Primed analytic thought and intrinsic religiosity: The importance of individual characteristics

Julie E. Yonker, Ph.D.
Objectives

- History of religion and psychology
- Terminology challenges in religiosity research
- Cognitive Science of Religion - definitions
- Motivation for research
- Research results
- Publication challenges
- Concluding thoughts
Religious background of Psychology

\( \Psi = \) soul, spirit

Psyche – breath, life, soul, ghost, conscious self, personality
First use of term “Psychology”

Definition: Reasoning about the soul and study of the mind.

- Probably coined by German Reformation theologian & philosopher, Philipp (Schwartzerdt) Melanchthon
“Father of American Psychology”

“Evidently, then, the science and the religion are both of them genuine keys for unlocking the world’s treasure-house to him who can use either of them practically.”

William James (1902)
Freud and Religion

*The Future of an Illusion* (1927)

- Belief in God is a collective neurosis
- Religious beliefs are an illusion and insusceptible of proof
- “Hope that in the future, science will go beyond religion and reason will replace faith in God”
B.F. Skinner - Behaviorism

- Described spirituality as “explanatory fiction” and irrational (1970’s)
Definition of Psychology

- The scientific study of behavior and mental processes.
Science
Always doubt
Always question
When challenged
Replies with evidence

Religion
NO doubt
NO question
When challenged
Becomes hostile
"One of the greatest tragedies of our time is this impression that has been created that science and religion have to be at war."

— Francis Collins
Terminology Challenges
Spirituality

✧ Spirituality = personal and transcendent practices involved in search for the sacred and significance (Pargament et al., 2013)
Spirituality and Meaning

- Spirituality = personal and transcendent practices involved in search for the sacred and significance (Pargament et al., 2013)

Five Themes of a Biblical View of Human Nature

**Meaning Seekers:**
We seek to make sense of our surroundings, our experience, and our purpose through perceiving patterns, creative meaning making, and desire for a deity.
Spirituality

- Spirituality lies beyond the surface, it involves the pursuit of depth, meaning, clarity.
Religiosity

Religiosity = organized institutional aspects related to search for sacred and significance (Pargament et al., 2013)
Terminology Challenges

- Religiosity = organized institutional aspects in search for sacred and significance
- Spirituality = personal and transcendent practices involved in search for the sacred and significance
- Quest for meaning
Cognitive Science of Religion

✦ CSR definition = “draws upon the cognitive sciences to explain how cross-culturally regular features of human minds, inform and constrain religious thought and action, therefore accounting for recurrent patterns in their expression.” (Justin Barrett, 2004)
A CSR Premise

✦ People the world over have similar minds
✦ Belief in things in ubiquitous
  ✦ Non-reflective – automatic (e.g. I can’t walk through a solid wall, God can understand human language)
  ✦ Reflective – arrived at through contemplation (e.g. caterpillars turn into butterflies, God exists in three persons)
Thinking Mind

- System 1 = thinking that is fast, intuitive, emotional, impulsive
- System 2 = thinking that is slow, deliberative, logical, analytical

$17 \times 24 =$
Religious Beliefs & Thinking

- System 1 = fast, intuitive, emotional
  - Non-reflective beliefs – automatic (e.g. God can understand human language)
- System 2 = slow, deliberative, logical
  - Reflective beliefs – arrived at through contemplation (e.g. God exists in three persons)
Analytic Thinking Promotes Religious Disbelief

Will M. Gervais* and Ara Norenzayan*

Scientific interest in the cognitive underpinnings of religious belief has grown in recent years. However, to date, little experimental research has focused on the cognitive processes that may promote religious disbelief. The present studies apply a dual-process model of cognitive processing to this problem, testing the hypothesis that analytic processing promotes religious disbelief.

Individual differences in the tendency to analytically override initially flawed intuitions in reasoning were associated with increased religious disbelief. Four additional experiments provided evidence of causation, as subtle manipulations known to trigger analytic processing also encouraged religious disbelief. Combined, these studies indicate that analytic processing is a factor (presumably among several) that promotes religious disbelief. Although these findings do not speak directly to conversations about the inherent rationality, value, or truth of religious beliefs, they illuminate one cognitive factor that may influence such discussions.

Although most people fervently believe in God or gods, there are nonetheless hundreds of millions of nonbelievers worldwide (1), and belief and disbelief fluctuate across situations and over time (2). Religious belief and disbelief are likely complex, multidetermined, psychologically and culturally shaped phenomena, yet to date little experimental research has explored the specific cognitive underpinnings of religious disbelief (3, 4). Here we begin to address this important gap in the literature by applying a dual-process cognitive framework, which predicts that analytic thinking strategies might be a potent source of religious disbelief.

According to dual-process theories of human thinking (5, 6), there are two distinct but interacting systems for information processing. One (System 1) relies upon frugal heuristics yielding intuitive responses, while the other (System 2) relies upon deliberative analytic processing. Although both systems can at times run in parallel (7), System 2 often overrides the input of System 1 when analytic tendencies are activated and cognitive resources are available. Dual-process theories have been successfully applied to diverse domains and phenomena across a wide range of fields (5, 6, 8, 9).

Available evidence and theory suggest that a converging suite of intuitive cognitive processes facilitate and support belief in supernatural agents, which is a central aspect of religious beliefs worldwide (10–15). These processes include intuitions about ideology (11), mind-body dualism (13), psychological immortality (15), and moral perception (16, 17). Religious belief therefore bears many hallmarks of System 1 processing. If religious belief emerges through a converging set of intuitive processes, and analytic processing can inhibit or override intuitive processing, then analytic thinking may undermine intuitive support for religious belief. Thus, a dual-process account predicts that analytic thinking may be one source of religious disbelief. Recent evidence is consistent with this hypothesis (4), finding that individual differences in reliance on intuitive thinking predict greater belief in God, even after controlling for relevant socio-demographic variables. However, evidence for causality remains rare (4). Here we report five studies that present empirical tests of this hypothesis.

We adapted three complementary strategies to test for robustness and generalizability. First, study 1 tested whether individual differences in the tendency to engage analytic thinking are associated with reduced religious belief. Second, studies 2 to 5 established causation by testing whether various experimental manipulations of analytic processing, induced subtly and implicitly, encourage religious disbelief. These manipulations of analytic processing included visual priming, implicit priming, and cognitive disfluency (18, 19). Third, across studies, we assessed religious belief using diverse measures that focused primarily on belief in and commitment to religiously endorsed supernatural agents. Samples consisted of participants from diverse cultural and religious backgrounds (20).

Study 1 was a correlational study with Canadian undergraduates (N = 179). We correlated performance on an analytic thinking task with three related, but distinct, measures of religious belief. The analytic thinking task (6) contains three problems that require participants to analytically override an initial intuition. This task was designed to specifically measure analytic processing because an intuitive reading of each problem invites a quick and easy, yet incorrect, response that must be analytically overridden (Table 1). Furthermore, experimental manipulations known to induce analytic processing...
Rob Brooks: Analytic Thinking Erodes Religious Belief
www.huffingtonpost.com/.../analytic-thinking-erodes-religious-belief...
May 1, 2012 – Although there is considerable disagreement about whether education kills religious faith, people's chances of identifying as religious believers ...

To Keep the Faith, Don't Get Analytical - ScienceNOW
news.sciencemag.org › News › ScienceNOW › April 2012
Apr 26, 2012 – But a new study finds that prompting people to engage in analytical thinking can cause their religious beliefs to waver, if only a little.

Does Analytic Thinking Erode Religious Belief? - Religion Dispatches
www.religiondispatches.org/.../does_analytic_thinking_erode_religion...
May 29, 2012 – In both studies, this subtle reminder of analytic thinking caused participants to express less belief in God and religion. The researchers found no ...

Losing Your Religion? Analytic Thinking Weakens Religious Belief...
heathland.time.com/.../losing-your-religion-analytic-thinking-weake...
Apr 27, 2012 – Most of the world's population believes in God, or gods, but alongside them there are also hundreds of millions of nonbelievers. What makes ...

Study: Analytic thinking can decrease religious ...
religion.blogs.cnn.com/.../study-analytic-thinking-can-decrease-religi...
Apr 27, 2012 – By Becky Perlow, CNN (CNN) – When was the last time you sat down and questioned your decision to believe in God? According to a new ...
Religiosity measures used in *Science* research

**Intrinsic Religiosity** = religious motivation and orientation (Hoge, 1972)

  e.g. My faith involves all of my life.
  
  I try hard to carry my religion over into all my other dealings in life.
  
  In my life I feel the presence of the Divine.

**Scales made up by Gervais & Norenzyan* (Science authors)**

**Belief in supernatural agents** = God exists. Devil exists. Angels exist.

**Intuitive Religiosity** = e.g. When I am in trouble, I find myself wanting to ask God for help., I just don’t understand religion.
Science Study 1

Participants 179 undergrads University of British Columbia

Analytical Task = Cognitive Reflective Tasks (CRT)
Example: A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?

Results = Correlation between CRT ability & religiosity

Intrinsic religiosity $r = -0.22, p = .003$
Beliefs in God/angels/devil $r = -0.18, p = .02$
Intuitive religiosity $r = -0.15, p = .004$
Science Study 2

Participants 57 undergrads University of British Columbia

Analytical Task (Independent Variable) = Visual Priming of Art Work, random assignment either to:

Dependent Variable = Belief in God (0-100)

Results = Discobolus = Belief in God, 61.55 ± 35.68
Thinker = Belief in God, 41.42 ± 31.47  p = .03, d = .59
**Science Study 5**

**Participants**  175 North Americans, on-line sample

**Analytical Task (Independent Variable) =**
Cognitive Disfluency  Example:  Font in greyscale or Standard Font

**Dependent Variable =** Belief in Supernatural agents (3-21)

**Results =**
- Standard Font = Beliefs in agents, $12.16 \pm 5.99$
- Greyscale Font = Belief in agents, $10.40 \pm 5.44$

$p = .04, d=.31$
“Combined, these studies indicate that analytic processing is one factor (presumably among several) that promotes religious disbelief.”
Our overall Research


2. Study 1 = Calvin College students, Study 2 = large, nationally represented on-line sample

1. Experimental model to test the priming effect of several analytical cognitive tasks with comparison to a control group

2. Statistically control for individual variables that could influence religiosity and analytical thinking such as: age, gender, education, religious affiliation, English proficiency
Definition = A task or activity that precedes a second task such that it can influence the outcome of the second task.
Nobel laureate challenges psychologists to clean up their act

Social priming research needs “daisy chain” of replication.

Ed Yong
03 October 2012

Nobel prize-winner Daniel Kahneman has issued a strongly worded call to one group of psychologists to restore the credibility of their field by creating a replication ring to check each others’ results.

Kahneman, a psychologist at Princeton University in New Jersey, addressed his open e-mail to researchers who work on social priming, the study of how subtle cues can unconsciously influence our thoughts or behaviour. For example, volunteers might walk more slowly down a corridor after seeing words related to old age, or fare better in general-knowledge tests after writing down the attributes of a typical professor.
Study 1  Priming tasks  (Independent Variable)

Task used in original study

<table>
<thead>
<tr>
<th>CRT</th>
<th>Stroop</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A bat and a ball cost $1.10 in total. The bat costs $1.00 more that the ball. How much does the ball cost?</td>
<td>State the color of the ink rather than read the word.</td>
<td>No Analytical Thinking Tasks used</td>
</tr>
<tr>
<td>The correct response depends on inhibiting an intuitive incorrect response</td>
<td><strong>BLACK</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>BLUE</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inhibiting the incorrect response will require more time</td>
<td></td>
</tr>
</tbody>
</table>

Participants = 127 Calvin College Students
Study 1  Religiosity Scales (Dependent Variables)

**Intrinsic Religiosity** = religious motivation and orientation (Hoge, 1972)

  e.g. My faith involves all of my life.
       I try hard to carry my religion over into all my other dealings in life.
       In my life I feel the presence of the Devine.

Scales made up by Gervais & Norenzyan

Belief in supernatural agents = God exists. The devil exists. Angels exist.

Intuitive Religiosity = e.g. When I am in trouble, I find myself wanting to ask God for help., I just don’t understand religion.
Primed analytical thinking results in increased intrinsic religiosity

Post-Hoc Bonferroni
* $p = .02$

$F = 1.817$, $p = .059$, $\eta_p^2 < 0.081$

Statistical control of: age, gender, education, religious affiliation, English proficiency
Conclusions relevant to Calvin

“It could be argued that the CRT primed our college students to think more analytically, but in their intellectual context, to think analytically is to consider reasons for their faith.”
Study 2

- Large, National Sample
- $N = 2,745$
Study 2 Priming Analytical thinking tasks (Independent variables)

**CRT**
A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?

The correct response depends on inhibiting an intuitive incorrect response

**Stroop**
State the color of the ink rather than read the word.

**BLACK**
**BLUE**
Inhibiting the incorrect response will require more time

**ACP**
Mr. Adams was involved in an accident driving home on his usual route. He thought about taking a different route, but decided against it. Mr. White was involved in a similar accident driving home on a route he only uses when he wants a change of scenery. Who felt more foolish about their decision?

Inhibit incorrect intuitive response

**Degraded Font**

**Control**
No Analytical Thinking Tasks used
Study 2  Religiosity Scales  (Dependent Variables)

**Intrinsic Religiosity** = religious motivation and orientation (Hoge, 1972)

- e.g. My faith involves all of my life.
- I try hard to carry my religion over into all my other dealings in life.
- In my life I feel the presence of the Devine.

**Scales made up by Gervais & Norenzyan**

- **Belief in supernatural agents** = God exists. The devil exists. Angels exist.
- **Intuitive Religiosity** = e.g. When I am in trouble, I find myself wanting to ask God for help., I just don’t understand religion.
Primed analytical thinking results in increased intrinsic religiosity

N = 2,747

$F = 2.64, \ p = .002, \ \eta_p^2 < 0.01$

Statistical control of: age, gender, education, religious affiliation
Individual Differences

Analytical Thinking Ability
- High CRT ability group (2 or 3 correct)
- Low CRT ability group (0 or 1 correct)

No significant differences on religiosity
(intrinsic religiosity, supernatural agents, intuitive religiosity)
Individual Differences

- Religious Affiliation
  - No religion/atheist/agnostic (n=1,397)
  - Minority religion (e.g. Buddhist) (n=485)
  - Majority religion (e.g. Christian) (n=1,417)

- Compare CRT ability and intrinsic religiosity
Majority religion - more intrinsic religiosity and lower scores on CRT

\[ F = 282.32, \ p = .001, \ \eta_p^2 < 0.24 \]

Statistical control of: age, gender, education

Post-Hoc Bonferroni
* \( p < .001 \)
Conclusions

“The current study suggests that, when tested using a control condition combined with statistical control of individual attributes, analytic priming results in more, rather than less intrinsic religiosity. These results indicate that priming analytic thinking serves to reinforce prior religious motivations and implies that the relationship found in previous research between analytic thinking and reduced religious belief is one that is likely moderated by prior religious commitments. A simple causal connection between thinking analytically and rejection of religious beliefs is unwarranted.”
Challenges.....

- Trying to get study published
- Nature
Editorial comments to submissions

**Nature** — “...referees were to certify the manuscript as technically correct, we do not believe that it represents a development of sufficient scientific impact to warrant publication in *Nature*."

**Science** — “Although there were no concerns raised about the technical aspects of the study, the consensus view was that your results would be better received and appreciated by an audience of sophisticated specialists.”
Journal for “sophisticated specialists”

Psychology of Religion and Spirituality

Journal from the American Psychological Association (APA)
Reviewer 1

“One of the psychological hallmarks of The New Atheism is a variant on what I have called the "People Are Stupid" School of Psychology - in this case, the idea seems to be that religious people don't think too much about their beliefs, and that if they thought about them rationally, they wouldn't have them anymore; but they don't, so they do. This view is implicit in the Gervais and Norenzayan (2012) article which provides the impetus for this article, and the media attention which accompanied that study. I always thought that the claim that analytical thinking inhibits religiosity was dubious on the face of it. But perhaps that's because I know too many Jesuits.”

Editor’s comments about Reviewer 2

“Reviewer 2 in particular provided a great deal of feedback, much of it critical, but much of it suggesting potentially constructive revisions [sic], to the extent that revisions would yield conclusions sufficiently clear to be of continued interest. Frankly, Reviewer 2's critiques appeared so trenchant that it seemed likely to me that you might need to gather fresh data in order to dispel the major doubts that were raised.”

Reviewer 2 = 7.5 pages of single-spaced comments
Revise & Resubmit

Editor’s Comments (2nd submission)

“As you can see from their comments, the two reviewers had somewhat different reactions to the revised manuscript. Whereas Reviewer 1 thinks that "it is good to get this study on the record," Reviewer 2 has put a great deal of conscientious effort, for which I am very grateful, into detailing a variety of concerns that remained for them.

I am inclined to agree with the overall thrust of Reviewer 1's opinion that it is good to get the study on record.”
Reviewer 1’s comments (2nd submission)

Looking over the paper and the authors' response to the previous reviews, I am satisfied with their responses and revisions. It's now nicely slimmed down, so that a reader can easily get the basic results. In the end, one doesn't know what to make of failures to replicate. But given the current controversy over "priming" studies, and the importance of the Gervais and Norenzayan (2012) study to the empirical study of religious belief, I think it is good to get this study on the record. But the contribution of this study is not just as a failure to replicate. By including a measure of intrinsic religiosity, the authors have also taken a positive step forward in this area of research.
"Although the present manuscript has some potentially interesting results, and has been improved from the previous version by the authors, the combination of the authors' insistence that it "conceptually replicates" a prior paradigm, albeit with conflicting results to prior research together with several major flaws or idiosyncrasies in the design renders it problematic. On the one hand, it is interesting that the use of these cognitive tasks did not result in decreasing intrinsic religiosity as in prior work. However, the present studies have introduced significant changes in protocol from the studies they claim to replicate, making it difficult to say that their results were a direct contradiction as opposed to being attributable to some other aspect of the procedures. Stylistically, their tendency to spend time critiquing the prior conceptualizations of both the religious variables as well as the type of cognitive process involved is confusing given that they use identical or highly similar measures. Thus, my reaction is that if the study is going to be framed as overturning or substantially revising an interpretation suggested by half a dozen other studies, the case needs to be built on a more solid foundation."

Primed Analytic Thought and Religiosity: The Importance of Individual Characteristics

Julie E. Yonker  
Calvin College

Laird R. O. Edman  
Northwestern College

James Cresswell  
Booth University College

Justin L. Barrett  
Fuller Theological Seminary

Analytic thought has been implicated in reduction of religious belief on the premise that intuitive cognitive systems facilitate religious belief and conscious inhibition encourages rejection of religious beliefs. Inherent in these studies are priming techniques to induce analytic thinking, resulting in reductions of religiosity and/or religious beliefs. The present study empirically reexamined the impact of priming analytic thought on intrinsic religiosity. In 2 randomized controlled experiments, we found little difference in intrinsic religiosity in control compared to analytic thinking prime conditions. When analytic thinking was primed, results were either unrelated to intrinsic religiosity or in opposite directions from those in previous research. Analytic thought primes led to higher intrinsic religiosity. All analyses statistically controlled for demographic characteristics. Our results suggest the relationship between analytic reasoning and intrinsic religiosity is more complex than previously suggested and establishes the importance of individual demographic characteristics for religiosity. Future research should engage measures that capture the nuances associated with religiosity.

Keywords: priming, religiosity, replication, intrinsic religiosity
Concluding Thoughts

- Against societal stereotype of religious people
  - Results – Priming one to think more analytically results in more intrinsic religiosity, not less
  - Results – Individual characteristics are important to consider with intrinsic religiosity
- Religiosity is more nuanced than previous research has recognized
- Religiosity requires careful, deliberative thought
Thank you

Erin Kinney-Cash
Tyler Greenway
Justin Barrett
Laird Edman
James Creswell
Center for Social Research