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# Religious Belief Systems of Persons with High Functioning Autism

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## Abstract

The cognitive science of religion is a new field which explains religious belief as emerging from normal cognitive processes such as inferring others' mental states, agency detection and imposing patterns on noise. This paper investigates the proposal that individual differences in belief will reflect cognitive processing styles, with high functioning autism being an extreme style that will predispose towards nonbelief (atheism and agnosticism). This view was supported by content analysis of discussion forums about religion on an autism website (covering 192 unique posters), and by a survey that included 61 persons with HFA. Persons with autistic spectrum disorder were much more likely than those in our neurotypical comparison group to identify as atheist or agnostic, and, if religious, were more likely to construct their own religious belief system. Nonbelief was also higher in those who were attracted to systemizing activities, as measured by the Systemizing Quotient.

**Keywords:** Cognitive science of religion; autism; cognitive styles; individual differences

## Introduction

On a discussion forum for Christian parents, a mother conveys her frustration because her 14 year-old high functioning autistic (HFA) son does not believe in God and refuses to write a paper for his confirmation class. On [wrongplanet.net](http://wrongplanet.net) and other discussion boards for autistic spectrum individuals, posters denounce supernaturalism, proclaim the merits of their self-constructed theistic belief systems and argue the logical appeal of Buddhism. These observations, combined with recent commentaries about the likely religious beliefs of HFA individuals (Delay, 2009; Graetz & Durbin, 2008), suggest that these individuals' beliefs may be influenced by their intellectual strengths (e.g. emphasis on logic and attraction to systematizing observables) and their social-emotional deficits (e.g. reduced automatic inferences about mental states and decreased orientation to social rewards).

There is currently no systematic study of the religious beliefs of autistic spectrum individuals who have normal or near-normal intelligence (i.e., those with high functioning autism and Asperger's disorder, which we jointly label HFA for descriptive convenience, following Attwood, 2001). Current research is limited to personal observations (Isanon, 2006), case studies (Graetz & Durbin, 2006) and

extrapolation informed by a clinical knowledge of HFA (Graetz & Durbin, 2009; Deeley, 2009).

Given this gap in the literature, two studies examined the thesis that HFA people's unique cognitive and socio-emotional profile influences their religious behaviors and beliefs. In Study 1, content analysis was conducted of online discussion forum postings. Study 2 consisted of a Questionnaire which directly asked questions about religious belief and included scales measuring thinking styles.

## Prior findings in cognitive science of religion

- These exploratory studies are grounded on the following assumptions.
- Religiosity is a multidimensional phenomenon encompassing behaviors, beliefs, and experiences (Fetzer, 1999). Religiosity is thus diverse enough to be a meaningful descriptor for people possessing a range of intellectual abilities, emotional sensitivities, and learning styles.
- Individual religious beliefs are the outcome of multiple causes, including personality, reasoning style, family socialization, and views of larger society (Caldwell-Harris et al., 2008).
- The diversity of individuals' religious beliefs reflects evolved psychological mechanisms, with at least some differences representing diverse tools in humanity's adaptive tool kit.
- The thinking styles of individuals with HFA are on a continuum with normal functioning and represent a difference, not a deficit (Atwood, 2006).

Table 1 lists some specific ways in which known characteristics of HFA may co-occur with distinctive patterns of religiosity.

To avoid oversimplifying HFA, religion, and the interactions between HFA and religion, our research will be exploratory, rather than hypothesis-driven. Our framework recognizes the potential for diversity in religious beliefs among HFA individuals, while still supporting the claim that HFA makes a distinctive, measurable, and predictable difference in religiosity.

To guide us in the investigation of these hypotheses, we developed a set of "Thinking Traits" that have been shown

by researchers to be typical of the HFA population (Baron-Cohen et al. 2003; De Martino et al. 2008; Frith 1991; Frith and Happe 2005; Kohls 2009; Shore 2001). Prominent among these is systemizing, which Baron-Cohen (2003) defines as the drive to analyze, explore and construct a system. Others are norm-rejection (Frith 1991), emphasis on rationality, social disinterest, social discomfort, literal mindedness, and need for structure.

Table 1: Correlations predicted from the literature

<b>Characteristics of High Functioning Autistics</b>	<b>Correlated pattern of religiosity</b>
<i>Hypo</i> active agency detection	Avoid supernaturalism (Deeley, 2009)
Concrete; literal-minded; discomfort with symbolic fluidity; local processing bias; attraction to scientism	Preference for logical beliefs; avoid metaphoric construals of religious texts
Need for sameness and predictability	Rigid and doctrinaire (Graez & Dubin, 2009)
Difficulty navigating new social relations	Appreciation of socially welcoming religious community (Graez & Dubin, 2009)

Personality psychologists have identified two styles of reasoning: emphasis on logic and emphasis on intuition (Demaria, Kassinove & Dill 1989). As the Autism Spectrum Disorder (ASD) thinking traits are indicative of a logical cognitive style, we developed a set of thinking traits that would be represented in postings by neurotypical (NT) individuals. The NT thinking traits embody the complimentary attributes of the ASD thinking traits. For example the NT thinking trait "emphasis on intuition" was developed to compliment the ASD thinking trait "emphasis on logic". The NT thinking traits looked for in the postings were emphasis on intuition, oriented towards social rewards, empathizing, symbolic fluidity/gestalt thinking, and openness to experience. The presence or absence these thinking traits are proposed to influence the religious beliefs of individuals across both populations, placing individuals on a continuum of cognitive styles that influence religiosity.

## Study 1: Analysis of Discussion Forums

### Method

The public discussion forum wrongplanet.net was designed for persons with autistic spectrum disorder (HFA). It currently has over 25,000 members from English speaking countries, although the majority are located in the United States. The forum boards have topics specific to autism, such as General Autism Discussion; Autism Politics, Activism, and Media Representation; Adult Autism Issues; Adolescent Forum. The site allows users to post profiles including a "diagnostic description" category; possible descriptions include : AS Diagnosed, AS

undiagnosed, "not sure if I have it or not", Other HFA, NT (Neurotypical).

The neurotypical forum analyzed was golivewire.com/teen forums. Because discussion forum websites are usually formed on the basis of some common interest (such as cat lovers, sports, political affiliations) we needed to find a website that was likely to share a common age demographic with wrongplanet.net but did not otherwise specify a specific group; golivewire.com/teenforums fit this criteria. The population of this website was mainly based in the United States.

On each of these two forums, the authors and research assistants read through the forums for discussions about religion. On wrongplanet the forum that was analyzed was titled Religion/Philosophy/Politics; on golivewire the one analyzed was titled Religion and Philosophy.

### Participants

To ensure that posts were analyzed in a systematic fashion, we planned to included in our content analysis 200 consecutive posts. We ended up with 192 posts from different users who identified themselves as individuals with HFA, and 195 users from golivewire.com (the NT group). All posts were collected within a year time frame (February 2009-March 2008). For each user, we included the first post containing a clear expression of religious beliefs, as defined by a coding protocol (more details below; full protocol available from the authors).

### Coding Religious Beliefs

Users from the discussion forums were coded for religious categories using the method of ethnographic content analysis (Altheide, 1987). Each individual was assigned one of the following categories: Agnosticism, Atheism, Christianity, Other Theistic, Own Construction, Neo-Pagan, Non-theistic, and Other. Coding was easiest when users explicitly used one of these labels or a related term (e.g., it is straightforward to coded "I'm Catholic" as Christian). Due to the debates over conceptual overlap between non-belief categories, our group developed a series of semantic clarifications between atheist, agnostic, and "nontheistic not further specified". Coders were trained through practice with example quotes from discussion forums that were not used in the final forum analysis. Upon completion of the practice quotes, coders met together to resolve discrepancies. Coders were blinded to the diagnosis category of each user during all coding. Inter-rater reliability for religious beliefs was 93%.

### Coding Thinking Traits

It was not required that each participant be assigned a thinking trait as it is expected that these will be exhibited spontaneously. Because the length and depth of religious description varied among the users, it was possible for some users to be assigned no thinking traits while others demonstrated multiple thinking traits. Coders were trained with practice quotes from online forums that were not used in the forum analysis portion of our experiment. Group discussions followed the completion of practice quotes to

ensure a full understanding of the thinking trait categories. Inter-rater reliability was 90%.

**Data Analysis**

The distribution of religious orientations across the NT and HFA samples were analyzed using a Chi Square test. The distribution of HFA and NT thinking traits were analyzed across populations using the Mann Whitney U test.

**Results**

**Religious Beliefs**

Religious beliefs were found to differ significantly between the HFA and NT populations,  $\chi^2(12, N=387)=43.69, p < .01$ . As shown in Figure 1, individuals with HFA were less likely to belong to an organized religion than their NT counterparts and were more likely to create their own religious belief system. The "own-construction" category comprised 16% of the HFA population as compared to only 6% of the NT population. HFA individuals also demonstrated higher rates of non-belief identities such as Atheism (26%) and Agnosticism (17%). In the NT group, only 17% of the population were Atheists and 10% were Agnostic.

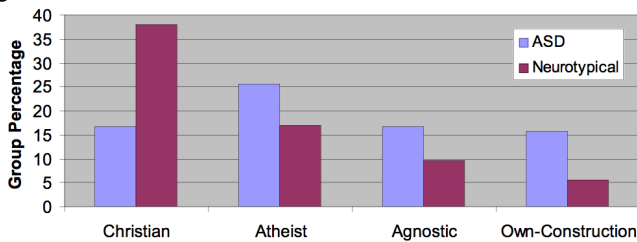


Figure 1: Religious Belief by Group, Forum Analysis

**Thinking Traits**

The Mann Whitney U comparison between groups was significant for emphasis on rationality, ( $z=-5.26, p<.05$ ), social discomfort ( $z=-2.27, p<.05$ ), and social disinterest ( $z=-2.02, p<.05$ ), but not for any other thinking trait category, although the trend was in the expected direction for literal mindedness see Figure 2). NT thinking traits did not vary across the two groups.

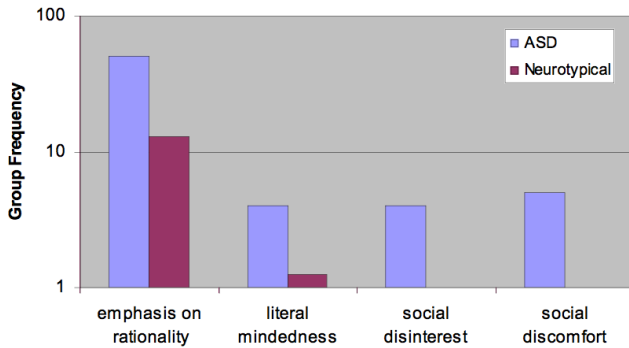


Figure 2: Thinking Traits by Group, Forum Analysis

**Summary**

We hypothesized that traits typically displayed among HFA individuals such as attraction to scientism and hyper rationality would render these individuals less likely to embrace supernaturalism and religious belief. Consistent with this, Atheism and Agnosticism were more frequent in the HFA group than the NT group. Previous research has established systemizing (Baron-Cohen et al. 2003) and low-conformity (Frith 1991) as prominent traits among HFA individuals. We proposed that HFA individuals would be likely to construct their own belief systems, drawing on their interest in systemizing and lack of need to conform to approved social behaviors. The belief orientation category of "own Construction" was more frequently endorsed by individuals in the HFA sample as compared to the NT sample.

Although most of the Autism Spectrum Disorder Thinking Traits did not differ between the two groups, emphasis on rationality was notably higher for wrongplanet users. Social discomfort and social disinterest was also slightly higher for the HFA and NT populations.

**Study 2: Internet Questionnaire**

**Method**

**Participants**

Sixty-one participants who identified themselves as individuals with an Autism Spectrum Disorder completed our survey. Respondents gained access to our survey from links posted on popular online autism communities and did so on a voluntary basis. One hundred-and-five individuals consisting mainly of undergraduates at a northeastern university taking psychology classes comprised our neurotypical (NT) comparison group. Demographically, the HFA and NT populations were similar except greater ethnic diversity was demonstrated by the NT population in comparison to the HFA group which included primarily Caucasian participants. Although participants in the HFA group demonstrated a wider age range than the NT group, the majority of both populations were younger than 30 years old.

**Questionnaire**

*Diagnostic Information.* Participants were asked whether they had obtained a diagnoses of Autism Spectrum Disorders as well as any other emotional, behavioral, or cognitive conditions they might have.

*Religious Belief.* Participants wrote their religious orientation, briefly described their beliefs and rated the intensity of their beliefs on a scale of 1 to 5. (1 = only slightly, 2 = somewhat, 3 = moderately, 4 = quite religious, 5= deeply religious). Questions included the presence and frequency of the individual's current and childhood religious practices, including education. Information regarding parent's religious beliefs and practices both presently and during the participants' childhood was also collected.

**Autism Quotient.** Baron-Cohen's Autism Quotient is comprised of 50 Likert statements. This measure can be used to define a continuum between autism and neurotypicals, with prior data on AQ scores showing that autism > Asperger's > mathematicians > scientists > college professors > all males > all females (Baron-Cohen et al, 2001a).

**Reading the Mind in the Eyes Test.** Participants were presented with 36 different photos of eyes and asked to identify the emotion from a set of 4 choices (Baron-Cohen et al., 2001b). This test measures facial affect recognition and is considered a sensitive index of emotional intelligence, including theory of mind.

**Systemizing Quotient Revised.** This scale requires participants to rate their degree of interest in different types of systemizing including collecting facts and figuring out how mechanical objects work (Baron-Cohen, Richler, Bisarya, Gurunathan, & Wheelwright, 2003).

**Data Analysis**

**Religion between populations.** Frequencies of religious orientations for each population were compared using a Chi Square analysis. One way ANOVAs were used to compare mean scores for each measure across religious categories, followed up by Tukey post hoc comparisons to detect specific differences between the religious categories.

**AQ, SQ and Reading the Mind in the Eyes.** The scores of each participant for the AQ, SQ, and Reading the Mind in the Eyes test were all correlated to determine the feasibility of a continuum from neurotypical to autism.

**Results**

Religious beliefs were found to differ significantly between the HFA and NT populations,  $\chi^2(12, N=166) = 22.698, p < .01$ . As was found in the content analysis of discussion forums, HFA questionnaire respondents were less likely than their NT counterparts to belong to an organized religion. HFA individuals were more likely to be atheist than were NT individuals. The "own construction" belief category was also found to be proportionally greater in the HFA population than in the NT population (see Figure 3).

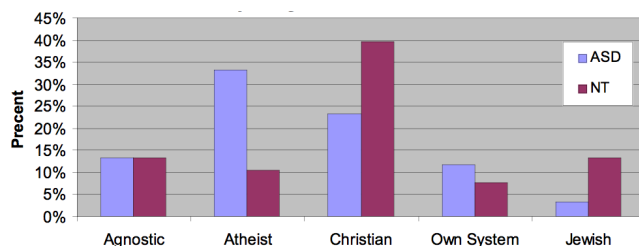


Figure 3: Religious Belief by Group, Questionnaire

To further investigate these findings, chi square tests were used to detect differences between populations regarding specific religious orientation pairings that were of "a priori" interest. A significant difference was found between HFA and NT groups when comparing distribution of Christian

and Atheist groups,  $\chi^2(1, N=86) = 12.65, p < .001$ , and Atheist and Jewish groups,  $\chi^2(1, N=47) = 11.47$ .

One way ANOVAs were used to test for significant differences in scores between religious categories.

**Autism quotient.** Across both populations AQ scores differed significantly between religious categories,  $F(7,141) = 4.33, p < .001$  (see Figure 4). Tukey post hoc comparisons of the religious categories indicate that Atheists ( $M = 32.89, 95\% \text{ CI } [28.55, 37.23]$ ) scored significantly higher on the AQ than Christians ( $M = 22.98, 95\% \text{ CI } [19.91, 26.04]$ ) and Jewish individuals ( $M = 15.57, 95\% \text{ CI } [10.82, 20.33]$ ). In addition, individuals in the Own Construction category ( $M = 28.07, 95\% \text{ CI } [22.12, 34.01]$ ) scored significantly higher than Jewish individuals ( $M = 15.57, 95\% \text{ CI } [10.82, 20.33]$ ).

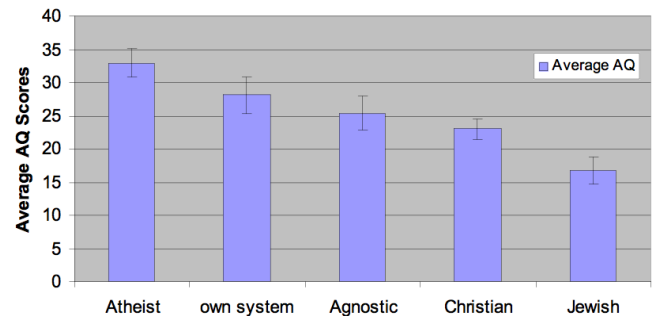


Figure 4: Autism Quotient for Religious Identity

**Systemizing quotient.** Atheists had higher SQ scores ( $M = 44.38, 95\% \text{ CI } [36.69, 52.06]$ ) scores than other respondents ( $M = 27.61, 95\% \text{ CI } [20.63, 34.6]$ ).

**Reading the Mind in the Eyes Test.** Although scores on the Eyes Test were higher for neurotypicals than for HFA respondents, no significant differences were found between religious categories within the HFA and NT populations.

**AQ, SQ, Reading the Mind in the Eyes Task.** A Pearson correlation was conducted among the three quantitative measures to demonstrate internal validity. Results indicated a significant relationship between the AQ and the Reading the Mind in the Eyes Task,  $r = -.36, n = 153, p < .001$ , as well as between the AQ and the SQ,  $r = .47, n = 153, p < .001$ . No significant relationship was found between the SQ and the Reading the Mind in the Eyes Task.

**Summary**

Results were consistent with the content analysis of the forum postings. In addition, we demonstrated that the autism quotient covaries with religious belief, combining over the HFA and NT groups, consistent with the proposal of a continuum in thinking styles from NT to high functioning autism.

**Conclusions**

Historically the study of religious belief was as far from the purview of cognitive science as any topic in human behavior could be. This has changed over the last decade as cognitive science has come to be the field where it is legitimate to combine in a single research program disparate

disciplines, even when they are outside the traditional cognitive science area of computer modeling of information processing tasks. Recently, the "cognitive science of religion" has emerged as a research program in which religion is understood as a product of cognitive aspects of the mind, such as an exaggeration of the normal human ability to infer agency, impose patterns on noise, and infer others mental states (Guthrie, 1993; Barrett, 2004). We suggest that individual differences in cognitive styles is an important predictor of human belief systems, including religious belief. An extreme type of cognitive style is high functioning autism. The 2 studies reported here found that individuals with HFA have a higher rate than neurotypicals of endorsing atheism and agnosticism. HFA individuals thus resemble another group of high-systemizers (scientists), who also reject religious belief at a relatively high rate.

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