious and supernatural belief. We, as researchers, can exploit the existing variance in types of supernatural belief to better understand the role of both cognition and culture in religions and other supernatural beliefs. This is something that is almost never done in the cognitive science of religion. Too often, Christianity is taken as a representation of all types of religious belief around the world. This is almost certainly hampering our knowledge of the phenomenon we wish to more fully understand.

This problem of a lack of diversity in psychological samples is in no way unique to the study of religion (see Henrich, Heine, & Norenzayan, 2010b), but this makes it no less important. Religion has traditionally been the domain of humanities and cultural anthropology using historical and ethnographic methodologies. As a way to refocus the efforts of understand religion, moving it away from an understanding of individual religions to an examination of religion as something that is cognitively based, early researchers pushed for a focus on the universal human mind as the topic of research rather then the idiosyncratic beliefs and practices of individual religions and cultures (see Barrett, 2004; Boyer, 1994). The process of collecting and cataloguing different religious practices was dismissed as "butterfly collecting," something far less important than understanding the universal aspects of the human mind (Boyer, 2001).

The push to understand religion as being based in the brain was a noble pursuit, and one I have followed whole heartily, but I feel the dismissal of 'collecting' different religions and religious practices has been an unfortunate one. The examination of actual religious concepts—including both their similarities and differences—is an important part of this puzzle. This dismissal not only does the cognitive science of religion a disservice, but also disregards the incredible boon the examination of collected butterflies has offered to the understanding of biology, physiology and evolution. A biologist who attempted to explain the evolution of a genus, or species of butterfly without first collecting specimens and examining them would find her job exceedingly difficult, yet this is precisely the approach implicitly advocated by those who would ridicule the 'butterfly collector' in the study of religion. This lets researchers of psychology of religion off the hook, freeing them from the burden of collecting religious 'specimens' before trying to explain a universality of religious cognitions.

A more complete catalogue of beliefs and practices offers us the chance to access profound insights into religions that are simply not possible with our currently limited scope. Christianity should be understood as a single data point in a wider sea of supernatural and religious beliefs—not as the focus of an entire field of research. An expansion of scope (one that sees cognitive psychologists looking as deeply into other religions as they have looked into Christianity) can only benefit the cognitive science of religion. For the cognitive science of religion to move forward, we may need to start collecting more butterflies.

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Appendix A:

God and Purpose Questions (Chapters 2, 3, 4)

<u>God</u>
1. I believe in God.
2. I believe in a divine being who is involved in my life.
3. There is no god or higher power in the universe.

<u>Life's purpose</u>
1. Things in my life happen for a reason.
2. There is a discernible purpose to the events of my life.
3. Most things that happen to me are random or coincidental.

Insecurity Questions (Chapter 3)

<u>Financial security</u>
1. How often do you feel you cannot afford to buy items you need?
2. How often do you worry about having enough money in the future?
3. How often do you worry about what your household financial situation will be like in 12 months?
4. How often do you worry about losing your job?

<u>Physical insecurity</u>
1. How often do you feel unsafe walking alone on your local area after dark?
2. How often do you worry about being burgled?
3. How often do you worry about being a victim of violent crime?

<u>Welfare and social security</u>
1. How much do you feel the government help would be sufficient if you lose your job?
2. Do you think the national health services will take good care of you if you fall sick?
3. How confident are you in your country's social security system?

<u>Wealth inequality</u>
1. How much do you think people who start out poor can become wealthy if they work hard enough?
2. How much do you think that most rich people acquire their wealth by some illegal methods?
3. How much do you think there is too large of a gap between rich and poor?

<u>Trust</u>
1. Generally speaking, how much would you say that most people can be trusted or that you need to be very careful in dealing with people?
2. How much do you think that most people would try to take advantage of you if they got the chance?
3. Would you say that most of the time people try to be helpful?

Anti-science questions (chapter 4)

<u>Anti-science views</u>
1. I trust that scientific findings are, for the most part, correct (R)
2. I trust my intuition more than scientific evidence.
3. We believe too often in science.
4. I don't believe science can answer most questions about the world.