

A Reflection on Belief

Joshua A. Cuevas

North Georgia College and State University, USA

Abstract

This paper explores the phenomenon in which, for many people, subjective personal belief is viewed as a more accurate representation of reality than objective scientific knowledge developed over the course of human history and transmitted through secular education. The first half of the article is based on personal observations of the author through the lens of a professor and psychologist. The latter half of the article reviews recent empirical psychological research on religious belief and the characteristics that accompany irrational thought processes. The findings suggest that there are a host of factors that research has shown to be linked to religious thought, including the inability of education to create disequilibrium to combat misconceptions, early indoctrination, social pressures, genetic influences, cognitive style, and a lack of analytic processing. Human progress on a variety of fronts will advance unfettered only if education can address issues such as these.

Key Words: education, religious belief, psychology, indoctrination, conservatism

As an educational psychologist I spend my life studying how people learn. I conduct empirical research that measures cognitive traits such as knowledge, intelligence, and a variety of other skills. As a professor, I teach current and future teachers about instructional strategies that may enhance learning in their students and about educational assessments that measure the learning we hope to facilitate. As a researcher, evidence is important to me.

Most of the content I deal with involves academic constructs that apply to formal educational environments, or in other words, within the walls of a school. But I have always been fascinated with certain aspects of learning that take place outside the classroom. Some of my research has been devoted to attempting to understand why people are willing to believe concepts, such as religion, that are inherently illogical

and seem to have so little basis in reality or the natural world. Why do otherwise intelligent people wholeheartedly believe that an invisible, all-powerful primate-like creature willed the universe into existence? Or that a snake could verbally converse with and psychologically sway a human despite the fact that we all know snakes don't possess vocal chords or higher reasoning skills? Or that a pair of every animal species on the planet, from polar bears to kangaroos, could be corralled onto a boat from their respective environments across the various continents, when all the evidence we have gathered throughout our lives would tell us otherwise?

Why do modern humans often cling to archaic beliefs that contradict everything we know and have learned about the natural world? In listening to conversation in the media and politics, it would seem that having expertise in a field of science, whether it be climate science, biology, medicine, psychology, or even an area such as economics, is a liability to one's capacity to understand the issue at hand. In other words, somehow those who know the most about a given issue are the ones whose opinions are seen as the least valid in regard to influencing public policy. Somehow politicians and their constituents know better about medicine than doctors; know better about education than professors and teachers; know more about our origins than biologists, geologists, and anthropologists; and know more about the universe than physicists and cosmologists. Somehow the common man and his "common sense" trump specific knowledge that the human species has compiled throughout all of human history. How have we reached this point? Here I contemplate disconcerting trends in modern society concerning a blurring in the distinctions between fact and opinion, between evidence and belief, between what is real and what we want to be real.

In much of American culture today all beliefs are accepted as being equal. In one light this can be interpreted as an ultimate goal of a free society. Everyone's opinion is valid, and everyone's view accepted on the merit of face value since it is one's choice and one's right to hold that belief. This is democracy in its highest form, true egalitarianism where every man or woman is his or her own ultimate judge of reality. Faith is the supreme power in the universe, no matter what that faith may be. Belief is everything.

Yet I worry when so many Americans view belief as the embodiment of reality. This may not be a new dynamic in society, but we live in a time when our civilization should be able to discard superstition and look to science in its many forms to answer the questions we still grapple with. But instead of evidence, facts, and reason dictating beliefs, our people hold the position that beliefs dictate facts. If facts emerge that are contradictory to one's beliefs, the beliefs are not altered, a new theory is not developed, but instead, those facts are not facts, but figments of someone else's imagination. Nothing is real that does not conform to one's established beliefs. The stronger the belief, the stronger the reality. The greater the evidence against that belief, the greater the vehemence in denying that evidence, and the greater the net of ambiguity that is cast to distort that evidence.

In this world all beliefs are equal, as long as the other person's beliefs conform to your own. The belief with no substantiation and tenets that defy every law of physics holds exactly as much weight as the belief that is soundly supported by hundreds of years of rigorous inquiry. Reason and logic are discarded as theoretical musings. Scientific studies are rejected in lieu of "real" evidence, although it is never quite clear what that "real" evidence is. Facts do not compound to build our knowledge; observations are not the foundation of our experience. Instead, knowledge and experience are rooted in highly subjective beliefs, and those beliefs are often adopted when people are convinced by others in the absence of evidence to support those assertions. Any suggestion that contradicts one's beliefs is an attack on those beliefs. Any request to validate or provide support for those beliefs is met with hostility.

For many people it is a reality, an absolute truth, that the universe was created in seven days less than 10,000 years ago. They hold this belief without evidence or empirical support for it. Others have told them that the book that contains this "fact" is the origin of all truth, even though they have no support for this claim either. In essence there is a chain of irrational belief passed from one generation to the next without the participants stopping to apply reason and question how they know what they think they know. If they are exposed to scientific evidence that suggests that no, the earth was actually created billions of years ago, they will deny the evidence and obfuscate the issue. They choose to reject reason and cling to hearsay. What is real is not real, and what is not real is real. Belief supersedes reality. Opinion dictates fact.

And this is acceptable in our society because everyone is free to choose their beliefs, and therefore, everyone's opinion is valid.

Educational Measurement

To illustrate I will recount a real experience from my first year teaching at a university. The school is a small, well-established state university, a teaching school with no religious affiliation. It also happens to be a senior military institute located in one of the most conservative congressional districts in the nation. Most of the students come from the rural surrounding areas, but because the school is so small, its entrance requirements are relatively high. Incoming freshmen regularly have the highest GPAs and SAT scores of any public school in the state, except for those who attend the two large, prestigious research universities.

I was teaching a course on educational measurement to juniors who were pre-service teachers. They intended to become high school instructors, so their content knowledge was expected to be relatively specific and sophisticated. Educational measurement, otherwise known as assessment, certainly falls under the purview of science. It is concerned with using observations and gathering artifacts (tests, products, projects, etc.) to systematically gather evidence in order to make accurate decisions about students' intellectual characteristics. With its use of valid and reliable pre- and post-tests, intervention methods, and controlled variables, the one major component of educational measurement that separates most of it from publishable scientific research is the lack of a control group. Other than that, a good assessment system looks much like psychological research, and it could be argued that that's exactly what it is. So one of the central concepts the course focused on was the need to come to justifiable conclusions based on strong evidence gathered in a rigorous and methodical fashion. One morning I witnessed the limits of that endeavor. The class was discussing instructional alignment, which deals with how closely the content that is taught in the classroom matches the curriculum the teacher is supposed to cover and what is assessed after instruction. One student was arguing that the textbook should not be the sole curriculum for any course and that a teacher should bring his or her own personal knowledge and expertise to the classroom to supplement the text, certainly a justifiable position and a relevant topic for the course. We began to explore what the extent of those personal insights should be. As an example, one student questioned

whether it would be appropriate for a social studies teacher who held a sympathetic view of the Nazi regime to introduce and teach those views in the classroom. The class seemed to agree that it would not be. I brought up a more common example when I told of a science teacher in the local school system who, during a PTA meeting, expressed her opinion that evolution was a myth. Undoubtedly, this belief carried over into her classroom. I suggested that that teacher was likely unqualified to teach science because her statement showed a basic lack of understanding of her subject area.

Needless to say, this caused quite a stir in my classroom, and while I tried to keep the conversation focused on how much the content of a course should diverge from the mandated curriculum, the students seemed intent on arguing the merits of evolution. The following is an account of how the conversation unfolded:

Student 1: “I don’t think evolution should have to be taught. I think the parents should decide what their kids will learn.”

Instructor (Me): “But we have to teach biology. If not, how would we ever get the next generation of doctors, veterinarians, and the scientists who find cures for diseases? And there is no biology without the framework of evolution. All of biology, and by extension medicine, is explained through evolutionary theory.”

Student 1: “Well, I think both evolution and intelligent design should be taught so students can make their own choices.”

Instructor: “But it’s science class. It’s good for everyone to have their own beliefs, but kids are supposed to be learning science in science class. We do a disservice to education when we don’t do that.”

Student 2: “Intelligent design is science.”

Instructor: “No, it’s not.”

Student 2: “Why not?”

Instructor: “Because there are no testable hypotheses. You can’t conduct research on it. And no one is actually researching it. There are certain criteria for science, and intelligent design does not meet those criteria. And besides that, it’s illegal to teach it in public schools.”

Student 2: “I didn’t know that.”

Instructor: “Yes, there was a legal case that went to the U.S. Circuit Court in Dover, Pennsylvania in 2005. The judge ruled that intelligent design was *not* science and was religiously based, and therefore teaching it breached the constitutional mandate for the separation of church and state.”

Student 2: “Huh!”

Student 3: “I had a science teacher in high school who used to call it Evolution!” [class snickers]

Instructor: “See, that’s exactly what I mean. That teacher was bringing personal beliefs into the classroom that conflicted with the material he was supposed to be teaching the students. That’s inappropriate.”

Student 4: “Well, why can’t they just teach what Darwin wrote about? You know, about little changes to finches and things, without getting into the whole thing about humans and apes?”

Instructor: “We can’t do that because we’re trying to teach science, not history. Darwin’s theory is well over one hundred years old. We don’t *only* teach about Galileo’s views when we teach about the solar system. We don’t stop with Newton’s views when we teach physics. We teach about them, but we focus on what we know *now*. And since Darwin’s discoveries 150 years ago, we have entirely new fields of science, like genetics and embryology, that have supported and verified his early findings, not to mention added a great deal of information to them. We know so much more now.”

Student 2: “But there’s no evidence of macro evolution. There’s only evidence of micro evolution, small changes in animals. There are no links between major animals like fish and reptiles”

Instructor: “That’s not true. Just a few years ago, in 2004, scientists discovered a fossil called Tiktaalik, which was exactly that- it was half fish, half reptile. It essentially had the head of a reptile and the body of a fish, with fins that were becoming feet. And that was only one of many types of fossils that show evidence of macro evolution.”

The students continued to grumble a bit, and I moved the discussion back to the next assessment topic. Luckily, the class was filled with future English and social studies teachers with a couple math teachers, and none of them were actually training to be science teachers. If any of them had been pre-service science teachers it would have left me with a difficult ethical dilemma of what to do about a student-teacher who insisted on teaching students things such as intelligent design that were not only outside the scope of their subject area, but unlawful to boot. I was spared having to contemplate that scenario for the time being.

But at the end of the semester when students filled out their instructor evaluations, a number of them wrote that I was closed-minded, likely because I would not accept the view that intelligent design is science or that their arguments against evolution were credible. If insisting that science teachers stick to teaching science and that teachers follow the guidelines set by U.S. courts makes me closed minded, I guess I will have

to live with that label. The larger point, though, is one of belief and how unsubstantiated belief often supersedes information that is based on legitimate evidence. My refusal to accept their view of reality, which was based on subjective, unsupported belief, meant, in their mind, that I had a stubborn, inaccurate view of reality. This despite the fact that logically, someone with a doctorate in a field of science, even a soft one, was likely to have gained more knowledge on the subject than students who had completed two years of post-high school education in English and social studies. And undoubtedly, their objections to the subject of evolution stemmed not from scientific knowledge, but from the fact that it didn't square with the religious beliefs they wanted to be true.

Senator James Inhofe

To extend the point, there is the case of James Inhofe, the U.S. Senator from Oklahoma, who in March of 2012, had a curious TV interview on a popular cable news program (MSNBC.com, 2012). James Inhofe is the Republicans' main point man on the issue of climate change. He has represented U.S. interests, or at least the U.S. point of view, in Copenhagen, in opposition to scientists from around the globe. The Senator holds a bachelor's degree in economics from the University of Tulsa, which is the extent of his academic education (United States Senate, 2012). I mention his education not to demean him, as many successful people have made a mark on history with far less formal education. Instead, I mention his education in order to illustrate what the Senator's scientific background is, which is to say, extremely limited.

Inhofe had recently released a book in which his central theme was that climate change is a hoax, a falsehood propagated upon American citizens. But for someone arguing issues of science, his reasoning in this interview simply amazed me. As the show host questioned him on specific points, Inhofe unveiled the reasoning behind his position. He read quotes from a variety of newspapers and magazines that questioned the validity of climate change. As he built his argument, it became clear that he believed that the accuracy of the facts were dependent not upon evidence compiled by scientists, but on a consensus of journalists, who, like him, likely held bachelor's degrees in fields other than physical science. He made his case by offering editorials, or opinions, written by those who questioned climate change and stories about those

who question the scientific evidence. But he did not actually reference any scientific studies or findings. Instead, he claimed that, “it doesn’t mean anything” that 97% of climatologists agree that climate change is taking place.

The reality, in the Senator’s mind, was not based on objective facts, like longitudinal records of average temperatures across the globe or changes in the chemical composition of the atmosphere, but on how many people believed the concept. It seems he thought that if we, or journalists, voted against the idea of climate change, then that would rule out its existence. It couldn’t be real if people refused to believe it, and Inhofe, no doubt, did not accept the possibility and was doing his best to prevent global warming by convincing other people not to believe it as well. It was a truly bizarre position put forth by an otherwise intelligent and very powerful individual. But this is also a man who has gone on record as arguing that humans cannot affect the climate of the earth because god is controlling the climate instead (Johnson, 2012). I am not sure what evidence Inhofe has acquired in forming that opinion, but the fact that he referenced the book of Genesis as the substantiation for it would indicate his entire stance is built upon wildly irrational belief rather than objective data of any sort, and I would hazard to guess he does not possess data on the existence of god. While this would not be overly alarming if Inhofe were an everyday citizen, it is quite troubling coming from a leader of our society whose views have the potential to affect not only millions of people but the entire natural world.

The Politics of Corporal Punishment

I’d like to offer one last example to illustrate how those with in-depth knowledge and expertise in a field are routinely disregarded in favor of those with little more than strong opinions and steadfast, if inaccurate, beliefs. While the previous two examples I have offered- evolution and climate change- tend to consistently be debated along strict partisan lines, this instance shows how blind belief is not relegated to a certain political perspective. Indeed, just as with religious belief, it does cross political boundaries.

One morning I was reading the Atlanta Journal Constitution online, by far the biggest, most widely read newspaper in the state, certainly not a partisan tabloid with a political agenda. There was an article about parenting and the appropriateness of

corporal punishment, spanking one's children. Below the article was an online discussion that I decided to scroll through and ultimately comment on. Of course, there were opinions on both sides of the issue, but I found myself aligning with a surprising colleague in my opposition to physically punishing children. There I was, a liberal college professor, in full agreement with a man who identified himself as a staunch conservative and a lifelong prosecutor in the public legal system. The two of us, one liberal and one conservative, both with some level of expertise in the matter, argued that it was not a good idea for parents to hit their kids, regardless of the semantic distinction one placed on their particular form of punishment.

As an educational psychologist, I am familiar with the scientific literature on the effects of corporal punishment. Having studied and taught human growth and development at the graduate level, I was well aware of the negative outcomes associated with physical punishment. Among other negative effects, children and adolescents who have been physically punished are more likely to have problems with cognitive development, language development, impulsiveness, self regulation, depression, aggression, antisocial behavior, academic achievement, truancy, violence, substance abuse and a host of other issues (Berk, 2008; Teicher, 2002). Furthermore, children who have been physically abused can suffer from posttraumatic stress disorder and show signs of damage to the central nervous system, such as damage to the size and function of the hippocampus, amygdala, and left cerebral cortex, which in turn can cause a range of subsequent cognitive, behavioral, emotional, and social problems (Teicher, 2002). It is important to note that it is the intense psychological stress, not necessarily the direct physical punishment, that causes the long term symptoms, so this type of damage can occur below the threshold of what some would consider abuse and in the range of what they may consider "reasonable" corporal punishment if the "reasonable" punishment elicits extreme stress responses in the child's brain. This is not to say that all or even most children who experience physical punishment will show these symptoms, just that they are much more likely to, and clear correlations have been revealed over the years. Given the potential for very harmful effects, the jury is no longer out in the fields of psychology and medicine over whether corporal punishment is considered beneficial or appropriate- it's not.

My colleague in the debate gained his expertise in a very different environment, but through far more direct real world experience. He indicated that over the years, every time he prosecuted someone, if he had the chance he would ask them about their upbringing. He wanted to know about their early home lives to see if there were common patterns in the backgrounds of the individuals who would later come before him for allegedly committing crimes. Unfailingly, according to him, nearly every young man or woman he asked over the years reported that they had been physically punished by their caregivers during childhood. To me, at least, this was a powerful testimony from someone in a position to make detailed longitudinal observations on the issue. It was also a testimony that fully squared with the consensus of the research I have studied in my lifetime. It was all the more compelling because this man was a conservative, and his argument contradicted one of the tenets of the traditional Christian doctrine that supports the use of corporal punishment (“spare the rod, spoil the child”).

So here we were, the liberal psychologist and the conservative prosecutor, arguing for the same point: that parents should not hit their children, a point that should not seem unreasonable in a civilized society. This posed a conundrum for those who opposed us in the debate; they could not attack on political or ethical grounds. They couldn't claim my position to be one held only by pacifist liberals and they couldn't attack him for being weak on discipline or lacking in moral fiber. So what did they attack us on? Paradoxically, they attacked us on our expertise, not that we lacked expertise in the area, but they criticized us for *having* expertise. In their minds, there was no way that anyone who had studied the subject for years, formally or informally, could possibly know the real truth that only they knew through viewing their own familial environment. Of course, everyone in their family had turned out just fine after having been beaten for many years, in their opinion, and I hope that's true. I suppose their sample size of one held more weight than all the research, all the statistics, all the years in the courtroom, all the objective knowledge that has been compiled on the subject over the years.

I was vilified for being a psychologist, with one woman explaining how a psychologist at one time had given her less than helpful advice, and therefore my own perspective was invalid. She did not seem to understand the difference between

developmental psychology and counseling psychology, nor was it likely to have mattered. Another person accused the prosecutor of being a government shill, a sellout whose only allegiance was to money and the great bureaucracy. Therefore, the prosecutor was allegedly unable to objectively assess the issue. Clearly, these were ad hominem attacks, but these individuals did not stop to ask what expertise they, themselves, brought to the table. They didn't explain how *not* being a psychologist gave them more knowledge and credibility than being a psychologist or how *not* having dealt with criminal defendants over many years would give them more insight into the characteristics of troubled adults than someone who had. It was simply accepted that their common wisdom was superior to the specific evidence that the two of us had been exposed to in our lives.

Why Belief?

I will not pretend to be able to definitively answer the question of why modern humans continue to adhere to irrational beliefs or why they so often choose to maintain unsubstantiated views in opposition to evidence or the advice of experts who are familiar with the evidence. I will, however, offer a theoretical look at the psychological factors associated with learning and misconceptions and examine some empirical evidence that contributes important information to what we know about rational thought and the belief in the supernatural.

Jean Piaget was one of the most influential figures in the fields of developmental, cognitive, and educational psychology. While modern research methods have evolved to demand more stringent scientific designs than were used in his time, Piaget contributed to constructivist learning theory, which today is still one of the most prevalent and most widely accepted theories of human learning (Pressley & McCormick, 2007). In brief, constructivism posits that learners create their own knowledge of the world, rather than receive and memorize it, as had been the traditional perspective, and that instructional processes that involve learners in active rather than passive cognition are most likely to stimulate development. Central to constructivist theory is a mechanism for dealing with misconceptions, for helping individuals to learn new concepts that are in opposition to previously held but incorrect beliefs.

According to the constructivist learning model, throughout our lifetimes, humans alternate between states of equilibrium and disequilibrium (Pressley & McCormick, 2007; Tennant, 2002). Equilibrium occurs when our knowledge of the world is balanced and our intellectual awareness meets the requirements of our environment so that we navigate life successfully. But periodically we fall into a state of disequilibrium, when what we thought we knew about the world turns out to be incorrect and no longer fits reality. At this point changes must be made to our schemata, which are the theoretical web-like structures that connect the ideas we have about the world to each other. If the adjustment is a slight one, we are said to assimilate the new information into an existing schema, and then we go on with our day. If the changes are extensive ones that we have little existing capacity to deal with, then we must form a brand new schema in order to account for this new reality.

For instance, for many Americans it was once a ‘reality’ when they were young that Santa Claus arrived to give them presents once a year on Christmas. They had a schema about Christmas that included decorated trees, presents, reindeer, possibly snowmen and elves, etc., much of which was predicated upon the existence of Santa Claus. Life at this time was in a state of equilibrium in regard to the child’s Christmas schema. But then one day, for whatever reason at whatever age, the child finds out that there is no such thing as Santa Claus. Now the child enters a state of disequilibrium because the prior facts that contributed to their equilibrium are no longer applicable, so a new theory of the world must be created. Depending on the strength of the child’s belief in Santa Claus, the process may require assimilation (based on a weak belief that simply necessitates replacing Santa Claus in their schema with their parents instead) or accommodation (based on a stronger belief that causes the child to view the world in a less benevolent way and to create a new schema of what Christmas means). Once the child has made these adjustments he will return to a state of equilibrium. This is how humans learn throughout their lives, through a constant cycle of equilibrium to disequilibrium addressed through assimilation and accommodation in order to find balance in a state of equilibrium once more before repeating the process over and over again.

So how should teachers deal with misconceptions? The simple answer is that they should try to create a state of disequilibrium in the learner. Instead of telling the child

“No, what you think is not correct; it’s actually this…” they should present the evidence that is inconsistent with the child’s view and let the child experiment, experience disequilibrium, and finally create a new theory. For instance, I take two wooden rods of equal length and hold them next to each other, parallel, but offset them so that one sticks out and appears longer on one end while the other sticks out and appears longer on the other end. If I were to show the pair of rods to children of a certain age, maybe 3 or 4, and ask them which rod was longer, they would likely fixate on just one end that overlapped and say that that was the one that was longer. Young children often tend to focus on just one aspect of a problem while ignoring other relevant factors. Piaget would say that a child at this stage had not yet mastered the concept of conservation. But in order to help the child understand the concept, it would not be beneficial for me to say, “No, both rods are really the same length,” because in the child’s “reality” he still only sees the one side overlapping and therefore is still in a state of equilibrium with no need to challenge his own misconception. Whatever the instructor says, the child will still see what makes sense to him in his worldview. So instead, the instructor may want to say something like, “I see what you mean about that side being longer, but if we look over here on this other side the other one is longer. How can that be? Are they both longer than the other?” Now the child must navigate a contradiction for himself. Instead of the teacher telling him what the reality is, which contrasts with what his mind tells him, the teacher has pointed out another aspect of the problem that the child has not previously considered, and the child must now cognitively experiment until he finds a solution. Now he is, in essence, in a state of disequilibrium until he can arrive at a solution for how both sticks could possibly be longer than the other.

For many of us, this process of experiencing disequilibrium when confronting misconceptions occurs regularly and continues to help us throughout our lives, even if we or our teachers are not aware of it. When I was a sophomore in college and took Biology 101, I experienced something similar, but at a much higher level. I had been a conservative Christian up until about that point in my life, and while I excelled in a range of academics, I had never given a great deal of thought to the origin of species, because I had more or less accepted the Biblical version that I had been taught since childhood, though deep down I knew it wasn’t logical. But this class, one that nearly all undergraduates are required to take, stimulated a great deal of disequilibrium for

me. Both versions of our origins couldn't possibly be right; both rods couldn't possibly be "longer." But here I saw the pictures of the fossils and the timelines of the changes and heard the explanations behind it all at a college level, far removed from the anthropology of early man we covered in junior high school. And I remembered how twice every year when I was a boy growing up in New York City my school would take us on field trips to the Museum of Natural History in Manhattan. And now those huge models of dinosaur bones; those different forms of animals that are no longer here; that skeleton of Lucy, at the time the oldest primate we had evidence of; now it all made sense, certainly more than the story about all the animals being willed into creation in a single day and man being molded out of a handful of dirt. A light bulb had gone off, and I could no longer accept the thoroughly mythical version I had always been taught because I had at last been exposed to the evidence needed to solve the problem. The disequilibrium had led to equilibrium and the correction of a lifelong misconception.

While I did not pursue biology and it would be a number of years before I returned to science, that experience of disequilibrium breaking down a misconception had a profound impact on my life, and much of my subsequent years have been spent questioning assumptions and trying to find better evidence for whatever the question at hand is. But this learning cycle of equilibrium-disequilibrium-assimilation/accommodation-equilibrium does not universally succeed for all humans throughout their lives. As I mentioned, all college students are required to take Biology 101, yet the majority of them, at least in this country, choose to reject the evidence they are exposed to there and maintain fantastic beliefs about the origin of life and of the universe. It seems that it is not quite enough to expose individuals to concepts that contradict their misconceptions, because as we have seen, adults will often dismiss the strongest evidence and turn a blind eye to reason in order to maintain a belief they desire to hold.

In an earlier theoretical paper I examined the psychological processes and consequences of fundamentalist indoctrination (Cuevas, 2008), so I won't delve into that content again here. Suffice it to say, though, education- both the formal academic type and nontraditional forms- is a powerful entity, and can influence us for the good or the bad, towards rational, well supported conclusions or towards accepting

fabricated explanations for basic concepts. However, education, indoctrination, evolutionary theory, and learning theory may not fully explain religious belief or the adherence to irrational concepts about the natural world. But modern research has shed some light on the issue and is worth examining.

Logic would seem to tell us that all babies are born as atheists and are only indoctrinated into religious belief. Children cannot spontaneously come to believe stories they were never told. For instance, remote tribesmen in New Guinea do not arrive at Christian beliefs if they are never exposed to them, hence the need for missionaries. It is our culture and environment that imbed religious belief in us. But recently researchers tested for both genetic and environmental influences on individuals' religiosity (Koenig, McGue, Krueger, & Bouchard, 2005). They examined the data of a cohort of 273 pairs of male twins. The participants responded to questions about their relative amount of religious belief during their childhood and at the present time of the study, as well as the amount of religious belief in their family environment during both times. Because both monozygotic (MZ) and dizygotic (DZ) twins were included, the researchers were able to account for the amount of genetic similarities between pairs and for the twins sharing the same environment as children.

Koenig et al. (2005) found that the participants' amount of religiousness differed significantly across time, with the pairs becoming less religious as adults. The DZ twins became less similar over time, but the MZ twins maintained their similarity. The researchers interpreted this to mean that early in life the genetic influence of religion was low and the environmental influence was high, but that the genetic influence grew as the participants aged, while the environmental influence diminished. They argued that a common environment accounted for the largest influence in childhood, while the genetic influence was the largest during adulthood, and suggested that religious heritability increased over time. Koenig et al. even went as far as contending that genes are responsible for religious belief. It is unsurprising that the influence of environmental factors would decrease as individuals age because once they enter adulthood they no longer live in the same household under the same parents and their life experiences become increasingly distinctive and varied. But until geneticists identify a gene that controls religiosity, it is a bridge too far to suggest that

religious belief is directly attributable to genes. MZ twins frequently show curious lifelong similarities in a wide variety of traits and preferences. It may be that the MZ twins continued to show close similarities and the DZ twins showed less similarities as they aged, and at the same time the influence of environment dissipated somewhat, causing the persistent similarity of the MZ twins to appear to be the result of a “religion gene.”

There are, however, important findings from this research. First, it is clear that early environmental factors greatly influence religious belief. This supports the argument that indoctrination plays a major role in the process. Next, there was clearly a shift in the participants’ religious belief in early adulthood. This suggests that developmental changes that occur around the time individuals leave home also affect their religious thinking, which is consistent with the findings of other studies (Hood, Spilka, Hunsberger, & Gorsuch, 1996). In addition, fluctuations in conservatism also occur around the college years, in the same timeframe that we see changes in religious belief here, and this may provide an alternate and more viable explanation to that of the religious gene. More recent research has eschewed the issue of genetics and instead focused on cognitive patterns in explaining religious belief.

Shenav, Rand, and Greene (2011), psychologists from Harvard, tested whether an individual’s cognitive style influences their belief in god. They wanted to know whether people who are more intuitive in their thought process are more likely to hold religious beliefs than those who make more reflective judgments. Theoretically, the intuitive-style thinkers would tend to go with their gut feelings when making decisions, while the reflective thinkers would use a more logical, critical, and rational approach. The researchers posed questions to the participants, and each question had an answer that was attractive and seemed correct at first glance, but was incorrect. The number of times each participant picked the “intuitive” but incorrect answer was compared to their responses on a survey that asked them about their relative certainty about their belief in god and their level of piety. The researchers also collected data on the participants’ age, gender, education, parental education, income, IQ, familial religiosity during upbringing, political orientation, and other cognitive abilities such as vocabulary that could potentially affect the outcome.

The results were consistent and revealing. The participants who gave more intuitive (and incorrect) responses reported more confident belief in god (Shenav, Rand, & Greene, 2011). These findings held true even when the researchers controlled for such influential variables as education, conservatism, and family factors. On the other hand, they found that the number of correct responses correlated with IQ, suggesting that those with higher IQs had a more reflective style and held less belief in god, while those with lower IQs were more intuitive and tended to answer incorrectly. However, when the results were examined after controlling for IQ, the effect was still present. This would indicate that belief in god cannot be explained simply by cognitive ability, i.e. IQ, and that the cognitive style with which participants solved problems was a strong factor on its own. Importantly, Shenav, et al. found that familial religiosity during childhood was not significantly correlated with cognitive style. This does not mean there was no correlation between religious belief during childhood and religious belief in adulthood, but instead suggests that the religious environment during childhood did not seem to be associated with whether the individuals became intuitive or reflective thinkers as adults.

So what do these results mean? First, those people who tend to make decisions with their gut feelings also tend to be religious in their orientation and vice versa. While not directly a question of this research, it also revealed that the religious individuals tended to draw incorrect conclusions more often, simply on the basis that those incorrect conclusions *felt* right to them. The religious individuals tended to have lower cognitive abilities than the less religious individuals, but that alone couldn't explain the differences. And, surprisingly, there was not a strong relationship between present cognitive style and religious environment during the participants' formative years, which would appear to dispute the premise that early indoctrination is the most prevalent factor in predicting religious belief in adulthood. But before attempting to draw broader conclusions from this information alone, it would be helpful to look at a similar study. Instead of focusing on the thought processes of the intuitive, religious believer, as Shenav et al. (2011) did, this more recent study focused on the religious belief, or lack thereof, of the analytic thinker.

Gervais and Norenzayan (2012) theorized that humans have two modes of information processing, intuitive processing and analytic processing, that take place

simultaneously and in parallel. However, the analytic system can override the intuitive system when necessary if a problem needs to be solved and the necessary resources, or clues, are available. If this is the case, then the authors wondered whether activating the analytic thinking process in order to override or inhibit the intuitive process would also undermine religious belief, since as we have seen, intuitive thinking has been shown to be associated with belief in god. First Gervais and Norenzayan gave the participants the same intuitive/analytical tasks that had been used in Shenav et al.'s (2011) research. Then they compared those scores to their own religiosity surveys and found nearly identical results to Shenav et al. (2011): Analytic thinking was negatively associated with religious belief, or in other words, the more rational, logical, and accurate the participants' thought processes were, the less likely they were to have a strong belief in god and vice versa.

But then the researchers completed four other experiments, and in each one they subtly manipulated the participants in the experimental groups to encourage them to take a more analytic perspective (Gervais & Norenzayan, 2012). The manipulations were as slight as having them view a picture of a man thinking (Rodin's *The Thinker*) as opposed to another statue of a man throwing a discus (for the control group) or having them arrange words associated with cognition such as "ponder", "think", "analyze", "rational", and "reason" as opposed to random unrelated words such as "hammer", "brown", and "jump". The final manipulation was so slight that it simply asked participants in the experimental group to try to read text written in a font that was more difficult to decipher than the font read by those in the control group. All of these manipulations were meant to put the participants in the experimental groups in a more active and/or reflective cognitive state and stimulate analytic thinking.

And just as with Shenav et al. (2011), Gervais and Norenzayan's (2012) findings were clear and convincing. In each instance, priming the participants in the experimental groups for analytic thinking improved their performance on the task. In other words, those participants who were stimulated to think analytically scored higher on the problem solving questions. In addition, in each of the five experiments analytic thinking was significantly correlated with greater *disbelief* in god when the results were compared to the participants' religiosity survey responses. So participants who used a more rational, logical, analytic approach were more likely to come to the

correct conclusion on the problem solving tasks, but less likely to report a strong belief in god, while those who used a more intuitive method were more likely to choose incorrect answers and also more likely to hold a stronger belief in god. These findings held true for Canadian and American adults of varying ages, education levels, and income levels.

So again, we are left with the question of what all this information tells us about human cognition and religious belief. First, there seems to be a clear empirical link between accurate, analytic thinking and skepticism in supernatural forces. Likewise, there appears to be a clear empirical link between those who respond with “gut feelings” and “common sense” and stronger religious belief. In these studies, at least, nonbelievers were more likely to determine the correct answer, and believers were more likely to choose incorrectly. Nonbelievers were also more likely to have higher IQs, based on the measures utilized. But what is not clear is the direction of cause and effect; it’s not clear whether people who are religious tend to abandon rational thought in favor of mysticism across broad segments of their lives, or if a tendency to reject analytic thought leads one to become more religiously oriented. Or it may be the case that some of the cause and effect cycle is reciprocal, with people embracing religion and intuitive decision making from either direction.

Regardless, it is likely that insistence on maintaining irrational religious beliefs is due to a convergence of factors. Certainly indoctrination, culture, and social pressures play an important role, as the researchers in each of these studies are careful to point out. Certainly education plays a role, because the less one knows about the natural world, the more likely they are to be willing to accept fantastic explanations for natural occurrences, as the historical record of mankind has shown us. Intelligence likely plays a role because the more unsophisticated one’s thought processes, the less likely they are to take a critical, analytic approach and the more likely they are to accept simplistic, though often unrealistic and inaccurate, justifications for phenomenon. But now we are coming to understand also that individual cognitive styles may impact belief in god. These cognitive styles appear to influence whether people are willing to accept explanations that they would like to believe but that are erroneous en lieu of more accurate explanations that may be less pleasant for them to contemplate or may go against their accepted social norms.

Going Forward Looking Back

Over 150 years ago the great American philosopher Henry David Thoreau argued that the opinions of the majority are not universally right or even just. Those opinions are, by definition, the most common and most often in the end serve the best interests of the majority, but are not inevitably ethical or objectively correct. Because the majority of Americans at one time supported slavery did not make it ethical. Yet Thoreau dealt in the sphere of philosophy, which, while certainly inherently fueled by reason and logic, retains a solid foundation of subjectivity at its core. It is not science and does not depend on objective evidence for its function. Yet today we have millions of Americans who deny a variety of scientific truths simply because those truths do not align with their ideology, a hollow ideology fueled predominantly by antiquated religious beliefs.

And while ideas of justice, rights, and morality can be debated based on the context of the situation, as they have been in the recent past on issues such as waterboarding and abortion rights, the weight of objectively collected scientific evidence leaves far less room for the influence of uninformed opinion. Or it should. Because the majority of doctors once thought bleeding a patient was beneficial did not make it so. Because women were at one time commonly believed to be intellectually inferior to men did not make it so, then or now, just as those who believed the earth was flat or that the sun revolved around the earth did not somehow force reality to conform to those beliefs, no matter how many people believed them.

I won't argue that an adherence to irrational thought and archaic, mythical beliefs is an existential threat to our society or the human race. As a species, we have survived and thrived for ages without being entirely led by reason at every step. But I will argue that it impedes human progress. The great leaps that have taken place in human civilization have usually been ushered in through scientific advances. At times those advances were the result of random experimentation, but their success was always dependent on objective facts, from farming, to transportation, to medical breakthroughs, to space travel. A resistance to the advancement of science today is limiting the medical marvels that could be developed, as conservative religious believers, who also tend to wield a great deal of political influence, have been found to be those most strongly opposed to stem cell research (Nielsen, Williams, Randolph-

Seng, 2009). That resistance to science is inhibiting us from doing anything of substance to address climate change, which could profoundly impact the world's population; it is limiting the number of new medical doctors and research scientists simply because students don't understand or value science. And our penchant for believing things we may simply *want* to believe has given us such fiascos as the war in Iraq. Our collective minds and energy could be directed towards so many more productive endeavors.

The divide between religious belief and scientific thought, which at times in the past had been reconciled to some extent by religious leaders intent *not* to impede medical progress or new technologies or discoveries, continues to be highly contentious, to the point that it halts some advancements entirely (Reichhardt, Cyranoski, & Schiermeier, 2004). Unfortunately, research indicates that there is not a substantial trend among young religious thinkers towards a more objective approach to forming views on most controversial topics. Smith and Johnson (2010) found no significant differences between the opinions of younger evangelicals when compared to older evangelicals on the topics of stem cell research, abortion, same-sex marriage, marijuana use, health care, or the war in Iraq, although younger evangelicals did have more concern for the environment. This last issue, the environment, might provide some hope for the future. Over the past two decades it has become the norm for most k-12 science classes in the U.S. to cover environmental issues such as ocean pollution and greenhouse gasses. This suggests that education does indeed have some effect on broadening the perspective of students whose parents might reject science for ideological reasons.

But the environment is an issue that can be more easily reconciled with religious thought than, say, evolution or whether there is a biological cause of homosexuality. For many Americans, acceptance of the scientific evidence for these two subjects may produce a conflict so great as to create an existential threat to their religious belief. If that is the case, then students may feel like they must choose between either their religion or their education, and findings suggest that the social forces associated with religion are a stronger influence than education when it comes to acceptance of the science behind evolution (Haider-Markel & Joslyn, 2008). Not only are the least well educated and most religious individuals the most likely to favor replacing evolution

with creationism in public schools, but even among more highly educated individuals, religious ideology can override education, providing them grounds to accept the idea of teaching creationism as science in the classroom. Likewise, religious belief has been found to be strongly associated with negative feelings towards homosexuals and with the belief that homosexuality is a choice rather than biologically determined (Whitehead, 2010). It also appears that if it was to be made known through science and education that there was a definite biological origin for homosexuality, then negative attitudes towards homosexuals would be likely to continue largely due to the influence of religion.

This creates a difficult situation for educators. Because the inclusion of environmental issues in the curricula appears to have had some effect on how young religious believers perceive the environment, it suggests that education can play an integral role in helping students move past ideologically-based irrational thought processes.

However, teachers are forced to tread very careful with the subject of evolution because of the extent to which it contradicts traditional religious beliefs.

Homosexuality is not a subject that can safely be broached at all by instructors prior to the college level. Topics such as stem cells and even the economics of health care can also cause potential problems for teachers if the information they cover does not align with the parents' ideological stances, regardless of how accurate that information is. So we are left with a situation in which we have reason to believe that students can successfully learn to weigh evidence more objectively, yet throughout the course of their education they can only sporadically be exposed to information that could stir the cognitive dissonance necessary to clarify basic misconceptions. Due entirely to potential conflicts with the dogmatic religious ideology of parents and community, it is not until the university level that students can be introduced to the full array of objective human knowledge that we have compiled through the course of history. But by then those students have become adults, many with deeply engrained, long held misconceptions, and they enter college at a time when professors expect to move on to more sophisticated concepts in hopes of producing the next generation of scholars, researchers, and scientists.

I do not have a simple solution for the problem at hand. But as an educator I must argue for better education. Can we develop instructional methods that enhance

analytic thinking? Can we structure courses to focus on critical thinking and epistemology? Can we teach science and evidence-based content prior to the college level without the general public and politicians attempting to inject pseudoscience like intelligent design or undoing the instruction with fables meant to “teach the controversy”? This is where society must do its part by coming to value not just science, but mankind’s capacity to understand and decipher the realities inherent in nature.

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Author Details

Joshua A. Cuevas is an educational psychologist and assistant professor in the school of education at the University of North Georgia. He has worked in educational assessment at both the state and national levels and teaches courses in assessment and research methods. His research interests include educational measurement, applied cognition, and evidence-based reasoning.

Correspondence

Joshua A. Cuevas, Ph.D.
University of North Georgia
82 College Circle
Dahlonega, GA 30597
jocue24@yahoo.com