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AN ANALYTIC COGNITIVE STYLE NEGATIVELY PREDICTS A MORE LITERAL BUT NOT A MORE SYMBOLIC RELIGIOSITY TYPE

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RESUMEN

La idea de que un estilo cognitivo más analítico está asociado con una menor religiosidad es una predicción teórica importante que ha sido puesta en duda por algunos hallazgos empíricos. Realizamos tres estudios con participantes argentinos (N=719) para clarificar esta cuestión. En el Estudio 1, replicamos la correlación negativa entre el estilo cognitivo analítico, medido con el Test de Reflexión Cognitiva, y la creencia en agentes supernaturales, intrínseca, y la religiosidad intuitiva. En los Estudios 2 y 3, fuimos más allá de las medidas de religiosidad unidimensionales, y consideramos el orden de las escalas y las diferencias individuales en la necesidad de cierre cognitivo. Los resultados mostraron que un estilo cognitivo más analítico predijo negativamente tanto la dimensión de inclusión de la trascendencia en las creencias como la interpretación literal de las ideas religiosas. Además, un estilo cognitivo analítico se mostró negativamente asociado con la inclusión literal pero no simbólica de la trascendencia. A su vez, mayores puntajes en mentalidad cerrada fueron asociados de forma positiva con una interpretación más literal de la religión. Finalmente, no encontramos efectos confiables de orden a través de los estudios. Concluimos que los presentes datos apoyan la hipótesis de que la religiosidad puede estar asociada negativamente con un estilo cognitivo analítico, pero los individuos que tienen una religiosidad con un enfoque más simbólico no se ajustan a ese patrón.

Palabras clave: Escala de Creencias Post-críticas, religiosidad literal, religiosidad simbólica, fundamentalismo religioso.

ABSTRACT

The idea that a more analytic cognitive style is associated with lower religiosity is an interesting theoretical prediction that has been challenged by some empirical findings. We conducted three studies with Argentine participants (N=719) to clarify this issue. In Study 1, we replicated the negative correlation between analytic cognitive style, measured with the Cognitive Reflection Test, and belief in supernatural agents, intrinsic, and intuitive religiosity. In Studies 2 and 3, we went beyond one-dimensional measures of religiosity, and also considered testing order effects and individual differences in need for cognitive closure. Results showed that a more analytic cognitive style negatively predicted both inclusion of a transcendent dimension in beliefs and a literal interpretation of religious ideas. Moreoever, an analytic cognitive style was negatively associated with a literal but not with a symbolic inclusion of transcendence in beliefs. In turn, higher scores of closed mindedness were positively associated with a more literal interpretation of religion. Last, we found no reliable testing order effects across studies. We conclude that present data support the hypothesis that religiosity may be negatively associated with an analytic cognitive style, but individuals who experience religion with a more symbolic approach do not accommodate to that pattern.

Keywords: Post-Critical Belief Scale, literal religiosity, symbolic religiosity, religious fundamentalism

1. INTRODUCTION

A basic claim in the field of the *Cognitive Science of Religion (CSR)* is that religious ideas, such as a belief in God, result intuitive for the human mind (Baumard & Boyer, 2013). Intuitive, in this sense, is meant to imply that such ideas are automatically and effortlessly processed, whereas entertaining religious or supernatural skepticism may require more cognitive effort (McCauley, 2011). In the present article, we focus on two related findings from the CSR literature that are presented as supporting the idea that religious notions may be intuitive for people.

First, it has been found that individuals with a more analytic (vs. intuitive) cognitive style report lower religiosity. Gervais and Norenzayan (2012), Pennycook, Cheyne, Seli, Koehler, and Fugelsang (2012), and Shenhav, Rand, and Greene (2012) found that the number of correct responses in the Cognitive Reflection Test (CRT; Frederick, 2005) were positively associated with lower scores in different measures of the strength of religious and supernatural beliefs. The CRT involves mathematical problems that prompt an intuitive solution which is incorrect. Inhibition of such intuitive errors and further thinking to arrive to the right answer has been claimed to measure individual differences in (analytic vs. intuitive) cognitive style (Pennycook, 2014). According to this logic, individuals with a higher propensity to inhibit the intuitions leading to incorrect responses in the CRT, are thus more likely to arrive at correct responses, and are probably also more likely to inhibit the intuitions associated with religious belief.

The second source of evidence is causal rather than correlational, and it pertains priming analytic processing before measuring religious belief. Shenhav et al. (2012) found that participants made to recall an experience in which thought and reflection led to a positive outcome reported lower religiosity than those made to recall an experience in which thought and reflection led to a negative outcome or intuition led to a positive outcome. Gervais and Norenzayan (2012) generalized that finding to other forms of analytic priming, such as showing a picture of Rodin´s *The Thinker* vs. a control sculpture, or presenting a scrambled-sentence task with words related to thinking as opposed to control words.

The problem with the correlational and causal links between an analytic disposition and religiosity is that both sources of evidence have been contested. For instance, Finley, Tang, and Schmeichel (2015) claim that the link between cognitive style and religiosity is an artifact of testing order. Their findings show that, when participants answer the CRT before religious questionnaires, an analytical cognitive style presumably gets primed and a significant association emerges. But, when religiousness was measured first, these authors found no reliable link between cognitive style and religious belief. Finley et al.´s (2015) proposal relies on the assumption that responding first to the CRT primes analytic thinking. Indeed, both Shenhav et al. (2012) and Gervais and Norenzayan (2012) showed that analytic priming could induce disbelief.

However, there have been some failed replication attempts of the effect of analytic priming on religious belief which questions the scientific status of this phenomenon (Camerer, Dreber, Holzmeister, Ho, Huber et al., 2018; Sanchez,Sundermeier, Gray, & Calin-Jagerman, 2017; Saribay, Yilmaz, & Körpe, 2020; Yilmaz & Isler, 2019). Another challenge to the negative association between analytic thinking and religiosity comes from research by Yonker, Edman, Cresswell, and Barrett (2016) who found a positive association between these variables. These authors rationalized that result by stressing the positive association between religiosity and self-control (McCullough & Willoughby, 2009), and the connection between self-control and inhibition, which is important for achieving correct responses in the CRT. In disagreement with Finley et al. (2015) and Yonker et al. (2016), Pennycook, Ross, Koehler, and Fugelsang (2016) presented meta-analytic evidence of a (modest) negative association between analytic cognitive style, as measured with the CRT, and religiosity. In addition, they report four studies in which the negative association was robust even when cognitive style and religious questions were taken in separate days, and religiousness was measured before analytic dispositions (Pennycook et al., 2016). It is possible that the heterogeneity of results among studies could relate to individual differences in thinking styles, religiosity types, or other psychological characteristics of the populations sampled. In line with this, Bahçekapili and Yilmaz (2017) found that, on one hand, an analytic cognitive style was negatively correlated to intrinsic/extrinsic religiosity and general religious belief. On the other hand, they found that a disposition towards analytic thinking was positively associated with quest religiosity, which is a measure of people´s proclivity to resist absolute answers to religion and be open to existential uncertainty (Batson & Schoenrade, 1991). Last but not least, Gervais et al. (2018) present data on the relationship between CRT and religiosity for samples from 13 countries and, despite finding an overall negative relationship for the pooled data similarly to Pennycook et al. (2016), they highlight the enormous variability among countries, and even show some countries in which the relationship was positive (e.g., in the UK; but see Stagnaro, Ross, Pennycook, & Rand, 2019, for a failed replication of that result).

Given the lack of unanimity about the relationship between cognitive style and religiosity, we believe that meta-analytic efforts, as those done by Pennycook et al. (2016), and sampling from diverse cultures, including non-WEIRD (Western, Educated, Industrialized, Rich, and Democratic) populations, as done by Gervais et al. (2018), are steps in the right direction. In addition, a complementary approach, in our opinion, is to deepen the study of the complexity that a concept such as religiosity hides, including the study of different motivations underlying religiosity. The present effort goes in this last direction. First, we went beyond a one-dimensional operationalization of religiosity in an attempt to capture more aspects of its multifaceted nature, and assess how these diverse aspects relate to individual differences in cognitive style. In particular, we here evaluated whether a more literal vs. a more symbolic interpretation of religious notions moderated the relationship between a disposition to think analytically and lower religiosity. Individual differences in the literal-vs.-symbolic interpretation of religion seems to be a promising variable considering that resisting absolute answers to religious and existential questions (a disposition seemingly closer to symbolic rather than literal interpretations) showed a positive relationship with analytic thinking, whereas intrinsic/extrinsic religiosity negatively correlated with correct responses in the CRT (Bahçekapili & Yilmaz, 2017). Second, we here explored individual differences in motivated social cognition, in particular, need for cognitive closure which measures the extent to which individuals are motivated to avoid ambiguity, unpredictability and being confronted with opposing views (Webster & Kruglansky, 1994). Individual differences in such motivations may help us gain discriminatory capacity among those with similar cognitive styles. Whereas a more literal interpretation of religion could serve such need for closure and therefore be associated with a lower tendency to think analytically, religious people with a more symbolic approach may be more open to thinking about the meaning of their beliefs, and therefore may not necessarily show a low analytic profile. Last, in the present article, we contribute to the literature on analytic thinking and religiosity with data from Argentina, thus providing to the relevant debates in the CSR, the first results relating CRT and religisioty from Latin America (see also Daws & Hampshire, 2017 for a related contribution including South American samples).

In the present studies, we surveyed three samples of Argentine university students, and we took several steps in order to approach the goal of relating individual differences in cognitive style and motivated social cognition with different aspects of people´s religious beliefs, affiliation, and practice. In Study 1, we replicated the correlational study relating correct responses in the CRT with three measures of religious beliefs used by Gervais and Norenzayan (2012). This replication serves to establish whether the relationship between cognitive style and religiosity in the present population is similar to that found in studies from other parts of the world which relied on the same measures. Hence, Study 1 contributes to grounding the potential generalizability of the findings from the subsequent studies done with samples from the same population. In Studies 2 and 3, we went beyond one-dimensional characterizations of religiousness, and we relied on Wulff´s (1991) notion according to which religiosity can be placed in a two-dimensional space along two orthogonal bipolar dimensions: the Inclusion-vs.-Exclusion of the transcendent and the Literal-vs.-Symbolic interpretation of religious ideas. These two dimensions have been operationalized and measured with the Post-Critical Belief Scale (Hutsebaut, 1996; Duriez, Fontaine, & Hutseabut, 2000). On one hand, inclusion oftranscendence intends to capture beliefs in God and other supernatural elements or characters of religion. Researchers associated with the CSR claim that belief in supernatural beings may result from automatic mechanisms in the human mind (patternicity, agenticity, mind-body dualism), and therefore, we expect belief in elements of a transcendent dimension to be negatively associated to ananalytic cognitive style characterized by the inhibition of automatic responses. To our best knowledge, there is no evidence to date that connects Wulff´s dimensions captured by the Post-Critical Belief Scale and cognitive styles as measured with the CRT.

On the other hand, Wulff´s (1991) Literal-vs.-Symbolic dimension refers to the manner in which religious contents are processed, namely either in a literal or a symbolic way. Whereas literal interpretations could be thought of as closed views with fixed answers, a symbolic approach may be more open to alternative interpretations and be associated with greater tolerance to ambiguity. Hutsebaut (1996) already relates a symbolic view of religion with open-mindedness, and, indeed, Fontaine, Duriez,

Luyten, and Hutsebaut (2003) found that lower scores in Openness to Experience were associated with a more literal processing predilection. In addition, the Literal-vs.-Symbolic dimension could be related to individual differences in epistemic motivations relevant for explanations of religiousness as motivated by a desire to reduce the anxiety aroused by unpredictability, confusion, or uncertainty (Kay, Gaucher, Napier, Callan, & Laurin, 2008; Inzlicht, Tullett, & Good, 2011). Indeed, Duriez (2003) found that the Discomfort with Ambiguity and the Closed-mindedness sub-scales from the Need for Cognitive Closure scale predicted higher literality in the religious proccesing predilection. Besides, a symbolic approach to religion can be conceived "as an invitation to think about the hidden meaning of a given story" (Hutsebaut, 1996, p.53). According to this view, symbolism should also be related to a cognitive style prone to reflection, and, therefore, we could expect CRT scores to relate to individual differences in the literal-vs.-symbolic interpretation of religion as well. We are unaware of any research reporting a relationship between a reflective cognitive style and literality of religious beliefs. The closest relevant evidence is Bahçekapili and Yilmaz´s (2017) positive association between an analytic cognitive style and quest religiosity. However, Bahçekapili and Yilmaz (2017) themselves caution that quest religiosity may measure more a need for cognition in the domain of religion than a type of religiosity.

Another advantage of using the Post-Critical Belief Scale is that, beyond the transcendence and literality dimensions, it measures four different religiosity profiles, from a more orthodox religiosity with the Literal Inclusion sub-scale, through intermediate types such as Symbolic Inclusion and Exclusion, to a more classic atheist position with the Literal Exclusion sub-scale. These profiles are of crucial importance to test whether the negative relationship between religiosity and an analytic cognitive style holds across religiosity types. Last but not least, we systematically varied testing order (CRT first or last) in Studies 2 and 3, in an attempt to assess whether priming analytic cognitive style with the CRT, as suggested by Finley et al. (2015), affected responses to religiosity measures.

2. STUDY 1

The goal of present research was to replicate with Argentine participants the study of the relationship between an analytic cognitive style, as measured with the CRT, and the religiosity measures used by Gervais and Norenzayan (2012).

Methods

Participants. Participants were 148 university students of diverse fields of study (Economics, Business, and Administration, n=107; Health Sciences, n=6; Engineering, n=16; and Humanities, n=19). This sample size was chosen considering a correlation of at least r=-0.23 between CRT and religiosity (Pennycook et al., 2016), a power of 0.80, and an alpha value of 0.05. All participants were Spanish-speaking students from public and private universities in Bahía Blanca, Argentina. Participants' age ranged from 17 to 44 years old (M = 20, Std. Dev. = 3), 33% of the sample were females (n=49), and 35% were males (n=52), whereas 32% did not report their gender (n=47).

Instruments and Procedure. All instructions, tests, and scales were presented in Spanish (participants´ native language). Booklets included socio-demographic questions and the scales and order of presentation used by Gervais and Norenzayan (2012): 1) the Cognitive Reflection Test, 2) The Intrinsic Religiosity Scale, 3) the Intuitive Religiosity Scale, and 4) the scale to measure Belief in Supernatural Agents (God, the devil, and angels). With consent from the professor in charge, the scales were administrated in classrooms. Participation was anonymous and voluntary, and consent was established orally before the administration of the scales. Participants were told that the confidentiality of the data was ensured. Each booklet printed in paper was distributed by hand.

Socio-demographic variables. In the beginning, we asked participants about their gender, age, and field of study.

Cognitive Reflection Test (CRT). The CRT is taken as a measure of cognitive style (Pennycook et al., 2015). The scale contains 3 items involving mathematical problems that may trigger a quick and intuitive response that is incorrect. To get the correct answer it is necessary to discard this intuitive response and make a more profound

analysis of the problem. Correct responses indicate a disposition to an analytic (as opposed to an intuitive) cognitive style (Frederick, 2005). Every correct answer adds a point, being 0 the lowest and 3 the highest score on this test. We did not have to exclude any data from this test because items left blank were considered incorrect responses. The internal consistency of the CRT for correct responses was good with a Cronbach's alpha of 0.76.

*Intrinsic Religiosity Scale***.** This scale was created by Hoge (1972), and contains 10 items that evaluate individual differences regarding people´s motivation to rely on religion for intrinsic as opposed to more instrumental reasons. An example of an item is "My faith involves all of my life". All items were scored on a 7-point Likert scale ranging from 1 (I strongly disagree) to 7 (I strongly agree). Not having found a Spanish version of this scale, we translated it from English ourselves. The internal consistency of this scale was very good with a Cronbach's alpha of 0.80. The exclusion criterion for this scale was to eliminate from analysis data from participants who left more than two items in blank (data from 4 participants were discarded). In protocols in which there were one or two answers in blank, missing data were replaced by the average score of the item.

Intuitive Religiosity Scale (IRS). This scale was created by Gervais and Norenzayan (2012), and contains 5 items that evaluate individual differences in intuitive religiosity as measured by asking participants whether they agree with statements, such as, for example, "When I am in trouble, I find myself wanting to ask God for help" or "I believe in God". All items were scored on a 7-point Likert scale ranging from 1 (I strongly disagree) to 7 (I strongly agree). Not having found a Spanish version of this scale, we translated it from English ourselves. The internal consistency of this scale was good with a Cronbach's alpha of 0.71. The exclusion criterion for this scale was to eliminate from analysis data from participants who left more than one item in blank (data from 2 participants were discarded). In protocols in which there was one blank answer, the missing data was replaced by the average score of the item.

Belief in Supernatural Agents. This scale contains 3 items asking participants for their belief in the existence of God, the devil, and angels. All items were scored on a 7-point

Likert scale ranging from 1 (I strongly disagree) to 7 (I strongly agree). The translation of this scale was simply literal, and its internal consistency was very good with a Cronbach's alpha of 0.86. The exclusion criterion for this scale was to eliminate from analysis data from participants who left more than one item in blank (data from 2 participants were discarded). In protocols in which there was one blank answer, the missing data was replaced by the average score of the item.

Statistical analyses

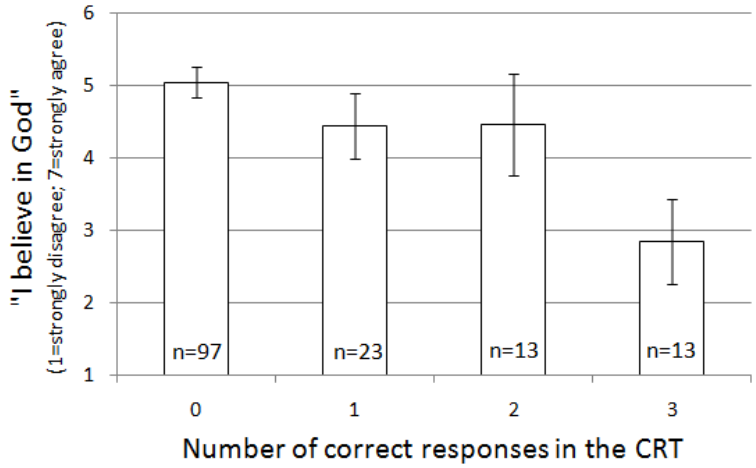
To analyze present data, following Gervais and Norenzayan (2012), we ran pair-wise Pearson correlations between religiosity measures and correct responses in the CRT. Analyses were run in STATA 13, and STATA codes (.do file) and data Excel files can be found at the following Open Science Forum (OSF) link: https://osf.io/ud4ay/?view_only=a919158c2d9a46eca09b97842cb2b53f

Results and discussion

We begin with the descriptive statistics for the CRT. Out of the three problems involved in this test, on average, participants correctly responded a mean (±1 SD) of 0.60 (±0.98) problems, and had 1.95 (±1.07) intuitive errors. Relative to the religiosity scales, intrinsic religiosity showed a mean (±1 SD) score of 29 (±13), intuitive religion showed a mean score of 22 (±7), and belief in supernatural agents showed a mean score of 12 (±6).

All three religiosity measures negatively correlated with the number of correct responses in the CRT, though only Intuitive Religiosity ($r=-0.20$, $p=0.02$, $N=146$) and Belief in Supernatural Agents ($r=-0.33$, $p<0.001$, $N=146$) significantly did so (Intrinsic Religiosity, $r=-0.11$, $p=0.18$, $N=144$; see also Figure 1).

Figure 1. Mean agreement with the statement “I believe in God” as a function of correct responses in the CRT



Mean (±1 SEM) agreement with the statement “I believe in God” (taken from the Intuitive Religiosity Scale) as a function of the number of correct responses in the Cognitive Reflection Test (CRT).

Following Finley et al. (2015), we also buildt a composite measure of religiosity by summing up the scores from the three religiosity scales, and divided the result by three (for two participants who did not have data for the Intrinsic Religiosity Scale, we divided the sum by 2). As expected, this composite score negatively correlated with correct responses in the CRT ($r=-0.23$, $p=0.006$, $N=146$).

In sum, results from Study 1 generally replicated Gervais and Norenzayan´s (2012) findings with an Argentine sample. Individual differences in analytic cognitive style, as measured through correct responses in the CRT, were negatively associated with religiosity measures. These findings can be interpreted in two different ways. First, the more straight forward claim could be that the correlations found indicate that individuals with a higher propensity to analytic thinking tend to be less religious. The theory behind this statement is that individuals´ capacity for inhibiting automatic processes underlies both correct responses in the CRT and discarding supernatural beliefs. The second interpretation has similar theoretical bases but involve the causal influence of the CRT upon religiosity measures. According to this second view, given that participants were exposed to the CRT first, the CRT could have primed analytic thinking, leading to an inhibitory effect on reported religious beliefs (Finley, et al., 2015).

In Studies 2 and 3, we tested the order effect to decide between the two possibilities described in the previous paragraph, and we went beyond a one-dimensional characterization of religiosity, and used Wulff´s (1991) notion of religiosity which involves two dimensions: 1) the Inclusion-vs.-Exclusion of transcendence in beliefs, and 2) the Literal-vs.-Symbolic interpretation of religious ideas.

3. STUDY 2

In this study, participants responded the CRT, the Post-Critical Belief Scale, and the Need for Cognitive Closure scale. Participants either responded the CRT first or last to assess the potential effect of priming analytic thinking on self-reported religiosity (Finley et al., 2015). If the CRT primed analytic thinking, we would expect participants who responded the CRT first to show lower Inclusion of Transcendence than those who responded the CRT last. Even if no testing order occurs, we would expect the number of correct responses to the CRT to negatively predict both Inclusion of Transcendence and literality. We also included the Need for Cognitive Closure scale (Webster & Kruglanski, 1994) with the expectation that its score positivey predicted literal (over symbolic) interpretation of religious ideas, assuming that closed-mindedness, a motivation for order, oraversion to ambiguity may underlie both measures.

Methods

Participants. Participants were 245 university students from diverse fields of study (Economics, Business, and Administration, n=103; Health Sciences, n=1; and Humanities, n=139; 2 participants did not complete this field). The sample size was chosen to be larger than that of Study 1, considering that we had higher uncertainty relative to the tested effects in Study 2, in particular, because we here used religiosity measures which correlation with the CRT had not been tested before. All participants were students from public and private universities in Bahía Blanca, Argentina. Participants' age ranged from 17 to 48 years old (M = 20, Std. Dev. = 4), 55% of the sample were females (n=135), and 35.5% were males (n=87), whereas 9.5% did not report their gender (n=23).

Instruments and Procedure. All instructions, tests, and scales were presented in Spanish (participants´ native language). Booklets included socio-demographic questions and three scales: the 33-item Post-Critical Belief Scale, the 14-item Need for Closure Scale, and the Cognitive Reflection Test. The scales were arranged in two different orders. The first order (order A) wasas described above, whereas the second order (order B) involved presenting the CRT first, the NFC second, and the PCBS third.

With consent from the professor in charge, the scales were administrated in classrooms. Participation was anonymous and voluntary, and consent was established orally before the administration of the scales. Participants were told that the confidentiality of the data was ensured. Each booklet printed in paper was distributed by hand. We had a pile of booklets with alternating order of the testing material (A and B) which was distributed to subsequent participants, thus avoiding any bias in the assignment of the order condition.

Socio-demographic variables. In the beginning, we asked participants about their gender, age, and field of study.

Post-Critical Belief Scale (PCBS). This scale contains 33 items that evaluate individual differences regarding four religious attitudes proposed by Wulff (1991): Literal Inclusion (8 items), Symbolic Inclusion (8 items), Literal Exclusion (9 items), and Symbolic Exclusion (8 items). Examples of these items are: “God has been defined for once and for all and therefore is immutable” (Literal Inclusion), “The Bible holds a deeper truth which can only be revealed by personal reflection” (Symbolic Inclusion), “A scientific understanding of human life and the world has made a religious understanding superfluous” (Literal Exclusion), “The manner in which humans experience their relationship to God, will always be colored by the times they live in” (Symbolic Exclusion). These categories are defined by two axes, the Inclusion versus Exclusion of Transcendence (which we calculated by summing up the scores of Literal and Symbolic Inclusion minus the scores of Literal and Symbolic Exclusion), and the Literal versus Symbolic lecture of religious content (which we calculated by summing up the scores of Literal Inclusion and Exclusion minus the scores of Symbolic Inclusion and Exclusion). Validity studies of the 33-item version of the PCBS showed that the

scale is highly stable and reliable, and that it measures the constructs elaborated in Wulff´s model (Duriez, Fontaine & Hutsebaut, 2000; Fontaine, Duriez, & Hutsebaut, 2003). Moreover, the Spanish version of the scale, validated in Argentina, shares these characteristics as well (Rabbia, Brussino, & Vaggione, 2012).

All scale items were scored on a 5-point Likert Scale ranging from 1 (I strongly disagree) to 5 (I strongly agree). The internal consistency of all sub-scales was at least acceptable: Symbolic Inclusion had a Cronbach's alpha of 0.74, Literal Inclusion of 0.62, Literal Exclusion of 0.81, and Symbolic Exclusion of 0.89. The exclusion criterion for this scale was to eliminate from analysis participants who left more than two items in blank. This criterion was used in the studies that validated the scale in English (Fontaine et al., 2003) and Spanish (Rabbia et al., 2012). We discarded data from 9 participants following this criterion, and another one for giving the same response to all 33 items. In protocols in which there were one or two answers in blank, missing data were replaced by the average score of the item.

Cognitive Reflection Test (CRT). See methods in Study 1 for a description of this measure. The internal consistency of the CRT for correct responses was acceptable with a Cronbach's alpha of 0.68.

Revised Need for Cognitive Closure Scale (NFC). Need for Closure is a concept that refers to a motivation to search and maintain a definitive answer when individuals face a problem, as something opposite to tolerating confusion, ambiguity, and uncertainty (Horcajo, Díaz, Gandarillas, & Briñol, 2011). This scale contains 14 items with statements that are scored on a 5-point Likert scale from 1 (I strongly disagree) to 5 (I strongly agree). A higher score implies a higher motivation for cognitive closure and a lower tendency to avoid closure. The internal consistency of this scale was good with a Cronbach's alpha of 0.79. The exclusion criterion for this scale was to eliminate from analysis data from participants who left more than two items in blank. We discarded data from 2 participants for that reason. In protocols in which there were one or two answers left blank, missing data were replaced by the average score of the item. This scale was adapted to Spanish and validated in an Argentine cultural context by Jaume, Cervone, Biglieri, and Quattrocchi (2015).

Statistical analyses

To analyze present data, we ran OLS regressions to assess, first, whether testing order affected CRT responses, religiosity measures, or NFC scores; second, whether NFC scores predicted religiosity measures (PCBS) with and without controlling for testing order, gender, age, and field of study; and third and last, whether the number of CRT correct responses predicted religiosity measures with and without controlling for NFC, testing order, gender, age, and field of study. The alpha value was set at the conventional 0.05 level. Analyses were run in STATA 13, and STATA codes (.do file), data Excel files, and a more complete description of results can be found at the following OSF link:
https://osf.io/ud4ay/?view_only=a919158c2d9a46eca09b97842cb2b53f

Results and discussion

Order effects

We begin with the descriptive statistics for the CRT. Out of the three problems involved in this test, on average, participants correctly responded a mean (±1 SEM) of 0.45 (±0.08) problems when the CRT was taken after the religiosity scales, and a mean of 0.52 (±0.08) problems when the CRT was taken before the religiosity scales. OLS regressions with correct responses in the CRT as dependent variable and testing order as predictor showed non-significant results (B=-0.07, p=0.54, N=234; standardized B=0.04). This means that performance in the CRT was not significantly influenced by testing order.

The descriptive statistics of the PCBS showed that Inclusion of Transcendence had a mean (±1 SEM) score of -17.06 (±1.57) when the scale was responded before the CRT and a mean score of -14.62 (±1.78) when the PCBS was taken after the CRT. In turn, the mean score for the Literal-vs.-Symbolic interpretation was -7.81 (±1.09) when the PCBS was taken before the CRT and -7.38 (±1.03) when the PCBS was taken after the CRT. OLS regressions with scores of Inclusion of Transcendence and Literal-vs.-Symbolic Interpretation as dependent variables showed non-significant effects of testing order (B=2.44, p=0.30, N=234, standardized B=0.07; B=0.43, p=0.77, N=234,

standardized B=0.02; respectively). When considering the statistics of each individual scale of the PCBS, the OLS regression for Literal Inclusion showed a significant order effect (B=2.45, p=0.001, N=234, standardized B=0.22), whereas we did not detect any significant order effect for the other three scales (see statistics in Online Suplementary Results, OSF link).

Last, the NFC mean (±1 SEM) score was 40.06 (±0.85) when it was taken before the CRT, and 41.01 (±0.94) when it was taken after the CRT. An OLS regression showed a non-significant order effect for the NFC (B=0.295 p=0.45, N=234, standardized B=0.05).

NFC and Religiosity

Zero-order correlations between NFC and PCBS are shown in Table 1. OLS regressions with NFC as predictor and religiosity scores as dependent variables showed a significant coefficient for the Inclusion of Transcendence (B=0.21, p=0.009, N=234, standardized B=0.19), but not for Literality (B=0.04, p=0.59, N=234, standardized B=0.03; we obtained similar results after controlling for testing order, gender, age, and field of study). When considering each PCBS sub-scale separately, NFC significantly predicted variation only in Literal Inclusion (B=0.15, p<0.001, N=234, standardized B=0.28) and Symbolic Inclusion (B=0.09, p=0.04, N=234, standardized B=0.13; Symbolic Exclusion, B=-0.04, p=0.23, N=234, standardized B=-0.08; Literal Exclusion, B=-0.06, p=0.22, N=234, standardized B=-0.08). Regression results remained qualitatively similar after adding controls, except for the analysis of Symbolic Inclusion which went from significant to marginally significant (B=-0.09, p=0.06, N=211, standardized B=0.13).

Table 1. Zero-order correlations between correct responses in the CRT or NFC scores (columns), and religiosity variables (rows).

	CRT	NFC
Transcendence (PCBS)	-0.09	0.19**
Literal vs. Symbolic (PCBS)	-0.18**	0.03
Literal Inclusion (PCBS)	-0.16*	0.28***
Literal Exclusion (PCBS)	-0.06	-0.08*
Symbolic Inclusion (PCBS)	-0.03	0.13*
Symbolic Exclusion (PCBS)	0.19**	-0.08*

CRT: number of correct responses in the Cognitive Reflection Test; NFC: score for the Need for Cognitive Closure scale; PCBS: Post-Critical Belief Scale. For all correlations, N=234; * p<0.05; **p<0.01;***p<0.001

CRT and Religiosity

Zero-order correlations between the number of correct responses in the CRT and scores from the PCBS are shown in Table 1. OLS regressions showed that correct responses in the CRT did not significantly predicted scores on the Inclusion of Transcendence (B=-1.91, p=0.17, N=234, standardized B=-0.09), but did negatively predict a more literal interpretation of religious ideas (B=-2.44, p=0.005, N=234, standardized B=-0.18; similar results were obtained after adding controls). When we tested the four sub-scales of the PCBS separately, we found that correct responses in the CRT negatively predicted scores on Literal Inclusion (B=-0.99, p=0.016, N=234, standardized B=-0.16), and positively predicted scores on Symbolic Exclusion (B=1.18, p=0.004, N=234, standardized B=0.19; regression coefficients were not significant for Symbolic Inclusion, B=-0.25, p=0.64, N=234, standardized B=-0.03, or Literal Exclusion, B=-0.51, p=0.38, N=234, standardized B=-0.06). These results remained qualitatively similar after adding controls (Table 2).

Table 2. OLS non-standardized regression coefficients (std. errors) of the four dimensions of the Post-Critical Belief Scale as dependent variables in columns, and correct responses in the Cognitive Reflection Test (CRT) and several controls as predictors in rows.

	Literal Inclusion		Literal Exclusion		Symbolic Inclusion		Symbolic Exclusion	
CRT	-0.99 (0.41)*	-1.02 (0.43)*	-0.51 (0.58)	-0.52 (0.65)	-0.25 (0.53)	-0.13 (0.59)	1.18 (0.41)**	1.44 (0.46)**
NFC		0.12 (0.04)**		0.08 (0.05)		0.09 (0.05)		-0.04 (0.04)
Testing Order		2.62 (0.70)***		0.76 (1.05)		1.12 (0.95)		0.68 (0.74)
Gender		-0.40 (0.76)		0.10 (1.14)		0.35 (1.03)		0.38 (0.80)
Age		0.01 (0.00)		-0.00 (0.01)		0.00 (0.01)		0.00 (0.00)
Business		1.99 (3.60)		-5.35 (5.43)		4.56 (4.90)		-0.13 (3.83)
Humanities		-0.15 (3.59)		-3.40 (5.42)		2.04 (4.89)		1.43 (3.82)
Constant	17.79 (0.40)***	10.77 (3.95)**	27.69 (0.57)***	34.83 (5.96)***	23.44 (0.52)***	15.49 (5.38)**	28.45 (0.40)***	28.53 (4.20)***
N	234	212	234	212	234	212	234	212

NFC: Need for Closure score; Testing Order: 0=CRT last; 1=CRT first; Gender: 0=males, 1=females; Business: Field of Study, 1=business, administration, and economics, 0=other; Humanities: Field of Study, 1=Humanities (e.g., history, literature, philosophy, psychology), 0=other. *p<0.05; **p<0.01; ***p<0.001

There are several findings from Study 2 worth highlighting and discussing. First, participants who were exposed to the CRT before rather than after the religion

questionnaire reported higher scores on the Literal Inclusion dimension. Assuming that the CRT could have worked as an analytic prime (Finley et al., 2015), this result is however contrary to the idea that reflection inhibits religiosity (Gervais &Norenzayan, 2012). Instead, participants first exposed to the CRT showed higher scores in the sub-scale that measures Inclusion of Transcendence with a literal interpretation of religion, that is, showed a more orthodox approach to religion than those who responded the CRT last. Nonetheless, there are antecedents of similar findings in the literature. In particular, Yonker et al. (2016) found that students from a US Christian college reported higher religiosity after responding to the CRT (Study 1). These authors claimed such result made sense considering the positive association between religiosity and self-control. However, they could not replicate the effect of CRT on religiosity with a wider online sample of US participants. At this point, we feel skeptical about the reliability of the order effect in which the CRT increased a literal inclusion of transcendence. In fact, we found that correct responses in the CRT were negatively associated to scores on the Literal Inclusion dimension even after controlling for testing order. We believe it is possible that the effect of testing order on Literal Inclusion of the PCBS could simply be a false positive. In Study 3, we test for this possibility with a larger independent sample.

A replication attempt is also called for by two other unexpected findings in Study 2. First, results from Study 1 had shown that belief in supernatural agents such as God, and participants´ intuitive religiosity were negatively associated with correct responses in the CRT. From this, it was expected correct responses in the CRT to negatively predict Inclusion of Transcendence in Study 2. Though the sign of the relevant regression coefficient was in the expected direction, it was non-significant. This outcome may be due to a lack of power in Study 2, or, instead, the expected effect may not exist at all in the tested population. In Study 3, we assessed again the relationship between CRT and the Transcendence dimension with a larger sample. Second, variation in the Literal-vs.-Symbolic dimension of the PCBS was expected to be partly explained byindividual differences in NFC. However, cognitive closure did not significantly predict literality but was only positively associated with the Inclusion of

Transcendence in religious beliefs. In Study 3, we test the relationship between NFC and PCBS with a larger sample.

4. STUDY 3

In this study, we ran procedures similar to those of Study 2 (two testing orders: CRT first and last) with an independent and larger sample. Besides the CRT, the PCBS, and the NFC, we included the Intuitive Religiosity Scale used in Study 1 as well as questions pertaining religious affiliation (Christianity, Atheism, etc.), and frequency of religious practice, to be able to further control for individual differences. To have in mind, measures of religious affiliation and practice may be related to religious belief, but are not beliefs themselves. Considering that the PCBS measures differences in the processing of religious notions (literal vs. symbolic), it is here relevant to consider religious affiliation and practice as controls pertaining religious social identity and religious behavior, respectively (see more details of these controls below).

Methods

Participants. There were 326 university students participating in Study 3, that is, a sample 1.4 larger than that of Study 2. This sample size was chosen to be slightly larger than that required to obtain, with a power of 0.80 and an alpha value of 0.05, a significant correlation of at least r=-0.16, which was the lowest significant correlation between CRT and a PCBS measure in Study 2. All participants were students from public or private universities in Bahia Blanca, Argentina, from diverse fields of study (Economics, Business, and Administration, n=60; Humanities, n=62; Health Sciences, n=85; Engineering, n=99; Natural Sciences, n=15; Agricultural Studies, n=4; whereas 1 participant did not report). Participants' age ranged from 18 to 51 years old (M = 20, Std. Dev. = 4), 55% of the sample were females (n=179), 38% were males (n=125), and 7% did not report their gender (n=22).

Instruments and Procedure. In this study, to explore the priming effect of analytic thinking, we presented the scales in two different orders to different participants. Every questionnaire in this study included the measurement of socio-demographic variables and six scales. In Order A, participants responded in the following order: the

Intuitive Religious Belief (Gervais & Norenzayan, 2012), religious affiliation (Christianity, Judaism, Buddhism, Atheism, Agnosticism, other), frequency of attendance to religious services in the last 12 months (Rabbia et al., 2012), the 18-item PCBS, the CRT, and the 42-item NFC. In the alternative order (Order B), participants responded the CRT first, then all the scales and items related to religiosity (in the order presented above), and finally the NFC.

With consent from the professor in charge, the scales were administrated in classrooms. Participation was anonymous and voluntary, and consent was established orally before the administration of the scales. Participants were told that the confidentiality of the data was ensured. Each questionnaire printed in paper was distributed by hand, and the order of the scales (A and B) was randomly distributed as described in Study 2.

Socio-demographic variables. Gender, age, and field of study were measured first of all.

Religious Affiliation. Participants were asked "In relation to religion, with which of the following groups do you identify most?" The options were Christianity, Judaism, Buddhism, Atheism, Agnosticism, and Other. Regarding this question, 51% of the sample self-identified with Christianity (n=165), 38% with Atheism or Agnosticism (n=124), 5.2% did not answer this question or gave more than one answer (n=17), 4% chose Buddhism (n=13), 1.2% chose the "other" option (n=4), and 0.9% self-identified with Judaism (n=3). In this sample, Christians (Catholics, Evangelists, etc.) were under-represented and the non-religious were over-represented relative to the general urban population in Argentina (Catholics + other Christians: 79.6%; Non-religious: 18.9%; Mallimaci, Giménez Béliveau, Esquivel, & Irrazábal, 2019).

Frequency of Attendance to Religious Services. This is a measure in which participants are asked about the frequency of attendance to religious services in the last 12 months without counting weddings, baptisms, and funerals (Rabbia et al., 2012). The range of possible answers included: 1) Never, 2) At least once, 3) Only in religious celebrations and special occasions , 4) At least once or twice a month, and 5) At least once a week. Concerning religious practice, 63.38% of the sample never attended to a religious

service in the last year, 15.29% attended at least once in the last 12 months, 8.60% attended only in special events and religious celebrations, 6.37% attended at least once or twice a month, and 6.37% of the sample attended at least once a week.

Intuitive Religiosity Scale (IRS). See methods in Study 1 for details about this scale. Data from 3 participants had to be discarded following the exclusion criterion for this scale mentioned in Study 1. The internal consistency of this scales was good (Cronbach's alpha=0.74).

Shortened Post-Critical Belief Scale (PCBS). This scale measures the same constructs as the original PCBS, but comprises only 18 items (Duriez, Soenens, & Hutsebaut, 2005) instead of the 33 items included in the original scale used in Study 2. We decided to use this reduced scale for brevity, but before taking this decision we made sure that results from Study 2 remained qualitatively similar when we calculated PCBS scores based only on the 18 items present in the short version (results from Study 2 with the 18-item PCBS can be seen in supplementary results posted on the OSF link). The exclusion criterion for this scale and the handling of missing data was as explained for the PCBS in Study 2. Data from 5 participants had to be discarded following the exclusion criterion. Assessing the reliability of each sub-scale, we found that Symbolic Inclusion had a Cronbach's alpha of 0.71, Literal Inclusion of 0.72, Literal Exclusion of 0.91, and Symbolic Exclusion of 0.90, showing all four scores from good to excellent internal consistency.

Cognitive Reflection Test (CRT). This test was the same used in Studies 1 and 2. The internal consistency of this scale for correct responses was good with a Cronbach's alpha of 0.70.

Need for Cognitive Closure Scale (NFC). This 42-item scale measures the same construct as the shorter version used in Study 2, but contains 5 subscales: Order and Structure (measures the desire for order and structure in life), Closed-mindedness (measures the degree to which one isprepared to have one's knowledge confronted by alternative opinions orinconsistent evidence), Ambiguity Aversion (measures the discomfort produced by ambiguity), Preference for Predictability (measures the degree to which predictable situations are preferred), and Decisiveness (measures the speed

at which decisions are madeand the degree to which one doubts this was the right decision) (Webster & Kruglanski, 1994). We chose the full NFC instead of the reduced version used in Study 2 to explore individual variation in this construct in more detail. Data from 9 participants had to be discarded following the exclusion criterion for this scale mentioned in Study 2. The internal consistency of this scale was excellent (Cronbach's alpha = 0.93). Relative to each subscale, the Cronbach's alpha was 0.92 for Order and Structure, 0.76 for Closed-mindedness, 0.91 for Ambiguity Aversion, 0.89 for Preference for Predictability, and 0.88 for Decisiveness, thus showing at least good internal consistency in all sub-scales.

Data analyses

To analyze present data, we ran OLS regressions to assess, first, whether testing order affected CRT responses, religiosity measures, or NFC scores; second, whether NFC scores predicted religiosity measures with and without controlling for testing order, gender, age, field of study, religious affiliation, and the frequency of religious attendance; and third and last, whether the number of CRT correct responses predicted religiosity measures with and without controlling for NFC, testing order, gender, age, field of study, religious affiliation, and the frequency of religious attendance. The alpha value was set at the conventional 0.05 level. Analyses were run in STATA 13, and STATA codes (.do file),and the data Excel file can be found at the following OSF link:
https://osf.io/ud4ay/?view_only=a919158c2d9a46eca09b97842cb2b53f

Results and discussion

Order effects

To start with, we present the descriptive statistics for the CRT. Participants that responded the CRT before the religiosity scales correctly solved a mean (±1 SEM) of 0.81 (±0.08) problems, whereas participants that responded the CRT last, correctly solved a mean of 0.90 (±0.08) problems. OLS regressions with correct responses in the CRT as dependent variable and testing order as predictor showed a non-significant

result (B=-0.09, p=0.43, N=314, standardized B=-0.04). This result remained qualitatively similar after adding controls.

In terms of the PCBS, mean (±1 SEM) scores for the Inclusion of Transcendence were -6.36 (±0.85) and -7.25 (±0.86) for responses before and after the CRT, respectively. For the Literal-vs.-Symbolic interpretation, participants who responded the PCBS before the CRT showed a mean scores of -0.81 (±0.56), whereas those who responded it after the CRT showed a mean score of -0.04 (±0.57). OLS regressions with scores of Inclusion of Transcendence and Literal-vs.-Symbolic Interpretation as dependent variablesshowed no significant effect of testing order (B=-0.88, p=0.47, N=314, standardized B=-0.04; B=0.77, p=0.34, N=314, standardized B=0.05; respectively; results remained qualitatively similar after adding controls). None of the four dimensions of the PCBS showed a significant testing order effect when tested separately (Literal Inclusion, B=-0.18, p=0.67, N=314, standardized B=-0.02; Symbolic Inclusion, B=-0.37, p=0.32, N=314, standardized B=-0.06; Literal Exclusion, B=0.45, p=0.41, N=314, standardized B=0.05; Symbolic Exclusion, B=-0.12, p=0.73, N=314, standardized B=-0.02; results remained qualitatively similar after adding controls). The non-significant order effect for Literal Inclusion suggests that the significant effect of order on that sub-scale found in Study 2 was not robust. To further confirm this conclusion, we pooled data from Studies 2 and 3 together to test for an order effect in the Literal Inclusion sub-scale with and without controlling for gender, age, and field of study, and found non-significant results (without controls, B=0.11, p=0.79, N=548, standardized B=0.01; with controls, B=-0.02, p=0.96, N=505, standardized B=-0.00).

Mean (±1 SEM) scores for the IRS (intuitive religiosity), when responded before and after the CRT, were 14.91 (±0.40) and 14.62 (±0.39), respectively. An OLS regression with testing order as predictor and the IRS as dependent variable showed no significant effect even after controlling for gender, age, field of study, religious affiliation, and frequency of religious practice (B=-0.20, p=0.73, N=314, standardized B=-0.02).

Last, mean scores for the full NFC were 133.27 (±1.44) and 133.30 (±1.13) when the scale was responded before and after the CRT, respectively. OLS regressions with

scores of the full NFC or its sub-scales as dependent variables showed all non-significant order effects (NFC, B=0.03, p=0.99, N=314, standardized B<0.001; Order, B=-0.81 p=0.26, N=314, standardized B=-0.06; Closed-mindedness, B=-0.41 p=0.38, N=314, standardized B=-0.05; Ambiguity Aversion, B=0.32 p=0.60, N=314, standardized B=0.03; Predictability, B=0.65 p=0.34, N=314, standardized B=0.05; and Decisiveness, B=0.28, p=0.68, N=314, standardized B=0.02; results remained qualitatively similar after adding controls).

NFC and Religiosity

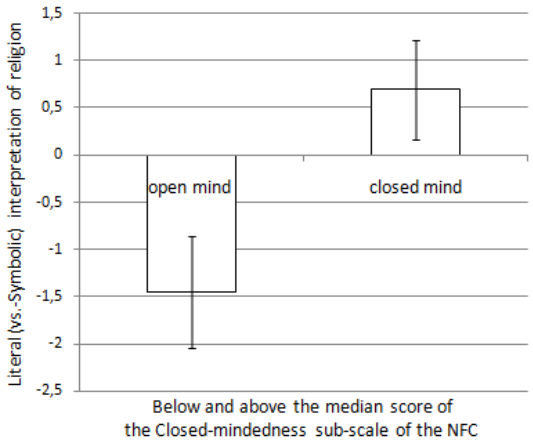
Zero-order correlations between NFC and religiosity measures are presented in Table 3. Secondly, we did OLS regressions with NFC total score and all five sub-scales as predictors,and religiosity scores (Inclusion of Transcendence, Literal-vs.-Symbolic religious ideas, and IRS) as dependent variables. Because each set of regressions involved running 6 analyses (NFC full score and the 5 sub-scales) with the same dependent variable, we used a Bonferroni-corrected alpha value of 0.0083. The main prediction was that NFC or its sub-scales should be associated with literality (though, note that we found that NFC was only associated with transcendence in Study 2). Closed-mindedness was the only NFC score that significantly (positively) predicted literality in the interpretation of religious ideas, even after adding controls (B=0.29, p=0.002, N=293, standardized B=0.17, see Figure 2; NFC, B=0.01, p=0.66, N=293, standardized B=0.02; Order sub-scale, B=0.04, p=0.46, N=293, standardized B=0.04; Ambiguity aversion, B=-0.02, p=0.82, N=293, standardized B=-0.01; Predictability, B=-0.04, p=0.57, N=293, standardized B=-0.03; Decisiveness, B=-0.09, p=0.19, N=293, standardized B=-0.07).

Table 3. Zero-order correlations between correct responses in the CRT or NFC measures (columns) and religiosity variables (rows).

	CRT	NFC	AA	Order	CM	PP	Dec
Transcendence (PCBS)	-0.08	0.01	-0.11*	0.05	0.03	-0.04	0.09
Literal vs. Symbolic (PCBS)	-0.13*	0.05	0.06	0.02	-0.19***	-0.01	-0.07
Literal Inclusion (PCBS)	-0.15**	0.05	0.00	0.05	0.13*	-0.02	0.02
Literal Exclusion (PCBS)	-0.00	0.04	0.14*	-0.01	0.08	0.04	-0.11*
Symbolic Inclusion (PCBS)	0.01	0.02	-0.04	0.04	-0.03	0.01	0.06
Symbolic Exclusion (PCBS)	0.10	0.00	0.12*	-0.05	-0.10	0.05	-0.04
Intuitive religiosity (IRS)	-0.12*	0.12*	0.01	0.14**	0.02	0.12*	0.02

CRT: number of correct responses in the Cognitive Reflection Test; NFC: full score for the Need for Cognitive Closure scale; AA: Aversion to Ambiguity sub-scale (NFC scale); Order: Order sub-scale (NFC scale); CM: Closed-mindedness sub-scale (NFC scale); PP: Preference for Predictability sub-scale (NFC scale); Dec: Decisiveness sub-scale (NFC scale); PCBS: Post-Critical Belief Scale. For all correlations, N=314; * p<0.05; **p<0.01;***p<0.001

Figure 2. Mean score for the Literal-vs.-Symbolic Interpretation and Closed-mindedness sub-scale



Mean (±1 SEM) score for the Literal-vs.-Symbolic Interpretation of religious ideas dimension of the Post-Critical Belief Scale as a function of whether participants were below or above the median value in the Closed-mindedness sub-scale of the Need for Cognitive Closure scale (NFC). Higher scores mean a more literal as opposed to a more symbolic interpretation of religion.

In terms of the Inclusion of Transcendence , NFC did not show any significant effect on this religious variable (we present the analyses done with controls, though the results without controls are qualitatively similar; NFC, B=0.01, p=0.66, N=293, standardized B=0.02; Order sub-scale, B=0.05, p=0.53, N=293, standardized B=0.03; Closed-mindedness, B=0.07, p=0.53, N=295, standardized B=0.03; Ambiguity aversion, B=-0.12, p=0.17, N=293, standardized B=-0.06; Predictability, B=0.03, p=0.72, N=293, standardized B=0.02; Decisiveness, B=0.07, p=0.35, N=293, standardized B=0.04). Because NFC positively predicted transcendence in Study 2, we pooled data from Studies 2 and 3 together to further test that relationship. In fact, we found that the effect of NFC on transcendence was not significant with the pooled data, even after controlling for gender, age, and field of study (B=-0.02, p=0.21, N=505, standardized B=-0.07).

Surprisingly, neither did the NFC full score nor any of its sub-scales show a significant association with any of the four sub-scales of the PCBS (see detailed statistics online on the OSF link). Last, we found that only a Preference for Predictability positively

predicted intuitive religiosity after adding controls (B=0.11, p=0.002, N=293, standardized B=0.14; NFC, B=0.03, p=0.02, N=293, standardized B=0.10; Order sub-scale, B=0.07, p=0.03, N=293, standardized B=0.10; Closed-mindedness, B=-0.01, p=0.89, N=293, standardized B=-0.01; Ambiguity aversion, B=0.04, p=0.38, N=293, standardized B=0.04; Decisiveness, B=0.01, p=0.73, N=293, standardized B=0.01).

CRT and Religiosity

Zero-order correlations between the number of correct responses in the CRT and religiosity measures are shown in Table 3. Secondly, we used OLS regressions to test whether correct responses predicted variation in Inclusion of Transcendence, in a Literal-vs.-Symbolic Interpretation of religious ideas, and in participants´ intuitive religiosity. We found that correct responses significantly and negatively predicted variation in all three measures after controlling for NFC, testing order, gender, age, field of study, religious affiliation, and frequency of religious practice (Transcendence , B=-1.37, p=0.003, N=293, standardized B=-0.14; Literality, B=-1.18, p=0.002, N=293, standardized B=-0.18; IRS, B=-0.49 p=0.02, N=293, standardized B=-0.11). The negative prediction of literality by correct responses in Study 3 replicates a similar finding from Study 2. In addition, the negative association between correct responses and intuitive religiosity (IRS) replicates a similar result from Study 1. Given that this last finding was robust to testing order in Study 3, it suggests that the negative correlation between correct responses and IRS scores in Study 1 was not the consequence of the CRT acting as an analytic thinking prime as suggested by Finley et al. (2015).

Of particular importance is the significant effect of correct responses on the Inclusion of Transcendence given that the coefficient of a similar regression in Study 2 was non-significant, despite having the same sign. To further confirm the significant effect of CRT on Transcendence, we pooled data from Studies 2 and 3 together, and we actually found a significant effect, even after controlling for NFC, gender, age, and field of study (B=-1.69, p=0.001, N=505, standardized B=-0.16; Literal-vs.-Symbolic, B=-1.56, p<0.001, N=505, standardized B=-0.22). This suggests that the lack of significance in Study 2 was probably due to lack of power given the smaller sample size.

Last, when we considered the four dimensions of the PCBS separately and controlled for testing order, gender, age, field of study, religious affiliation, and frequency of religious practice, we found that correct responses in the CRT showed a significant negative association with scores on Literal Inclusion (B=-0.73, p=0.001, N=293, standardized B=-0.21) and a significant positive association with scores on Symbolic Exclusion (B=0.55, p=0.002, N=293, standardized B=0.18), but were not significantly associated with the other two dimensions (Symbolic Inclusion, B=-0.07, p=0.63, N=293, standardized B=-0.02; Literal Exclusion, B=0.02, p=0.92, N=293, standardized B=0.00). These effects of CRT on each sub-scale of the PCBS replicated those of Study 2 (see Tables 2 and 4).

Table 4. OLS non-standardized regression coefficients (std. errors) of the four dimensions of the Post-Critical Belief Scale as dependent variables (columns) and correct responses in the Cognitive Reflection Test and several controls as predictors (rows).

	Literal Inclusion		Literal Exclusion		Symbolic Inclusion		Symbolic Exclusion	
CRT	-0.53 (0.20)*	-0.72 (0.21)**	-0.02 (0.26)	0.03 (0.23)	0.04 (0.18)	-0.06 (0.15)	0.29 (0.17)†	0.55 (0.18)**
NFC		0.01 (0.01)		0.00 (0.01)		0.01 (0.01)		0.00 (0.01)
Testing Order		-0.28 (0.42)		0.34 (0.45)		-0.04 (0.30)		-0.01 (0.35)
Gender		-1.75 (0.48)***		1.21 (0.52)*		-1.00 (0.35)**		1.60 (0.40)***
Age		0.06 (0.07)		-0.02 (0.07)		0.02 (0.05)		-0.01 (0.06)
Business		0.43 (4.10)		5.21 (4.46)		-5.59 (3.00)†		-2.24 (3.44)
Humanities		1.57 (4.16)		4.89 (4.52)		-4.65 (3.04)		-1.22 (3.50)
Engineering		1.96 (4.18)		6.33 (4.54)		-4.73 (3.06)		-2.14 (3.52)
Health Sciences		1.62 (4.20)		5.54 (4.57)		-5.38 (3.08)†		-2.84 (3.53)
Christian		2.01 (0.80)*		-2.55 (0.87)**		1.76 (0.59)**		-0.72 (0.67)
Atheis/Agnostic		0.29 (0.82)		0.51 (0.89)		-1.03 (0.60)†		0.32 (0.69)
Religious Attendance		0.44 (0.19)*		-1.64 (0.20)***		0.84 (0.14)***		-0.58 (0.16)***
Constant	11.73 (0.28)***	7.13 (5.29)	14.98 (0.35)***	12.26 (5.75)*	11.74 (0.24)***	14.06 (3.87)***	14.64 (0.23)***	15.99 (4.45)***
N	314	290	314	290	314	290	314	290

CRT: number of correct responses in the Cognitive Reflection Test; NFC: full score for the Need for Cognitive Closure scale; Testing Order: 0=CRT last; 1=CRT first; Gender: 0=males, 1=females; Business: Field of study, 1=business, administration, or economics, 0=other; Humanities: Field of study, 1=humanities, 0=other; Engineering: Field of study, 1=engineering, 0=other; Health Sciences: Field of study, 1=health sciences (infirmary, medicine), 0=other; Christian: Religious Affiliation, 1=christianity, 0=other; Atheist/Agnostic, Religious Affiliation, 1=atheism/agnostiscism; 0=other; Religious Attendance: 1-5 (1: less frequent; 5: more frequent) . †p<0.10; *p<0.05; **p<0.01; ***p<0.001

To start with, results from Study 3 helped clarifying some unexpected findings from Study 2. Most importantly, present analyses showed that a testing order effect (whether the CRT was taken first/last) for any religiosity measure was not reliable. This suggests that the order effect found on the PCBS Literal Inclusion sub-scale in Study 2, beyond being of a sign opposite than expected, was spurious. Another false positive from Study 2 was the effect of NFC on the Inclusion of Transcendence, which did not replicate in Study 3 or in the analysis with the pooled data of Studies 2 and 3. Finally, the lack of effect of CRT on the Inclusion of Transcendence in Study 2 was likely a false negative, given that present analyses support the expected negative relationship between correct responses and transcendence, even with pooled data from Studies 2 and 3, and socio-demographic controls.

Of main importance, results from Study 3 replicated several findings from Studies 1 and 2. First, we again found a negative association between correct responses in the CRT and intuitive religiosity, this time controlling for testing order. In addition, correct responses in the CRT again negatively predicted a literal (over a symbolic) interpretation of religious ideas and scores on the Literal Inclusion sub-scale which captures an orthodox approach to religion. Interestingly, CRT scores, again, did not show a significant relationship with scores from the Symbolic Inclusion sub-scale, thus suggesting that an analytic cognitive style may not be associated with a religiosity type characterized by a more open interpretation of religious ideas. Finally, we found that the Closed-mindedness positively predicted literality, suggesting that a literal interpretation of religion is associated with reluctance to be confronted by alternative opinions or inconsistent evidence.

5. GENERAL DISCUSSION

In the present studies with samples of Argentine university students, we showed that the relationship between an analytic cognitive style and religiosity is conditional on the type of religiosity participants are reporting about. First, in Study 1, we showed that the relationship between cognitive style and religiosity was similar to the typical findings from samples from other parts of the globe (Pennycook et al., 2016; Gervais et al., 2018). That is, belief in supernatural agents, intuitive and intrinsic religiosity

negatively correlated with a more analytic cognitive style. However, a different perspective emerged when we measured the literality of religious beliefs as well as the inclusion of a transcendent dimension in beliefs with the Post-Critical Belief Scale (PCBS) in Studies 2 and 3. In these two studies, participants with a higher number of correct responses in the CRT showed lower religiosity as measured by the Literal Inclusion sub-scale of the PCBS, which captures an orthodox approach to religion with inclusion of transcendence and a literal interpretation of religious ideas. In contrast, cognitive style was not associated with variation in the Symbolic Inclusion sub-scale, which measures a type of religiosity in which people interpret religious ideas more openly, and relative to the historical context in which they were generated. This is an important finding for the literature on the *Cognitive Science of Religion* (CSR), because the predominant result is a negative relationship between analytic thinking and different measures of religiosity (see Pennycook et al., 2016 for a meta-analysis). Nevertheless, Yonker et al. (2016), Bahçekapili and Yilmaz (2017), and Gervais et al. (2018) have reported some notable exceptions to that pattern, some of which we discuss next.

Most relevant for the discussion of present findings are Bahçekapili and Yilmaz´s (2017) results. These authors reported that, whereas intrinsic and extrinsic religiosity were negatively associated with an analytic cognitive style, quest religiosity showed a positive relationship with correct responses in the CRT. Quest religiosity and Symbolic Inclusion both capture an open attitude towards religion, the former also including a positive disposition to belief doubt and change (Batson & Schoenrade, 1991). Whereas Bahçekapili and Yilmaz (2017) reported a positive relationship between this open religious attitude and an analytic cognitive style, we found no reliable association between Symbolic Inclusion and CRT responses. What to do with thisdiscrepancy? The Quest Scale asks individuals about their disposition to approach existential questions, doubt their beliefs, and be open to belief change. Bahçekapili and Yilmaz (2017)indeed argue that this scale may capture a need for thinking in the domain of religion more than a religiosity type. In fact, we observed a reliable positive association between Symbolic Exclusion and an analytic cognitive style. Symbolic Exclusion involves an attitude of religious disbelief that also contemplates the rich symbolic and historical

meaning of religion and religious ideas. The positive relationship between Symbolic Exclusion and CRT may suggest that Bahçekapili and Yilmaz´s (2017) positive relationship between quest religiosity and CRT represents a relationship that only appears in people not comitted to beliefs in the transcendent. In the present studies, we also found that an analytic cognitive style was negatively associated with Inclusion of Transcendence and positively related to a more symbolic view of religion. It is possible that these effects may cancel each other out in people with a religiosity type characterized by open symbolic interpretations. That would explain the lack of association between Symbolic Inclusion and CRT. In any case, future studies should tackle the relationship among Symbolic Inclusion, Symbolic Exclusion, quest religiosity, and need for cognition to elucidate whether there are religiosity types that truly show a positive relationship with an analytic style.

Yonker et al. (2016) argue that a dual-process perspective on religion not necessarily leads to conceive a negative relationship between analytic thinking and religiosity. Even if analytic thinking overrides natural intuitions, this may not necessarily lead to disbelief, but could lead to more sophisticated theological beliefs instead (McCauley, 2011). If we think that belief sophistication should be positively associated with a more symbolic view of religious ideas and a historically-contextualized interpretation of religion, then, present findings do not lend support to Yonker et al.´s view however. Despite our finding that symbolism was positively related to an analytic cognitive style, such result involves believers as well as nonbelievers. When we tested scores of the Symbolic Inclusion sub-scale, which captures the strength of symbolic beliefs while including a religious transcendent dimension, the relationship with an analytic cognitive style disappeared. In turn, CRT positively predicted Symbolic Exclusion, suggesting that CRT may predict a sophisticated view of religion for those with an inclination towards disbelief. Last, relevant for the present discussion, Daws and Hampshire (2017) found that apostats relative to religious converts showed higher performance in conflict detection tasks, which, as the CRT, measure an analytic disposition. If Symbolic Inclusion could be thought of as a type of religiosity in transition (towards secularization or from disbelief to belief), mostly adapted to a desacralised world and society (Hutsebaut, 1996), participants high in Symbolic

Inclusion may be showing an intermediate religiosity type in which the relationship between religious beliefs and cognitive style breaks down.

The present research makes several other contributions. First, to our best knowledge, we provide the first Latin American samples in which CRT responses are correlated with religiosity measures (see also Daws & Hampshire, 2017, for an online study linking analytic thinking –though not operationalized with the CRT- and religious beliefs, including South American participants). Indeed, we found that correct responses in the CRT negatively predicted a variety of religiosity measures, including the replication of several findings from WEIRD samples. In Study 1, we replicated, in Argentine university students, the finding that an analytic cognitive styleis negatively associated with intuitive religiosity and with belief in supernatural agents (Gervais & Norenzayan, 2012). This direct replication is relevant because established knowledge comes from the demonstration of robust findings from independent researchers (Earp & Trafimow, 2015; Makel, Plucker, & Hegerty, 2012; Open Science Collaboration, 2015). Moreover, we are here providing data from a previously untested society to establish the robustness of a relationship that has been claimed to show wide cross-societal variability (Gervais et al., 2018). In this last respect, it is relevant to mention that Argentina is a country with a Christian (Catholic) majority (Mallimaci et al., 2019). Yilmaz and collaborators (Bahcekapili & Yilmaz, 2017; Saribay & Yilmaz, 2017; Yilmaz & Saribay, 2017) have also replicated the relationship between an analytic cognitive style and religiosity with Muslim Turkish, and Gervais et al. (2018) with Arabs, Chinese, and people from India, among others. Future efforts need to keep enlarging the database with untested religions and cultures with the goal of finding the boundary conditions of the negative relationship between analytic cognitive style and religiosity.

Second, present findings replicated the negative association between an analytic cognitive style and religiosity while controlling for testing order (CRT before/after religiosity questionnaires). This is important because the robustness of that relationship has been questioned (Finley et al., 2015; Yonker et al., 2016). In addition, in Studies 2 and 3, we tested the relationship between CRT and measures of religiosity that go beyond the mere inclusion of transcendence in beliefs to also involve the literality (vs. symbolism) of their interpretation, while also controlling for testing order.

Together with others´ research (Pennycook et al., 2016; Bahçekapili & Yilmaz, 2017), present findings provide evidence against Finley et al.´s (2015) hypothesis of an analytic priming effect of the CRT on religiosity. Disagreement among results from different studies could be related to diverse characteristics of the samples in terms of religiosity or other individual differences (Yonker et al. 2016; Bahçekapili & Yilmaz, 2017). In order to tackle these possibilities, we also controlled for individual differences in socio-demographic factors as well as in epistemic motivations as measured with the Need for Cognitive Closure scale (Webster & Kruglansky, 1994), and showed that present findings were robust to the inclusion of these controls.

Furthermore, correct responses in the CRT negatively predicted both the inclusion of transcendence as well as a more literal interpretation of religion, thus providing evidence of the robustness of the relationship between cognitive style and religious beliefs, and extending that relationship to previously untested religiosity dimensions. This is the first time that the CRT has been used to predict variation in dimensions of the PCBS. On one hand, the inclusion of transcendence was expected to correlate negatively with correct responses based on previous findings of the inverse relationship of analytic cognitive style and intuitive religiosity or belief in supernatural agents. On the other hand, for the first time, the CRT has been shown to predict the type of interpretation people make of religious ideas (i.e., more literal or more symbolic).

Finally, underlying religious beliefs people may hide a motivation to reduce the anxiety associated with unpredictability and lack of control (Kay et al., 2010). Such motivations may be related to individual differences in proclivities related to information processing and judgment. As a third contribution of the present research, we here studied whether variation inepistemic motivations as measured with the Need for Cognitive Closure scale (NFC, Webster & Kruglansky, 1994) contributed to explaining variation in religiosity. Duriez (2003) found that a higher preference for predictability and order was associated with higher inclusion of transcendence in beliefs. Though we did not replicate that finding here, we did find that a preference for predictability was associated with higher intuitive religiosity. This could be interpreted as if a desire for predictable environments underlies people´s reliance on God. In turn, as Duriez (2003)

found with Belgium university students, we too found that closed-mindedness was positively associated with higher literality in the interpretation of religious ideas. This is to say that people reluctant to have their ideas challenged are proner to more literal interpretations of religion. Stanley (1963) argued that fundamentalism, i.e., a distinctive attitude of certainty about the ultimate truth of one´s beliefs (Altemeyer & Hunsberger, 1992), represents the religious version of closed-mindedness. In turn, Wulff (1991) proposed that, rather than religion itself, it is how people deal with beliefs that may represent a threat to reason, and that dogmatism may occur in atheists as well as in religious people. As far as present results concerns, Wulff could be right, since we did not find closed-mindedness to correlate with religiosity measures beyond literality. Another socially relevant dimension that has been linked with a literal interpretation of religion is prejudice and racism (Altemeyer & Hunsberger, 1992; Duriez, 2004). Again, empirical findings suggest that religion may not be the main driving force leading towards these social issues, but, instead, literal interpretations of religious beliefs may underlie social intolerance (Duriez, 2004). Indeed, closed-mindedness has been found to mediate the relationship between fundamentalism and prejudice (Brandt & Reyna, 2010; Sadowski & Bohner, 2016).

6. LIMITATIONS OF THE PRESENT RESEARCH

To start with, it is relevant to discuss the limitations involved in the samples used. All participants in present studies were university students. That should caution the generalizability of the results to a wider population. Notwithstanding, present participants belonged to a diverse array of fields of study (from humanities, through economics and business, to health sciences and engineering). This may lead to samples representing abroad spectrum of ideological positions and political views. For instance, a similar sample from this population showed political preferences that qualitatively predicted the result of a presidential election (Freidin, Senci, Ryan, &Carballo, 2016). In terms of religious affiliation, however, Christians were under-represented, whereas the non-religious were over-represented in thesample from Study 3. Still, the majority of sampled students self-identified with Christianity, in accordance with the dominance of Catholicism in Argentina (Mallimaciet al., 2019).

The strongest biases that student samples may entail are relative to age, socio-economic status, and educational level. In terms of age, the vast majority of participants in present studies were in their 20s. Therefore, we cannot know whether present results generalize to older adults, or teenagers. In terms of socio-economic status and educational level, poorer sectors of the population are under-represented in university students, and, of course, university students only involve persons with complete secondary education and incomplete university studies, that is, a narrow margin of the whole population. Having taken notice of the boundary characteristics of the samples used, it is important to mention that Daws and Hampshire (2017) showed with large cross-country samples (~50,000 participants) that the negative relationship between an analytic cognitive style and religiosity was robust to variations in educational level and age. In fact, their sampling also included South American participants, which may give some confidence that present findings may not be exclusive of people in their 20s with a certain level of education attained and coming from middle-income families. In any case, the extent to which present findings may be representative of the general population in Argentina is a question that requires further empirical exploration.

Another limitation of present methods is that we relied on the CRT as a measure of cognitive style, while it is known that individual differences in cognitive ability and numeracy also affect the number of correct responses in this test (Toplak, West, & Stanovich, 2011; Liberali et al., 2011; Sinayev & Peters, 2015). This implies that the conclusion that an analytic cognitive style is associated with religiosity could be biased by the CRT being an impure measure of cognitive style. Indeed, Razmyar and Reeve (2013) showed that, when controlling for general cognitive ability, the CRT stopped predicting variation in religiosity. In contrast, others have shown that the predictive power of the CRT on religiosity is not hampered when cognitive ability and numeracy are controlled for (Shenhav et al., 2012; Pennycook et al., 2014; Daws & Hampshire, 2017; see Pennycook, 2014 for a revision of this issue). Furthermore, Pennycook, Cheyne, Koehler et al. (2013) showed that religious believers presented more biases in probabilistic reasoning tasks and responded faster than skeptics. Interestingly, differences in response times between believers and skeptics remained qualitatively

unaltered after controlling for belief bias, cognitive ability, and socio-demographic controls, which may suggest a difference between believers and skeptics in their disposition to engage reasoning processes. This is reassuring; it does not allow however to discard the possibility that individual differences in cognitive ability may underlie some of the novel findings reported in present studies.

Last but not least, the interpretative intention of present research was causal. We meant to answer whether an analytic cognitive style determined variations in religiosity, in an attempt to understand the cognitive underpinnings of religiosity. However, it is crucial to understand that the correlational nature of the methods used does not allow inferring causal links between the variables of interest. Nonetheless, given the samples and controls used in the statistical analyses done, we can be confident of the associations found. Aid with theory and others´ experimental research (e.g., Gervais & Norenzayan, 2012), we made some causal interpretations that need to be dealt with caution under the present circumstances. What we did vary in a systematic manner was testing order, and therefore, we were able to test whether responding to the CRT before religiosity questionnaires had any effect on religiosity self-reports. Indeed, we found no reliable order effect, and therefore, we conclude that present data did not support the notion that the CRT may act as an analytic thinking prime.

We want to finish this section with a positive note, highlighting a byproduct of the sampling strategy that we used in the research presented here, in particular, the fact that we tested students in between classes. This method almost abolished self-selection biases, because, despite allowing students to stand down from participating, we did not register any such cases, and at most, we found a few unanswered questionnaires (from the 719 participants in the three studies, we only had to discard data from 23, that is, <3.2%). This minimization of self-selection contrasts with online studies, which are pervasive in the study of analytic cognitive style and religiosity (Pennycook et al., 2016; Daws & Hampshire, 2017), and depend on the collaboration of volunteers that typically participate for course credits, if they are students, or to earn money. If volunteers may be different from non-volunteers, for instance, in religiosity

or any other relevant measure, we can be confident that present findings are unlikely to be contaminated with such bias.

7. CONCLUSION

In the present studies, we attempted to contribute to the understanding of the cognitive underpinning of religiosity. In research with Argentine undergraduates, we found a negative relationship between correct responses in the CRT, as a measure of analytic cognitive style, and inclusion of a transcendent dimension in religious beliefs as well as a literal (over a more symbolic) interpretation of religious ideas. Interestingly, an analytic cognitive style negatively predicted a more literal but not a more symbolic approach to religion. In turn, a more skeptic belief profile with a symbolic view of religious ideas was positively associated with correct performance in the CRT, but not so much for literal skeptics. In short, present findings replicated the negative relationship between a disposition towards analytic thinking and religiosity, while also showing some boundary conditions for that relationship. Of particular interest for the *Cognitive Science of Religion* is the finding that the negative association between analytic thinking and religiosity breaks down for those entertaining more symbolic historically-contextualized religious beliefs.

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Online Supplementary Results

Study 2

Order effects

OLS regressions with scores of Inclusion of Transcendence and Literal-vs.-Symbolic Interpretation as dependent variables showed non-significant effects of testing order (B=2.44, p=0.30, N=234, standardized B=0.07; B=0.43, p=0.77, N=234, standardized B=0.02; respectively). The same regressions done with the 18-item PCBS, showed non-signficant order effects for Transcendence (B=1.55, p=0.27, N=212, standardized B=0.07) and Literality (B=1.62, p=0.09, N=212, standardized B=0.12).

When considereing the statistics of each individual scale of the PCBS, mean (±1 SEM) scores for Literal Inclusion were 16.08 (±0.46) and 18.53 (±0.52) for the PCBS taken before and after the CRT, respectively. The OLS regression for Literal Inclusion showed a significant order effect (B=2.45, p=0.001, N=234, standardized B=0.22). For Literal Exclusion, mean scores were 27.20 (±0.69) and 27.67 (± 0.71), when the PCBS was taken before and after the CRT, respectively (order effect, B=0.47, p=0.63, N=234, standardized B=0.03). For Symbolic Inclusion, mean scores were 22.58 (±0.61) and 24.06 (±0.67) before and after the CRT, respectively (order effect, B=1.48, p=0.10, N=234, standardized B=0.11). And, for Symbolic Exclusion, mean scores were 28.52 (±0.55) and 29.53 (±0.46) before and after the CRT, respectively (order effect, B=1.01, p=0.16, N=234, standardized B=0.09). OLS regressions done with the 18-item PCBS, only showed a signficant order effects for Literal Inclusion (B=1.58, p=0.002, N=212, standardized B=0.21; Literal Exclusion, B=0.61, p=0.35, N=212, standardized B=0.06; Symbolic Inclusion, B=0.58, p=0.23, N=212, standardized B=0.08; Symbolic Exclusion, B=-0.01, p=0.99, N=212, standardized B=-0.00).

NFC and Religiosity

OLS regressions with NFC scores as predictor and religiosity scores for Transcendence and Literality as dependent variables showed a significant coefficient for Transcendence (B=0.21, p=0.009, N=234, standardized B=0.19), but not for Literality (B=0.04, p=0.59, N=234, standardized B=0.03). These results remained qualitatively similar after controlling for testing order, gender, age, and field of study. When considering each PCBS sub-scale separately, NFC significantly predicted variation only in Literal Inclusion (B=0.15, p<0.001, N=234, standardized B=0.28) and Symbolic

Inclusion (B=0.09, p=0.04, N=234, standardized B=0.13; Symbolic Exclusion, B=-0.04, p=0.23, N=234, standardized B=-0.08; Literal Exclusion, B=-0.06, p=0.22, N=234, standardized B=-0.08). Results remained qualitatively similar after controlling for testing order, gender, age, and field of study, except for the analysis with Symbolic Inclusion as dependent variable which went from significant to marginally significant after the inclusion of controls (B=-0.09, p=0.06, N=211, standardized B=0.13). The same OLS regressions with NFC and controls as predictors and the 18-item PCBS as dependent variable showed qualitatively similar results: Inclusion of Transcendence, B=0.19, p=0.009, N=212, standardized B=0.18; Literality, B=0.02, p=0.66, N=212, standardized B=0.03; Literal Inclusion, B=0.08, p=0.002, N=212, standardized B=0.21; Literal Exclusion, B=-0.04, p=0.29, N=212, standardized B=-0.07; Symbolic Inclusion, B=0.05, p=0.053, N=212, standardized B=0.13; Symbolic Exclusion, B=-0.02, p=0.28, N=212, standardized B=-0.07.

CRT and Religiosity

We used OLS regressions to test whether correct responses in the CRT predicted variation in Inclusion of Transcendence and in a Literal-vs.-Symbolic Interpretation of religious ideas. We found that correct responses in the CRT did not significantly predicted scores on Transcendence (B=-1.91, p=0.17, N=234, standardized B=-0.09), but did negatively predict a more literal interpretation of religious ideas (B=-2.44, p=0.005, N=234, standardized B=-0.18). This significant result remained so even after controling for NFC, testing order, gender, age, and field of study. When we tested the four sub-scales of the PCBS separately, we found that correct responses in the CRT negatively predicted scores on Literal Inclusion (B=-0.99, p=0.016, N=234, standardized B=-0.16), and positively predicted scores on Symbolic Exclusion (B=1.18, p=0.004, N=234, standardized B=0.19), but regression coefficients were not significant for Symbolic Inclusion (B=-0.25, p=0.64, N=234, standardized B=-0.03) or Literal Exclusion (B=-0.51, p=0.38, N=234, standardized B=-0.06). These results remained qualitatively similar after controlling for variation in NFC, testing order, gender, age, and field of study (see Table 2 in the manuscript). The same OLS regressions with CRT and controls as predictors and the 18-item PCBS as dependent variable showed qualitatively similar results: Inclusion of Transcendence, B=-1.26, p=0.15, N=212, standardized B=-0.11; Literality, B=-2.24, p<0.001, N=212, standardized B=-0.28; Literal Inclusion, B=-0.83, p=0.007, N=212, standardized B=-0.19; Literal Exclusion, B=-0.51, p=0.21, N=212, standardized B=-0.09; Symbolic Inclusion, B=-0.02, p=0.95, N=212, standardized B=-0.00; Symbolic Exclusion, B=-0.92, p=0.001, N=212, standardized B=-025.

Study 3

NFC and Religiosity

The NFC full score or its sub-scales showed all non-significant associations with the four sub-scales of the PCBS (NFC full score on: Literal Inclusion, B=0.01, p=0.35, N=314; Literal Exclusion, B=0.01, p=0.50, N=314; Symbolic Inclusion, B=0.00, p=0.72, N=314; Symbolic Exclusion, B=0.00, p=0.97, N=314; Order sub-scale on: Literal Inclusion, B=0.03, p=0.42, N=314; Literal Exclusion, B=0.00, p=0.86, N=314; Symbolic Inclusion, B=0.02, p=0.47, N=314; Symbolic Exclusion, B=-0.02, p=0.38, N=314; Closed-mindedness sub-scale on: Literal Inclusion, B=0.12, p=0.0.25, N=314; Literal Exclusion, B=0.10, p=0.14, N=314; Symbolic Inclusion, B=-0.03, p=0.56, N=314; Symbolic Exclusion, B=-0.07, p=0.08, N=314; Ambiguity Aversion sub-scale on: Literal Inclusion, B=0.00, p=0.93, N=314; Literal Exclusion, B=0.13, p=0.012, N=314; Symbolic Inclusion, B=-0.02, p=0.51, N=314; Symbolic Exclusion, B=0.07, p=0.028, N=314; Preference for Predictability sub-scale on: Literal Inclusion, B=-0.01, p=0.74, N=314; Literal Exclusion, B=0.03, p=0.45, N=314; Symbolic Inclusion, B=0.00, p=0.90, N=314; Symbolic Exclusion, B=0.03, p=0.38, N=314; Decisiveness sub-scale on: Literal Inclusion, B=0.01, p=0.70, N=314; Literal Exclusion, B=-0.09, p=0.049, N=314; Symbolic Inclusion, B=0.03, p=0.29, N=314; Symbolic Exclusion, B=-0.02, p=0.43, N=314).