

August 24, 2010



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Posted: June 9, 2009 08:33 AM

## Religious Conviction: Effects on the Human Brain

The US has approximately 306 million people as of February 2009. Organized religion plays a role in the lives of the majority of these people. As of the last large study in 2001, 81% of American adults identify themselves with a religion: approximately 76.5% of people identify as Christian, 1.3% of people identify as Jewish, 0.5% of people identify as Muslim, 0.5% of people identify as Buddhist and 0.4% of people identify as Hindu. Although 15% of the population identify as having no religious affiliation, this is much lower than other developed nations such as the UK where 44% of people identify as having no religious affiliation and Sweden where 69% of people identify as having no religious affiliation (ARIS study, 2008). Religion is therefore an intrinsic part of being American, and understanding the effects of religion on the American brain is important. In lieu of this, in a recent study in Psychological Science, researchers examined where religious and non-religious people differed in their brain-wave (EEG) patterns during a task requiring high levels of attention. They measured the reactivity of the part of the brain instrumental in monitoring for errors (the conflict detector called the anterior cingulate cortex or ACC) and levels of anxiety. In this column, I present these findings with some conjecture about what this could possibly mean.

The study conducted by Inzlicht and colleagues (2009) found that stronger religious zeal and greater belief in God was associated with decreased reactivity of the brain's error detection center (ACC) and fewer wrong answers. Since the ACC is also implicated in anxiety and self-regulation, the authors concluded that having a strong religious belief acts as a buffer against anxiety and minimizes the experience of error by decreasing ACC activation, thereby reducing the reaction to error. What are the implications of these findings? Here are some of my thoughts:

1. Religion protects against anxiety during the performance of thinking tasks. This is consistent with evolutionary theories that state that religion evolved as a result of human "need". It is possible that this need was anxiety reduction.

2. The finding of decreased ACC activation is confusing. While it implies less reactivity to error, does this mean that if we are religious we are less likely to pick up errors? While this may be so, it is

also curious that religious people make fewer errors possibly because they are not distracted by the brain firing every time an error is made. As a preliminary thought this would suggest that having a strong religious conviction may obscure awareness of our own errors. Is this the reason that religious wars continue for so long? Is it possible that regardless of the specific religious belief, having a strong belief makes both sides less aware of mistakes they are making?

3. The implication of having less anxiety is also intriguing as it may explain why we hold onto our religious beliefs. It may also explain why wars based on strong religious conviction may continue for so long - they may have an anxiety reducing effect that people become addicted to.

4. Since these findings are fairly non-specific (depression and alcohol may all decrease ACC activation), it is possible that it is not religious conviction per se but "conviction" or "addiction" that steadies the ACC. This would make sense as a greater sense of commitment to an idea often "holds attention" and decreases distraction and therefore anxiety.

5. One of the questions that arises is: why do Americans have a greater need to be religious than people in the UK or Sweden? Do we want to be less anxious? Do we want to recognize our errors less? Do we want to make fewer errors? What are the implications of the fact that the numbers of religious Americans has dropped in recent times?

6. One of the implications of reacting less to one's own mistakes may be to allow for greater self- and other forgiveness. Cause and effect are confusing here. Are we a guilty nation in need of forgiveness or a forgiving nation that encourages exploration and discovery? That religion creates reduced awareness of error in one's self seems clear. What does this mean in terms of recognizing other people's errors?

7. When our beliefs are invested in something greater than ourselves, they protect us from anxiety because our attention is not on what is going on inside of us. Lower ACC activation may reflect attention directed elsewhere.

Clearly, my conjectures here are just thoughts emanating from contemplation of the data and not scientific facts. Yet, it is my hope that as we grow in our understanding of how religion impacts the brain, we will also grow in our understanding of how it protects us from anxiety. Why would anyone give up his or her religious beliefs if giving them up meant becoming more anxious? I think that we need to integrate this interaction between religion, error awareness and anxiety more if we are to grow from an understanding of our own mistakes. Certainly, in terms of how well we do on these tasks of attention, it appears to be good not to be distracted by our errors but concerning that we may feel we are right when in fact we are wrong. If we grow in our religious convictions, this is something to consider more closely.

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