Adults' Understanding of Extraordinary Mental, Perceptual, and Physical Capacities

by

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A Thesis Submitted in Partial Fulfillment of the

Requirements for the Degree of Bachelor of Arts

with Honors in Psychology from the

University of Michigan

2011

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Abstract

In two studies undergraduates' understanding of extraordinary capabilities was investigated using religious and secular contexts. Six stories assessed participants' endorsement of anthropomorphic language to describe attention, physical power, perception, and presence of three agents: God, a human, and Qwore, an agent with the same powers as God. Participants attributed human-like limitations to God's capabilities, and participants anthropomorphized attention and presence more than perception or physical power. Certain religious practices were associated with decreased use of anthropomorphic concepts, such as belief in God's existence and frequency of reading religious materials. These results indicate that God is treated differently from other agents, some supernatural capacities may be easier to understand than others, and some religious practices may change one's concept of supernatural abilities.

Keywords: god concepts, anthropomorphism, religion, supernatural abilities

Adults' Understanding of Extraordinary Mental, Perceptual, and Physical Capacities

According to a 2010 Gallup poll, approximately 54% of Americans consider religion to be a very important part of their lives. Additionally, approximately 92% indicated a belief in either the Christian God or a universal spirit (Gallup, 2011). Despite the relatively strong influence of religious beliefs on the average American, research has shown that many adults tend to misunderstand several of the key attributes assigned to God (Barrett & Keil, 1996). Developing an understanding of how people perceive and understand supernatural agency has important implications, even outside of religion. Ideas of extraordinary capacities expand beyond the scope of God concepts; they exist throughout popular media, in novels, television shows and movies. Understanding the way that we conceptualize extraordinary capacities promises to shed light on our general understanding of agency, and this research may have further implications involving theory of mind and evolutionary psychology.

Studies have shown that college students tend to understand the monotheistic, Christian God with two or more parallel thought processes. There is the *theological God* and the *intuitive God* (Barrett & Keil, 1996). The theological God, based on western Christianity, is understood to be all-powerful, all-knowing, omnipresent, and unrestricted in terms of perceptual ability and attention span (Kohler, 1918). In contrast, the intuitive God often does not adhere to these attributes and is anthropomorphized with the limitations typical of average humans. While an individual may profess a belief in an omniscient, omnipotent, and omnipresent God, the same person may not apply those beliefs when asked about the agency of God outside of a biblical or religious context (Barrett & Keil, 1996).

In the current studies, I assess adults' understanding of supernatural agency, in particular the cultural and cognitive factors that play a role in the elicitation of an intuitive

"anthropomorphic" God in contrast to a theological God. These studies are conceptual

replications and extensions of Barrett and Keil's (1996) research on adults' understanding of

extraordinary agents' abilities. Before describing their study in detail, I first review the counter-

intuitive nature of many religious concepts and the reasons why these concepts are transmitted

through generations. Next, I discuss how supernatural agency is often composed of several

counter-intuitive elements, and I tie my research to Barrett and Keil's (1996) study of the

theological God. Finally, I present several other perspectives and extend the discussion to other

branches of psychology.

Counter-Intuitive Concepts

Many researchers have focused on developing an understanding of why people tend to

anthropomorphize supernatural agents. Perhaps one of the most convincing arguments is based

on the idea that certain religious notions are more easily transmitted because they strike a

balance between intuitive and counter-intuitive. These "minimally counter-intuitive concepts"

are easy for humans to process -- they fit with most of our existing intuitions about the world yet

are different enough to catch our attention. These types of concepts also allow a bridge to form

between our intuitive and counter-intuitive representations (Boyer, 1998; Atran, 1989; Atran &

Norenzayan, 2004; Guthrie, 1993). In particular, counter-intuitive agents rely on our intuitive

ontology of living things and artifacts in the world and the domain specificity of particular agents

within each category. For example, a person who can exist in the same space as a chair violates

our intuitive sense of physics, which assumes that objects cannot coincide in the same space,

while still following all other ontological properties that we assume for a person (Boyer, 1998;

Atran, 1989). Humans also categorize objects based on several ontological domains -- Person,

Animal, Artifact, Natural Object, and Plant. There are many properties that we associate with

each of these domains, such as assumptions of physics for artifacts (e.g. two solid objects cannot pass through each other) and living functions for plants and animals. Extensive research has indicated that when properties within a certain domain are transferred to another domain, these counter-intuitive concepts are more likely to be remembered and passed on. For instance, a tree that can speak would be a prime example of a transfer of human properties onto the plant domain (Atran, 1989; Boyer, 1996; Boyer, 1998; Boyer, 2000; Boyer, 2003).

The same types of property transfers and counter-intuitive properties that are applied to agents can also be applied to systems of belief. More often than not, religious systems of belief include minimally counter-intuitive agents. Boyer and Ramble (2001) have studied the role of expectation violation as a basis for transmission of religious beliefs and ideas. Their studies indicate that the most successfully-transmitted religious concepts usually include explicit violations of expectations; an angel is a good example of explicit violations of expectations -- most people cannot fly and pass through solid objects, but angels can. Likewise, Atran and Norenzayan (2004) argue that God is a memorable concept because of the violation of several basic assumptions of intuitive ontology. A jealous God that is endowed with an ability to move mountains ties in easily with our knowledge of the world. Implicitly, we extrapolate that a jealous God is also capable of experiencing other emotions, such as joy or anger. We also assume that God has the senses necessary to touch and see the mountain, despite the fact that these claims were not explicitly stated.

However, as previously mentioned, these concepts only attract attention if they can be entertained within the context of our intuitive reasoning about the world (Atran & Sperber, 1991; Barrett, 2004). A similar pattern of balancing intuitive and counter-intuitive concepts can also be found in transmission of narratives. In a study by Atran and Norenzayan (2004), participants

were more likely to accurately remember specific details of a story over a one week period when they included a mix of intuitive elements, such as a wandering cow or a grazing deer, with a small number of minimally counter-intuitive concepts, such as a giggling oak or a melting lady. Narratives that intermixed mostly intuitive themes, which were used to keep the story salient, with a few counter-intuitive concepts that were attention-grabbing, were remembered with higher accuracy than narratives with many counter-intuitive concepts or none at all (Atran & Norenzayan, 2004).

Reasons for Anthropomorphism

To account for how God concepts are transmitted, Sperber (1975) explains that beliefs are stored in our minds as representations of ideas rather than as "encyclopedic knowledge." This means that statements and ideas that are about beliefs or God concepts may require additional commentary to explain that they are true, regardless of the context. A belief such as "'God is omnipresent' *is a true statement*" is a prime example of this additional commentary. Because this type of meta-representation of ideas occurs, in-depth analysis of the belief is not required in order to retain the belief in memory. Thus, the counter-intuitive nature of such concepts is not a barrier to memory retention. However, more contemporary research focuses more on specific cognitive mechanisms as opposed to hierarchical representations in the mind. These types of studies explore the ties between agency detection, the creation of agents, and pre-existing cognitive systems. Boyer (2003) theorizes that the creation of supernatural agents is based upon several, interacting cognitive predispositions and pre-existing systems in the brain. For example, supernatural agents are often invoked to help explain single events, such as a death in the family, or a series of coincidental events, such as having multiple car accidents in the same month, because the probability of these misfortunes is usually misunderstood. People tend to

process such events as a type of exchange between humans and supernatural agents, which activates an intuitive logic about social exchanges that is normally present in non-religious contexts.

Other studies have examined the broader mechanisms behind anthropomorphism of non-human agents. Waytz and colleagues (2010) studied the effects of predictability on levels of anthropomorphism for electronics and robots. Their results indicate that people tend to perceive non-human agents as possessing "a mind of their own" when they respond in unpredictable ways or malfunction. This unpredictability activates an intuitive logic that we have about perceived intentional behaviors, which is often referred to as the "Hyper-Active Agency Detection Device" (Guthrie, 1993). Guthrie has studied this device as an evolutionary basis for agency detection in human perception. He argues that humans have developed a mental module designed to detect intentional agency in the world as a survival measure. However, the hypersensitivity of this detection device increases the likeliness of detecting false or supernatural agents in the world in order to explain perceived intentional agency.

The role of anthropomorphism of non-human agents and belief in religious agents in loneliness and desire for control has also been explored. These experiments indicate that increasing subjective levels of loneliness leads to greater professed belief of supernatural agents, such as God, and in attributing anthropomorphism to pets. In this particular study, anthropomorphism satisfied a social motivation to form a closer, human-like connection with non-human agents (Epley, Akalis, Waytz, & Cacioppo, 2008). Their results gives credence to the theory that supernatural agent concepts tend to be emotionally powerful. Atran and Norenzayan (2004) argue that agents who are involved in one's direct life are more memorable

than agents who do nothing, even if these non-interacting agents are endowed with God-like

abilities.

Most of these theories point towards anthropomorphism as an evolutionary adaptation.

Our existing cognitive systems, such as theory of mind, are the basis for our detection and

processing of supernatural agency. We use these systems to understand other people, but the

same concepts are also applied to God and other agents. This type of research also

acknowledges the impact of socio-cultural input in our perception of agency and the

supernatural. However, many important aspects of social life have been overlooked or simply

forgotten. While God concepts are of particular interest, the study of supernatural agency in

general is vital to furthering our understanding of how anthropomorphism strategies develop in

humans. By studying factors, such as religion, that may mediate understanding of extraordinary

abilities, we may be able to discover the cognitive architecture that underlies anthropomorphism.

Barrett and Keil's Anthropomorphism Study

In order to explore the interacting areas of culture and cognition, these studies assess

adults' understanding of supernatural agency. The current studies were created as conceptual

replications and extensions of Barrett and Keil's (1996) research on adults' understanding of

extraordinary agents' abilities. They used short narratives involving humans and God. Each

story focused on God interacting with a person or an object on Earth. For example, one narrative

depicted God rescuing a boy, and another narrative involved God admiring a beautiful stone.

After participants heard or read each story, they summarized the details of each narrative and

were asked several questions regarding God's anthropomorphic qualities. These questions

assessed participants' understanding of God's movement or being in a particular place, God's

requiring some type of sensory input to gather information, God's need to perform physical actions in a sequential order, God's attention, and God's perceptual limits.

The results of their study indicate that participants have a tendency to anthropomorphize God, even if their theological concept of God stands in direct opposition to these attributes. When answering questions and summarizing the narratives, participants had a strong tendency to report that God must be near something to receive any type of sensory input from it, that God is unable to attend to simultaneous sensory stimuli, and that God has a limited focus of attention and must move from place to place (Barrett & Keil, 1996).

Barrett and Keil also developed other agents to test adults' levels of anthropomorphism. In another version of their study, they introduced a super computer named Uncomp. Using answers from previous questionnaires about God concepts, Uncomp was given all the qualities that participants commonly attributed with God, such as omnipresence, omniperception, mind-reading abilities, and the ability to work on several tasks simultaneously. These details were explained before participants heard the narratives or answered questions, but they were not told that the study was exploring God concepts. Likewise, other conditions of the study included several non-natural super agents named Mog, Beebo, and Swek who were each endowed with certain "God-like" characteristics, such as omnipresence, limitless attention, or the ability to read minds.

Barrett and Keil's study revealed that participants have a tendency to anthropomorphize agents, regardless of their prior exposure to them. A significant proportion of participants used similar anthropomorphic concepts to process each of the agents within their studies (God, Uncomp, Superman, Mog, Swek, and Beebo). However, these levels of anthropomorphism, while significantly different from chance, fell only slightly above chance, and the study did not

include human agents for comparison. Barrett and Keil (1996) hypothesize that this

anthropomorphism could be due to the novelty and complexity of processing new agents such as

Uncomp or Swek. This anthropomorphism may also be due to the constraints of processing and

retaining information in stories. Much like introducing a complex and novel agent into a story

that requires processing some subtle differences in ability, adding intricate story details to the

task may have forced some participants to default to an anthropomorphized version of Mog,

Swek, or Uncomp. Thus, perhaps anthropomorphizing an unfamiliar agent is easier than

developing a full understanding of such counter-intuitive properties as omnipresence.

However, significant differences also emerged between each condition type. When the

non-natural super agents were introduced to the task, participants demonstrated significantly

decreased levels of anthropomorphism. These systematic differences between the super agents

and God indicate that God requires a different type of processing compared to other agents.

Even when participants were primed to think of God as "radically different from humans,"

participants were actually more likely to anthropomorphize God (Barrett & Keil, 1996).

Results also indicated that correct attribution of supernatural qualities to God could be

primed by asking questions about religion or having participants think about their belief systems.

By manipulating the order in which they administered a short, free-form response questionnaire

to ask participants about their perception of God, Barrett and Keil discovered that participants

were more accurate in their ratings of each God item when the questionnaire was presented

before the focal task (Barrett & Keil, 1996). These results indicate that participants can be

primed to understand the supernatural qualities of God by thinking about them. The current

studies also employ a questionnaire to collect information on participants' religious exposure and

beliefs, but to eliminate the questionnaire's influence on participants' responses, it was administered after the focal tasks.

There may be more to a human's comprehension of God's agency than simply attributing anthropomorphism. Gray, Gray, and Wegner (2007) conducted a study that involved some of the more subtle nuances of participants' understanding of God's agency and thoughts. According to their research, participants, who were Christian women with an average age of 30, were tested on their understanding of various mental capacities, such as emotions, personalities, memory, and self-control in relation to God and several other agents. These capacities were split into two categories: experience and agency. The experimenters sought to expand our current understanding of theory of mind, which is often thought of as a singular variable of possessing a specific amount of "mind." This type of distinction was chosen because it addresses the difference between moral *agents* (assessed under the agency variable), whose actions can be moral or immoral, and moral *patients* (assessed under the experience variable), who are subjected to the moral or immoral acts of agents. Types of experience ranged from the ability to feel pain to emotion states like pride and fear. On the other hand, agency capacities included planning, self-control, morality, and thought. Based on the results of their study, participants rate God very high in agency (just like humans), but low in experience (like robots).

These results may indicate that participants understand God as lacking some human-like qualities, such as emotions. However, particular characteristics of the testing protocol may have elicited these less-anthropomorphic responses. When dealing with the details of God, asking explicit questions regarding mental and physical states may only tap into one's theological God concept. Without an additional context or story to place the agent in, it is easy to see why participants would rate God very low in terms of being a moral patient (Gray et al., 2007).

In order to access the intuitive God concept, the current studies attempt to replicate and extend Barrett and Keil's research on adults' understanding of extraordinary abilities and supernatural agents. The testing protocol used in these studies is very similar, but several alterations were made. While the emphasis in their experiments was to check if participants understood God concepts, this research additionally focuses on the cultural factors that might affect one's understanding. Aspects such as prior religious belief, belief in God, parental religious views, and attitudes towards religion may prime participants to apply complex supernatural properties to agents outside of a religious context. Additionally, these studies attempt to address many of the problems with the past research. By separating each of the supernatural traits into four separate categories, I hope to see significant differences between specific capacities. It is conceivable that some supernatural qualities are easier to anthropomorphize than others. Similarly, religious exposure may only affect an understanding of specific abilities, while other capacities may show little differences between religious and secular participants.

Attributes of a Theological God

Certain attributes and abilities associated with God are important in identifying an agent as God. Trimèche, Visonneau, and Mullet (2006) presented adolescents, young adults, and older adults of mixed religious backgrounds with several short stories involving ancient tribes and the deities they worshipped. Each story consisted of the names of the tribe and the deity, whether or not the deity was omnipotent, omnipresent, omniscient, or eternal, and how the deity presented itself (unity, trinity, multiplicity). After being presented each deity, participants were asked to rate whether they believed the tribe worshipped the "true God" on a response scale. Abilities such as omnipotence were much more dominant in this identification than others, such as unity,

or the way that an agent presents itself. These findings indicate that people may assess a supernatural agent based on a continuum. The more an agent possesses attributes such as omnipotence, omnipresence, and omniscience, the more that agent is viewed as God. Thus, even if given another name, an agent that possesses God-like abilities may simply be processed as God or something very similar to God (Trimèche, Visonneau, & Mullet, 2006).

Despite the importance of the supernatural abilities, the individuals who process them are also essential to understanding the mechanisms involved in thinking about God or other agents. However, the importance of variables such as prior religious belief and religious exposure have not been fully explored in this type of research. Limited studies have been conducted on adult levels of anthropomorphism based on image-use and religion (comparing Roman Catholicism with Protestantism) during worship, but those studies have been very narrow in scope. One study by Barrett and VanOrman (1996) suggests that levels of anthropomorphism were related to image-use rather than religion, in that those participants who used images regularly during worship and services tended to anthropomorphize God to a greater level. Using a similar paradigm to Barrett and Keil's (1996) study, participants listened to several stories involving God, and then they were asked to recall details about God's agency. Levels of anthropomorphism corresponded to participants' tendency to assert that God must do actions in sequential order, cannot simultaneously process competing sensory information, requires perception of sensory information, and must move from place to place. In this study, however, participants endorsed a limited range of religious backgrounds. In fact, only 32 participants were used in the study, and each participant identified as either a practicing Roman Catholic or a practicing reformed Christian Protestant, therefore questions regarding the influence of religious background were difficult to answer (Barrett & VanOrman, 1996).

Because there are so many different subgroups of religion, perhaps the easiest way to compare participants of differing religious values is to look at Christian and nonreligious groups. Even though the umbrella term "Christian" encompasses many people with diverse or even conflicting belief systems, use of such subgroups would ensure a base level of homogeneity between participants, such as sharing belief in a monotheistic God. Using Christian and nonreligious subgroups, Foster and Keating (1992) found that the majority of participants viewed God as a male and as a "father," but that participants who identified themselves as Christian via a short questionnaire were more likely to include feminine elements in their cultural concept of God, such as referring to God as both "mother" and "father." Likewise, the same study indicates that Christians are more likely to accept a female God. While this type of research does not investigate why such differences exist, it does show that there may be systematic distinctions between religions as a result of God concepts and upbringing.

Another beneficial way to analyze differing belief systems is to examine the cultural aspects implicated with certain religious groups. For example, "Mainline Presbyterian" churches may be considered part of a liberal Christian culture, and "Evangelical Presbyterian" churches are more often associated with a conservative Christian culture. Jensen (2009) used this dichotomy to compare differences in God concepts between the two cultures. For the purposes of this study, conservative religious cultures are associated with an emphasis on traditional roles for men and women, parental control, and authority derived from an unchanging moral code. In contrast, liberal religious cultures are associated with flexibility in belief system and freedom from absolute church law. The liberal culture is more willing to accept a relative moral code that can be altered by changes in social context. Even though this particular study did not assess specific differences in religion, Jensen saw several interesting patterns between the liberal and

conservative religious cultures. For example, liberal participants were more likely to designate

God as being male, whereas conservative participants were more likely to consider God

genderless. Also, conservative participants were much more likely to describe God using human

traits such as jealousy, wanting, and expressing desires. The same participants also assigned

human roles to God significantly more, using words such as "counselor" or "friend" (Jensen,

2009).

However, this type of research does not investigate why such differences exist. It does

illustrate that certain variations among religious cultures may lead to differing concepts of God,

but the conclusions are mixed. For example, a similar study illustrated that belief in a spiritual

afterlife and stronger religious belief are correlated with a decreased perception of God as

experiencing human-like emotions or capacities, such as joy or fear. Those same participants

were also less likely to attribute agency (measured as levels of self-control, thought, and similar

mental capacities) to humans and other earth-based characters (Gray et al., 2007). Religious and

secular cultural backgrounds may also affect the way we perceive God. Using a survey with a

seven-point Likert scale, Chara and Gillett (2004) asked participants to rate God on various

sensory modalities based on how they viewed God most of the time. By comparing students

from a secular and a religious university, they found significant differences between the

Evangelical/Nondenominational Christians group and the nonreligious group. The Evangelical

Christians were more likely to rate God positively in perceptual differences (i.e. smelling better

or flowery, higher in levels of consciousness, sweeter tasting, brighter, closer, etc.) when

compared to nonreligious students. Another interesting finding was that 20% of the participants

from the religious group viewed God as resembling a triangle shape, whereas none of the

nonreligious participants rated God's shape as triangular. This may be due to the doctrine of the

holy trinity in some Christian denominations (Chara & Gillett, 2004).

One of the studies that explored some of the truly cross-cultural differences in God

concepts compared the western God with the eastern Krishna, Vishnu, Brahman, and Shiva in

Indian, Muslim, and Hindi culture. These gods are not exact parallels to the western God, but

there are some very important similarities based on unlimited attention, omnipotence,

omnipresence, and unlimited sensory perception. Barrett's (1998) study was a replication of the

protocol he and Keil used in 1996, and the results were strikingly similar. Use of a religious

questionnaire revealed that most participants viewed the various gods as possessing supernatural

abilities such as omnipresence and limitless attention, but there were significant differences

between the participants' scores on the questionnaire and their scores on the narrative memory

task. Despite professing a theological belief in a Krishna or a Vishnu that exists everywhere at

once, participants still mistakenly remembered that the deities had to walk or move from place to

place. Significant differences were not found between the religious groups, but age did play a

factor in the levels of anthropomorphism. The ages of participants ranged from 9-55 years, with

a mean age of 25.4 years. Older age was correlated with higher levels of anthropomorphism on

the narrative task and higher ratings of supernatural ability for each deity in the questionnaire.

Based on this limited research assessing the influence of religious beliefs and exposure

on God concepts, one can see that there is a potential to discover significant differences between

cultures in their belief systems. There may even be fundamental differences in one's concept of

God based on sects within a single religion (e.g. Mainline vs. Evangelical Presbyterian).

Therefore, it is extremely important to gain an understanding of how different groups of people

understand supernatural agency in general, not just based on God concepts. Research with God is

abundant because God is a salient supernatural being, and, as stated previously, God concepts fall under the category of the minimally counter-intuitive. While there is much research on understanding why humans tend to anthropomorphize, few studies have focused on the mechanisms behind how we process such agency. Some research suggests that when we anthropomorphize non-human agents, we use similar patterns and structures of the brain as when we process actual human agents. However, more studies need to be conducted on the patterns of activation and the concurrent areas of the brain in order to solidify this claim (Waytz et al., 2010).

A Developmental Perspective

While these studies may be useful in developing a general theory of agent concept, they fail to recognize individual differences between groups. Taking such a pan-human perspective may be helpful in formulating theories, but it becomes less useful when dealing with specific people or groups of people. One way that some researchers have managed to circumvent these generalized theories is looking into the developmental spectrum for cues or priming effects in children's understanding of religious concepts. In particular, several researchers have examined relations between children's exposure to religious concepts and their anthropomorphism of extraordinary agents. In short, across several studies conducted with children from various populations, it is now clear that, by age five, children appreciate that human minds possess certain limitations (for example, ignorance and false-beliefs) whereas other agents (e.g., the Judeo-Christian God) posses minds that are less limited (e.g., Barrett, Richert, & Drisenga, 2001; Lane, Wellman, & Evans, 2010; Makris and Pnevmatikos, 2007).

Lane and colleagues (in press) conducted a study focusing on the effects of socio-cultural input and prior religious experience on understanding on extraordinary minds. Their results

support an anthropomorphism hypothesis in very young children -- when children first begin to

attribute human-like mental fallibilities to humans, they also apply them to God. However, there

appears to be a priming effect in the Judeo-Christian tradition that allows children as young as

four-years of age to attribute less mental fallibility to agents that are described (at testing) as

having extraordinary perceptual or mental abilities. This information was not intuitively carried

over to their understanding of God (who was not described as "all-knowing" at testing) until age

five. Thus, significant differences could be found between religiously-raised and secularly-

raised children. However, the comparison between religiously-schooled children and secularly-

schooled children may not be a proper platform for comparison because of the discrepancies

between age groups (Lane et al., in press).

In addition to asking parents about their children's exposure to religious media, Lane and

colleagues (in press) took measures of prior exposure to religious concepts by asking each child

about their knowledge of God. These open-ended responses were coded in five levels: No

information given, knowledge of God without details, knowledge of superficial details about

God, knowledge of God's supernatural abilities that are not perceptual or mental, and specific

mentioning of God's extraordinary perceptual or mental abilities. Using these measures, results

indicated that increased knowledge of God predicted correct mental attributions and knowledge

to God and other agents in a false-belief task. Additionally, increased knowledge of God also

correlated with greater references to an agent's extraordinary perception or mental ability when

justifying false-belief responses. Therefore, the results of this study indicate that comprehension

and understanding of extraordinary abilities for any agent may be mediated by knowledge of

God and prior exposure to religious belief systems (Lane et al., in press).

However, these conclusions have yet to be generalized outside of theory of mind tasks, and other research with children has yielded mixed results. For example, Ladd, McIntosh, and Spilka (1998) conducted a study where children of various Christian denominations were asked to draw a picture of God. The pictures were analyzed by comparing amount of power symbolism, nature symbolism, and religious symbolism. While they found that older children tended to rely more on abstract symbolism to describe their pictures, no significant differences were found between the religious affiliations. However, anthropomorphism is inherent, to some extent, in the protocol of this type of study. Asking participants to draw a picture of God assumes that their God concept is material and able to be expressed in a drawing. As such, the lack of significant differences between denominations must be taken with caution.

The Current Studies

The current studies examine whether a priming effect for supernatural comprehension carries over into adult life as well as investigating some of the differences between major Western religions as they relate to understanding of God concepts. This research will also explore some of the processing variation between different types of agents, such as humans, God, and supernatural beings. Conducting research such as this will help psychologists understand how humans develop an understanding of extraordinary traits and counter-intuitive abilities.

The scenarios in the present studies explore the levels of anthropomorphism on four different capacities -- omnipotence, omnipresence, limitless attention, and unlimited perceptual abilities. These capacities are normally attributed to a western, monotheistic God, but are all supernatural in nature. Based on previous research, omnipotence should be the least subject to

anthropomorphism as it has been shown to be one of the most integral parts of determining

divinity of an agent (Trimèche et al., 2006).

Each scenario is also carefully designed to limit or eliminate anthropomorphic cues or

properties normally associated with certain agents. Language use involving time or sequencing

of events, spatiality of agents, and perception is minimized or completely removed from each

scenario. Thus, the questions that follow each scenario should only address the participant's

understanding and concept of each agent. Compared to Barrett and Keil's (1996) study, the

scenarios presented are also much shorter. Therefore, the details of the story should be easier to

remember because of the reduced memory demand. Even though we are presenting a novel

agent, Qwore, the simplicity of our stories and the use of only one agent as opposed to three

should not place extraneous stress on the participants' memories. Therefore, participants have a

better chance to fully process Qwore's abilities outside of their usual intuitive theories and may

be less likely to anthropomorphize this new agent. Another way that the current studies will

attempt to deal with past problems is by explicitly asking questions about prior religious

experience. In addition to asking about personal beliefs in the present, a religious questionnaire

administered after the main survey asks questions about parental religious beliefs and any prior

exposure to organized religion or subset of beliefs. This type of design should allow proper

interpretation of results and will give valuable insight into the way that religion may shape one's

understanding of supernatural abilities. In contrast to Barrett and Keil (1996), these responses

will not prime participants' theological concepts as the questionnaire is given after, rather than

during, the survey.

I expect to see a significant difference in capacity interpretation between the religious and

secular participants. Those who were raised in a religion and regularly attend services should be

less likely to apply anthropomorphic attributes in their concept of God. Their early exposure to

complex God concepts, such as omniscience and omnipotence, should prime them to avoid

intuitive interpretations of God, even outside of religious contexts. Also, it is likely that different

patterns of anthropomorphism will surface between religions. Because Christian religions tend

to emphasize the supernatural qualities of God more so than other religions, the data should

reflect a lower level of anthropomorphism. For example, a Christian participant may be more

likely to disagree with a statement that Qwore would need to move from one place to another.

Alternatively, a non-Christian participant may insist that Qwore would need to move or switch

locations in order to go somewhere. The novelty of omnipresence may increase a non-

Christian's tendency to anthropomorphize those aspects of the narratives.

In sum, in addition to shortening and clarifying the stories and questions, the following

two studies differ from those of Barrett and Keil's in several ways. A human agent will be

included as one of the three agents, which makes it possible to compare participants' levels of

anthropomorphism for God and Qwore with those of the human agent, rather than against chance

levels of responding. In the analyses I shall also assess whether capacities attributed to a

theological God are more or less easy to anthropomorphize. Finally, I shall assess the impact of

participants' religious beliefs on their tendency to anthropomorphize. In the first study I verified

that this revised protocol elicited participants' anthropomorphic tendencies and, following some

further revisions, in a larger second study I also assessed the impact of participants' prior beliefs.

Study 1

Method

Participants. Thirty-eight participants (13 females and 25 males), between the ages of

18 and 21 (mean age of 18.54 years), took part in this study. The breadth of belief systems

represented included Judaism (12), Roman Catholicism (6), nonreligious (5, including Atheism

[2] and Agnosticism [3]), Wiccan/Pagan (4), Baptist (3), Lutheran (2), other Christian religion

(2), Eastern Orthodox (1), Methodist (1), Pentecostal (1), Protestantism (1), and Islam (1).

Participants were undergraduate students attending a Midwestern research university and

enrolled in the Introduction to Psychology Subject Pool. Participants received course credit for

their involvement.

      Procedure. Participants were administered a survey in a quiet location on campus.

Participants' knowledge and comprehension of various agents was assessed by asking a series of

questions about several short scenarios (for scenarios, see Appendix A). The questions were

answered on a four-point, Likert-type scale; participants were also asked to explain certain

responses and to paraphrase each scenario.

      The order in which the three agents were presented was randomized across six different

versions. These agents included a human, God, and a supernatural agent named Qwore. No

additional information was given regarding the humans or God, but a short introduction was

placed before the scenarios for Qwore. In this description, Qwore is described as existing

everywhere, being all-powerful, having no limitations on sensory input, and having unlimited

capacity for attention (for the full description, see Appendix D).

      For each of six stories, six questions were asked involving the interactions of the focal

agent with the humans in the scenario. The questions asked were similar to Barrett and Keil's

(1996) study, and they all focused primarily on mistaken anthropomorphism of an agent. These

questions implied that each agent would have to stop a certain action to start another or that the

agent's limits on attention or perception were tested during the story (for a full list of questions,

refer to Appendix B). The description of Qwore is similar to descriptions of Uncomp, Mog,

Swek, and Beebo from Barrett and Keil's study; no descriptions were given for the human agents

or God. After reading each narrative, participants were first asked to paraphrase what they had

read on a separate page (participants could not turn back to check the details of the story). Six

questions were then asked about specific details within the text of the scenario on the following

page. The focal questions within these blocks contained information pertaining to the agent's

presence, physical power, perception, and attention. Two memory check questions were also

added between focal questions. If participants responded with "disagree" or "strongly disagree"

to any of these questions, they were asked to explain why. The order in which the agents and

questions were asked was counterbalanced across six versions of the survey.

Next, participants were administered a questionnaire about their religious beliefs, prior

religious exposure, and parents' religious beliefs. Some questions about demographics such as

age and gender were also included. This survey included a mixture of closed-ended and open-

ended questions (for a full list of questions, refer to Appendix C).

Measures. For each measure in the initial survey, participants were presented with a

scenario involving either a human, God, or a supernatural being named Qwore. Each story

minimized anthropomorphic cues and did not assign the agent to a particular location. After

reading each scenario, participants were asked two questions about the details of the stories as

well as four questions about the abilities and powers of each agent, these powers included:

Agents' attention. Participants were asked whether each of the agents could focus or

attend to various actions simultaneously. For example, following a scenario involving Qwore,

participants were asked to mark their level of agreement with the following statement: "Qwore

paid attention to Amy's yelling after attending to the drowning boy." In each story, agents are

never limited in their ability to pay attention or focus on various actions, but the taxing nature of

each action is detailed. For each of the three agents, participants earned a score of 0 for

"Strongly Disagree" up to a score of 3 for "Strongly Agree" for each of the two attention

questions. These two scores were averaged in order to obtain a mean level of anthropomorphism

for each agent. Thus, for *attention,* participants could earn a mean score ranging from 0 to 3 for

each agent, with higher scores reflecting concepts of human-like, limited, attention

(anthropomorphism).

   Agents' physical power. Participants were asked whether each of the agents could do

various physically taxing actions simultaneously. For example, following a scenario involving

God, participants were asked to mark their level of agreement with the following statement:

"God helped Mike after he saved the woman." In each story, agents are never explicitly

described as performing actions in a sequence, but the difficult nature of each task is detailed.

For each of the three agents, participants earned a score of 0 for "Strongly Disagree" up to a

score of 3 for "Strongly Agree" for each of the two power questions. These two scores were

averaged in order to obtain a mean level of anthropomorphism for each agent. Thus, for *physical*

power, participants could earn a mean score ranging from 0 to 3 for each agent, with higher

scores reflecting concepts of human-like, limited, power (anthropomorphism).

   Agents' perception. Participants were asked whether each of the agents had to hear or

see an event to know that it had occurred. For example, following a scenario involving a human

coach, participants were asked to mark their level of agreement (using a four-point Likert-type

scale) with the following statement: "The coach saw the bar fall on Jimmy's chest." In each

story, agents are never specified as hearing or seeing the action in question. For each of the three

agents, participants earned a score of 0 for "Strongly Disagree" up to a score of 3 for "Strongly

Agree" for each of the two perception questions. These two scores were averaged in order to

obtain a mean level of anthropomorphism for each agent. Thus, for *perception*, participants

could earn a mean score ranging from 0 to 3 for each agent, with higher scores reflecting

concepts of human-like perception (anthropomorphism) -- one must see or hear something before

acting upon it.

     Agents' presence. Participants were asked whether each of the agents had to move from

one area to another. For example, following a scenario involving Qwore, participants were

asked to mark their level of agreement (using a four-point Likert-type scale) with the following

statement: "Qwore went from the drowning boy to Amy's car." Of note, agents' locations were

never specified in the stories. For each of the three agents, participants earned a score of 0 for

"Strongly Disagree" up to a score of 3 for "Strongly Agree" for each of the two presence

questions. These two scores were averaged in order to obtain a mean level of anthropomorphism

for each agent. Thus, for *presence*, participants could earn a mean score ranging from 0 to 3 for

each agent, with higher scores reflecting concepts of human-like, limited, presence

(anthropomorphism).

Results

     Two participants were excluded based on poor performance on the check questions,

resulting in a sample of 36 participants. This exclusion was based on a score of nine or below

(out of 12) for questions regarding basic story details. Means levels of anthropomorphism for

each agent for each of the four capacities are shown in Figures 1a-d. In these figures, higher

numbers reflect higher levels of anthropomorphism.

     In an initial 3 (Agent: Human, God, Qwore) X 4 (Capacity: Perception, Attention,

Presence, Physical Power) repeated measures ANOVA (analysis of variance) on the degree of

anthropomorphism, results indicated a significant main effect of agent, $F(2, 34) = 18.08$, $p <$

.001, and a significant interaction between agent and capacity, $F(6, 30) = 11.69$, $p < .001$. No

main effect for capacity was found (attention ($M = 1.71$, $SD = .39$); physical power ($M = 1.63$,

$SD = .53$); perception ($M = 1.62$, $SD = .43$); presence ($M = 1.69$, $SD = .54$)).

Follow-up comparisons (using a Bonferroni's adjusted alpha level) between humans ($M =$

1.91, $SD = .41$) and God ($M = 1.69$, $SD = .36$) show that participants are significantly more likely

to anthropomorphize humans when compared to God, $p < .05$. Likewise, other pairwise

comparisons between humans and Qwore ($M = 1.37$, $SD = .41$) indicate that participants are

much more likely to anthropomorphize humans when compared to Qwore, $p < .001$. Further

comparisons between God and Qwore show that participants are more likely to

anthropomorphize God when compared to Qwore, $p < .01$. Therefore, it appears that participants

are much less likely to anthropomorphize Qwore when compared to other agents. Likewise, God

is less anthropomorphized than a person, but falls between humans and Qwore in mean levels of

anthropomorphism.

In order to explore the significant interaction effect, a separate repeated measures

ANOVA was conducted for each of the four capacities. An initial ANOVA examined the

specific differences in the *attention* capacities attributed to the three agents (see Figure 1a). This

analysis revealed a significant effect of agent, $F(2, 34) = 11.84$, $p < .001$. Using a Bonferroni-

adjusted alpha level in a pairwise comparison, results indicate that levels of anthropomorphism

were significantly lower for God than the human, $p < .001$. No other significant differences were

found between the other agent pairs. Thus, it appears that participants are less likely to assign

limitations of attention to God when compared to ordinary humans.

The same analyses were carried out to examine the differences in *physical power*

between each of the three agents. A repeated measures ANOVA revealed a significant effect of

agent, $F(2, 34) = 4.59$, $p < .05$. Bonferroni-corrected pairwise comparisons indicate

anthropomorphism levels were significantly lower for Qwore than God, $p < .05$. No other

significant differences were found between the other pairs. Therefore, participants were more

likely to regard God as possessing limitations on physical ability and power when compared to

Qwore.

Analysis continued with a third repeated measures ANOVA between agents in the

perception capacity. This analysis revealed a significant effect of agent, $F(2, 34) = 11.05$, p

$< .001$. A Bonferroni-corrected pairwise comparison indicated that anthropomorphism levels

were significantly lower for Qwore than God, $p < .001$. Additional pairwise comparisons

revealed significantly lower levels of anthropomorphism for Qwore compared to humans, $p < .01$.

No significant differences were found between humans and God. It appears that, in regards to

perception, participants were less likely to imply that Qwore requires sensory information when

compared to the other two agents.

A final repeated measures ANOVA was run to examine the differences between agents in

the *presence* capacity. This analysis revealed a main effect of agent, $F(2, 34) = 5.02$, $p < .05$.

Bonferroni-corrected pairwise comparisons revealed significantly lower levels of

anthropomorphism for Qwore compared to the God, $p < .05$, and humans, $p < .05$. No

significant differences were found between God and humans. Thus, participants were much

more likely to regard Qwore as existing in multiple places at once when compared to the other

agents.

Discussion

The results of Study 1 indicate that participants may process each agent in a different way,

and are similar to the results obtained by Barrett and Keil (1996). Participants were significantly

less likely to anthropomorphize Qwore than any other agent, and God was sometimes

anthropomorphized less than humans. However, across all three agents, anthropomorphism

levels were relatively low. While the restricted sample size makes it difficult to assess

significant correlations and effects, these results are consistent with Barrett and Keil's (1996)

study. According to their results, participant levels of anthropomorphism fell only slightly above

chance.

   Despite the lower levels of anthropomorphism across many agents, specific differences

did exist between capacities. The final two pairwise comparisons that examined differences

between mean levels of anthropomorphism by capacity indicate that distinct differences may

exist between agents. Qwore was much less likely to be anthropomorphized in both the

perception and presence capacities, and no significant differences were found between God and

humans. This may indicate a unique processing bias in terms of understanding and thinking

about God's abilities. Perhaps it is more difficult or less common to view God as an omnipresent

being that does not need to perceive a stimulus to have knowledge of it. The concept of a

"personal God" may rely more on "hearing" prayers or "watching" over human lives, and it may

be more salient or more comforting to think of a God that is *with us* rather than *everywhere*.

   Another possible explanation for this lower anthropomorphism is the possible priming

effect within the description of Qwore's abilities. By explaining counterintuitive concepts such

as omnipresence and unlimited attention before presenting each story, participants may have

been primed to seek out details of extraordinary abilities within the questions. The nature of

Qwore's agency necessitates such a detailed description, and participants may have had

difficulty remembering Qwore's specific abilities if they were presented near the beginning of

the survey. However, this explanation is also useful in understanding how and why we

anthropomorphize supernatural agents. The fact that such a priming system exists for an agent such as Qwore leads to many more questions about humans' concept of extraordinary abilities.

It is also possible that participants may have been more inclined to think about the Qwore questions logically due to the specific details of the description. These reasoning processes may not have been active while the participants were thinking about God because of the counter-intuitive nature of supernatural abilities. These results imply that processing problems involving God may be considered outside of traditional logic, whereas novel agents, such as Qwore, may still activate our normal sense of agency.

Upon further examination of the focal questions, I also found that some of these results may have been due to subtle problems in the wording of the survey. In particular, I realized that many of the physical power questions were slightly ambiguous when compared to the other capacities. For example, one of the Study 1 physical power questions for God was "God helped Mike after he saved the woman," and it was changed to "God set the woman down in order to help Mike." This rewording placed increased emphasis on the taxing physical nature of the actions. Similarly, many of the attention capacity questions were changed to eliminate any physical capacity confounds, such as including details of lifting or moving objects. By making these changes, I hoped to downplay the potential for confounding variables and to ensure the assessment of the true focal variables.

Some of the patterns that emerged were interesting, but the statistical power of these analyses must be significantly increased in order to adequately test my hypotheses. After making the appropriate changes to certain focal questions and further refining the survey and testing protocol, I conducted a second study. This second study additionally examined relations between religious background and anthropomorphism of God and Qwore's capacities.

Study 2

Method

     Participants. Eighty-one participants (30 females and 51 males), between the ages of 18 and 40 (mean age of 18.80 years), took part in this study. Participants represented a range of belief systems, including Roman Catholicism (19), nonreligious (15, including Atheism [8] and Agnosticism [7]), other Christian religions (8), Judaism (6), Baptist (5), Islam (5), Hinduism (5), Lutheran (5), Protestantism (4), Presbyterian (3), Methodist (2), Eastern Orthodox (1), Episcopalian (1), Unitarian (1) and other (1). Participants were undergraduate students attending a Midwestern research university and enrolled in the Introduction to Psychology Subject Pool. Participants received course credit for their involvement.

     Procedure. The testing protocol was modified slightly for the second version of the study. In order to reduce the possibility that participants were misinterpreting the questions, certain questions were reworded or changed. Almost all of the attention capacity questions were changed in order to clarify the capacity in question. For example, an item involving an ordinary human's attention capacities (a sports coach; see Appendix A) was changed from "The coach shifted his attention from dropping the bag of equipment to lifting the bar" to "The coach shifted his attention from the bag of equipment to lifting the bar." By removing the physical element of dropping the bag, the item focused exclusively on the coach's attention.

     Some physical power capacity questions were changed in order to emphasize the strength required of each agent in order to achieve the task. For example, God's task in one story was changed from helping an angel with a Rubix cube to helping the angel move the Golden Gates. This particular change emphasizes the amount of physical power required to complete the task, and helps avoid confusion with the attention capacity questions. Finally, an online

component was added for several participants. The surveys administered were identical to the

print versions, but they were made available through a survey website.

Measures. The measures of participants' were similar to those from Study 1, with

potential anthropomorphism scores ranging from 0-3 for each capacity, for each agent.

Participants' religious background and demographic information. After completing

the survey involving the agents' capacities, participants were asked to complete a questionnaire

about their demographic information, prior religious experience, and personal religious beliefs.

Questions about gender and age were asked initially. Immediately following those sections,

participants answered several questions about their personal religious belief systems.

The questions assessed the participant's religious institution (chosen from a list of various

responses), their past belief in God (using a three-point scale, with scores ranging from 0-2),

their current belief in God's existence (using a four-point scale, with scores ranging from 0-3),

whether they were raised in their current religious institution (two-point scale, with scores

ranging from 0-1), and whether they attend a place of worship (two-point scale, with scores

ranging from 0-1). Other questions asked about frequency of prayer, worship, and reading of

religious materials (six-point scales, with scores ranging from 0-5). A four-point Likert-type

scale was used to assess the role of religion in the participant's everyday life, with a score range

of 0-3. Several other yes-or-no questions assessed participants' concept of God's powers.

Participants were also asked to answer several questions regarding their parents' religious

beliefs. These questions had the same measures as the questions from the previous section, but

the wording was altered. Participants answered questions regarding their parents' religious

institutions, the importance of religion in their lives, their attitudes towards religion, and their

certainty about the existence of God. For a full listing of questions, refer to Appendix C.

Results

Three participants were excluded based on low accuracy on the memory check questions, resulting in a total sample of 78 participants. This exclusion was based on a score of eight or below (out of 12) for questions regarding basic story details. Mean levels of anthropomorphism for each agent for each of the four capacities are presented in Figures 2a-d. In these figures, higher numbers reflect higher levels of anthropomorphism.

An independent samples t-test for equality of means between Study 1 levels of anthropomorphism and Study 2 levels of anthropomorphism showed some main effects. Participants from Study 1 were significantly more likely to anthropomorphize God when compared to the other agents, $t(114) = 2.12$, $p < .05$. Also, more specifically, participants from the first study were also more likely to anthropomorphize God's physical power, $t(114) = 2.23$, $p < .05$. Because a large portion of the protocol changes from Study 1 focused on altering the physical power questions, it seems plausible that they influenced these main effects.

Examining data just from Study 2, an initial 3 (Agent: Human, God, Qwore) X 4 (Capacity: Perception, Attention, Presence, Physical Power) repeated measures ANOVA (analysis of variance), revealed significant effects for capacity, $F(3, 75) = 5.12$, $p < .01$, and for agent, $F(2, 76) = 59.62$, $p < .001$. These data also reflect a significant interaction between agent and capacity, $F(6, 72) = 6.66$, $p < .001$. Follow-up comparisons (using a Bonferroni's adjusted alpha level) between humans ($M = 1.88$, $SD = .32$) and God ($M = 1.54$, $SD = .32$) show that participants are significantly more likely to anthropomorphize humans when compared to God, $p < .001$. Likewise, other pairwise comparisons between humans and Qwore ($M = 1.31$, $SD = .40$) indicate that participants are much more likely to anthropomorphize humans when compared to Qwore, $p < .001$. Further comparisons between God and Qwore show that participants are more

likely to anthropomorphize God when compared to Qwore, $p < .001$. Thus, it appears that participants are much less likely to anthropomorphize Qwore when compared to any other agent. Similarly, God is anthropomorphized less than humans, but more so than Qwore.

Follow-up pairwise comparisons (using a Bonferroni's adjusted alpha level) of capacity between attention ($M = 1.69$, $SD = .40$) and physical power ($M = 1.43$, $SD = .55$) indicate that participants are significantly more likely to anthropomorphize attention, $p < .01$. Additionally, when comparing levels of anthropomorphism between attention and perception ($M = 1.53$, $SD = .46$), participants are more likely to anthropomorphize the attention capacity, $p < .01$. Further pairwise comparisons of capacity between physical power and presence ($M = 1.66$, $SD = .39$) indicate that participants are significantly more likely to anthropomorphize presence, $p < .05$. Therefore, it appears that participants more often assigned limits to agents' attention, and, when compared to agents' physical power, participants more often assigned limits to agents' presence.

In order to explore the significant interaction effect, a separate repeated measures ANOVA was conducted for each of the four capacities. The first ANOVA examined the differences in the *attention* capacities attributed to the three agents (see Figure 2a). This ANOVA revealed a significant effect of agent, $F(2, 76) = 28.23$, $p < .001$. Using a Bonferroni adjusted alpha level in a pairwise comparison, results indicate that levels of anthropomorphism were significantly higher for humans than God, $p < .001$, and Qwore, $p < .001$. No significant differences were found between God and Qwore. These results imply that participants are much less likely to assign attention limits to God and Qwore in comparison to ordinary humans.

Similar analyses were carried out to examine differences in *physical power* between each of the three agents (see Figure 2b). A repeated measures ANOVA revealed a significant effect of agent, $F(2, 76) = 5.24$, $p < .01$. Bonferroni-corrected pairwise comparisons indicate

anthropomorphism levels were significantly lower for Qwore than both God, $p < .05$, and humans, $p < .05$. No significant differences were found between humans and God. Thus, participants were much less likely to attribute physical limitations to Qwore than any other agent.

Analysis continued with a third repeated measures ANOVA between agents in the *perception* capacity (see Figure 2c). This analysis revealed a significant effect of agent, $F(2, 76) = 22.53$, $p < .001$. A Bonferroni-corrected pairwise comparison indicated that anthropomorphism levels were significantly lower for Qwore than God, $p < .001$, and humans, $p < .001$. Perception anthropomorphism levels were also significantly lower for God than humans, $p < .01$. Thus, participants were less likely to assign perceptual limitations to Qwore when compared to any other agents, and they were also less likely to attribute such limitations to God when compared to ordinary humans.

A final repeated measures ANOVA examined the differences between agents in the *presence* capacity (see Figure 2d). This analysis revealed a main effect of agent, $F(2, 76) = 7.52$, $p < .01$. Bonferroni-corrected pairwise comparisons revealed significantly lower levels of anthropomorphism for Qwore when compared to the God, $p < .01$, and humans, $p < .01$. Results also indicated significantly lower levels of anthropomorphism for God when compared to humans, $p < .05$. Therefore, participants were less likely to regard Qwore or God as existing in a specific location when compared to humans.

In order to assess relations between prior religious exposure and attributions of capacities to God and Qwore, I ran several correlations to determine their relations with levels of anthropomorphism (refer to Table 1). Participants' certainty in God's existence was correlated with higher *perception* anthropomorphism levels in God and lower *attention* anthropomorphism levels in God. Certainty in God's existence was also correlated with lower *presence*

anthropomorphism levels in Qwore and higher *attention* anthropomorphism levels in Qwore. Regular reading of religious texts and materials correlated strongly with lower levels of *physical power* anthropomorphism in God and a higher tendency to anthropomorphize *presence* for Qwore. These results are mixed, but it appears that familiarity with religious texts and certainty in God's existence may correlate with one's tendency to use anthropomorphic concepts to understand and process supernatural agents.

In order to explore possible differences between religions, I used an independent samples t-test for equality of means to compare a Christian group (including any sects of Christianity, *n* = 47), and a nonreligious group (including both agnostics and atheists, *n* = 15), based on their levels of anthropomorphism. Unfortunately, analysis of other religious sub-groups was not possible due to lack sizeable sub-samples. There were no significant differences between the Christian and non-religious groups when comparing levels of anthropomorphism for the three agents or when comparing each capacity. Follow-up comparisons revealed no significant differences between specific capacities with each of the agents.

Analysis continued with an additional independent sample's t-tests for equality of means, conducted with a monotheistic group (including sects of Christianity, Judaism, Islam, and Sikhism, *n* = 57), versus a nonreligious group (including atheists and agnostics, *n* = 15). It was not possible to compare the means for a polytheistic group due to a lack of participants. The results of the t-tests show no significant group differences in levels of anthropomorphism for each of the agents or for each of the four capacities. Additional tests revealed no significant differences between specific capacities with each agent.

General Discussion

The goal of these studies was to explore and narrow the gaps in the existing literature on individuals' God concepts and their understanding of counter-intuitive, extraordinary abilities. One focus of the current studies was to examine differences in levels of anthropomorphism for specific extraordinary capacities and powers. A second focus of these studies was to assess levels of prior religious exposure through practices such as reading religious texts, prayer, belief in God, and parental religious beliefs. Linking these cultural practices to the degree of anthropomorphism found across participants gave some interesting insights into the relationship between certain religious rituals and beliefs in theological and intuitive God concepts.

Differences Between the Studies

The protocol of some questions changed between the two studies, and analysis revealed that there were significant differences between the studies. It is likely that the subtle wording changes may have influenced participants' tendency to anthropomorphize. In particular, God was considered more powerful by participants in Study 2; they generally anthropomorphized God's agency less, and they were more likely to assert that God can do various physical activities simultaneously. The vast majority of the changes from Study 1 included placing increased emphasis on the physical portion of the tasks, such as changing "working on a rubix cube" to "moving the Golden Gates." Perhaps when the details of the questions require participants to think specifically about God's physical strength or power, their theological concept of God is activated. Thus, they are more likely to stress that God can do many things at the same time.

Replicating and Extending Barrett and Keil's Study

These studies were partially designed to be conceptual replications of Barrett and Keil's (1996) study and it is important to note that these results confirm their initial conclusions.

Participants in these studies had a tendency to anthropomorphize God, even if they professed a theological belief that was incompatible with these types of assertions. Because Barrett and Keil did not use a human agent, they were forced to compare their levels of anthropomorphism to chance response rates. According to their results, participants were only slightly more likely to anthropomorphize when compared to this level of chance, and the anthropomorphism levels in the current studies were also relatively low.

Unlike Barrett and Keil's (1996) study, this testing protocol also included a human agent, against which other agents could be compared. Across all of the capacities, the human agents elicited the highest levels of anthropomorphism, while Qwore typically elicited the lowest, and God typically fell between these two agents. This result is also similar to Barrett and Keil's results with God and the non-natural agents, Mog, Swek, and Beebo. Participants in the current studies treated God as an agent that is different from ordinary human beings and Qwore, a special agent that was endowed with God-like powers. The results with Qwore also reinforce the hypothesis that this anthropomorphism is not simply based on a misconception or misunderstanding of supernatural abilities. Because the levels of anthropomorphism were significantly lower for Qwore than God, there must be something different about God's agency.

One of the unfortunate limitations of Barrett and Keil's (1996) study was the lack of separation between supernatural abilities; they grouped all of the same abilities and capacities together as a single level of anthropomorphism. In order to address this limitation, the current studies focus on the differences between the specific capacities of each agent. Overall, participants were much more likely to agree that supernatural agents were constrained to some form of serial processing in that they were unable to *attend* to various events simultaneously. In comparison to *physical power*, participants were also more likely to anthropomorphize the

presence of an agent. That is, they tended to assert that supernatural agents needed to move from one place to the next and that they could not exist in several places at the same time.

These differences may be due to the difficulty of grasping the counter-intuitive nature of these specific capacities. One might argue that it is difficult to notice significant variation in attention levels between people; a person with a greater attention span may be difficult to distinguish from a person with a lower attention span. When compared to capacities such as physical power or perception, it is easy to see why *attention* may be quite difficult to conceptualize. We regularly see agents (both human and animal) that have varying degrees of perceptual ability and physical strength, but no natural agent can exist in multiple places at once. Perhaps due to a lack of exposure to extreme variation in capacities such as attention and presence, undergraduates are more likely to anthropomorphize these aspects of an agent.

Upon more detailed examination of these capacities and the differences between agents, a general pattern emerged. For the majority of the capacities, humans were anthropomorphized the most, God was second, and Qwore was the least anthropomorphized. Considering the previous data, this result is unsurprising. However, certain capacities did show deviations from this pattern. When comparing anthropomorphism between agents within the attention capacity, results indicated that participants treated God and Qwore similarly. In fact, attention was the only capacity where levels of God's anthropomorphism were statistically equal to Qwore's. Returning to the point made earlier, this difference may be due to the difficulty of processing and understanding attention as a capacity. Because of the novelty of Qwore, participants may have had more difficulty attributing complex attributes to the agent when compared to a familiar agent like God.

Physical power also showed some slight deviations from the standard pattern of anthropomorphism; results indicated that participants treated God and humans similarly in terms of this capacity and in both cases the levels of anthropomorphism were relatively low. These low levels of anthropomorphism for physical power are consistent with the findings of Trimèche and colleagues (2006), who concluded that omnipotence may be an integral capacity for agents to be considered the "true God." It makes sense that this capacity has such low levels of anthropomorphism; if the God agent in the current studies had high levels of physical power anthropomorphism, participants may not have considered the agent as the "true God." This deviation may also be due to the nature of the task and the wording of the questions. While the protocol emphasized the taxing nature of each physical action, participants may have been more willing to assume that human agents were able to do various physical activities simultaneously, such as lifting a heavy bag and picking up a metal bar. Also, several participants used rationalizations to justify responses. Such responses include "Joe was given the feeling after the gates were [already] moved," "I think the officer restrained the criminal first," or "The officer probably arrested the criminal and put him in his car … first." Because these explanations clearly state that the acts took place in sequential order, they are implying that the actions could not have taken place simultaneously. Thus, they are attributing physical limitations to the agents.

These anthropomorphized rationalizations were not restricted to the physical power capacity. Some participants relied on other modes of sensory information for the perception category, explaining that the police officer may have heard the crash without seeing it or that the coach may have heard Jimmy yelling as opposed to actually seeing the bar fall on his chest. One of the limitations of these studies was that the perception category relied on multiple modalities

of sensory information, such as sight and hearing. A better comparison may have been to restrict

this capacity to single sense or to split each sensory input into a separate category.

Influence of Religion and Belief Systems

One of the primary research questions that these studies examined was the impact of prior

religious exposure on comprehension of counter-intuitive capacities and anthropomorphism of

agents. While the limited representation of certain religions and belief systems rendered some

comparisons impossible to make, there were enough participants to look at some of the

differences between Christians and nonreligious participants, and between participants from

monotheistic religions and nonreligious participants. Unfortunately, the comparisons showed no

significant differences between participants from Christian backgrounds (and monotheistic

backgrounds, more generally) and nonreligoius participants. Perhaps with a larger sample size

and a more diverse representation of religions, significant differences could have been found.

Additional analyses explore some of the specific rituals and beliefs associated with

certain religions in relation to levels of anthropomorphism. These data indicate that two aspects

of religious life are related to the tendency to anthropomorphize agents and capacities. In

particular, the more participants believe in the existence of God, the higher their levels of

perception anthropomorphism for God. This result seems counter-intuitive, but one plausible

explanation lies in the language that Christians use to describe God's interactions with humans.

In many Christian religions, there is an insistence that God "hears" prayers (Proverbs 15:29**,** 1

John 5:14-15, 2 Chronicles 7:14 New International Version) and "watches over" the people

(Psalm 33:18-22, Psalm 121:5). Even though these statements may be purely metaphorical, the

wording may prime participants to agree that God hears prayers or cries for help. Perhaps in

future studies a greater emphasis can be put on the mandatory nature of this sensory information (i.e. that God *must* hear/see something in order to know it happened).

Belief in God's existence also correlated with both lower attention anthropomorphism in God and higher attention anthropomorphism in Qwore. Without further studies to explore this result, it is difficult to interpret this pattern. One possible explanation is that attention is similar to omnipotence in terms of its "God-like" capacity (Trimèche et al., 2006). Perhaps participants who believe in God are more likely to assert that the one, true God would have unlimited attention, and, at the same time, stress that any other agent that is not God cannot possess such powers. Participants who believed in God's existence were also less likely to anthropomorphize Qwore's presence. This relationship can be explained by a participant's familiarity with the concept of omnipresence, which may make attributing such abilities to other agents easier. Lane and colleagues (in press) came to a similar conclusion in their study with children of religious and nonreligious backgrounds; this increased ease of attribution is known as a "facilitation effect." Considering that monotheistic religions traditionally relate God to an omnipresent entity (Kohler, 1918), participants who believe in the existence of God should be more familiar with omnipresence as a concept. Also, because of the relative difficulty of processing the presence capacity, the differences between God-believers and non-believers may be accentuated. The novelty of Qwore may have made it difficult for non-believing participants to process such a complex capacity.

Significant correlations were also found between frequency of reading religious materials and lower physical power anthropomorphism of God. This relationship is in keeping with the conclusions of Trimèche and colleagues (2006), whose study indicates that participants regard physical power and omnipotence as a special ability that is reserved only for God. Therefore,

participants who have a very strong theological concept of God due to their familiarity with religious texts would be more likely to assert that God has fewer limits on physical ability. Frequency of reading religious materials was also correlated with higher levels of presence anthropomorphism in Qwore. While this result might seem to contradict the previous relationships, one interpretation may be that participants who regularly read the Bible are more familiar with God-centric stories that invoke imagery of omnipresence. Whereas a God-believer who does not read the Bible may simply be familiar with omnipresence enough to apply the concepts to a novel agent, a person who frequently reads religious texts may be less likely to attribute God-like qualities to a non-deity. As mentioned before, without further studies to examine these specific differences, it is difficult to draw conclusions from these correlational results.

Another important aspect of these data to keep in mind is that many of the participants who identified themselves as "religious" did not necessarily read religious texts on a regular basis. Similarly, some participants were familiar with the Bible, but did not profess a belief in God. These variables are complicated, and their relations with anthropomorphism levels are not necessarily straight-forward. In fact, belief in God or adherence to a specific religion may not even be enough to assume belief in specific concepts of God. For example, some participants commented that certain powers or capacities did not apply to their concept of God. Specific examples include: "If God did [perceive everything] he would have stopped bad things from happening" or "God can't control nature." These subtle nuances within religions and groups make it even harder to look for contextual variables that might influence one's understanding of counter-intuitive concepts.

Conclusion

Overall, several conclusions can be drawn from the data. It does appear that participants use anthropomorphic concepts to understand God and other supernatural agents, but participants can overcome anthropomorphism for some capacities when agents' extraordinary abilities are emphasized. The results of these studies also indicate that certain types of powers and capacities are treated differently -- some capacities, such as attention or presence, may be more likely to be anthropomorphized. Finally, there are some aspects of religious life and ritual that might influence individuals' comprehension of God concepts, such as unlimited attention and omnipotence. More studies will need to be conducted before a full understanding of the role played by a belief in God's existence and familiarity with religious materials in the tendency to anthropomorphize agents can be developed.

While some of the original hypotheses of these studies require further investigation, the results and conclusions open the door for future studies. These studies should explore, in more detail, relations between religious background and the anthropomorphism of God and other agents. Such research will help develop a more complete understanding of how humans think about extraordinary agents and supernatural abilities. Religious beliefs play a crucial role in the everyday lives of many people all over the world. One's church or religious affiliation can dictate daily activities, personal values, and even diet, but, more importantly, religious belief can influence the way one thinks about the world and other people. This type of research is important to the future of psychological studies because a person's identity cannot be complete without taking their spirituality into account. In some cases, a strongly-held religious belief may define a person more than race, gender, or age. While this research may not illustrate the full extent of religion's influence, it may start a discussion about the viability of religious belief as a regular variable outside of religious or God-based studies.

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Table 1

Correlations Between Religious Exposure and Anthropomorphism Levels by Capacity for God and Qwore

	God Attention	God Physical Power	God Perception	God Presence	Qwore Attention	Qwore Physical Power	Qwore Perception	Qwore Presence
Importance of Religion	.12	-.11	-.13	.06	-.11	-.02	-.01	.16
Religion Live According[a]	.14	-.05	-.10	.09	-.08	.06	.04	.13
Religion Life Approach[b]	.16	-.09	-.10	.003	-.14	.02	-.04	.08
Worship Attend Frequency	.04	-.19	.05	.05	.04	-.14	.09	.02
Frequency of Prayer	.05	-.15	.003	-.06	-.02	-.03	-.01	.03
Religion Material Study Frequency	.20	-.33**	-.18	.17	-.15	-.15	-.05	.29**
Belief God Exists[c]	-.24*	.10	.27*	-.10	.23*	.06	-.04	-.37**
Belief in God[d]	.10	.13	-.01	.16	-.07	-.02	-.01	.20
Parents Certain God Exists	-.09	.21	.06	-.07	.06	.20	-.05	-.02
Parent Importance of Religion	.06	-.09	-.05	.02	-.06	-.17	-.06	-.02
Parent Religion Attitudes[e]	.07	.05	-.07	.16	-.06	.12	-.14	-.06

Note: Data were coded such that higher numbers represent higher levels of anthropomorphism and increased religious exposure. Negative numbers represent lower levels of anthropomorphism and decreased religious exposure.

*p < .05, **p < .01

[a] Participants were asked to agree or disagree with the following statement: "I try hard to live my life according to my religious belief."
[b] Participants were asked to agree or disagree with the following statement: "My whole approach to life is based on my religion."
[c] Participants were asked "Which option best describes your belief in God?" with options ranging from "I am certain that God exists" to "I am certain that God does not exist."
[d] Participants were asked "Have you ever believed in God?" with options ranging from "Yes and continue to do so" to "Never."
[e] Participants were asked "How would you describe your parent(s)'/guardian(s)' attitudes about religion to indicate their parents' attitudes towards religion" with options ranging from "Not religious at all" to "Extremely religious."
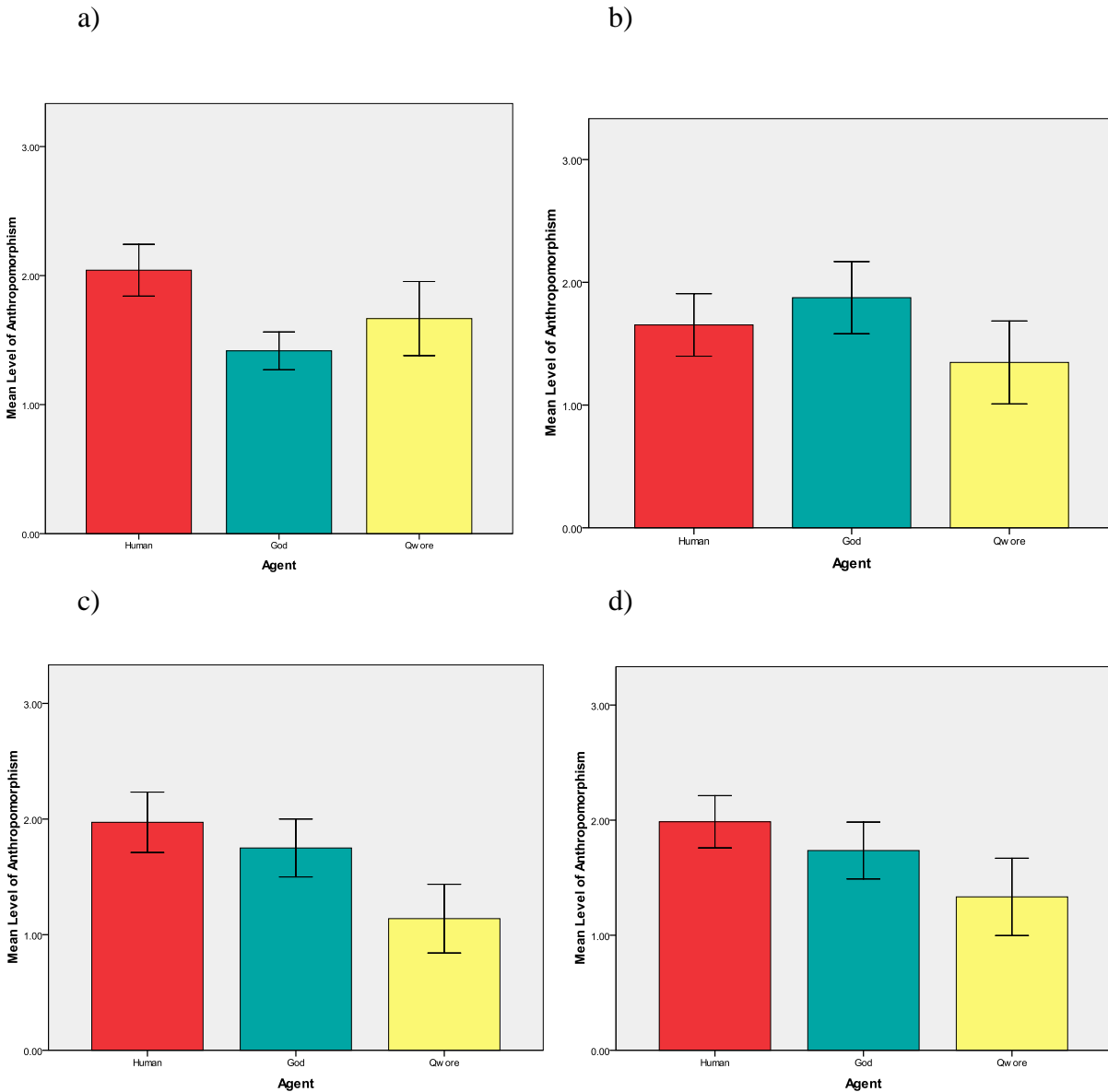
a)

b)

c)

d)

Figure 1. Study 1 mean levels of anthropomorphism separated by agent and capacity. a) Mean Level of Attention Anthropomorphism by Agent, b) Mean Level of Physical Power Anthropomorphism by Agent, c) Mean Level of Perception Anthropomorphism by Agent, and d) Mean Level of Presence Anthropomorphism by Agent. Graphs show that participants were less likely to anthropomorphize Qwore when compared to humans and God in most capacities. Error bars represent two standard errors of the mean.
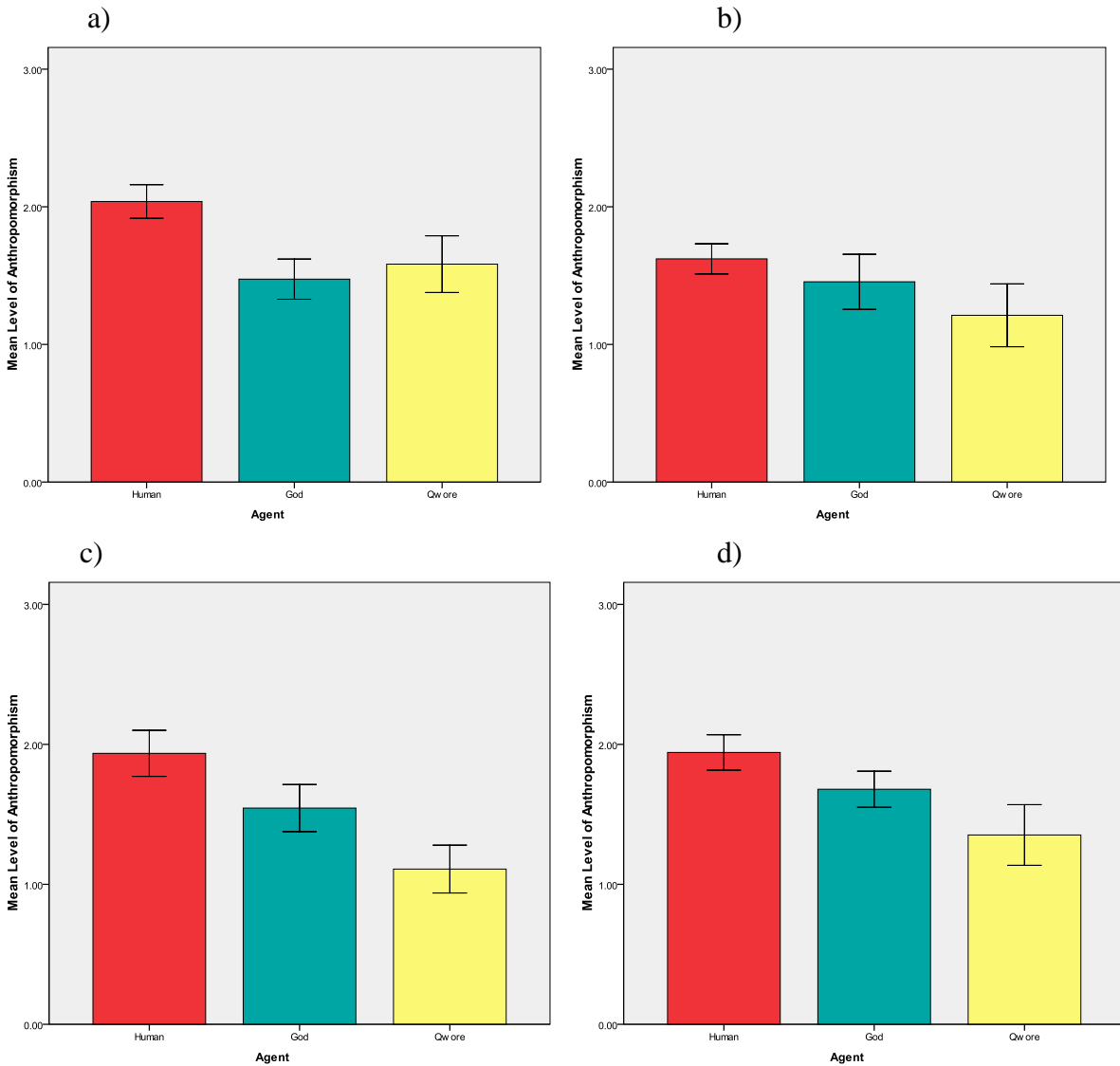
Figure 2. Study 2 mean levels of anthropomorphism separated by agent and capacity. a) Mean Level of Attention Anthropomorphism by Agent, b) Mean Level of Physical Power Anthropomorphism by Agent, c) Mean Level of Perception Anthropomorphism by Agent, and d) Mean Level of Presence Anthropomorphism by Agent. Graphs show that participants were generally more likely to anthropomorphize ordinary humans and less likely to anthropomorphize Qwore. Error bars represent two standard errors of the mean.

Appendix A

Scenarios Used in Study 2

A. A police officer was restraining and arresting a flailing criminal. On the other side of the street, Bob was driving his car through a busy intersection. Another driver cut him off, and he hit a lamp post. His car door jammed, and he couldn't get out. The police officer kicked the driver's side window in, and Bob was able to crawl through the broken glass before any gas fumes ignited. The police officer called for an ambulance.

B. Jimmy was lifting weights on the bench press bench at a gym. The sweat from Jimmy's hands caused the bar to slip and fall on his chest. Fortunately, a coach was carrying a heavy bag of equipment to the room. The coach lifted the weight from Jimmy's chest and rescued him. Jimmy thanked the coach and switched to the treadmill.

C. Mike was kayaking in a river in Massachusetts. A rapid flipped his kayak over, and he fell into the water. His shirt snagged on a rock in the riverbed, so he couldn't reach the surface to breathe. Mike prayed to God. God was lifting a woman from a burning building on the other side of the country. In response to Mike's prayers, God moved the heavy rocks in the riverbed, and Mike was able to reach the surface before running out of air.

D. Joe was playing in The Arb, and he found a baby bird. The bird was chirping because it had fallen from its nest. Joe carefully picked up the bird, climbed up the tree, and placed it back in the nest. He climbed back down and continued playing. God was helping an angel reposition the Golden Gates. Aware of Joe's good deed, God gave Joe a happy feeling.

E. Will was walking home from a party. He slipped on a patch of ice and twisted his ankle in the street. Will saw a truck driving towards him. He closed his eyes and shouted for help. Qwore was helping a construction team demolish buildings. In response to Will's yelling, Qwore moved the truck to a second lane. Will opened his eyes to see the truck drive past. He could see no one around, and he crawled to the sidewalk.

F. Amy was driving her car on a country highway. A deer jumped in front of her, and she swerved into a tree. Amy's door was jammed, so she couldn't escape her car. The car was smoking and burning, so she called for help. Qwore was pulling a drowning boy out of the water elsewhere and responded by moving the heavy car door. Amy was able to jump out of the car before it burst into flames.

Appendix B

Questions from Study 2.

Participants were asked to mark their level of agreement with the following statements on a four-point scale.

A.
1. The police officer focused on calling the ambulance after focusing on saving Bob. - *Attention*
2. The police officer stopped restraining the criminal to help Bob. – *Physical Power*
3. The police officer saw Bob crash his car. - *Perception*
4. The police officer moved from the other side of the street to the car. - *Presence*
5. Bob crashed into a fire hydrant. – False Check Question
6. The police officer broke a window to save Bob. – True Check Question

B.
1. The coach shifted his attention from the bag of equipment to lifting the bar. - *Attention*
2. The coach dropped the equipment bag to lift the bar. – *Physical Power*
3. The coach saw the bar fall on Jimmy's chest. – *Perception*
4. The coach ran over to help Jimmy. – *Presence*
5. Jimmy continued lifting weights after being saved. – False Check Question
6. Jimmy was lifting weights in a gym. – True Check Question

C.
1. God shifted attention to the Mike's prayer after attending to the woman. - *Attention*
2. God set down the woman in order to help Mike. – *Physical Power*
3. God heard Mike's prayer. - *Perception*
4. God went from the burning building to the river. – *Presence*
5. Mike's hair got caught in the rocks. – False Check Question
6. God helped a woman escape a burning building. – True Check Question

D.
1. God focused on giving Joe a happy feeling after focusing on helping the angel. – *Attention*
2. God stopped moving the Golden Gates to reward Joe for his good deed. – *Physical Power*
3. God saw Joe pick up the bird. – *Perception*
4. God left the angel to go give Joe a happy feeling. - *Presence*
5. The angel was working on a fence. – False Check Question
6. Joe continued to play after climbing down the tree. – True Check Question

E.
1. Qwore focused on saving Will after focusing on demolishing the buildings. - *Attention*
2. Qwore stopped demolishing buildings in order to help Will. – *Physical Power*
3. Qwore heard Will's cry for help. – *Perception*
4. Qwore had left when Will opened his eyes again. – *Presence*
5. Qwore moved a motorcycle. – False Check Question
6. Will twisted his ankle. – True Check Question

F.
1. Qwore paid attention to Amy's yelling after attending to the drowning boy. – *Attention*
2. Qwore set the drowning boy down in order to help Amy. – *Physical Power*
3. Qwore heard Amy's shouts for help. – *Perception*
4. Qwore went from the drowning boy to Amy's car. – *Presence*
5. Amy hit a skunk. – False Check Question
6. Amy was driving on a country highway. – True Check Question

Appendix C

Religious Questionnaire

Please indicate your gender: _____ Male   _____ Female

Please write your age: _____

What university are you currently attending? _____

How important is religion in your life? (Please circle)

Unimportant   Not very important   Fairly important   Very important

Which religion do you most identify with? **(Please place a check mark next to the appropriate response)**

____ Roman Catholic

____ Christianity - Protestant

____ Christianity - Baptist

____ Christianity - Lutheran

____ Christianity - Methodist

____ Christianity - Presbyterian

____ Christianity - Eastern Orthodox

____ Christianity - Episcopalian

____ Christianity - Pentecostal

____ Christianity - LDS

____ Christianity - Other

____ Hinduism

____ Judaism

____ Unitarian

____ Islam

____ Buddhism

____ Sikhism

____ Shinto

_____ Wiccan/Pagan

_____ None, please specify

_____ Other, please describe

If "**None**," please specify.

_____ Agnosticism

_____ Athesim

If "**Other**," please describe.

Were you raised in this religion?   _____ Yes   _____ No

If "No," please explain **BRIEFLY**.

Do attend church, synagogue, or another place of worship?   _____ Yes   _____ No

If "**Yes**," what type of place of worship?

During the past year, how often did you attend this place of worship? (Please circle)

Never   Rarely   Monthly   Weekly   Daily

Have you ever believed in God?

_____ Yes, and continue to do so

_____ Yes, in the past but not now

_____ Never

Which option best describes your belief in God?

_____ I am certain that God exists

_____ I have my doubts, but I believe God exists

_____ I am certain that God does not exist

_____ Other (please describe below)

If "**Other**," please specify.

How much do you agree with the following statement?

"I try hard to live my life according to my religious belief." **(Please circle)**

Strongly Disagree   Disagree   Agree   Strongly Agree

How much do you agree with the following statement?
"My whole approach to life is based on my religion."

Strongly Disagree   Disagree   Agree   Strongly Agree

During the past year, approximately how often have you prayed? **(Please circle)**

Never   Rarely   Monthly   Weekly   Daily   More than once a day

During the past year, approximately how often have you studied or read religious/spiritual materials?

Never   Rarely   Monthly   Weekly   Daily   More than once a day

If you believe in a god, what powers does that god possess?

Does God know everything? _____ Yes   _____ No

If "**Yes**," how? If "**No**," why not?

Does God perceive everything?   _____ Yes   _____ No

If "**Yes**," how? If "**No**," why not?

Is God all-powerful (omnipotent)?   _____ Yes   _____ No

If "**Yes**," how? If "**No**," why not?

Is God everywhere (omnipresent)? _____ Yes   _____ No

If "**Yes**," how? If "**No**," why not?

The next few questions involve your parent(s)'/guardian(s)' religious background. Please answer each question by circling the appropriate response.

**If your parent(s)/guardian(s) have differing beliefs, please answer in response to the belief system that influenced you the most.

Which religion do **YOUR PARENT(S)/GUARDIAN(S)** associate with? (**Please place a check mark next to the appropriate response**)

_____ Roman Catholic

_____ Christianity - Protestant

_____ Christianity - Baptist

_____ Christianity - Lutheran

_____ Christianity - Methodist

_____ Christianity - Presbyterian

_____ Christianity - Eastern Orthodox

_____ Christianity - Episcopalian

_____ Christianity - Pentecostal

_____ Christianity - LDS

_____ Christianity - Other

_____ Hinduism

_____ Judaism

_____ Unitarian

_____ Islam

_____ Buddhism

_____ Sikhism

_____ Shinto

_____ Wiccan/Pagan

_____ None, please specify

_____ Other, please describe

If "**None**," please specify.

_____ Agnosticism

_____ Athesim

If "**Other**," please describe.

How would you describe **YOUR PARENT(s)'/GUARDIAN(s)'** attitudes about religion? **(Please circle)**

Extremely religious   Very religious   Somewhat religious   Not religious at all

How important in religion to **YOUR PARENT(s)/GUARDIAN(s)**? **(please circle)**

Unimportant   Not very important   Fairly important   Very important

Which option best describes **YOUR PARENT(s)'/GUARDIAN(s)'** belief in God?

   _____ They are certain that God exists

   _____ They have doubts, but they believe God exists

   _____ They are certain that God does not exist

   _____ Other, please describe

If "**Other**," please specify.

If you have any other comments or thoughts about your belief system or the belief system of your parent(s)/guardian(s), please write them below.

Appendix D

Full Description of Qwore

 Qwore is omnipresent; Qwore is everywhere. This means that Qwore is in all places at all times, and has no need to move from place to place. Qwore is also invisible.

Qwore is omnipotent; Qwore's strength is unlimited. This means that Qwore can modify or move any physical object (a rock, a mountain, a building) with equal ease.

 Qwore has unlimited sensory abilities. This means that Qwore can see, hear, taste, feel, and smell anything, anywhere, anytime. Qwore processes sensory information from multiple sources simultaneously.

Finally, Qwore has unlimited attention. So, Qwore can focus on multiple events occurring simultaneously