

**Original article**

**DENIAL OF EVOLUTION: AN EXPLORATION  
OF COGNITION, CULTURE AND AFFECT**

Kilian James Garvey  
*Department of Psychology  
The University of New England*

**Abstract**

Numerous polls conducted in the United States on the subject of the diversity of life on earth show an approximate 50/50 split between belief in biological evolution and belief in biblical creationism. Hypotheses generated to explain this have focused primarily on cognitive and cultural characteristics of individuals who reject Darwinian evolutionary theory. To date the consideration of affective characteristics has been lacking. In this exploratory study, the cultural measures of church attendance and belief in God, the cognitive measure of Need for Cognitive Closure and the affective measures of fear and disgust all correlate with denial of evolutionary theories. Limits and implications of exploring the affective motivations of cognitions will be discussed.

**Keywords:** Creationism, Evolution, Cognitive, Cultural, Affective, Fear, Disgust

**Introduction**

In May of 2007, a Gallup poll asked, “Now, thinking of how human beings came to exist on Earth, do you personally believe in evolution or not?” The results were consistent with most polls on the general acceptance of evolution: 49% responded, “Yes, I believe in evolution;” 48% responded, “No, I do not believe in evolution;” and 2% had no opinion. This is a curious response to the validity of perhaps the single strongest theory in the history of science (Dennett, 1995; National Academy of Sciences, 1999), a theory that is considered the only valid explanatory mechanism in the study of biology (Futuyma, 2005; Dobzhansky, 1973). However, in June of 2007, another Gallup poll was conducted asking about the origin of life on earth in a slightly different manner. This poll obtained somewhat counter-intuitive results. When asked what their views were on *both* creationism (“the idea that God created human beings pretty much in their present form at one time within the last 10,000 years”) and evolution (“the idea that human beings developed over millions of years from less advanced forms of life”), 24% of those polled

---

AUTHOR NOTE: Please address all correspondence to Kilian Garvey, University of New England, Maine.  
Email: [kgarvey@une.edu](mailto:kgarvey@une.edu)  
©2008 Journal of Social, Evolutionary and Cultural Psychology

responded that both the theory of creationism and the theory of evolution were either probably or definitely true; 41% believed that creationism was true and that evolution was false and 28% believed that evolution was true and creationism was false.

In an attempt to understand the factors contributing to the high rate of disbelief in evolution (Mazur, 2005) the current exploratory study examines the relationship among cognitive, cultural and affective measures and attitudes on creationism and evolution.

### *Cognitive Explanations*

The widespread rejection of such a strongly validated theory may stem from one of two cognitive reactions: either the sciences supporting the concept of biological evolution are so complex and remote that the average person would have difficulty understanding the theory or the implications of the idea itself are objectionable.

Biological evolution is based on relatively sophisticated research in the areas of genetics, biochemistry and paleontology. It is possible that the difficulty that the average person might have in understanding these scientific disciplines leads to apprehension, unease, or distrust. If the complexity of a branch of science is negatively correlated with its acceptance, then, other equally or more complex branches of science should meet with levels of rejection similar to that which the Darwinian paradigm has faced.

Consider the theory of immunology, which leads, of course, to a variety of vaccinations that have either eradicated or greatly reduced many life-threatening illnesses. The sciences supporting immunology, including but not limited to molecular biology, pharmacology and pathology, are hardly more accessible or easier to understand than those sciences supporting the theory of evolution. Yet, while more than 90% believe in and are supportive of vaccinations (Gallup, 2001), at least half of the American population does not believe in or support evolution (Gallup, 2005).

If evolution and immunology are both complex sciences, why would one be rejected at such a high rate and the other be accepted at such a high rate? The difference in acceptance rates of these two sciences may lie not in the composition of the ideas themselves but in the consequences of belief.

The theory of biological evolution may seem, at least to some, based in large part on the assumption that life on earth is the result of a series of seemingly random genetic mutations accumulated over millions and millions of years rather than the specific and intention creation of the first humans, between 6,000 and 7,000 years ago in the Garden of Eden by an all-loving, all-powerful, and all-knowing deity. Evolution may seem to oppose accepted (and comforting) ontological beliefs while offering no immediate benefits.

The theory of immunology, also based in large part on seemingly random genetic mutations (at least those of viruses) does not seem to infer anything about the privileged nature of humans, nor does it pose any obvious threat to the existence of God. However, it does seem to offer the existential promise of protecting the believer and the friends and families of believers from pain, disease and death.

Current attitudes about evolution may be attributed, at least in part, to ignorance of the near universal scientific support it receives. Alters and Nelson (2002) have described the lack of evolution and scientific literacy among both teachers and students at the high school and university level, the poor job that the media does at explaining the scientific basis for the theory of evolution; and the “intentional undermining of evolution education by antievolution organizations with some of the most influential groups headquartered in North America” (p.1892). However, they have also reported that even specific biological training seems not to

make much difference in how individuals think about evolution. Biology majors have shown about the same degree of evolutionary understanding as non-majors even after a semester long ecology and evolutionary biology course (Sundberg & Dini, 1993, in Alters & Nelson, 2002). While exposure to the science supporting evolutionary concepts is not universal, even students majoring in biology with specific coursework in evolutionary theory seem to be resistant to accepting the concept of natural selection as an explanation for the diversity of life on earth. If this study allows us to rule out the lack of formal scientific training as the sole explanation for the rejection of biological evolution, then it is possible that an alternative or contributing factor may be motivating individuals to reject the biological and accept the Biblical explanations. It has been hypothesized that closed mindedness, as measured by the Need for Cognitive Closure scale (Webster & Kruglanski, 1994), might account for this denial of evolution.

Hypothesis 1 predicts that greater need for cognitive closure will be correlated with rejection of biological evolution and acceptance of biblical creationism.

### *Cultural Explanations*

An alternative explanation for the rejection of biological evolution is the impact of culture.. Specifically, it is the perception that Darwinian evolution stands in direct conflict to the Biblical version of creation (Alters & Nelson, 2002; Scott, 1997).

The June 2007 Gallup poll mentioned above found that of the respondents denying evolution, 72% explained their response in terms of belief in Jesus, God, the Bible, or their religion. Only 14% suggested that they rejected evolution because of a lack of scientific evidence. This does not necessarily mean that it is a particular religious denomination or denominations that oppose evolution (although many do). A central tenet of the monotheistic religions is that humans are special among life on earth, specifically created in the image of the divine (Holy Bible, New International Version, Genesis 1:26, 27), and, thus, could not have non-human ancestors (Scott, 1997).

The majority of antievolutionist positions make very specific reference to Biblical scripture and implicitly or explicitly imply that evolution is morally reprehensible. Additionally, those advocating the antievolutionist position threaten that by accepting the scientific explanation for the diversity of life on earth, one will necessarily sever a relationship with a personal, loving and protective God. Scott (1997) explores some of the motivations behind religious antievolutionism. She reports that while “some pay lip service to supposed scientific problems with evolution, what motivates them to battle its teaching is apprehension over the implications of evolution for religion” (p. 264).

Therefore, it would stand to reason, that religious characteristics would contribute to the acceptance or rejection of the theory of evolution. Hypothesis 2 predicts that (1) frequency of church attendance and (2) specific belief in God will be positively correlated with creationist beliefs.

### *Affective Explanations*

Lastly, emotional characteristics of individuals who deny biological explanations for the diversity of life were explored. A cursory reading of the literature on the creation-evolution debates exposes the existence of strong emotional resistance to the implications of Darwinian theories.

Specifically, most resistance originates in “fear that if their children learn evolution, they will cease to believe in God” and fear that “without God to guide them, children will grow up to

be bad people” (Scott, 1997, p. 264). Numerous books and publications (Hunter, 2001; Weikart, 2004; Ham, 1987, 1999; Ham & Ware, 2007; Morris, 1994) interpret evolutionary theory in general and the work of Charles Darwin in particular as threatening to religious morality and directly or indirectly responsible for communism, slavery, and the evils of genocide through the works of Marx, Trotsky, Hitler, Stalin, and Pol Pot, among others.

Hypothesis 3 predicts that the traits of (1) higher fear perception and (2) more acute disgust sensitivity would predict acceptance of creationism and rejection of biological evolution.

## **Method**

### *Participants*

Participants were 62 students (46 female, 16 male) aged between 18 and 22 ( $M = 18.9$ ,  $SD = 1.1$ ) enrolled in introductory psychology classes at a private liberal arts college in New England. The reported ethnicity of the participants was 58 European-American, 1 Hispanic-American, 1 Asian-American, 1 self-reported “other”, and 1 participant did not respond to this question.

### *Procedures and materials*

Six measures were taken in this study: Creation/Evolution-10 (CE10); Need for Cognitive Closure (NFC); a single item “frequency of church attendance” question; a single item belief in God question; the Fear Perception Index (FPI); and the Disgust Sensitivity Scale-Revised (DS-R). The CE10 (Garvey, 2006) measures rejection of evolution. This scale (appendix A) is constructed of 10 items ( $\alpha = .96$ ) tapping beliefs about the origin of the universe, the development of biological life, the age of the earth, and the accuracy of the Biblical version of creation. The responses, measured on a 7-point Likert scale, were summed to compute total scores. Lower overall scores indicate a more creationist outlook and higher overall scores indicate a more evolutionary outlook.

The NFC questionnaire (Webster & Kruglanski, 1994) is a self-report instrument consisting of 42 items ( $\alpha = .87$ ) that asks participants to state the degree to which they agree with statements indicating a preference for closure, and statements indicating a preference to avoid closure. For example: “I think that having clear rules and order at work is essential for success,” “I don’t like to go into a situation without knowing what I can expect from it,” and “In most social conflicts, I can easily see which side is right and which is wrong.” The need for cognitive closure was constructed to tap motivations underlying nonspecific closure, or, the “desirability of any answer as long as it is definite” (Kruglanski & Webster, 1996, p. 263). Conclusions reached by this motivated closing of the mind are often socially relevant, providing feedback leading to self-verification or self-enhancement. Responses to items on the NFC were given on a 6-point Likert scale, ranging from 1 (strongly agree) to 6 (strongly disagree), and are summed to compute total scores. Higher scores on the NFC signify greater need for cognitive closure.

Frequency of church attendance was measured with the single item question “Approximately how many times a month do you attend religious services?” Responses were given on a 5-point Likert scale, from “zero” (scored as “1”) to “four or more” times a month (scored as “5”).

Belief in God was measured with the single item question asking participants to indicate their position on the existence of God. Responses range from “Strong theist: 100% probability that God exists” (scored as “1”) to “Strong atheist: Zero percent probability that God exists; I

know there is no God” (scored as “7”). The wording for the “belief in God” question was adapted from Dawkins (2006).

Individual differences in fear sensitivity were assessed with the Fear Perception Index (FPI; Eigenberger, 1998). The FPI measures aversion to a wide range of unpleasant but non-dangerous environmental stimuli. The FPI asks participants to assess how (un)comfortable they are with 108 items ( $\alpha = .96$ ) which one might expect to encounter in a modern environment. Items include biological “threats” (dogs, bats, fire, toads, harmless spiders, harmless snakes), medical “threats” (open wounds, dead people, human blood, medical odors, germs and viruses), and social or moral “threats” (offending God, dancing, making important decisions alone, being alone in a foreign country, encountering people who seem insane) but nothing specifically directly or indirectly related to the theory of evolution. Responses to items on the FPI were measured on a 5-point Likert scale, summed to compute total score. Higher scores on the FPI signify greater self-reported fear reactions.

Individual differences in disgust sensitivity were assessed with the Disgust Scale-Revised (Haidt, McCauley, & Rozin, 1994). The DS-R is a 27-item scale ( $\alpha = .93$ ) that explores attitudes about stimuli that you might ingest (eating monkey meat, drinking spoiled milk), touch (picking up a dead cat with your bare hands, stepping barefoot on an earthworm), or see (seeing maggots on a piece of meat, seeing a man with his intestines exposed after an accident). The scale does not address biblical or evolutionary concepts. Responses on the DS-R were assessed with a 5-point Likert scale, summed to compute total score. Higher scores on the DS-R signify greater self reported disgust sensitivity.

## Results

All hypotheses were supported by the data. Table 1 presents the results of the correlational analysis. As expected, the preference of a Biblical explanation versus an evolutionary explanation of the origins of the universe, the age of the earth, and the phenomenon of biological life was strongly associated with frequency of church attendance ( $r = -.669, p < .001$ ), and belief in God ( $r = .748, p < .001$ ), such that creationists reported attending religious services more frequently and reported a stronger level of belief in God than those who doubted creationism. Belief in creationism was also strongly correlated with need for cognitive closure ( $r = .406, p = .001$ ), such that higher need for non-specific closure was associated with a creationist ideology. Finally, the affective measures of fear ( $r = -.395, p = .004$ ), and disgust ( $r = -.365, p = .006$ ) were correlated with creationism such that individuals who self reported greater fear reactions and disgust sensitivity were more likely to believe in creationism.

Table 1 for Denial of evolution: An exploration of cognition, culture, and affect.

<b>Variable</b>	Creationism	Need for Closure	Church Attendance	Belief in God	Fear	M	SD	Scale Range
Creationism						41.88	18.74	10-70
Need for Closure	0.406**					146.08	26.29	105-220
Church attendance	-0.669**	-0.450**				2.24	1.42	1-5
Belief in God	0.748**	0.227	-0.554**			2.78	1.68	1-7
Fear	-0.395**	-0.307*	0.292*	-0.260*		280.19	72.95	147-395

---

Disgust	-0.365**	-0.311*	0.22	-0.234	0.589**	79.19	21	35-113
---------	----------	---------	------	--------	---------	-------	----	--------

---

\*Correlation is significant at the 0.05 level (2-tailed)

\*\*Correlation is significant at the 0.01 level (2-tailed)

### **Discussion**

It was predicted that church attendance and belief in God would be strongly correlated with a Biblical version of creation. Inclusion of these questions was motivated primarily as a replication of previous research (Alters & Nelson, 2002; Mazur, 2005; Scott, 1997). The measure of need for cognitive closure has been used primarily to assess individual differences in political or social decision making but has never been used to explore cognitive characteristics of anti evolutionary attitudes. Kruglanski and Webster (1996) claimed that cognitive closure would have “widely ramifying consequences for social-cognitive phenomena at the intrapersonal, interpersonal, and group levels of analysis” (p. 263). The correlation of NFC with creationism suggests that at least part of the rejection of Darwinian evolutionary theory is a reaction to the idea as if it were a personal or social threat. This would not be the first time, of course, that social groups rejected a scientific discovery because of its direct or indirect implications. From the heliocentric theory of Copernicus, Kepler, and Galileo to the theory of continental drift formalized by Wegener, new ideas that threaten an established worldview are commonly resisted. Some of this historical resistance may have been due to an existential threat, and some to an epistemic threat, but they might all qualify as motivated closing of the mind.

Finally, and most importantly from the perspective of this study, individual differences in fear and disgust were associated with creationist beliefs. These measures did not correlate as strongly as the cultural and cognitive factors, but this does represent the first analysis of emotion as a factor in creationist ideology. While personal need for cognitive closure has been viewed as a protection against “bad news” (Kruglanski & Webster, 1996) the measures of fear perception and disgust sensitivity suggest that individuals who are more likely to see the world as threatening interpret the science of evolution as a threat. The emotion of fear is considered to be primarily concerned with the perception of a specific threat (e.g., snakes, spiders, terrorists) and is more likely to be articulated when experienced. Disgust, however, is more likely to be activated by a subtle perception of an indirect or non-specific transgression, often an offense to the group to which one belongs, such as burning the American flag. Individuals experiencing fear are much more likely to have conscious access to their feelings: “If we don’t fight terrorists over there, then we’ll have to fight them over here,” than are individuals experiencing disgust: “I know retired flags are burned anyway, but, it just seems wrong to do it at a political rally” (Rozin, Haidt, & McCauley, 2000). These results are interpreted as revealing a sensed, consciously or not, threat to the group. In this case, the group is the religious organization and the threat is the perception that evolutionary theory might contradict the writings in the book of Genesis. This perceived threat ultimately may be interpreted as a contradiction to the idea that the individual is special, the group is chosen, and that belief in God will be rewarded with infinite happiness (Pascal, 1670/1966).

### **Acknowledgements**

The author would like to thank Nell-Garwood Garvey, Satoshi Kanazawa, Glenn Geher, Daniel Kruger and Glenn Branch for their helpful comments.

## References

- Alters, B. & Nelson, C. (2002). Teaching evolution in higher education. *Evolution*, 56, 1891-1901.
- Dawkins, R. (2006). *The God Delusion*. New York: Houghton Mifflin.
- Dennett, D. C. (1995). *Darwin's Dangerous Idea: Evolution and the Meanings of Life*. New York: Simon & Schuster.
- Dobzhansky, T. (1973). Nothing in biology makes sense except in the light of evolution. *The American Biology Teacher*, 35, 125-129.
- Eigenberger, M. E. (1998). Fear as a correlate of authoritarianism. *Psychological Reports*, 83, 1395-1409.
- Futuyma, D. J. (2005). On Darwin's shoulders. *Natural History*, 114, 64-68.
- Gallup Organization. (2007). *Majority of republicans doubt theory of evolution*. Retrieved on October 4, 2008, from [www.gallup.com/poll/27847/Majority-Republicans-Doubt-Theory-Evolution.aspx](http://www.gallup.com/poll/27847/Majority-Republicans-Doubt-Theory-Evolution.aspx).
- Gallup Organization. (2005). *Most Americans tentative about origin-of-life explanations*. Retrieved on October 4, 2008, from [www.gallup.com/poll/18748/Most-Americans-Tentative-About-OriginofLife-Explanations.aspx](http://www.gallup.com/poll/18748/Most-Americans-Tentative-About-OriginofLife-Explanations.aspx).
- Gallup Organization. (2001). *Americans supportive of childhood vaccinations*. Retrieved on October 4, 2008, from [www.gallup.com/poll/4768/Americans-Supportive-Childhood-Vaccinations.aspx](http://www.gallup.com/poll/4768/Americans-Supportive-Childhood-Vaccinations.aspx).
- Garvey, K. (2006). *Interaction of epistemic, existential, and ideological motivations of anti-Darwinian cognitions*. Poster presented at the 18th Annual Meeting of the Human Behavior and Evolution Society, Philadelphia, PA.
- Haidt, J., McCauley, C., & Rozin, P. (1994). Individual-differences in sensitivity to disgust – a scale sampling 7 domains of disgust elicitors. *Personality and Individual Differences*, 16, 701-713.
- Ham, K. (1987). *The Lie: Evolution*. El Cajon, CA: Master Books.
- Ham, K. (1999). *Creation Evangelism for the New Millennium*. Green Forest, AR: Master Books.
- Ham, K. & Ware, C. (2007). *Darwin's Plantation: Evolution's Racist Roots*. Green Forest, AR: Master Books.
- Hunter, C. (2001). *Darwin's God: Evolution and the Problem of Evil*. Grand Rapids, MI: Brazos.
- Holy Bible: New International Version. (1988). Grand Rapids, MI: Zondervan Publishing House.
- Kruglanski, A. W. & Webster, D. M. (1996). Motivated closing of the mind: "Seizing" and "freezing." *Psychological Review*, 103, 263-283.
- Mazur, A. (2005). Believers and disbelievers in evolution. *Politics and the Life Sciences*, 23, 55-61.
- Morris, J. (1994). *The Young Earth*. Green Forest, AR: Master Books.
- National Academy of Sciences (1999). *Science and Creationism: A View from the National Academy of Sciences* (2nd Ed.).
- Pascal, B. (1666). *Pensées*. (A. J. Krailsheimer, Trans.). Harmondsworth, UK. (Original work published 1670).
- Rozin, P., Haidt, J. & McCauley, C. (2000). Disgust. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of Emotions*, 2<sup>nd</sup> edition (pp. 637-653). New York: Guilford Press.

*An exploration of the contributions of cognitive*

- Scott, E. (1997). Antievolution and creationism in the United States. *Annual Review of Anthropology*, 26, 263-289.
- Sundberg, M. D. & Dini, M. L. (1993). Science majors versus nonmajors: Is there a difference? *Journal of College Science Teaching*, 23, 299-304.
- Webster, D. M. & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, 67, 1049-1062.
- Weikart, R. (2004). *From Darwin to Hitler, Evolutionary Ethics, Eugenics and Racism in Germany*. New York: Palgrave MacMillan.

**Appendix A - Creationism Evolutionism Scale: The CE10 (Garvey, 2006)**

All responses are from 1 (strongly agree) to 7 (strongly disagree).

1. The physical universe of space, time, matter, and energy was supernaturally created by a transcendent personal Creator who alone has existed from eternity.
2. The phenomenon of biological life did not develop by natural processes but was specially and supernaturally created by the Creator.
3. The first human beings did not evolve from an animal ancestry, but were specially created in fully human form from the start of time.
4. Dinosaurs and many other animals are pre-historic: most of the earth's history took place before man existed (reverse score).
5. The age of the Earth, approximately 4.5 billion years, is supported by the geological record (reverse score).
6. The concept of biological evolution is a scientific theory supported by a large body of collected data; specifically scientific research which evaluates and measures the age of organic materials (reverse score).
7. The Bible is the divinely-inspired revelation of the Creator to man. Its unique verbal inspiration is complete in every respect and guarantees that these writings, as originally and miraculously given, are infallible and completely authoritative on all matters with which they deal, free from error of any sort, scientific and historical as well as moral and theological.
8. All things in the universe were created and made by God in the six literal days of the creation week, between 6,000 to 7,000 years ago. The creation record is factual, historical, and perspicuous; thus all theories of origins or development which involve evolution in any form are false.
9. The first human beings, Adam and Eve, were specially created by God, and all other men and women are their descendants.
10. The Biblical record of primeval earth history is fully historical, clear and indisputable, including the worldwide cataclysmic flood in the days of Noah.