Original Research

An Integrative Complexity Analysis of Religious and Irreligious Thinking

Shannon C. Houck¹, Lucian G. Conway, III², Kimberly Parrow², Alex Luce², and Joeann M. Salvati¹

Abstract

Stereotypical views cast religious believers as closed-minded, unthinking individuals, and irreligious persons as comparatively more intellectual and complex. But are these perceptions accurate? To investigate, three studies assessed differences between religious and irreligious thinking on Integrative Complexity (IC). In Study 1, six atheist–Christian opponents were selected for IC. Findings revealed that Christians were significantly more complex than their atheist counterparts overall, but variability existed across comparisons. Study 2 examined persons writing about what matters most to them, finding that people more likely to generate religious language had significantly higher complexity. Study 3 evaluated a famous atheist-to-religious convert (C.S. Lewis) who wrote comparable materials during an irreligious and religious phase of his life. Results demonstrated that Lewis’ complexity was higher during his religious phase. Taken together, Studies 1 to 3 suggest that religious thinkers are sometimes more complex than nonreligious thinkers and vice versa—variability that sometimes goes unnoticed in public circles.

Keywords

integrative complexity, religiosity, atheism, public perception, stereotypes

Introduction

The majority of Americans are religiously affiliated (Gervais, 2013) with about seven in 10 people adhering to some branch of Christianity (Pew Research Center, 2015). Given this trend, it is unsurprising that Americans view religiosity as largely positive. For example, religious believers are perceived as moral, altruistic, prosocial, and trustworthy (Gervais, 2013; Saroglou et al., 2011; Tan & Vogel, 2008). Atheists, however, are one of the most disfavored groups in the United States, as evidenced by the extensive research literature on antiatheist prejudice (Cook, Cohen, & Solomon, 2015; Gervais, 2013; Gervais & Norenzayan, 2013; Simpson, Piazza, & Rios, 2016; Swan & Heesacker, 2012). They are commonly perceived as dishonest and less altruistic (Saroglou et al., 2011), immoral and self-interested (Edgell, Gerteis, & Hartmann, 2006) and untrustworthy (Gervais, Shariff, & Norenzayan, 2011). Indeed, atheists are rejected by “mainstream” religious believers (Christians) more so than Muslims in the post-9/11 era (Edgell et al., 2006). According to some polling data, atheists are the least likely minority group to receive votes in politics (Jones, 2012).

Yet despite this deeply entrenched antiatheist prejudice in the United States, atheistic thinking is nevertheless frequently viewed as more open-minded and intelligent. And some research supports this view—atheists are indeed highly educated, intelligent, open-minded, and tolerant (Beit-Hallahmi, 2007; Nyborg, 2009), whereas religiosity is related to a reliance on automatic cognitive processes, closed-mindedness, dogmatism, decreased tolerance, rationality, analytic thinking, and general intelligence (Blogowska, Lambert, & Saroglou, 2013; Pennycook, Cheyne, Barr, Koehler, & Fugelsang, 2014; Shenhar, Rand, & Greene, 2012; Uzarevic, Saroglou, & Clobert, 2017; Yilmaz, Karadöller, & Sofuoglu, 2016; Zuckerman, Silverman, & Hall, 2013; Zuckerman, Galen, & Pasquale, 2016). Interestingly, some recent research has identified analytic thinking as a mechanism that can help to reduce antiatheist prejudice (Franks & Scherr, 2017).

The overall picture that emerges from the existing evidence suggests that (a) religiosity is perceived favorably overall but associated with closed-minded, dogmatic
thinking and (b) atheism is disesteemed yet associated with open-minded, tolerant thinking. But are these perceptions accurate? Given previous findings, it is worth considering if atheist and religious thinkers are cognitively different from one another on some fundamental level as public perception (and some research) might suggest. Although prior research offers some suggestion that these perceptions are accurate, most of that research has used self-report questionnaires that are subject to biases (Conway, Gornick, et al., 2016). Very little research to date has evaluated religious persons’ communications for its complexity. To investigate, the present research focuses on one linguistic marker to assess cognitive differences between irreligious and religious individuals: integrative complexity (IC).

IC

Why IC? IC measures the complexity of language in many forms: speeches, debates, essays, books, and other open-ended materials. IC has been validated as a measurement of cognitive differences in a number of domains (Abe, 2012; Conway & Conway, 2011; Conway, Conway, Gornick, & Houck, 2014; Conway, Dodds, Towgood, McClure, & Olson, 2011; Conway, Houck, Gornick, & Repke, 2016; Conway et al., 2017; Conway et al., 2008; Conway, Suedfeld, & Tetlock, 2001; Franks & Scherr, 2017; Hale, 1986; Houck, Conway, & Gornick, 2014; Suedfeld, 2000, 2010; Suedfeld & Bluck, 1988; Suedfeld, Conway, & Eichhorn, 2001; Suedfeld, Leighton, & Conway, 2005; Suedfeld & Tetlock, 1976; Tetlock, 1981, 1986; Thoemmes & Conway, 2007). On a conceptual level, IC reflects the degree to which a person uses simplistic, black-and-white thinking versus a more nuanced pattern of thinking that incorporates multiple perspectives. As such, the IC construct is particularly useful for our research aims, as it provides a good measure of the accuracy of the perception that religious thinking is simple.

IC measurement details. IC is a measurement of the underlying cognitive structure of spoken or written language (Conway, Suedfeld, & Clements, 2003; Conway et al., 2008; Suedfeld, Conway, & Eichhorn, 2001; Suedfeld & Rank, 1976; Suedfeld, Tetlock, & Streufert, 1992; Tetlock, 1984, 1993; Tetlock, Bernzweig, & Gallant, 1985; Thoemmes & Conway, 2007; Van Hiel & Mervielde, 2003). Using a 1 to 7 scale, it measures the degree to which a person recognizes multiple perspectives on an issue (differentiation) and subsequently integrates those perspectives into a larger cognitive framework (integration). The absence of differentiation reflects simplistic thinking, resulting in a score of 1. For example, the statement “Believing in God can provide the believer with a sense of purpose” is simple in that it only addresses one perspective about the belief in God—deriving a sense of purpose. In contrast, differentiation involves inclusion of multiple viewpoints, resulting in a score of 3. Consider the following statement: “Believing in God can provide the believer with a sense of purpose, but it can also be a source of anxiety and guilt if the individual does not live up to the standards of their God’s doctrine.” This statement is more complex because it demonstrates an understanding of potential positive and negative aspects of a belief in God—deriving a sense of purpose and feeling anxious/guilty for one’s shortcomings. Scores higher than 3 are assigned when differentiated viewpoints are connected. Further details and explanations of intermediary scores are delineated in the coding manual for IC (Baker-Brown et al., 1992).

IC and (Ir)religious Thinking

Previous research on complexity of thought and religiosity is quite limited. The research that does exist focuses primarily on predictors and differences within religious groups or degrees of belief extremity. For example, one study found that religious quest orientation (viewing religion as a means of personal existential discovery) is positively related to cognitive complexity (Batson & Raynor-Prince, 1983), whereas other research suggests that extreme religious orthodoxy (Pancer, Jackson, Hunsberger, Pratt, & Lea, 1995) and religious fundamentalism (Liht, Conway, Savage, White, & O’Neill, 2011) are negatively related to complexity—although only for certain topic domains. Other work has focused on changes in IC across the lifespan for religious persons discussing personal conflicts (Pratt, Hunsberger, Pancer, & Roth, 1992). While this previous research is a useful starting point for our understanding of the cognitive tendencies within the religious sector, none of these studies compared complexity differences between religious and nonreligious persons.

It is only very recently that some research has begun to direct attention to this comparison, albeit with indirect measures that only very loosely approximate IC. Specifically, one preliminary study examining the links between dogmatism and religious belief (versus unbelief) found that while religious believers (using a sample of Christians) were more dogmatic than atheists on self-report measures, atheists nevertheless demonstrated more “myside bias,” which measures “the propensity to imagine many arguments contrary to one’s own position and find them somewhat convincing—in fact, a proxy for integrative complexity of thinking” (Uzarevic et al., 2017). This study importantly suggests that there is a disconnect between traditional self-report measures and measurements of the complex or simple content of the actual thinking of religious and irreligious people.

These preliminary findings are interesting, as they suggest a more nuanced picture of religious cognition than previous research has illustrated. However, most of these data are only tangentially related to the religiosity–complexity connection, and thus more research is clearly needed. Indeed, there is currently no empirical research that we are aware of that has directly assessed the complexity of irreligious versus religious thinking. The following three studies aim to fill this
gap using complementary methodological approaches. Study 1 assesses complexity levels between notable religious and irreligious persons, Study 2 examines the complexity of spontaneously produced religious language, and Study 3 provides an in-depth analysis of one famous person (C.S. Lewis) who wrote comparable materials both during an irreligious phase of his life and a religious phase.

Ethics Statement

Given the archival nature of these studies, Institutional Review Board approval was not a necessary protocol. All studies were conducted with strict adherence to the terms and conditions of third-party sources in which the data were obtained. Writing samples were obtained with appropriate permissions. All data sources used are clearly acknowledged in the corresponding Methods and Materials section.

Study 1

Overview

In this study, spoken and written communications from several famous religious (Christian) persons and several atheists from the similar historical time periods were selected for IC.

Method

Sample and Materials Selected for Complexity Scoring. We selected religious writings and dialogue from notable Christians and notable atheist counterparts from roughly the same era, the primary goal of which was to produce “matched” pairs for comparison across different historical periods. From the early 1900s generation, we selected atheist Robert Blatchford’s book God and my Neighbor (Blatchford, 1919) and Christian G. K. Chesterton’s book Orthodoxy (Chesterton, 1959). It is worth noting that Blatchford and Chesterton were direct ideological opponents (and indeed the books selected for IC were part of an ongoing dialogue between them). From the mid/late-1900s generation, we selected atheist Bertrand Russell’s essay “Why I am not a Christian” (Russell, 1975) and Christian C. S. Lewis book Mere Christianity (Lewis, 1952). While Lewis and Russell were not direct opponents, they were arguably two of the most famous representatives of Christianity and atheism of their era. From the 2000s generation, materials from several opponent pairs were selected: (a) atheist Richard Dawkins’ book The God Delusion (Dawkins, 2006) and Christian Alister McGrath’s book The Dawkins Delusion? (McGrath & McGrath, 2007), (b) a 2006 religion debate between atheist Richard Dawkins and Christian David Quinn, (c) a 2007 religion debate between atheist Sam Harris and Christian Rick Warren, and (d) a 2010 religion debate between atheist Bill Maher and Christian Bill O’Reilly.

We do not claim these sample materials to be perfectly matched pairs on every dimension, nor is such a goal realistic when comparing archival materials. Rather, as a starting point for investigating an issue on which very little data exist, we attempted to produce a sample of materials that encompassed both a broad time period and diverse modes of communication about religious or irreligious beliefs: written (religious or irreligious books) and spoken (religious debates). Thus, while of course not perfectly representative of religious and irreligious thinking, it is, nonetheless, a useful starting point for exploring a complicated issue.

IC Scoring. All source materials—both spoken and written communication—were selected using the validated Automated Integrative Complexity scoring system (Conway & Conway, 2011; Houck, Conway, & Gornick, 2014). Documents were also selected for IC’s two subcomponents on the same 1 to 7 scale: elaborative complexity and dialectical complexity. Elaborative complexity is a complex articulation of a singular perspective, whereas dialectical complexity occurs when someone recognizes that competing points of view are both legitimate (Conway et al., 2008). Thus, three scores were attributed to each person in this analysis: (a) overall IC, (b) elaborative complexity, and (c) dialectical complexity.

Following conventions in IC research, analyses are presented using the paragraph as the unit of analysis (Conway et al., 2012; Houck, Repke, & Conway, 2017; Thoemmes & Conway, 2007). Doing so directly weighs documents by their actual size while simultaneously maximizing statistical power. Prior to performing IC scoring, trained research assistants removed all extraneous information from the documents (e.g., any text that was not a direct quote from the speaker or writer of interest) as is standard procedure (Conway et al., 2014; Houck et al., 2014).

Results and Discussion

Overall IC-religiosity relationship. An independent samples t-test was performed to analyze complexity differences between atheists and Christians, aggregating across specific atheist–Christian opponent pairs. Results revealed that Christians were significantly more integratively complex than atheists overall, t(5,437) = 7.52, p < .0001, d = .20. Similar results emerged for elaborative complexity, t(5,412) = 4.90, p < .0001, d = .23, and dialectical complexity, t(5,451) = 8.62, p < .0001, d = .13.

Results for specific atheist–Christian pairs. For a finer-grained analysis, planned comparisons were performed to assess differences between specific opponent pairs. Consistent with expectations, there was variability in the results. Some Christians were more complex than their atheist counterparts (this was especially evident in written communication), others...
showed comparable levels of complexity, and still others were less complex than the opponent atheist.

**Written communication.** Independent samples t tests were performed on all opponent pairs’ written communications. Findings revealed that Robert Blatchford (atheist) was significantly less complex than G.K. Chesterton (Christian) on IC, \( t(1,855) = -7.39, p < .0001, d = .34 \), dialectical complexity, \( t(1,855) = 8.45, p < .0001, d = .39 \), and elaborative complexity, \( t(1,855) = 3.61, p < .0001, d = .17 \). Bertrand Russell (atheist) was significantly less complex than C.S. Lewis (Christian) on overall IC, \( t(1,458) = -3.78, p < .0001, d = .42 \), and dialectical complexity, \( t(1,458) = -2.92, p = .004, d = .32 \), but not on elaborative complexity, \( t(1,458) = -1.58, p = .114, d = .18 \). Finally, no differences emerged between Richard Dawkins (atheist) and Alister McGrath (Christian) on overall IC, \( t(2,002) = -1.19, p = .233, d = .07 \), or elaborative complexity, \( t(1,458) = 1.00, p = .317, d = .06 \), but did emerge for dialectical complexity, \( t(2,002) = -3.35, p = .001, d = .21 \), with McGrath scoring higher.

**Spoken communication.** Independent samples t tests were also performed on all opponent pairs’ spoken communications (religious debates). No differences emerged between Richard Dawkins (Atheist) and David Quinn (Christian) on overall IC, \( t(39) = -.936, p = .355, d = .30 \), or dialectical complexity, \( t(39) = 5.39, p = .593, d = .17 \), but Quinn was more elaboratively complex than Dawkins, \( t(1,458) = -2.40, p = .021, d = .77 \). There were no differences between Sam Harris (Atheist) and Rick Warren (Christian) on any forms of complexity, \( p > .711, ds < .11 \). Finally, Bill Maher (Atheist) was significantly more complex than Bill O’Reilly (Christian) on overall IC, \( t(38) = -2.09, p = .043, d = .68 \), but not on dialectical or elaborative complexity (\( ps > .302, ds < .34 \)). Descriptive and inferential results are summarized in Table 1.

**Type of communication as a moderator.** To examine the potential impact of the type of communication that was analyzed, we also conducted a 2 (Belief Orientation: atheist vs. Christian) \( \times 2 \) (Type of Communication Selected: written vs. spoken) factorial analysis with IC as the dependent measure. No interaction effect emerged, \( F(1, 5,454) = 1.04, p = .308 \), suggesting that the type of communication forum did not affect complexity in this sample.

However, despite the lack of an interaction effect, it is evident from the descriptive mean pattern of results that the effect of religiosity on IC is driven almost entirely by written communication. See Table 1 for a breakdown of descriptive and inferential results for specific atheist–Christian pairs by the type of materials selected. To investigate further, we performed an independent samples t test comparing atheists and Christians’ written communications only, and found that Christian writings were more complex on all forms of complexity compared to atheist writings (\( ps < .0001 \)). However, when analyzing spoken communications, there were no differences between atheists and Christians on any forms of complexity (\( ps > .293 \)).

We also selected all of spoken communication (each debate) used in Study 1 via human scoring. At the person level, the average correlation between human-selected IC and automated IC was \( r = .46 \) (a score that is in a fairly

### Table 1. The Complexity-Religiosity Relationship by Type of Communication Analyzed.

| Type of communication | IC       | Dialectical | Elaborative |
|-----------------------|----------|-------------|-------------|
|                       | M        | p           | d           | M          | p            | d          | M          | p            | d          |
| Written               |          |             |             |            |              |             |            |              |             |
| Blatchford (A)        | 1.85     | <.001       | .34         | 1.55       | <.001        | .39        | 1.38       | <.001        | .17        |
| Chesterton (C)        | 2.10     |             |             | 1.80       |              |            | 1.48       |              |            |
| Russell (A)           | 2.04     | <.001       | .42         | 1.78       | .004         | .32        | 1.53       | .114         | .18        |
| Lewis (C)             | 2.33     |             |             | 1.99       |              |            | 1.65       |              |            |
| Dawkins (A)           | 2.20     | .233        | .07         | 1.87       | .001         | .21        | 1.54       | .317         | .06        |
| McGrath (C)           | 2.26     |             |             | 2.01       |              |            | 1.50       |              |            |
| Spoken                |          |             |             |            |              |             |            |              |             |
| Dawkins (A)           | 2.01     | .355        | .30         | 1.80       | .593         | .17        | 1.53       | .021         | .77        |
| Quinn (C)             | 2.24     |             |             | 1.70       |              |            | 1.94       |              |            |
| Harris (A)            | 2.13     | .735        | .10         | 1.74       | .711         | .11        | 1.61       | .714         | .11        |
| Warren (C)            | 2.20     |             |             | 1.82       |              |            | 1.67       |              |            |
| Maher (A)             | 2.08     | .043        | .68         | 1.76       | .302         | .34        | 1.42       | .359         | .30        |
| O’Reilly (C)          | 1.76     |             |             | 1.60       |              |            | 1.29       |              |            |
| Overall Effect        |          |             |             |            |              |             |            |              |             |
| Atheists (A)          | 2.08     | <.001       | .20         | 1.76       | <.001        | .23        | 1.49       | <.001        | .13        |
| Christians (C)        | 2.24     |             |             | 1.92       |              |            | 1.57       |              |            |

Note. IC = Integrative Complexity; \( p = \) probability value; \( d = \) Cohen’s \( d \) effect size measure; A = Atheist; C = Christian.
typical range for human-automated correspondence; Conway et al., 2014; Houck et al., 2014). Although some mild divergence emerged in the pattern of individual comparisons, the larger picture was essentially the same as when using automated scoring: There was no significant difference between Christians and Atheists in IC, Atheist Mean = 1.88; Christian Mean = 1.75; t(126) = 1.03, p = .304. We report the automated analyses in Study 1 primarily for ease of comparison within study, but both the human and automated analyses point to the same conclusion.

Study 1 Conclusion and Possible Objections

These initial findings diverge from the commonly held views of religious and irreligious thinking. For example, Russell’s book and Lewis’s book were actually developed 15 years apart and thus it is possible that the difference between Russell and Lewis reflects a difference in time frames and not in religiosity per se. Furthermore, as suggested by the title The Dawkins Delusion?, McGrath’s book was written to address Dawkins’ own book, and it is possible that this direct attacking mindset altered complexity.

These and many other factors might have altered complexity besides religion. However, it is important to consider three things. (a) It is not always clear in what direction we might expect these confounding variables to exert influence. It is true that there was a time difference between Lewis and Russell, and yet it is unclear why this difference would have mattered to affect complexity in a specific direction that would account for the found results. Similarly, while it may be the case that writing a book attacking another book would lead to more complexity, it is also true that such an approach might lead to less complexity. (b) These comparisons are often complementary in their strengths and weaknesses. Even if one grants the explanation that writing a book attacking another book increased McGrath’s complexity, that explanation cannot hold for why Lewis is more complex than Russell. Even if one grants that Lewis is more complex than Russell due to the 15-year gap, that explanation would not hold for why Chesterton is more complex than Blatchford. (c) Furthermore, we must be careful to apply the same standards of evidence on all sides. For example, one could argue that some of the comparisons feature more academic-minded atheists with less academic counterparts (e.g., famous academic Dawkins versus journalist Quinn), a factor that one might presume would underrepresent the comparative degree of religious complexity. It is thus possible to generate reasons why both atheists’ and Christians’ complexity might have been underrepresented in the present sample—and yet the evidence from Study 1 suggests Christians were more complex for written samples.

In summary, taken in total, there is little reason to believe that this particular sample of materials has a general bias in the matched comparisons that would favor either atheists or Christians. They are largely matched on content and approach (e.g., both Lewis and Russell’s books originated as means of explaining why they believe what they believe to a popular audience), and while such archival matches are always imperfect by nature, we believe this serves as a useful starting point for an archival view of the complexity of religious versus irreligious persons.

Study 2

Study 1 revealed that religious thinkers are not necessarily less complex (if anything, in our sample, they were more complex) than irreligious counterparts. Of course, Study 1 used a fairly small sample of notable public persons who themselves differ in other ways besides religious belief, such as political ideology (more on this in the general discussion). To help to compensate for such limitations, in a complementary fashion, Study 2 takes a different approach to the question of the religiosity–complexity relationship that involves a much larger sample of ordinary persons.

One of the implications of the view that religious persons are simple is that considering religion is a complexity-reducing activity (Gervais & Norenzayan, 2012). However, little research directly addresses this issue. To fill in this gap, Study 2 evaluates a very large sample of persons ($N > 37,000$) who voluntarily wrote about the things that mattered to them in their lives. It then correlates the degree that they spontaneously wrote about religion mattering to them with the resulting IC.

While this approach does not measure individual religiosity directly, it has the advantage of comparing the spontaneous generation of religious language with resulting complexity across a very large sample of people. It cannot be interpreted directly to mean that religious people are more or less complex; however, it can be directly interpreted to evaluate the degree that persons who spontaneously use religious language are more complex when they discuss their beliefs (as opposed to people who use less religious language). As such, it is a complementary approach to Study 1. Unlike
Study 1, it evaluates directly the complexity-reducing or complexity-enhancing power of discussing religious topics across a large number of persons.

Method

Source materials. Source materials were obtained from This I Believe (n.d.). According to their own materials, “This I Believe is an international organization engaging people in writing and sharing essays describing the core values that guide their daily lives.” They have provided a repository of essays that people write about their own core values. We selected essays that were written from 2006 to 2008 (N = 37,434). The breakdown of the sample characteristics reflects a diverse sample in terms of gender and age (females = 18,145, males = 12,732, unreported = 6,557; mean age ranges: under age 18 = 11,429; ages 18-30 = 11,258; ages 30-50 = 7,995; ages 50-65 = 5,138; ages 65 and up = 1,213; age unreported = 401).

IC scoring. All essays were selected using the validated Automated IC scoring system (Conway et al., 2014; Houck et al., 2014) that was used for automated scoring in Study 1. The system scores overall IC and the two subtypes (dialectical complexity and elaborative complexity).

Religious language. To measure the degree that persons spontaneously used religious language, we used the validated Linguistic Inquiry and Word Count’s (LIWC; Pennebaker, Booth, & Francis, 2007; Pennebaker & King, 1999) “religion” category. This is a direct measurement of the usage of religious-relevant language.

Scoring the positivity of religious language. To examine the possibility that the use of religious language in the LIWC is associated with more anti-religious sentiment (e.g., atheists expressing their strong dissent) as opposed to positive statements of religious belief, the first and second authors independently selected the 25 responses with the most religious language in the data set for whether or not it contained negative versus positive expressions of religion. Of those that contained positive expressions of religious belief, we further coded the degree the positive expression was qualified by a strong dissent to organized religion in general. Interrater agreement on these judgments was very high: 100% agreement on supportive versus opposing religious belief judgments and 92% agreement when including the qualified category. The two disagreements were resolved by using the more conservative score—that is, the score that would oppose our assumption that religious scores largely represent positive religious expressions.

The results were overwhelming in their unanimity: 96% (24/25) of the responses were judged as supporting religious belief in some form, while only 4% (1/25) were judged as unilaterally opposing it. Of those supporting it, the majority (88%) expressed open support of organized religion and/or religious belief, while 12% expressed support of religious belief, but skepticism about organized religion in general. In summary, these codings strongly support the idea that higher scores for religious language on the LIWC in this sample are associated with more positive expressions of religious belief.

Expectation of small effect sizes. Due to the extremely large sample size and the multitude of variables that contribute to the complexity of language, we would expect any emerging effect sizes to be very small. Small effect sizes are often typical of large-n research, and increased sample size tends to be inversely related to effect size (Slavin & Smith, 2009). For example, Kramer, Guillory, and Hancock (2017) study on emotional contagion in social networks had primary effect sizes of r = .01, and in some cases effect sizes of r < .001. Yet, as they and others have argued small effects can be meaningful. In this case, even an effect of .03 or less would be potentially impressive, given the large sample size and the many personality and situational variables that influence the complexity of language on a given essay (Conway & Conway, 2011; Prentice & Miller, 1992; Tesser, 1993). Furthermore, the expected small effect size potential is compensated for by the fact that such large-n effects by definition represent a larger sample of the population and thus have much higher ecological validity.

Study 2 Results and Discussion

Contrary to the view that religion is complexity-reducing, participants who used more religious language were more complex than those that used less, r(37,434) = .04, p < .001. This effect was essentially identical for both dialectical complexity r(37,434) = .03, p < .001 and elaborative complexity, r(37,434) = .03, p < .001.

These results suggest, in a large sample of persons, that people who spontaneously generate religious language are more likely to use complex language to describe their core beliefs—and they do so regardless of the type of complexity under consideration. Although the effects are small, as in Study 1 these effects are highly unlikely due to sampling error. As a result, in very different ways, both Studies 1 and 2 demonstrate the counter-stereotypical view that religion does not decrease complexity (and in fact, in these studies religion is positively related to complexity overall).

Study 3

Study 1 demonstrated that religious thinkers can be more complex than irreligious thinkers, and Study 2 similarly demonstrated that a large sample of persons writing about religious beliefs can be more complex than persons writing about something else. However, both of these methods take a single cross section of research from irreligious
persons and compare them to more religious persons. A complementary method of gauging the effects of being religious and irreligious is pursued in Study 3: Namely, evaluating a famous person who wrote comparable materials both during an irreligious phase of his life and a religious phase of his life. This method controls for person-level variability (because all effects are evaluated within-person).

For this study, we selected C.S. Lewis, an English Professor at Oxford and later Cambridge. According to his letters to his long-time friend, Arthur Greeves, Lewis was very strongly nonreligious prior to 1930. In 1931, Lewis became religious (and indeed, is primarily famous as a religious convert to Christianity), formally converting to Christianity in September 1931. While still an atheist opposed to organized religion, he had written some (now published) letters to his close friend Arthur Greeves. He continued writing letters to the same friend after his conversion. As a result, it is possible to compare his private letters in their complexity, both before and after his conversion to Christianity. This method has the advantage of using similar, private materials during both a clearly irreligious and clearly religious phase of his life.

**Method**

**Source materials.** A comparison of the letters C.S. Lewis wrote to Arthur Greeves before and after September 1931 (his conversion date) were examined. The preconversion paragraphs came from letters dated from 1921 to 1927, well before (but still approaching) his conversion. The postconversion paragraphs were all from October to December 1931, immediately after his conversion to Christianity in September. Thus, these letters provide an excellent opportunity for a relatively clean comparison of Lewis’ complexity pre- and postconversion.

**IC scoring.** Study 3 used human-selected IC. All letters from each of these time frames were selected for IC and the two subcomponents by three trained coders. Coders were blind to whether the paragraph was pre- or postconversion and were presented with the paragraphs \((N = 69)\) in a random order. Interrater reliability was satisfactory (IC \(\alpha = .79\); dialectical complexity \(\alpha = .76\); elaborative complexity \(\alpha = .68\)).

**Religious content.** Because previous work suggests that religious conversion may affect religious and nonreligious topics differently (Pancer et al., 1995), two trained researchers coded each paragraph for whether that topic had religious content (Any religious content in the paragraph earned a score of “1”—if the paragraph had no religious content, it earned a score of “0.”). Interrater reliability for these codings was satisfactory (intrarater agreement = 91%); discrepancies were resolved through discussion.

**Study 3 Results and Discussion**

Lewis’ preconversion complexity \((M = 2.10)\) was lower than his postconversion complexity \((M = 2.58)\). Thus, Lewis’ complexity was higher during his religious phase as compared to his nonreligious phase, \(F(1, 33) = 8.31, p = .007, d = 1.00\).

To test for the effect of topic type, we performed a 2 (pre-vs. postconversion) \(\times\) 2 (religious vs. nonreligious topic) Factorial analysis of variance (ANOVA). The results of this comparison suggested that topic type did significantly affect the results, as no interaction between religious status and topic type emerged, interaction \(F < 1.7, p > .210\). Although the effect was larger for religious topics (preconversion \(M = 2.11\), postconversion \(M = 2.79; d = 1.09\)) than for nonreligious topics (preconversion \(M = 2.10\), postconversion \(M = 2.31; d = 29\)), both sets of results show a descriptive increase in complexity after conversion. These results for C.S. Lewis suggest that the effect of religious conversion on complexity was likely not domain-specific—although if it was, it was driven more by his discussions of religious topics.

We further broke Lewis’ complexity down by dialectical and elaborative complexity. Lewis showed the same pattern for both dialectical complexity (preconversion \(M = 1.64\); postconversion \(M = 2.10; d = 1.04\)) and elaborative complexity (preconversion \(M = 1.75\); postconversion \(M = 1.97; d = .36\)). A repeated measures ANOVA with type of complexity and pre-/postconversion as variables suggested no interaction between conversion and complexity type, interaction \(F < 1.6, p > .210\). Thus, the effect of religiosity was likely neither domain-specific or complexity type-specific.

**General Discussion**

Science is a discipline of investigation and constructive doubt, questioning with logic, evidence and reason to draw conclusions. Faith, by stark contrast, demands a positive suspension of critical faculties.—Richard Dawkins

As Richard Dawkins’s quote suggests, it is a commonly held view that religious people are unthinking and simple-minded. Taken together, the three studies presented in this article give pause to this generalization. While they do not demonstrate (nor do we suggest) that religious persons are more prone to complex thinking than irreligious persons, they do provide converging evidence that in some contexts the religious can be more complex than the irreligious. Below, we discuss what this means in the larger picture and some limitations of this research.

**The Strengths and Limits of IC**

IC, a construct with a long history in psychology, is commonly used as a linguistic marker of cognitive complexity. Yet no single measurement can completely capture the very
wide range of implications involved in complex thought. IC is one measurement of a complex outcome and does not measure whether or not a complex process was followed (Franks & Scherr, 2017). Furthermore, although we used a system that accounts for two completely different kinds of complexity (dialectical and elaborative; Conway et al., 2008), complexity has many more potential facets than those measured here—and often those facets are not highly correlated (Houck et al., 2014).

Nevertheless, while we do not make sweeping claims for what our results mean for the construct of complexity writ large, it would be a mistake to dismiss these results. IC has a long history in psychology for a reason. In addition to its usefulness at getting “behind the scenes” to understand and predict behavior (Conway & Conway, 2011; Houck et al., 2017; Suedfeld & Bluck, 1988; Suedfeld & Rank, 1976), research suggests it is a marker of the complexity of individuals’ private thoughts (Conway, Suedfeld, & Tetlock, 2001; Suedfeld & Bluck, 1988; Tetlock & Tyler, 1996). Also, IC clearly captures the major dimensions—differentiation and integration—that comprise complex linguistic structures, giving the construct face validity as a measurement of how complex people’s thoughts are represented (Houck et al., 2014). Importantly, it is not subject to the biases that self-report questionnaires often exhibit—biases which have led to scales purportedly measuring (for example) dogmatism to be classified more as measurements of ideological beliefs than dogmatism (Franks & Scherr, 2017; Van Hiel, Onraet, & De Pauw, 2010). These problems with self-report open the possibility that in interpreting an apparent relationship between constructs such as religiosity and dogmatism, it is sometimes hard to know whether (for example) religious people are more dogmatic or whether one is just measuring the same religious content twice (Conway, Gornick, et al., 2016; Van Hiel et al., 2010). Finally, IC is predictive of real-world phenomena that fit with the conceptualizations of complexity—especially dialectical forms of complexity—such as the long-standing effect that integrative simplicity is predictive of violence (Conway et al., 2001; Smith, Suedfeld, Conway, & Winter, 2008; Suedfeld & Bluck, 1988).

In summary, while it would be presumptuous to infer our results suggest wide-ranging effects across multiple different measurements of complexity, it is arguably equally presumptuous to dismiss them entirely. These data are an important piece in the larger panorama of evidence that contribute to our understanding of the relationship between religion and complex thinking.

The Strengths and Limits of Our Samples

In the present studies, a multi-method approach was used to better triangulate the real effect of religious belief on IC. These approaches have complementary strengths and weaknesses. For example, Study 3 has the potential for a maturational confound—it is possible that most people get more complex as they age and that is why Lewis scores higher postreligious conversion. While this seems intuitively unlikely to account for such a jump in a comparatively short period of time, it nonetheless cannot be definitively ruled out. Yet Studies 1 and 2 results cannot be accounted for very easily by this, because they are cross-sectional comparisons.

Similarly, political ideology is a possible confound in Study 1 for some of the chosen comparisons, such as Bill Maher (Atheist and staunch political liberal) and Bill O’Reilly (Christian and staunch political conservative). While it is certainly reasonable to speculate that political ideology may partially account for the IC-religiosity effects observed, we view that as relatively unlikely. Previous research suggests that political conservatives and liberals do not necessarily differ in IC (Conway, Gornick, et al., 2016), thus making it less plausible that political ideology is the key explanatory factor in Study 1. At the very least, Study 1 shows that in some clearly religious contexts—contexts in which people are debating about religion or discussing religious issues in books—religious perspectives are not inherently less complex. Moreover, while Study 1’s effects might be due to other personality differences among the small group of comparisons studied, this possibility is reduced in Study 2 (which has a sample of over 37,000 persons) and even less likely for the single-person, within-person design of Study 3.

As is the case with all research, we ultimately had to make decisions about which persons and materials to include in each study—sampling selection is never exhaustive and to some degree involves subjective decision making. For example, the specific comparisons chosen for Study 1 are neither all-encompassing nor precisely equivalent on every dimension. Other notable religious and irreligious persons and communications might have been equally reasonable to include. We are not concerned with drawing inferences about specific opponent pairs, but rather are interested in assessing an initial sample to examine complexity differences between religious and irreligious thinkers. In line with that goal, comparisons were strategically selected based on (a) the approximate degree to which Christian–Atheist pairs represented either direct or indirect intellectual opponents, and/or (b) the historical time period in which the communication occurred, the goal of which was to capture a wider range of comparisons over time. While as we discussed earlier, this process is imperfect and it is always possible to include a wider range of persons, we nonetheless feel this particular sample is a meaningful starting point for a single study.

Similarly, Study 2’s use of available essays from the “This I Believe” website is in one sense a form of convenience sampling, and thus hinders some of the advantages inherent in random selection. However, all archival data collection is in this same sense a form of convenience sampling—and such archival data collection has both potential costs and potential benefits. In this case, the potential costs are offset by the benefits of having a high degree of ecological validity,
both because of the real-world nature of the data and because of the use of an extremely large sample size. Furthermore, use of the “This I Believe” data conveys many advantages: As a popular mechanism for capturing what people believe, any self-selection likely reduces potential personality variability by ensuring that people who write are (for example) interested enough in what they believe to write an essay about it under no compulsion. It also allows people to write about what is most important to them under the same controlled parameters in each instance.

Finally, our sample is culturally limited. It focused on comparisons in North American and Western European contexts—which means that the primary religion discussed in those contexts is Christianity—and further, these data do not account for the many possible denominations within Christianity. On one hand, this narrow scope cannot inform us about cognitive tendencies in the vast array of Christian denominations, other religious orientations, or other forms of nonreligious beliefs. But on the other hand, it allows for concise comparisons between the most predominant religious and irreligious groups in the United States and Western Europe—groups that public perceptions of are primarily based on. Nevertheless, exploring other religious orientations is a useful avenue for future research to pursue.

Are Irreligious People Simple-Minded?

It would be premature (and inaccurate in our view) to presume that irreligious people are inherently more simple-minded, or that atheistic thinking in general is more rigid than religious thinking. Indeed, this evidence must be taken in total with an array of evidence suggesting that religious systems may be more intuitive and less analytical (Gervais & Norenzayan, 2012) and that for some topics, orthodox or fundamentalist religion can reduce IC compared to those less orthodox or fundamentalist (Liht et al., 2011; Pancer et al., 1995). Given how domain-specific complexity is (Conway, Gornick, et al., 2016; Repke, Conway, & Houck, 2018) and further, given the fact that we focused mostly on important personal values discussions or religious debates, it would be unwarranted to suggest that irreligious people are simple-minded in some large sense.

However, it is worth considering briefly the factors that might make religious persons both more and less simple. On one hand, religions often rely on intuitive systems that use less analytic thought (Gervais & Norenzayan, 2012). Because complexity requires more thought than simplicity on average (Conway & Conway, 2011), this would tend to reduce the complexity of religious thinking overall. Furthermore, religions can be avenues for dogmatism (Uzarevic et al., 2017) and groupthink (Rosander, Granstrom, & Stiwne, 2006), which also would decrease complexity.

On the other hand, religions themselves are often complex and deal with deep existential issues or the mind/body duality. Buddhism, for example, presents a picture of the world that involves a constantly moving, nonstatic reality (Bhikkhu, 1990)—to even consider these things require some complex thought. Christianity—which comprises the bulk of the persons from the religious samples here—likewise contains multiple complex elements, including a god who comprises three persons but yet is one person. We could similarly articulate complexities in all the major world religions, including (but not limited to) Hinduism, Islam, and Judaism.

That is not to say that all people who embrace those religions consider the complexities—clearly they do not. However, it could be a partial explanation for some of the results considered here. Generally, when thinking about questions irrelevant to religion, research suggests there is little effect of religion on complexity (Liht et al., 2011; Pancer et al., 1995). It thus seems unlikely that irreligious people are either more or less complex in general than religious people. It is possible, however, that the effects we see here emerge due to the specific interface of religion with complexity—in cases where religion is debated in public, or where the existential meaning of life is in play, religion might (on average) be more likely to induce complexity because the nature of religious systems (and the questions they deal with) are often complex. In other contexts, however, religion may induce less complex thinking.

Of course, this is speculation beyond the direct scope of our data. However construed, although, these findings at least suggest that the narrative of the simplifying effects of religion ought to be reconsidered. In the same way that conservatives were once considered more simple-minded, recent evidence calls that into question (Conway, Gornick, et al., 2016); these results suggest that perhaps religious persons are also not as simplistic as once believed.

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**Author Biographies**

**Shannon C. Houck** is a faculty member at Syracuse University. She researches political & moral attitudes and decision-making, dynamics of peace and conflict, and the causes and consequences of cognitive complexity.

**Lucian G. Conway, III** is a professor of Psychology at the University of Montana. His work on culture and cognitive complexity has appeared in over 40 journals and book chapters.

**Kimberly Parrow**, MA, LCPC was a research assistant in the Political Cognition Lab at the University of Montana as an undergraduate student, and is currently a pursuing her PhD in the Department of Counselor Education at the University of Montana.

**Alex Luce** is a graduate of the University of Montana, where he worked as a research assistant in the Political Cognition Lab for much of his undergraduate career.

**Joeann M. Salvati** is a graduate of Syracuse University and is currently a post-baccelorate research assistant at Yale University. Her research interests include the underlying mechanisms of behaviors that are deemed as deviant- specifically externalizing behaviors exhibited by adolescents who are at risk for entering or already involved in the criminal justice system.