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Who Believes in the Giant Skeleton Myth? An Examination of Individual Difference Correlates

Viren Swami[1,2], Ulrich S. Tran[3], Stefan Stieger[3,4], Jakob Pietschnig[3], Ingo W. Nader[3], and Martin Voracek[3]

Abstract

This study examined individual difference correlates of belief in a narrative about the discovery of giant skeletal remains that contravenes mainstream scientific explanations. A total of 364 participants from Central Europe completed a survey that asked them to rate their agreement with a short excerpt describing the giant skeleton myth. Participants also completed measures of the Big Five personality factors, New Age orientation, anti-scientific attitudes, superstitious beliefs, and religiosity. Results showed that women, as compared with men, and respondents with lower educational qualifications were significantly more likely to believe in the giant skeleton myth, although effect sizes were small. Correlational analysis showed that stronger belief in the giant skeleton myth was significantly associated with greater anti-scientific attitudes, stronger New Age orientation, greater religiosity, stronger superstitious beliefs, lower Openness to Experience scores, and higher Neuroticism scores. However, a multiple regression showed that the only significant predictors of belief in myth were Openness, New Age orientation, and anti-scientific attitudes. These results are discussed in relation to the potential negative consequences of belief in myths.

Keywords

scientific myths, New Age orientation, Big Five, anti-scientific attitudes, giant skeleton

Myths can be defined as commonly held, false beliefs about real persons or events, which are held contrary to known evidence (DiFonzo & Bordia, 2007). Common science-related myths include the misconception that human beings only use 10% of their brains and that the Great Wall of China is the only human-made object visible from the moon (Swami, Stieger, Pietschnig, Nader, & Voracek, 2012). Such myths have sometimes been referred to as "naïve science," because it is thought that individuals acquire such beliefs in a primitive, trial-and-error fashion (Pine, Messer, & St. John, 2001) and because they carry some significance that motivates their preservation and propagation (Brunvand, 2002).

Understanding science-related myths remains an important task for a number of reasons. First, it is known that, once a myth is accepted, new information is frequently distorted or ignored (Dole, 2000), and the incorrect belief is strengthened and becomes difficult to dislodge (Vosniadu, 2001). In addition, acceptance of science-related myths has a detrimental effect on scientific literacy, which in turn may have a negative impact on academic achievement, economic productivity, and participation in civic affairs (Hazen & Trefl, 2009). In some cases, myths—including myths derived from within social science (Ferguson, 2013)—may also be at the center of moral panics and unnecessary fears in society (Radford, 1999) or result in harmful or wasteful effects (e.g., seeking out ineffective medical or psychological treatments; Lilienfeld, Lynn, Ruscio, & Beyerstein, 2010). Conversely, better understanding of myths as well as attitudes toward science may help practitioners promote acquisition of more accurate knowledge (Sturgis & Allum, 2004).

To date, however, much of the literature on science-related myths has focused on belief in myths of psychology, or what Lilienfeld et al. (2010) termed "psychomythology." Thus, studies have reported that members of the general public have difficulty distinguishing between factual and fictional claims about human behavior (e.g., Bensley, Lilienfeld, & Powell, 2014; Della Sala, 1999, 2007; Furnham, Callahan, & Rawles, 2003; Gardner & Brown, 2013; Herculano-Houzel, 2002). Related work has indicated that even students

[1]Anglia Ruskin University, Cambridge, UK
[2]HELP University College, Kuala Lumpur, Malaysia
[3]University of Vienna, Austria
[4]University of Konstanz, Konstanz, Germany

Corresponding Author:
Viren Swami, Department of Psychology, Anglia Ruskin University, East Road, Cambridge, Cambridgeshire CB1 1PT, UK.
Email: viren.swami@anglia.ac.uk

of psychology subscribe to many myths of psychology or do not accurately understand psychology as a science (e.g., Standing & Huber, 2003; Swami et al., 2015; Taylor & Kowalski, 2004; Thompson & Zamboanga, 2004).

By contrast, one recent study sought to develop a psychometric measure of belief in a broader range of science-related myths (Swami et al., 2012). More specifically, the authors developed the 20-item Belief in Science-Related Myths Scale (BiSMyS) consisting of popular science-related narratives, which they reported could be reduced to two moderately correlated factors (r = .46) concerning human-related (e.g., "The average woman swallows six pounds of lipstick during her lifetime") and non-human-related myths (e.g., "Storing batteries in a refrigerator or freezer will improve their performance"). In addition, Swami and colleagues (2012) reported that human-related, but not non-human-related myths, were significantly associated with anti-scientific attitudes, New Age orientation, and the Big Five personality factor of Extraversion.

Although the BiSMyS is a useful addition to the armory of researchers wishing to examine belief in science-related myths, an alternative method of approaching the same topic is to focus on belief in specific myths. For example, in 2004, digitally altered photographs purporting to depict "giant skeletons" were paired with a fictitious narrative based on the Islamic account of the people of Aad. In 2007, the hoax was repeated and widely disseminated through social networking sites and email forwards, with the locale changed from Saudi Arabia in the original to northern India in the new version (Mikkelson & Mikkelson, 2010). Although a myth (the origin of accompanying photographs have been traced to an entry to create an archaeological hoax[1]), the narrative was widely disseminated, including by reputable news agencies in South Asia (see Owen, 2007).

The giant skeleton myth offers a useful means of examining belief in myths for two reasons. First, the fuller narrative of the myth and the use of accompanying imagery allow scholars to examine belief in the myth in a similar fashion to its original transmission. That is, by utilizing the myth as it was originally transmitted, it should be possible to focus on belief in a myth that retains most, if not all, of its transmission mechanism (see Fernback, 2003; Kibby, 2005). Second, by focusing on a specific myth, it is possible to examine individual difference correlates of belief in the myth specifically, rather than science-related myths in general.

In this study, then, we focused on belief in a giant skeleton myth that was presented to participants in a similar manner to its original transmission. Specifically, participants were presented with information about the purported discovery of the skeletal remains of a giant along with an accompanying (doctored) image, and were asked to rate their belief in the claim. In addition, we examined associations between belief in this particular myth and measures of the Big Five personality factors, anti-scientific attitudes, and New Age orientation. Based on previous work (Swami et al., 2012), we expected that belief in the giant skeleton myth would be positively associated with anti-scientific attitudes, New Age orientation, and possibly the Big Five traits of Openness to Experience and Extraversion. In addition, participants also completed a measure of superstitious belief and, given the myth's religious connotations, a measure of religiosity.

Method

Participants

Participants were 364 German-speaking individuals (194 women, 170 men) from Central Europe (Austria = 80.7%, German = 17.1%, other = 2.2%). Participants ranged in age from 18 to 85 years (M = 32.09, SD = 13.53). The vast majority of participants were of European Caucasian descent (98.9%) and, in terms of marital status, 33.4% were single, 38.1% were cohabiting with a romantic partner, 21.8% were married, 2.8% were divorced or separated, 2.2% were widowed, and 1.7% were of some other marital status. In terms of educational qualifications, 4.5% had completed minimum compulsory schooling, 68.4% had completed secondary education, 7.1% had an undergraduate degree, and 19.5% had a postgraduate degree.

Measures

Belief in the giant skeleton myth. Participants were presented with an excerpt that purportedly reported on the discovery of the skeletal remains of a giant skeleton (see the appendix). The excerpt was adapted from a blog entry that was circulated via email (and attributed to an April 2004 *Times of India* article), with the locale set in northern India (for details, see www.snopes.com/photos/odd/giantman.asp). Accompanying the excerpt was an image purportedly depicting the remains of a giant, which had been circulated along with the original email. Once participants had read the excerpt and viewed the image, they were asked to rate their agreement with four statements, namely "This article presents good evidence for the existence of giants," "I am convinced that giants once existed on Earth," "I believe this article is a hoax," and "The arguments of this article are convincing." Each of these items were rated on a 6-point Likert-type scale (1 = *strongly disagree*, 6 = *strongly agree*) and the third item was reverse-coded prior to analyses for consistency. The factor structure of this measure is evaluated in the "Results" section.

Big Five personality dimensions. Participants completed the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1989; German translation: Borkenau & Ostendorf, 1993), which assesses each of the dimensions of Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness with 12 items each (sample item, "I often feel tense and jittery"). These dimensions reflect an individual's

personality at the broadest level (i.e., through the inclusion of a maximum spectrum of different traits) and with efficiency (i.e., with a minimum set of dimensions). All items were rated on a 5-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*) and dimension scores were computed as the mean of items associated with each subscale. The parent NEO-FFI and its translations have been shown to have very good patterns of reliability and validity (Costa & McCrae, 1989). In the present study, Cronbach's α for the subscales were Neuroticism, .87; Extraversion, .79; Openness, .77; Agreeableness, .75; and Conscientiousness, .85.

Anti-scientific attitudes. To measure anti-scientific attitudes, we used the Anti-Scientific subscale of the New Age Beliefs Scale (Yates & Chandler, 2000; German translation: Swami et al., 2012; sample item: "The primary purpose of scientific language is to confuse the average person"). This is an 8-item measure of negative attitudes toward contemporary science, in which items are rated on a 7-point Likert-type scale (−3 = *totally unbelievable*, +3 = *totally believable*). For the present purposes, scores were recomputed prior to analysis (1 = *totally unbelievable*, 7 = *totally believable*) and an overall score was computed as the mean of all items (higher scores reflect greater anti-scientific attitudes). Previous work has reported that this subscale has a one-dimensional factor structure with good internal consistency (Yates & Chandler, 2000). Cronbach's α for this scale in the present study was .73.

New Age orientation. Participants completed the 22-item New Age Orientation Scale (NAOS; Granqvist & Hagekull, 2001; German translation: Swami et al., 2012; sample item: "The position of the stars at birth affects how one will live one's life or how one's personality will develop"). This scale measures individual differences in broad and specific systems of thought, beliefs, interests, and activities that can be described as New Age. Items were rated on a 6-point Likert-type scale (1 =*strongly disagree*, 6 = *strongly agree*) and an overall New Age orientation score was computed by taking the mean of all items (higher scores reflect greater New Age orientation). The NAOS has been shown to have good patterns of validity and reliability. In the present study, the scale's internal consistency was .94.

Superstitious beliefs. Superstitious beliefs were measured using the six-item Lucky Charms Scale developed by Wiseman and Watt (2004; German translation: Voracek, 2009; sample item: "Have you avoided walking under a ladder because it is associated with bad luck?"). The scale measures agreement with both negative (e.g., walking under a ladder) and positive (e.g., touching wood) superstitions (1 = *totally disagree*, 6 = *totally agree*). Although it is possible to calculate separate scores for positive and negative superstitious beliefs, Voracek (2009) showed that the German version of this scale was best considered as one dimensional. Therefore, an overall score was computed as the mean of all six items, with higher scores reflecting stronger superstitious beliefs. Cronbach's α for this scale in the present study was .85, which is similar to that reported for previous uses of the German translation of the scale (Swami et al., 2011; Voracek, 2009).

Religiosity. Participants' religiosity was measured using a single-item measure of intrinsic religiosity (1 = *not at all religious*, 7 = *very religious*). Although the use of a single item is limited in terms of breadth, single-item measures of religiosity have been shown to have good reliability and validity among community samples (e.g., Abdel-Khalek, 2007).

Demographics. Participants provided their demographic details consisting of sex, age, nationality, ethnicity, marital status, and highest educational qualification.

Procedure

All participants were recruited opportunistically; that is, eight researchers directly recruited participants from among their personal contacts. Participants were given brief information about the project, provided informed consent, and completed an anonymous paper-and-pencil version survey. Order of appearance of the scales was fixed (belief in the giant skeleton myth, NEO-FFI, NAOS, Anti-Scientific subscale, Lucky Charms Scale, demographics, religiosity). All participants took part on a voluntary basis and were not remunerated for participation.

Results

Giant Skeleton Myth

To examine the factor structure of the four-item measure of belief in the giant skeleton myth, we computed a principal-axis exploratory factor analysis using quartimax rotation, because of the expectation of the emergence of a general factor (Pedhazur & Schmelkin, 1991). Bartlett's test of sphericity, $\chi^2(6) = 482.00$, $p < .001$, and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, KMO = .86, showed that the items of this scale had adequate common variance for factor analysis. Both, the EGV1 criterion (eigenvalues with a value > 1.0) and examination of the scree-plot, suggested the extraction of a single factor, which accounted for 63.1% of the variance (λ = 2.55). All four items loaded onto this factor with loadings in the range of .74 to .84. Based on these results, we computed an overall score of belief in the giant skeleton myth as the mean of all four items, with higher scores indicating greater belief that the article was truthful. Cronbach's α for this measure was .79.

Stronger agreement with the giant skeleton myth was shown by women ($M = 2.36$, $SD = 1.11$) compared with men

Table 1. Descriptive Statistics for, and Inter-Scale Correlations Between, All Measures Included in the Present Study.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	Belief in giant skeleton myth		.12*	−.05	−.21**	−.01	.01	.38**	.34**	.21**	.24**
(2)	Neuroticism			−.42**	.01	−.16*	−.38**	.13*	.19**	.19**	−.02
(3)	Extraversion				.17*	.35**	.24**	−.01	.01	.07	.07
(4)	Openness					.11*	.16*	−.20**	.09	−.10	−.14*
(5)	Agreeableness						.09	.12*	.13*	.01	.16*
(6)	Conscientiousness							.01	−.04	−.07	.14*
(7)	Anti-scientific attitudes								.63**	.25**	.46**
(8)	New Age orientation									.33**	.34**
(9)	Superstitious beliefs										.10
(10)	Religiosity										
M		2.21	2.77	3.32	3.64	3.59	3.63	2.93	2.68	2.08	2.83
SD		1.10	0.71	0.55	0.57	0.51	0.61	0.98	1.04	1.15	1.75

Note. $N = 364$.
*$p < .05$. **$p < .001$.

Table 2. The Unstandardized and Standardized Regression Coefficients for the Variables Entered Into the Regression Model.

Variable	*B*	*SE*	β	*t*	*p*
Neuroticism	.09	.09	.06	1.05	.296
Extraversion	.04	.11	.02	0.33	.742
Openness to experience	−.34	.10	−.18	−3.38	.001
Agreeableness	−.08	.11	−.04	−0.73	.465
Conscientiousness	−.02	.10	−.01	−0.21	.834
Anti-scientific attitudes	.19	.08	.17	2.46	.014
New Age orientation	.23	.07	.21	3.26	.001
Superstitious beliefs	.01	.01	.03	0.46	.645
Religiosity	.04	.05	.06	0.76	.446

($M = 2.04$, $SD = 1.06$). An independent *t* test showed that the difference between women and men was significant, $t(362) = 2.77$, $p = .006$, $d = 0.29$. However, univariate ANOVAs showed that whereas there were no significant between-group differences as a function of nationality, $F(2, 360) = 1.53$, $p = .218$, $\eta_p^2 < .01$, there were some small between-group differences as a function of education, $F(3, 360) = 3.62$, $p = .013$, $\eta_p^2 = .03$. Participants who had completed only minimum compulsory schooling ($M = 2.88$, $SD = 1.24$) agreed more strongly with the giant skeleton myth than participants with upper secondary education ($M = 2.21$, $SD = 1.09$) or a postgraduate degree ($M = 1.98$, $SD = 0.95$; Tukey Honest Significant Difference post hoc tests, ps $< .05$; participants with undergraduate degree: $M = 2.41$, $SD = 1.29$).

Inter-Scale Correlations and Multiple Regression

Descriptive statistics (*M* and *SD*) and inter-scale correlations for all variables included in the study are reported in Table 1. As can be seen, stronger belief in the giant skeleton myth was significantly associated with greater anti-scientific attitudes, stronger New Age orientation, greater religiosity, stronger superstitious beliefs, lower Openness to Experience scores, and higher Neuroticism scores. We next conducted a multiple linear regression with belief in the giant skeleton myth as the criterion variable and the Big Five traits, anti-scientific attitudes, New Age orientation, superstitious beliefs, and religiosity as predictors. Results showed that the regression model was significant, $F(9, 350) = 9.82$, $p < .001$, adj. $R^2 = .20$. Multicollinearity was not a limiting factor in this regression (all variance inflation factors <2.36). Regression coefficients are reported in Table 2 and, as can be seen, the only significant predictors of belief in the giant skeleton myth were Openness to Experience, New Age orientation, and anti-scientific attitudes.

Discussion

Our results showed, first, a significant and negative relationship between belief in the giant skeleton myth and Openness to Experience. It is likely that this association is based on the fact that Openness correlates with intelligence and intellectual curiosity. For example, studies have indicated that Openness is moderately correlated with crystallized and fluid intelligence (e.g., Moutafi, Furnham, & Crump, 2006). Improved cognitive abilities, in turn, may mean that individuals are more intellectually suspicious, particularly when presented with information that is diffuse and of unknown

veracity. Consistent with this perspective, it has also been shown that Openness is positively associated with need for cognition (Fleischhauer et al., 2010), that is, a personality construct referring to an individual's tendency to scrutinize information and to think deeply about ideas and concepts. More broadly, this perspective may also help to explain why individuals with lower educational qualifications more strongly endorsed the giant skeleton myth than those with higher qualifications, although it should be noted that the effect size of this difference was small.

Our results also showed that greater belief in the giant skeleton myth was associated with stronger New Age orientation. It has been suggested that New Age beliefs may represent a secularized religion that incorporates a blend of ingredients (Granqvist & Hagekull, 2001; Houtman & Aupers, 2007), including systems of thought (e.g., astrology, Eastern philosophies) and specific beliefs (e.g., in parapsychological phenomena). Indeed, two particularly notable aspects of New Age orientation are its religious syncretism and epistemological subjectivism (Hanegraaff, 2002). These characteristics may make the myth of the giant skeleton a particularly appealing one to individuals with a strong New Age orientation. In addition, the New Age approach to truth is often opposed to the analytic methods of science (Flere & Kirbiš, 2009), which may enhance belief in the giant skeleton myth either directly or through the association between New Age orientation and anti-scientific attitudes (in our study, $r = .63$).

This suggestion links with our third key finding, namely, the relationship between belief in the giant skeleton myth and anti-scientific attitudes. The latter refers to an aversion to the analytic methods of mainstream science, particularly rules of evidence generation and evaluation (Yates & Chandler, 2000). This may make individuals who are holding stronger anti-scientific attitudes less willing or able to critically evaluate claims of a dubious nature, such as the giant skeleton narrative. Although anti-scientific attitudes was the weakest of our significant predictors in our regression, this relationship is consistent with the earlier finding that anti-scientific attitudes are correlated with belief in science-related myths (Swami et al., 2012). More broadly, it might be suggested that holding anti-scientific attitudes makes the assimilation of anomalous beliefs, such as the giant skeleton myth, more likely.

A number of additional findings of the present work are worthy of mention. First, we found that religiosity emerged as a significant correlate of belief in the giant skeleton myth (indeed, it was one of the stronger correlates), but did not emerge as a significant predictor in our multiple regression. If New Age beliefs do indeed represent a secularized religion (Granqvist & Hagekull, 2001), then it is likely that there is a good deal of shared variance accounted for by New Age orientation and religiosity. Likewise, there is likely a good deal of overlap between New Age beliefs and superstitious beliefs, which may explain why the latter emerged as a significant correlate of belief in the giant skeleton myth but not as a significant predictor.

In addition, our results suggest that belief in the giant skeleton myth may have a number of unique personality predictors compared with belief in science-related myths more broadly. Specifically, science-related myths appear to be associated with the Big Five personality factor of Extraversion (Swami et al., 2012). However, Extraversion did not emerge as a significant correlate of belief in the giant skeleton myth, possibly suggesting a distinction between meta-theoretical beliefs about science-related myths and specific myths. We also found that women were significantly more likely to believe in the giant skeleton myth than men. This finding stands in contrast to the lack of gender differences in belief in science-related myths (Swami et al., 2012), although it should be noted that the effect size of the difference in the present study was small.

There are a number of ways in which the design of the present study could be improved upon. First, our sampling method may have introduced an inherent bias and our findings should only be generalized to the wider population with caution; utilizing a more representative sample would offer one means of improving on the present work. Second, whereas we have focused on individual difference correlates of belief in a specific myth, future research may wish to incorporate a different theoretical perspective, such as the dual-process persuasive model (Eagly & Chaiken, 1993; Petty & Cacioppo, 1996). Such a perspective may be particularly useful in understanding the assimilation of myths, insofar as it focuses attention on variables associated with the source and message, which the present study did not manipulate.

The findings of the present study suggest that there are a number of individual difference correlates of belief in a specific myth that contravenes conventional scientific explanation. Although our study was limited to a specific myth, it should be noted that most such myths have a specific format and are typically in continuous circulation (Sacco, 2005), thus allowing for some generalization of findings. Moreover, such myths can sometimes emerge from within social science itself (Ferguson, 2013). If our research can be corroborated (e.g., with a further set of myths or using a naturalistic design), our findings will prove useful for policy makers seeking to inoculate individuals from erroneous narratives, which may bring a raft of negative consequences with them (e.g., Ferguson, 2015; Hazen & Trefl, 2009; Lilienfeld et al., 2010).

Appendix

The Excerpt of the Giant Skeleton Myth Presented to Participants

Recent exploration activity in the northern region of India has uncovered the skeletal remains of a human of phenomenal

size. This region of the Indian desert is called the Empty Quarter. The discovery was made by the Indian Division of the National Geographic Team, with support from the Indian Army as the area comes under the jurisdiction of the Army. The exploration team also found tablets that suggest the giant belonged to a race of superhumans that are mentioned in the *Mahabharata*, a Hindu epic poem from about 200 BC. The government of India has now secured the whole area and no one is allowed to enter except National Geographic personnel.

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Note

1. The claim must be a hoax because humanoid giants break the square-cube law, that is, the law that as a shape grows in size, its volume grows faster than its area. This law places fundamental limits to the size that humans can grow.

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Author Biographies

Viren Swami is professor of Social Psychology at Anglia Ruskin University and his research focuses on the psychology of human appearance and body image. He is the author of *Attraction Explained*.

Ulrich S. Tran is based at the University of Vienna and specialises in clinical psychology, and psychometrics.

Stefan Stieger is at the University of Konstanz and has research expertise in the areas of social psychology and psychometrics.

Jakob Pietschnig is based at the University of Vienna, with research expertise in cognitive and differential psychology.

Ingo W. Nader is at the University of Vienna and his research focuses on differential psychology and psychometrics.

Martin Voracek is associate professor and deputy head of Department of Basic Psychological Research at the University of Vienna. His areas of specialism include individual differences research and meta-analysis,