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You and me baby ain't nothing but mammals:

Disgust, evolution, and the transcendence of an immaterial soul

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Abstract

Materialist theories of mind are disturbing for those who endorse the idea that an immortal soul is distinct from the material body. Many argue for a uniqueness of the human spirit that transcends bodily qualities. The present research focuses on the rejection of human evolution from the perspective of disgust, which has both a physical (body) and moral (soul) component and is elicited by objects that remind us of both death and animals. Study 1 asked whether those primed to feel disgusted would show an implicit preference for creationism over evolution on an Implicit Associations Test but failed to find significance. Studies 2 and 3 found that disgust motivates a preference for the view that humans are unique from animals but failed to disambiguate the disgust emotion from an overall negative affect. Implications for the broader role of disgust as a body-soul emotion, especially as it relates to rejecting evolution and scientific reductionism, are discussed.

Forward

Most religions endorse the idea of a soul (or spirit) that is distinct from the physical body. As research in neuroscience increases, it seems that incrementally more aspects of a person can be explained by the functioning of a material system. Gilbert Ryle (1949) accused Descartes of making a category mistake when he sought to uncover the location of a human soul - what Ryle referred to as "the ghost in the machine." Some theologians and even certain neuroscientists resist what the mind sciences have to tell us about love, personality, spirituality, and morality. The term "nonmaterialist neuroscience" has even joined "intelligent design" as an alternative interpretation of scientific data.

Flanagan (2002) cites "the problem of the soul" as the wider concern regarding scientific reductionism:

> …A shorthand way of referring to a cluster of philosophical concepts that are central components of the dominant humanistic image. These concepts include, for starters, a nonphysical mind, free will, and a permanent, abiding, and immutable self or soul. It is the survival of these concepts that ordinary people fear at risk from scientific progress, and this fear is at the root of the deep-seated resistance to the scientific image…If the nonphysical mind, free will, and the soul are not real things but are mere appearances, then, well, it is the end of the world – at least the end of the world as we know it (p. x).

The present research focuses narrowly on resistance to the view that humans evolved from animals: humans are not the superior product of some unique process of evolution, and there is no special place for an immaterial or immortal soul in the wholly material body. I will use empirical psychological methods to investigate the role of the disgust emotion in intuitions regarding human uniqueness and, by extension, human evolution.

This project is a wholly interdisciplinary approach; the method is psychological, but the questions are fundamentally philosophical. Prinz (2008) argues that there is a revolution taking place in philosophy – especially in the philosophy of mind and moral philosophy - since philosophers have been "getting their hands dirty." A new class of experimental philosophers are leaving the armchair and contributing to science by designing and conducting their own experiments. Subsequently, the present project encompasses the broader philosophical nexus and then finds its narrow focus in psychological literature. I am in agreement with Hume (1739), who wrote, "All the sciences have a relation, greater or less, to human nature: and that however wide any of them may seem to run from it, they still return back by one passage or another [and] are in some measure dependent on the science of *man*" (p. xix).

Mind-body dualism and the search for an immaterial soul

The dominant view of the mind for contemporary cognitive and mind scientists is that of a *dual process model*. When a person makes judgments or solves problems, there are two processing systems at work that often arrive at differing conclusions. Zajonc (1980) argued that feeling and thought are to some extent separate systems with biological bases, and research on automatic evaluation confirms that very brief or even subliminal presentations of affectively valenced words can alter a person's goals and motivations. Bargh (1994) went so far as to argue that most of our behaviors and judgments are made automatically (i.e., made without intention, effort, or awareness of process).

This idea that human actions are guided by two separate processes - one that is slow, effortful, and under conscious control, and one that is not - is a modern evaluation of the ancient mind-body problem in philosophy. Historically, the mind-body problem is typically associated with dualism in the philosophy of mind, which states that the mental (mind) and the physical (body) are radically different kinds of thing. This is, for most individuals, the "default option" by way of dualism's intuitive appeal – there is something that *feels* qualitatively different about the way we experience our bodies and the way we experience the inner contents of our minds. In Plato's *Phaedo,* he argued that the true substances are not physical bodies, which are ephemeral, but the eternal Forms of which bodies are imperfect copies. Here, Plato provided a variety of arguments for the immortality of the soul, one of which argued that the intellect is immaterial because Forms are immaterial and intellect must have an affinity with the Forms it apprehends.

Plato's dualism speaks of the soul as imprisoned in the body and is integral to his entire metaphysics.

Cartesian dualism is notable for its emphasis on interaction: Descartes held that the mind and body are distinct substances, but that they interact at the point of the Pineal gland. Again, Descartes' philosophy of mind is inextricable from his wider conception of epistemology and metaphysics, but he generally held that the one thing which we cannot doubt is that we possess the capacity for thought, which is not subject to the material world. As Descartes' skepticism and doubts of the material world increased, his certainty of the existence of his soul only augmented. The crux of his argument is as follows:

(1) I cannot be sure of anything in the material world;
(2) I am sure of the mind;
(3) Therefore, the mind is part of the immaterial world.

Descartes' proof relies on introspection, and regardless of whether his conclusions are sound, it seems that the lay individual can sympathize with his intuitive appeal. Nothing is more certain to us, as humans, than the fact that we possess some superior ability to think. And by extension, there is something distinctive between the faculties of the mind of humans and the faculties of the minds of animals. The crux of a human being is material flesh, a mere animal body, and yet, as Descartes purported, even the greatest skeptic cannot doubt the existence of some immaterial soul.

In his *Discourse on the Method for Conducting One's Reason Well and for Seeking the Truth in the Sciences*, Descartes (1998) wrote:

> …There is none at all that puts weak minds at a greater distance from the straight path of virtue than to imagine that the soul of beasts is of the same nature as ours, and that, as a consequence, we have nothing to fear or to hope for after this life any more than do flies and ants. On the other, when

> one knows how different they are, one understands much better the arguments which prove our soul a nature entirely independent of the body, and consequently that it is not subject to die with it. Then, since we do not see any other causes at all for its destruction, we are naturally led to judge from this that it is immortal (p. 34)

Placing this in the wider nexus of Descartes' philosophy of mind, we see that he places particular emphasis on the elevated nature of human existence. His motivation to locate some immaterial soul within an otherwise material body reveals a key distinction that will become the focus of the present research. The nature of human existence seems intuitively irreducible to that of animals, and I argue that this view is not limited to Cartesians. The body is often compared to a temple that houses a non-corporeal soul – we perceive the soul of a human as something sacred, transcendent and elevated above and beyond the repugnant, mortal and materially limited nature of its bodily flesh.

Descartes' project to resurrect an immaterial soul from an otherwise materialist view of the mind follows directly from one of the sincerest of human existential dilemmas – the need to understand ourselves as somehow elevated beyond mere animal qualities as a means to suppress the fear of death. In his book *The Denial of Death,* Becker (1973) reflects upon the conflicted dual nature of human beings:

> For ages, when philosophers talked about the core of man they referred to it as his 'essence'…but nothing like it was ever found…This is the paradox: he is out of nature and hopelessly in it; he is dual, up in the stars and yet housed in a heart-pumping, breath-gasping body…His body is a material fleshy casing that is alien to him in many ways – the strangest and most repugnant way being that it aches and bleeds and will decay and die. Man is literally split in two: he has an awareness of his own splendid uniqueness in that he sticks out of nature with a towering majesty, and yet he goes back into the ground a few feet in order blindly and dumbly to rot and disappear forever. It is a terrifying dilemma to be in and to have to live with. The lower animals are, of course, spared this painful

> contradiction, as they lack a symbolic identity and the self-consciousness that goes with it. They merely act and move reflexively as they are driven by their instincts (p. 26).

This conflicted essence of human existence seems an undeniable reality. The human body, after all, is inherently disgusting – we eat, belch, fart, excrete, kill and procreate in the same ways as our animal relatives. And this link between mortality, material flesh, and the disgust emotion is not merely anecdotal; the Disgust Sensitivity Scale (Haidt, McCauley, & Rozin, 1994) identifies two classes of disgust elicitors as those relating to death or those relating to animals. And since the human body is, at its core, both mortal and animal-like, we are motivated to repress the repugnance of our own flesh. We inherently favor the notion that there is an undeniable transcendent quality of what we perceive to be an immortal and immaterial soul.

From dualism to disgust

The conceptual focus of this research project is the relationship between the disgust emotion and intuitions of human exceptionalism. Philosophers have long sought to locate an immaterial, immortal soul in an otherwise material world. Descartes argued for a stark distinction between the soul of humans and the soul of beasts, and Becker reflected upon the existential dilemma of being inextricably chained to a repugnant, mortal, fleshy body. The disgust emotion, from a dualist perspective, is significant in that it has both a *physical* component and a *moral* component. More explicitly, disgust has roots in both the *body* and the *soul*.

In *The Expression of the Emotions in Man and Animals*, Darwin (1872) defined disgust as referring to "something revolting, primarily in relation to the sense of taste, as

actually perceived or vividly imagined; and secondarily to anything which causes a similar feeling, through the sense of smell, touch and even of eyesight" (p. 253). Later, psychoanalyst Angyal (1941) held that disgust is a reaction specifically targeted toward waste products of the human and animal body. In particular, he related the strength of a disgust response to the degree of intimacy and contact with the disgust elicitor and attributed a specific importance to the mouth. Tomkins (1963) expanded upon this notion, stating that disgust defends the self against any increase in intimacy with aversive objects.

Rozin and Fallon (1987) have assimilated these three definitions into what they describe as *core disgust*: "Revulsion at the prospect of 'oral' incorporation of an offensive object. The offensive objects are contaminants; that is, if they even briefly contact an acceptable food, they tend to render that food unacceptable" (p. 23).

Chapman, Kim, Susskind and Anderson (2009) illustrated this transition from disgust as a physical emotion to disgust as a moral emotion by showing that the facial response expressed in response to unfair treatment uses the same muscle that responds to bad tastes. Rozin, Haidt and Fincher (2009) call this transition between physical and moral domains *oral to moral*. Although disgust likely evolved to discourage humans from ingesting noxious or harmful substances (Rozin, Haidt & McCauley, 2000), the emotion also plays a significant role in shaping moral perceptions of specific groups and acts (Bloom, 2004; Hodson & Costello, 2007). Indeed, the disgust emotion is shown in response to immoral behavior (Rozin, Lowery, Imada, & Haidt, 1999). Wheatley and Haidt (2005) showed that participants who were hypnotized to feel a flash of disgust

while reading vignettes of mildly immoral behaviors rated these behaviors as more immoral than did participants who were not hypnotized. Similarly, participants who made moral judgments while sitting at a messy desk were more inclined to regard behaviors as more morally wrong than did those evaluating the same moral judgments at clean desks (Schnall, Haidt, Clore, & Jordan, 2008).

The reverse effect also holds true; Schnall, Benton and Harvey (2008) demonstrated that making physical purity salient caused participants to make less severe moral judgments. Thus, there exists a strong link between physical purity and moral purity. Zhong and Liljenquist (2006) coined the "Macbeth effect" – threatening one's moral purity induces the need to cleanse oneself; participants asked to recall an unethical deed from their past showed an increased cognitive accessibility of cleansing related concepts and a greater desire for cleaning products than did those who recalled an ethical deed. This body of research not only supports the idea that intuitive processes may profoundly direct moral judgments (Haidt, 2001) but more specifically emphasizes the powerful role of disgust as driving intuitions regarding morality. It comes as no surprise, then, that disgust is able to persuade people to morally condemn certain groups or individuals. The Jews have long been a target of disgust, which is an incredibly effective way of motivating people toward mass murder and genocide - as was the case in the Holocaust. Telling a certain group that they are disgusting is distinct from assigning them with any of the other negative emotions due to its unique body-soul quality. As Bloom (2004) explains, deeming a certain person or group of persons disgusting gets right at the heart of Cartesian dualism – disgust is a response to people's bodies, not to their souls.

People with souls have moral worth, but mere bodies fall outside of the moral circle. Nazis denied to the Jews inner mental states, failed to extend empathy to them, and turned to disgust as a tool to commit the most heinous and debasing atrocity. Unsurprisingly, Hodson and Costello (2007) found that individual sensitivity to interpersonal disgust predicted dehumanizing perceptions of out-group members, thus establishing a link between disgust sensitivity and prejudice that was not accounted for by fear of infection or contamination. Recent work linked disgust to politically conservative attitudes, especially purity related issues, such as abortion and gay marriage (Inbar, Pizarro, Knobe & Bloom, 2009), and participants who scored high on the disgust sensitivity scale (Haidt et al., 1994) showed a greater unfavorable automatic association with homosexual as opposed to heterosexual men on an implicit associations test (Inbar, Pizarro, Knobe, & Bloom, 2009). As Nussbaum (2004) writes:

> The interest in having a subordinate group whose quasi-animal status distances the dominant group further from its own animality leads, here too, to a constructing of the woman, or the gay man, as disgusting by the imputation of further properties found disgusting. Bad smell, sliminess, eating feces – these are projected onto the group in ways that serve a political goal (p. 114).

Disgust as embodied cognition

Why has the emotion of disgust expanded from the physical (i.e., the *body*) to the moral (i.e., the *soul*)? We find one explanation in the view of human reasoning known as *embodied cognition* (Lakoff, 1987). This model suggests that cognition involves metaphors in the environment more than logical propositions and reasoning. Lakoff (1987) describes "experiential realism," in which "the structures used to put together our conceptual system grow out of bodily experience and make sense in terms of it…The

core of our conceptual systems is directly grounded in experience of a physical and social character" (p. xiv). Moreover, Lakoff and Johnson (1980) suggest that we only understand concepts such as *push* and *pull* because we have bodies that are familiar with these physical sensations. Metaphor is one of the basic cognitive processes; if we did not have the bodies and bodily experiences that we do, certain types of understanding would not be possible. Recent experimental work in embodied cognition demonstrates a link between physical warmth and social warmth (Williams & Bargh, 2008a; Zhong & Leonardelli, 2008) and also a nonconscious link between physical spatial cues and social judgment (Williams & Bargh, 2008b).

Haidt, Rozin, McCauley and Imada (1997) apply the term "embodied schemata," which refers to imaginative structures or patterns of experience that are based on bodily sensations, to the disgust emotion. People generally possess ambivalent feelings toward food, since core disgust and sensation seeking oppose each other, creating approach-avoidance conflicts regarding whether or not to try new or unfamiliar foods. Food provides humans with a wide variety of embodied schemata – "some food attracts me," "some food makes me nauseous," "washing removes danger." Haidt et al. (1997) note that we are compelled to convey these schemata as propositions, but each one is intended to include feelings and sensations (e.g., fear interest, hunger, revulsion) and bodily knowledge about chewing, swallowing and vomiting. It follows, then, that Zhong and Liljenquist (2006) found that a threat to moral purity induces the need to cleanse oneself, and that Schnall et al. (2008) found that physical cleansing leads people to judge certain moral actions as less wrong. The physical experience of purity is highly relevant to the

abstract notion of moral purity, and such judgments are grounded in bodily experience. I purport that embodied cognition bridges the link between disgust in the physical domain and disgust in the moral domain.

I am not *an animal!*

A New England Puritan Cotton Mather once found himself urinating alongside a dog, and observed that the dog presently engaged in the exact same act. He famously wrote: "Yet I will be a more noble creature; and at the very time when my natural necessities debase me into the condition of the beast, my spirit shall (I say at that very time!) rise and soar…(Thomas, 1983, p. 38). Cotton Mather illuminated the same concern articulated by Descartes and Becker – he is *not* an animal. The limitations of his corporeal body debase him, but his spirit shall lift above.

Becker (1972) proposed that humans engage in many activities to minimize their connections with animals because acknowledging this relationship makes us highly aware that, like all other animals, we are material mortal beings. Rooted within the paradoxical essence of the human body is knowledge of an eventual death - the surest of all things we will ever know. Solomon, Greenberg and Pyszczynski (1991) suggest that acknowledging our close ties with animals is disturbing: "Given such awareness, humans could not function with equanimity if they believed that they were not inherently more significant than apes, lizards, and lima beans" (p. 96).

I previously acknowledged that both death reminders and animal reminders are defined by Haidt et al. (1994) as elicitors of disgust. Accordingly, two of the items on the disgust sensitivity scale that correlate most highly with an overall score fall into the death

category (Haidt et al., 1994), and those who score highly on disgust sensitivity also score high on a fear-of-death scale (Haidt et al., 1994). Rozin, Haidt and McCauley (2000) surmise that disgust helps to suppress thoughts or experiences that suggest human mortality. The present focus is not on this link between disgust and mortality, but rather the more general connection of disgust to reminders of our animal qualities.

The role of mortality salience naturally contributes to a more general description of disgust elicitors, since anything that reminds us that we are animals elicits disgust (Rozin & Fallon, 1987). Haidt et al. (1997) write, "The massive restrictions that Americans place on eating, sexuality and body modification, and the linkage of all three to disgust, point to a concern about the human body that cannot be based on rational fears about health…Rather, Americans seem at times to hold a view of the body observed in other parts of the world: that the body is a temple, housing the self or the soul within" (p. 114). Rozin et al. (2000) write, "Humans must eat, excrete, and have sex, just like animals. Each culture prescribes the proper way to perform these actions – by, for example, placing most animals off limits as potential foods, and all animals and most people off limits as potential sexual partners. People who ignore these prescriptions are reviled as disgusting and animal-like" (p. 642).

Rozin (1990) compares the emotion of fear to the emotion of disgust; while fear primarily guards against physical threats to the body, disgust protects against subtle threats to the soul. Disgust uniquely involves a vertical dimension, setting it apart from many other emotions; it involves elements of degradation and elevation and a strong connection to purity and sacredness.

The resolution of Cotton Mather while urinating alongside a dog – "Yet I will be a more noble creature" - fits nicely with Miller's (1997) broad conception of disgust: "…ultimately the basis for all disgust is *us* – that we live and die and that the process is a messy one emitting substances and odors that make us doubt ourselves and fear our neighbors" (p. xiv). Just as Descartes saw the path to virtue guided by denying the soul of beasts as the same as the soul of humans, Cotton Mather was greatly disturbed when the boundary between human and animal became uncomfortably blurred. His soul was no longer elevated, and his corporeal body was both repugnant and mortal.

Goldenberg, Pyszczynski, Greenberg, Solomon, Kluck and Cornwell (2001) investigated why we, as humans, engage in so many activities that seem to minimize our connections with other animals – we dress in the latest fashions, cook and prepare our food to look attractive and tightly control our bodily activities. Even if we wish to convince ourselves that we are not animals, the human body confounds us in certain domains: people continue to eat, excrete and have sex. However, regardless of our attempts to minimize our relationship to animals, evolutionary theory asserts that humankind derived from the same stock as many primates and is closely related to a wide variety of living things. Goldenberg et al. (2001) showed that mortality salience leads to an increased emotional reaction of disgust to body products and animals. Her participants were asked a series of questions regarding the views of two vignettes: one vignette described people as distinct from animals, while the other vignette emphasized the similarities between humans and animals. The researchers found that, compared to a control condition, mortality salience led to a greater preference for the vignette describing

people as distinct from animals. Within the mortality salient condition but not the control condition, participants preferred the essay that emphasized distinctiveness from other animals compared to the essay emphasizing the similarities.

Goldenberg et al.'s (2001) essay theme manipulation essentially espoused two views: one explained that humans evolved from animals, and one explained that humans are the unique product of some type of creation. The authors made no explicit mention to either evolution or creationism, but the focus on human similarity to or human uniqueness from animals leads me to wonder whether the disgust emotion is involved in generating intuitions regarding theories of human evolution.

Is evolution disgusting?

Scott (2004) writes that close to 50% of Americans reject evolution, and Miller, Scott and Okamoto (2006) found that the nation is almost evenly divided in terms of accepting or rejecting it. About 35% of those who support Creationism adopt a literal interpretation of the bible, with which evolution is an incompatible view. But what about those who adopt a more mainstream, nonliteralist interpretation? Scott (2004) argues that evolution, for them, is mostly a matter of human exceptionalism. Evolution unquestionably contains an "ick factor" – there is greater comfort in seeing a bold line demarcating us from animals than acknowledging that we are inextricably linked. This is the essence of Descartes' writing on the distinction between the soul of humans and the soul of beasts, which certainly continues to hold intuitive appeal. Inbar et al. (2009) investigated the relationship between disgust and evaluations of homosexuality and note that individuals may at some level evaluate homosexuality as "wrong" but are able to

consciously override these intuitions when asked to provide explicit judgment. The present study investigates the analogous process by which individuals make judgments regarding human uniqueness and, by extension, evolution.

Emotion may play a significant role in mediating these evolutionary beliefs – perhaps more than political or religious orientation – and this study investigates the role of disgust in such intuitions. And while disgust may play a role in the highly controversial topic of human evolution, a weaker hypothesis holds that disgust drives a preference for the view that humans are created uniquely and are irreducible to mere animals. Across three studies, I seek to demonstrate a link between disgust and the view that humans are the exceptional product of a unique creation process.

Study 1

Study 1 tested my strongest hypothesis by using explicit mention of evolution versus creationism. I primed participants to feel either disgusted or emotionally neutral, and used an Implicit Association Test of words related to evolution, creationism, good, and bad. I predicted that those made to feel disgusted would show an implicit preference for creationism.

Method

Participants

Seventy-three Macalester College students (46 females and 27 males, M = 19.51 years old, SD = 1.41 years) participated in exchange for course credit or lottery prizes, though nine non-native English speakers were excluded from analyses involving the IAT. Participants self-reported to be fairly liberal and religiously unobservant: on a 7-point Likert scale ranging from *very liberal* to *very conservative,* M = 2.29, SD = .91, and on a similar scale ranging from *not at all religious* to *extremely religious*, M = 2.10, SD = 1.36. Participants were recruited from the Introduction to Psychology course for course credit, and students from other classes on campus also participated in exchange for the opportunity to win lottery prizes. All participants were told that the study was titled "Film Clips and Reaction Time" and were randomly assigned to either the experimental condition or the control condition.

Procedure

After random assignment, participants entered a lab where they provided informed consent and watched a video clip that either primed the disgust emotion or a

video clip that was emotionally neutral. They then rated how much they were experiencing various emotions as a manipulation check for the disgust prime. This scale contained seven items (trust, joy, fear, surprise, disgust, sadness, anticipation, anger). Participants then completed an Implicit Associations Test (IAT) for creationism versus evolution and completed the Disgust Sensitivity Scale. Last, they provided demographic information and answered whether or not they were aware of the true purpose of the study; they were subsequently debriefed.

Disgust prime

Participants in the experimental condition watched a 1 minute and 10 second film clip from *Trainspotting* that involved a disgusting toilet. Participants in the control condition watched an identically long neutral scene about whales from the documentary *Planet Earth*. Schnall, Benton and Harvey (2008) and Schnall, Haidt, Clore and Jordan (2008) used these videos successfully in their research on disgust.

IAT materials and design

The present study necessitated an implicit measure to test for a preference of evolution versus creationism. Although Nosek (2005) demonstrated a significant positive correlation between implicit IAT preferences and explicit preferences on a wide range of pairs, including evolution and creationism, I hypothesized that the politically and religiously left-leaning sample would likely be unwilling to admit a preference for creationism explicitly. For those in the experimental condition, the connection between the emotional induction of disgust and performance of the subsequent task should not

have been available to conscious awareness, and hence I necessarily measured the way their affective states drove an implicit preference.

Materials consisted of a set of words or short phrases representing the categories "evolution" and "creationism" obtained from Nosek (2005). Nosek's six items were God, Bible, Religion, Creator, Created, and Six Days. Because I thought the phrase "Six Days" would be confusing to participants who are not familiar with creationist theory, I substituted "Intelligent Design" in its place. Items related to evolution were: Darwin, Origin of Species, Science, Natural Selection, Eons, and Evolved. The categories "good" and "bad" were represented by six positive words (e.g., "Wonderful") and six negative words (e.g., "Horrible").

The IAT consisted of five practice blocks and two critical blocks. In the first practice block, participants used two response keys to sort the stimuli that represented "evolution" or "creationism," and in the second practice block used the same two keys to sort valenced words as either "good" or "bad," and in the third practice block they sorted words related to "evolution" and "creationism" simultaneously with words related to "good" and "bad." Half of the participants were told to pair "evolution" and "good" with one key and "creationism" and "bad" using the other key. The other half of the participants was instructed to perform the reverse. Immediately after the third practice block, participants began the first critical block, which was identical to the practice block they had just performed except for being longer (40 trials rather than 24 trials). After the first critical block, key assignments were changed such that the key used previously to indicate the category "evolution" was now used to indicate "creationism," and vice versa.

They were given one practice block to sort stimuli representing “evolution” and “creationism” according to the new key assignments, and then a practice block in which they sorted these words simultaneously with valenced words in the opposite combination as before (e.g., if the participant was previously told to use one key to categorize “evolution” and “good,” he or she was now instructed to use one key to categorize “evolution” and “bad” together). Immediately following this practice block, participants completed the second critical block, which was identical to the practice except for being longer (40 trials rather than 24 trials). Practice blocks were not scored, and critical blocks yielded response times measured in milliseconds. I used these response times to calculate an overall D score, similar to a Cohen’s *d* for effect size, according to Greenwald, Nosek and Banaji (2003). This score denoted the strength and direction of an individual’s preference for either evolution or creationism.

Manipulation check

To ensure that participants in the experimental condition were indeed more disgusted than those in the control condition, they were asked to rate how much they were experiencing eight emotions on a seven-point Likert scale (ranging from *not at all* to *completely*). These items were taken from Plutchik’s (1991) list of eight basic emotions. Disgust, the target emotion, was listed among these items.

Disgust sensitivity scale

To control for a potential moderator, I measured individual sensitivity to disgust (Haidt, McCauley & Rozin, 1994, modified by Olatunji, Williams, Tolin, Sawchuck, Abramowitz and Lohr (2007). Participants rated how much they agreed with certain

statements (e.g., “It would bother me tremendously to touch a dead body”) on a 4-point Likert scale ranging from *strongly disagree* to *strongly disagree*, and how disgusting they would find certain activities (e.g., “You discover that a friend of yours changes underwear only once a week”) on a 4-point Likert scale ranging from *not disgusting at all* to *extremely disgusting*. In addition to revealing wide variation in sensitivity, Haidt, McCauley and Rozin (1994) demonstrated a positive correlation between the scale and the degree to which subjects would actually engage in a wide range of disgusting activities (Rozin et al., 1999). Olatunji et al. (2007) found the internal reliability of the revised scale to have a Cronbach’s alpha of .87, which was almost identical to our finding ($\alpha = .86$).

Demographic information

Participants provided their age, gender, and political orientation on a Likert scale ranging from 1 *(very liberal*) to 7 (*very conservative*). They also provided their religious identification (if any) and how religious they were (on a 7-point Likert scale ranging from 1, *not at all religious,* to 7, *extremely religious)*. To recognize whether participants were aware of the nature of the study, they were asked to describe what they believed to be the true purpose of the study. I planned to exclude those who were aware of the nature of the study, but nobody successfully guessed the true purpose.

Results

Manipulation check

To test whether participants in the experimental condition were more disgusted than those in the control condition, I performed an ANOVA to reveal a main effect of

condition on current experience of disgust (M = 5.95, SD = 1.27 and M = 1.25, SD = .50, respectively; $F(1,71) = 428.69$, $p < .001$). Thus, participants who viewed a disgusting film rated themselves as experiencing disgust significantly more than those who viewed an emotionally neutral film. There was an unexpected effect of condition on all of the other emotions, except for anticipation. Unsurprisingly, those in the disgust condition displayed a more negative general affect than those in the control condition. To test for this, I collapsed trust, joy and surprise to generate a composite score of average positive affect and collapsed fear, sadness and anger to generate a composite score of average negative affect.

Indeed, those in the disgust condition displayed more negative emotion (M = 2.73, SD = .92) than those in the control condition (M = 1.69, SD = .70; $F(1,71) = 29.60$, $p <$ .001). I ran a repeated measures ANOVA for positive emotion, negative emotion and disgust, and found a significant interaction effect of condition and emotion: $F(2,70) =$ 162.55, $p < .001$. As evident in Figure 1, the difference in levels of disgust between conditions is substantially more pronounced than the difference in either positive or negative emotions. These findings are displayed in Figure 1.

Implicit evaluation of evolution

IAT scores were computed according to instructions provided by Greenwald, Nosek and Banaji (2003) to produce an IAT D score for each participant. Higher D scores indicate a more favorable implicit evaluation of evolution as opposed to creationism. There was not a significant overall preference for either evolution or creationism.

Among the 64 native English speaking participants, an ANOVA failed to detect a main effect of condition on D score: $F(1,62) = .261$, $p = .611$. To test for an interaction effect of disgust sensitivity, I recoded each participant's score on the Disgust Sensitivity Scale to either "high" or "low" depending on where this score fell relative to 1.6, the average score obtained from www.yourmorals.com. An ANOVA failed to detect an interaction effect on the D score ($F(1,60) = 1.27$, $p = .264$. Only level of religiousness and overall D score were significantly correlated; as level of religiousness increased, so did an implicit preference for creationism ($r = -.31$, $p < .02$).

Discussion

Study 1 failed to find an effect for disgust on implicit preference for evolution versus creationism on an Implicit Associations Test. Average D scores measuring preference for evolution. The IAT may not be a sensitive enough measure to capture this subtle effect, and thus I now question whether the IAT was the most appropriate measure for the present study. The IAT was used successfully by Inbar et al. (2009) to show that disgust sensitivity predicts an intuitive disapproval of gays. More recently, however, in a study testing whether inducing disgust leads to a disapproval of gays, Inbar confirmed that the IAT did not detect an effect following a disgust prime, although alternate measures were successful (Inbar, personal communication, 3/1/2010). I attribute this flaw in the method to potential issues of length, as it is likely that the emotional effects of the prime, which lasted only 80 seconds, diminished over the period of the IAT, which took approximately 10 minutes to complete. The IAT may have been more effective if I had a less homogenous population (given the extremely left-leaning political student body).

And last, a large proportion of the introductory psychology students that participated in the present study had learned about the IAT in the same week during which they participated; Nosek (2005) demonstrated that the strength of a manipulation diminishes with IAT practice and experience, which may have been the case in the present study.

Study 1 also revealed an unexpectedly generalized emotional effect of the disgust prime as opposed to the neutral prime, as seven of the eight emotions differed significantly between groups and those in the disgust condition displayed significantly more overall negative affect. The nonselective nature of the prime suggests that any conclusions I make could not be attributed solely to feeling emotionally disgusted. Study 2 sought to demonstrate the relationship between disgust and attitudes concerning evolution by using an alternative dependent measure, and Study 3 aimed to disambiguate the disgust emotion from overall negative affect.

Study 2

Study 2 followed the aim of Study 1 to show that an emotional induction leads to an implicit dislike for the view that humans evolved from animals but without explicit mention of evolutionary theory. Participants were primed to feel disgusted or emotionally neutral, and then rated passages written by supposed college students that either emphasized the uniqueness of humans compared to other animals, or the similarity of humans to related species. These passages escaped limitations of the IAT and I hoped would detect a subtle effect. I would measure an implicit evaluation of evolutionary theory. Since the study was administered online, I were unable to show a film clip as a

mood induction and instead chose an alternate prime that I believed to be of equal or greater strength.

Method

Participants

One hundred and thirty eight college students (109 females, 28 males, and one participant of unknown gender) participated in this online survey. Six participants who were not of college age were excluded from analyses. The remaining participants ranged in age from 18-25 with a mean age of 21.05 years (*SD* = 1.40 years). Overall, participants self-reported as politically liberal and religiously unobservant on 7-point Likert scales identical to the ones in Study 1 (*M* = 2.53, *SD* = 1.28 and *M* = 2.64, *SD* = 1.81, respectively). All participants were told that the study was titled "Writing and reading texts" and were randomly assigned to either the experimental condition or the control condition.

Procedure

After random assignment, participants in the experimental condition completed a mood induction task to make them feel disgusted; participants in the emotionally neutral control condition were asked to describe the room in which they were sitting. All participants then completed a manipulation check to assess their current emotional state. Participants then read one of two vignettes and answered several questions evaluating the text. Participants then provided demographic information and were subsequently debriefed.

Materials

Mood induction: One frequently used method, developed by Bodenhausen, Shepard and Kramer (1994), asks participants to write about a time in their lives when they experienced a certain emotion. In line with Schnall et al. (2008), participants in the experimental condition were asked to write about a specific event that happened to them that involved seeing or touching something physically disgusting. Instructions specified that the event should be one that made the participant feel physically ill or sick to the stomach. Participants were asked to relive the experience and to write at least ten sentences containing as much detail as possible. Participants in the control condition were asked to write at least ten sentences describing in detail the room in which they were sitting. Participants who did not follow the directions of the emotional induction were not allowed to continue with the study; several people did quit the survey in their browser before completing this question and were thus not included in analyses. All those who provided full data wrote at least six sentences. I believed their free responses to be of adequate strength for the emotional induction to take effect, and thus included all participants in our analyses.

Manipulation check: To ensure that the mood induction made participants in the experimental condition feel more disgusted than those in the control condition, all participants completed a short emotion scale. On 7-point Likert scales ranging from 1 (*not at all*), to 7 (*completely)* they evaluated how much they were presently experiencing four separate emotions: trust, disgust, anticipation and anger. I aimed to use a shorter manipulation check than that of Study 1 to capture the target emotion (disgust), both a

positive and negative emotion (trust and anger), and one emotion that should not change with condition (anticipation).

Essay theme manipulation: To assess the need to see oneself as distinct from other animals, participants read an essay either emphasizing the similarity of humans to other animals or the uniqueness of humans as compared to other animals (Goldenberg et al., 2001). The directions stated that the passage was written by a college student and they were told that they were randomly selected to read about a certain topic and provide their opinion. In actuality, however, there were two essays (one explicating the view that humans are similar to animals, and one that humans are different from animals). The former essay claimed that:

> The boundary between humans and animals is not as great as most people think…what appears to be the result of complex thought and free will is really just the result of our biological programming and simple learning experiences.

The latter, on the other hand, stated that:

> Although we humans have some things in common with the other animals, human beings are truly unique…we are not simple selfish creatures driven by hunger and lust, but complex individuals with a will of our own, capable of making choices, and creating our own desires.

Both essays were titled, "The most important things that I have learned about human nature" and were shown to be comparable in level of difficulty (Goldenberg, Arndt, Routledge & Hart, 2005).

Text evaluation: The essay was followed with six questions assessing reactions to the essay and the author (Goldenberg et al., 2001). Specifically, participants were asked, "How much do you think you would like this person?" "How intelligent do you believe

this person to be?" "How knowledgeable do you believe this person to be?" "Is this person's opinion well-informed?" "How much do you agree with this person's opinion?" and "From your perspective, how true do you think this person's opinion is of the topic they discussed?" Participants rated each item on a 7-point Likert scale, with 1 reflecting the most negative evaluation and 7 the most positive evaluation. According to Goldenberg et al. (2001), Cronbach's alpha was .86 for both essay themes. In the present study, Cronbach's alpha for both stories was .91.

Demographic information: Participants provided their age, gender and political orientation on a Likert scale ranging from 1 *(very liberal*) to 7 (*very conservative*). They also provided their religious identification (if any) and how religious they were (on a Likert scale ranging from 1, *not at all religious,* to 7, *extremely religious).* To recognize whether participants were aware of the nature of the study, they were asked to describe what they believed to be the true purpose of the study. No participants were aware of the nature of the experiment.

Results

Manipulation check

Study 2 compared groups on four emotions: disgust (the target item), trust, anticipation and anger. Those who wrote about a time they felt significantly more disgusted did indeed report more disgust than those in the control condition (M = 4.02, SD = 2.01 and M = 2.26, SD = 1.48, respectively; $F(1,130) = 33.10$, $p < .001$). I also found a main effect of condition on anger, with those in the disgust condition displaying more anger than those in the control condition (M = 2.73, SD = 1.85 and M = 2.03, SD =

1.33, respectively; $F(1,137) = 6.44$, $p < .02$). Again, those made to feel disgusted displayed a more generalized negative affect than those in the control condition. To measure the change in positive affect, negative affect and disgust, I used a repeated measures ANOVA to reveal a significant interaction of condition and emotion (for disgust, trust and anger), $F(2,129) = 12.05$, $p < .001$. This mirrors our findings in study 1: although experimental groups differed in overall positive and negative affect, rather than differing purely on disgust, the difference in levels of disgust between groups was much greater than that of either anger or trust.

Essay theme manipulation

A univariate ANOVA revealed a significant interaction effect of condition (disgust versus control) and essay theme (humans are unique from animals versus humans are similar to animals) on a composite rating score of the essay, $F(1,128) = 3.98$, $p < .05$. Those made to feel disgusted rated the human unique vignette more favorably than those not disgusted ($M = 4.50$, $SD = 1.60$ and $M = 4.06$, $SD = 1.17$, respectively). Similarly, those made to feel disgusted rated the human similar essay less favorably than those not disgusted ($M = 3.87$, $SD = 1.06$ and $M = 4.28$, $SD = 1.00$, respectively). While this interaction was significant, however, there was no significant main effect for condition when I tested for each text manipulation separately, and this interaction effect of condition and essay theme is shown in Figure 2. I also found a significant positive correlation between political orientation and composite rating score of the human uniqueness essay ($r = .29$, $p < .03$), although neither political orientation nor level of religiousness moderated the interaction effect.

Discussion

Study 2 revealed an interaction effect of condition and essay theme manipulation on composite rating of the vignette. Those made to feel disgusted rated the human uniqueness more favorably than did those in the control condition. These results support our hypothesis that disgust plays a role in implicit judgments of evolution; indeed, those in the disgust condition favored the view that humans are distinct from animals (a creationist standpoint) more than the view that humans are inherently similar to animals (an evolutionarily based view).

The emotional induction in Study 2 elicited an unwanted effect similar to that of Study 1 because those in the disgust condition displayed more anger and less trust than those in the control condition, suggesting that the disgust induction led to more negative overall affect. Study 3 sought to disambiguate this emotional confound. I aimed to establish the same findings of Study 2 while controlling for negative affect.

Study 3

Study 3 utilized an emotional induction identical to the first study but with an additional sadness condition. As a dependent measure, I used Goldenberg's (2001) human uniqueness essay. Again, the goal of Study 3 was to demonstrate that inducing disgust causes an increased liking for the view that humans are created unique as opposed to evolved from animals, and that this effect is specific to the disgust emotion.

Method

Participants

45 Macalester College students (17 males, 28 females; *M* = 19.14 years-old, *SD* = 1.00 years) participated for course credit or were independently recruited from various groups on campus. Participants were similar to those in Study 1, and self reported to be politically liberal (*M* = 2.32, *SD* = 1.00) and religiously unobservant (*M* = 2.57, *SD* = 1.51) on 7-point Likert scales. All participants were told that the study was titled "Film clips and memory" and that they would first watch a film, then complete an unrelated task, and then return to the film. They were randomly assigned to one of two experimental conditions or to the control condition.

Procedure

After random assignment, participants were either induced to feel disgusted or sad, or were assigned to an emotionally neutral control condition. Each condition watched a different film of equivalent length. They then completed a manipulation check, read a short essay and answered several questions evaluating the text. Participants then provided demographic information and, instead of returning to the film, were subsequently debriefed and probed for suspicion as to how the two tasks were related. One participant was excluded from analyses for correctly suspecting the true purpose of the study.

Materials

Mood induction: The disgust and control primes were identical to those in Study 1 (*Trainspotting* and *Planet Earth*). Those in the sadness condition watched a scene from the 1979 film *The Champ* in which a young boy watches his father die. All films were exactly 1 minute and 10 seconds long. These videos were shown to successfully prime

the appropriate emotions (or leave participants emotionally neutral) by Schnall, Benton and Harvey (2008) and Schnall, Haidt, Clore and Jordan (2008).

Manipulation check: Although I used the same emotional induction in Study 1, the addition of a sadness condition necessitated a manipulation check. Participants rated how much they were experiencing the same 8 emotions described in Study 1 on 7-point Likert scales ranging from *not at all* to *completely*.

Essay evaluation: Study 2 randomly assigned participants to read one of two vignettes from Goldenberg et al. (2001) describing humans as either similar to or unique from animals. The present study provided all participants with the human uniqueness essay since Goldenberg et al. (2001) found an effect of condition only on this vignette, and Study 2 demonstrated a similar pattern. The instructions were identical to those used in Study 2.

Text evaluation: The essay was followed with six questions assessing reactions to the essay and the author, identical to those used in Study 2 (Goldenberg et al., 2001).

Demographic information: Participants provided their age and gender as well as their political orientation on a Likert scale ranging from 1 *(very liberal*) to 7 (*very conservative*). They also provided their religious identification (if any) and how religious they were (on a Likert scale ranging from 1, *not at all religious,* to 7, *extremely religious)*. To recognize whether participants were aware of the nature of the study, they were asked to describe what they believed to be the true purpose of the study.

Results

Manipulation Check

In similar fashion to the previous studies, a multivariate ANOVA revealed a main effect of condition for level of disgust, with those in the disgust condition being significantly more disgusted that those in either the sadness or control conditions: $F(2,41) = 85.69$, $p < .001$. As expected, participants in the sadness condition reported experienced significantly greater sadness than either of the other two conditions: $F(2,41) = 22.06$, $p < .001$. After collapsing the positive emotions (trust, joy) and the negative emotions (fear, sadness, anger), I found that the three conditions differed overall with regard to overall positive affect ($F(2,41) = 20.49$, $p < .001$) and overall negative affect ($F(2,41) = 11.34$, $p < .001$). Post-hoc analysis revealed that those in the sadness condition experienced more overall negative affect ($M = 3.49$, $SD = 1.29$) than those in the disgust condition ($M = 2.16$, $SD = 1.00$); $p < .003$. I collapsed the positive emotions (trust, joy) and the negative emotions (fear, sadness, anger) to compile average scores on positive and negative affect. As is evident, the sadness condition added a dimension of negative affect that exceeded the effects of priming for disgust.

Text evaluation

I used an ANOVA to test for a main effect of condition on text evaluation. In a similar manner to Study 2, I created a composite score for each participant's evaluation of the text, with higher numbers signifying a greater liking of the author's ideas. I failed to detect this effect ($F(2,41) = .87$, $p = .43$). As is evident in Figure 3, those in the sadness condition displayed the greatest preference for the text ($M = 4.30$, $SD = 1.21$), followed by the disgust condition ($M = 4.02$, $SD = 1.07$) and then the control condition ($M = 3.80$, $SD = .73$). Although analyses did not reveal significance, a bivariate correlation revealed

that level of disgust correlated more highly text evaluation (r = .23, p = .13) than did overall negative affect (r = .18, p = .25), sadness (r =.12, p =.46), or overall positive affect (r = -.01, p = .95).

Discussion

Study 3 sought to disambiguate the emotional effect of inducing disgust while demonstrating that those who are disgusted will show an increased liking for the view that humans are created unique. The present study failed to detect a main effect of condition.

The aim of Study 3 was to elaborate the results of Study 2; I sought to maintain significance regarding disgust and text evaluation while simultaneously disambiguating the overall negative affect that results from inducing disgust. Study 2 revealed a significant interaction effect between condition and essay theme manipulation (i.e., human uniqueness or human similarity with animals), and the present study eliminated the human similarity vignette due to practical constraints (e.g., time, lack of naive participants). It is possible that the present study would have revealed a significant interaction effect of condition (control, sadness, or disgust) and essay theme manipulation had I been able to include both essays. In addition, the rather small population size and extremely left-leaning political student body constrained our ability to detect the wanted effect.

It remains unclear as to why those in the sadness condition displayed such great preference for the human uniqueness essay. I do, however, have reason to believe that the sadness induction elicited unwanted mortality salience that interfered with the wanted

effect. The video used to prime sadness (*The Champ*) illustrates a boy watching his father, a boxer, die after competition. I chose to use this film following Schnall et al. (2008), who tested for the effects of disgust as opposed to sadness for generalized moral judgment. The present study targeted a very specific moral concern (i.e., feelings of approval or disapproval regarding the idea that humans are uniquely created). Goldenberg et al. (2001) demonstrated the link between mortality salience and a preference for the view that humans are created uniquely using the exact same passage in the present study. I believe the mortality concerns raised by *The Champ* may have elicited a type of disgust distinct from the type of disgust elicited by the *Trainspotting* toilet video. The Disgust Sensitivity Scale (Haidt et al., 2007) identifies disgust elicitors as reducible to either contamination factors, death related concepts, or animal reminders. The mortality concerns raised by the sadness prime could have not only elicited a type of disgust distinct from that in the disgust prime, but also likely elicited feelings of creatureliness and the need to assert human uniqueness (Goldenberg, 2001). This combination of disgust and mortality salience likely occurred at an implicit level beyond participants' conscious awareness, and this accounts for why the manipulation check did not reveal a significant difference in present level of the disgust emotion between the sadness and disgust conditions, even though both groups were experiencing a certain level of disgust. And although this prime was used successfully in past studies looking at the effects of emotional disgust on moral judgment (e.g., Schnall et al, 2008), our particular focus was on this issue of human creatureliness, which Goldenberg et al. (2001) related to mortality-accessible thoughts. Overall, it seems that the concept of death in the sadness

prime elicited the need to assert human uniqueness, and this interfered with the emergence of the desired effect. To eliminate this confound, a follow-up study would use a sadness prime that makes no mention of death, and also use both of Goldenberg et al.'s (2001) creatureliness primes to reveal an interaction effect of essay theme manipulation and condition. If this change in priming stimulus, together with the human similarity text manipulation, yielded insignificant results, I would conclude that this effect does not exist and abandon the present research question.

General Discussion

The goal of this study was to investigate the role of the disgust emotion in shaping intuitions regarding evolutionary theory. In particular, I was interested in the creatureliness aspect of human evolution (i.e., the idea that humans are mere animals and inextricably linked to a mortal body) and the need for humans to see themselves as an elevated species that is unique from our primate ancestors. The present set of studies investigated whether priming disgust leads to an implicit preference for the belief that humans are uniquely created. Study 1 tested my stronger hypothesis – that disgust induces an implicit preference for creationism over evolution using an IAT and failed to detect significance. Study 2 used a text theme manipulation and found that those primed to feel disgusted showed greater preference for a vignette arguing that humans are unique from, as opposed to similar to, animals. Study 3 aimed to disambiguate disgust from overall negative effect and failed to detect a main effect of condition when I added a sadness condition. Taken together, the present research failed to confirm that disgust is directly related to intuitions regarding human evolution. Study 2 did, however, provide

preliminary evidence that disgust is related to intuitions of human exceptionalism, although a follow-up on Study 3 is necessary to disambiguate the disgust emotion from overall negative affect. In the future, I hope to re-run Study 3 with both the human uniqueness and human similarity texts and will use a sadness prime that does not reference mortality or death. If this does not reveal a significant interaction of condition and text theme manipulation, then I will conclude that this effect does not exist. The present results should be taken meaningfully only should this follow-up run successfully.

Inbar et al. (2008) and Inbar et al. (2009) found that disgust is related to being politically conservative and to an intuitive disapproval of homosexuals, and Goldenberg et al. (2001) showed that mortality salience drives individuals to prefer the view that humans are created uniquely. The present set of studies extends this body of research with tentative evidence that the disgust emotion drives intuitions regarding human exceptionalism. In the future, I hope to extrapolate this finding to evolution in general, although much work will be needed to construct a measure that will detect such a subtle effect. I also hope to continue researching disgust as a form of embodied cognition, and make use of highly visceral stimuli (e.g., disgusting smells, tastes, etc.). At the broadest level, this research supports Haidt's (2001) social intuitionist model of moral: the disgust emotion plays a role in motivating intuitions of approval or disapproval for the view that humans are a uniquely created species.

Does a preference for human uniqueness inform personal stance on evolution?

According to the Church of Christ Christian Courier, "The most insidious and damaging ideology ever foisted upon the mind of modern man is the notion that human

beings are but animals, and the offspring of other, more primitive creatures" (Jackson, 2002). He cites alternate reasons for rejecting evolution (e.g., an escape from moral responsibility, dislike of cultural reductionism) but points to the creatureliness component as the most emotionally disturbing.

The initial goal of this research was to uncover an affective component of judgments of evolutionary theory with particular focus on the disgust emotion and this issue of creatureliness. Study 1 focused narrowly on the terms "evolution" and "creationism" but failed to find significance on an IAT with this specific set of word items (Intelligent Design, God, Bible, Religion, Creator and Created for Creationism terms, and Darwin, Origin of Species, Science, Natural Selection, Eons and Evolved for evolution words). Studies 2 and 3 extended this investigation to the broader notion of human uniqueness without explicit mention of evolution, creationism, a divine creator, or intelligent design. The idea of human uniqueness is, nonetheless, fundamental to the controversy over human evolution, and Scott (2004) argues that even among religious individuals who take a non-literalist interpretation of the bible, a denial of evolution hinges most centrally on a matter of human exceptionalism, or the idea that humans are unique from their animal relatives. The vignettes created by Goldenberg et al. (2001) and used in Studies 1 and 2 tapped into this idea of human exceptionalism as opposed to animal and human similarity, but further work is needed to understand whether her concept of creatureliness is related to the concept of evolution. The results of this research, then, shed preliminary light on human uniqueness and do not demonstrate a

direct relationship between the disgust emotion and judgments concerning human evolution.

The place of emotion in America's "culture war"

An overarching goal that I sought to achieve in the present research is to better understand the role that emotion plays in resisting materialist theories of mind, which broadly view all facts of the mind as causally dependent upon, or even reducible to, physical processes. Searle (1992) surveys the history of the mind-body problem and argues that the general landscape of the topic is confined to a dualist vocabulary that stems from Descartes' writings. He argues that the whole tradition of philosophy is confused because any attempts to override dualism still work under the framework of a stark distinction between materialism and immaterialism, as the mind sciences tend to flee from subjectivity out of a fear that mental phenomena will collapse into a form of dualism, with strict categories signifying the mind and the body separately. And as Bloom (2004) confirms, it is the nature of the human cognitive system to operate this way - the great majority of people are still operating under this folk psychological framework, carving the world into souls and bodies and perceiving a uniquely separate quality of the mind as opposed to the body.

Searle's (1992) arguments are quite radical and certainly controversial among philosophers of mind, and it is not my attempt here to evaluate the strength of his analysis. His conclusions are, however, quite provocative from a psychological perspective. If he is correct that the history and current status of the mind-body problem is stuck in a dualist vocabulary, then I ask what role *emotion* has played in informing the

development of this philosophical dilemma. Certain individuals express resistance to reducing the mind to the body, and hence resistance to materialist theories of mind, and the present research provides preliminary evidence that the disgust emotion is involved in generating intuitions regarding the unique creation of human life. My conclusions are, at the present moment, quite preliminary and must be confirmed through more controlled experimentation, but if I am correct, then there is an emotional component to the more general resistance to scientific reductionism.

This project focused narrowly on the disgust emotion as distinct from other negative emotions, especially sadness. The results of Study 2, although significant for condition, were ambiguous regarding the role of an overall negative affect. Schnall et al. (2008) argued for a specificity of the disgust emotion by showing that the effects of disgust on moral judgment are not merely a manifestation of a general tendency for negative affect to amplify moral judgments. Disgust holds a unique relationship to the way we perceive ourselves and others as comprised of bodies and souls, and it holds discrete physical (bodily) and social (moral) components (Bloom, 2004). And while the present work failed to illuminate the unique nature of disgust as a moral emotion, I attribute this to a flaw in the sadness prime used in Study 2 and hope that follow-up work will successfully disambiguate disgust from the other negative emotions.

I argue that the role of emotion, especially disgust, in the resistance to scientific reductionism is understudied in both psychology and philosophy. Social psychologists possess the empirical tools to understand certain aspects of why these philosophical dilemmas have progressed as they have. The topic of evolution is highly controversial in

the political sphere, and especially focused on how we should teach evolution (or creationism) in the schools. It is unlikely that knowledge of the emotional component of this debate will quell concerns altogether, but what I hope is that work of this sort will allow more room for sympathetic understanding on both sides. Graham, Haidt and Nosek (2009) found that purity/sanctity concerns are one of five sets of moral foundations; they are more related to moral concerns for conservatives in the United States than they are for liberals, and they thus illuminate the inextricability of moral disagreements from the American "culture war," or the idea that America is polarized on a set of cultural morals or values. National Center for Science Education executive director Eugenie Scott (2010) expressed that some Americans hold religious convictions regarding evolution that are at odds with secular Ameriacn society, and the schools are prime ground on which culture is passed on generationally. The present work focuses on issues concerning the nature of human life, a general stance on scientific reductionism and, by extension, views on evolution as part of this "culture war." My hope is that the present work genuinely contributes to this trend in understanding social issues of religion or politics from the perspective of moral psychology.

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	Disgust**	Trust*	Joy**	Fear	Surprise	Sadness**	Anticipation	Anger*
Disgust	6.33(.90)	2.53(1.60)	2.67(1.54)	2.80(1.37)	5.07(1.71)	2.27(1.16)	3.87(1.81)	1.40(0.83)
Sadness	2.93(1.62)	3.27(1.90)	2.27(1.44)	2.80(1.47)	3.60(1.40)	5.00(1.46)	3.01(1.83)	2.67(1.50)
Control	1.07(.27)	4.71(1.54)	4.79(1.42)	2.36(1.69)	4.14(1.75)	1.93(1.49)	3.71(1.90)	1.21(0.43)

Note. * $p < .01$, ** $p < .001$

Table 1. Means and standard deviations for Study 3 manipulation check. A MANOVA revealed a significant main effect of condition for disgust, trust, joy, sadness and anger.

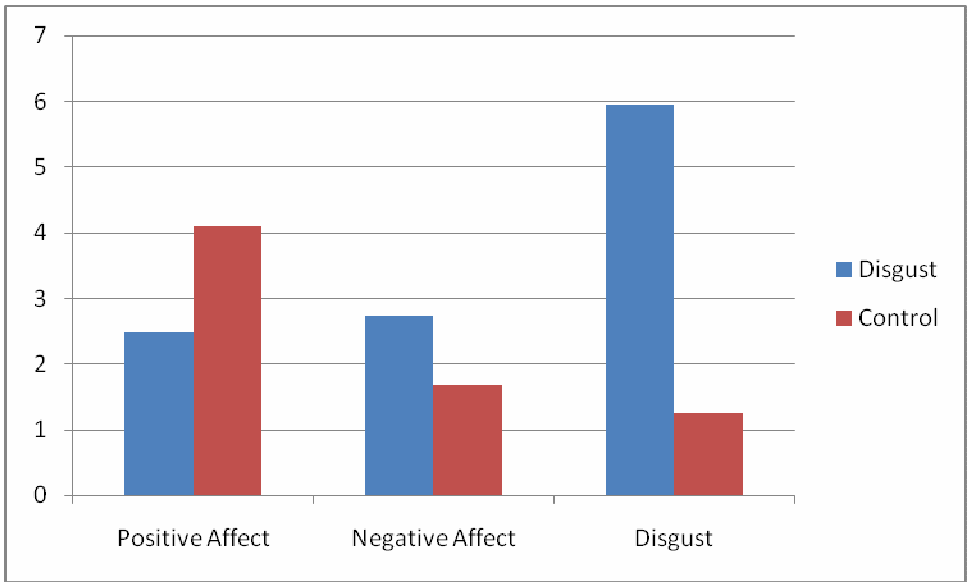

Figure 1. Change in positive affect, negative affect, and disgust between conditions.

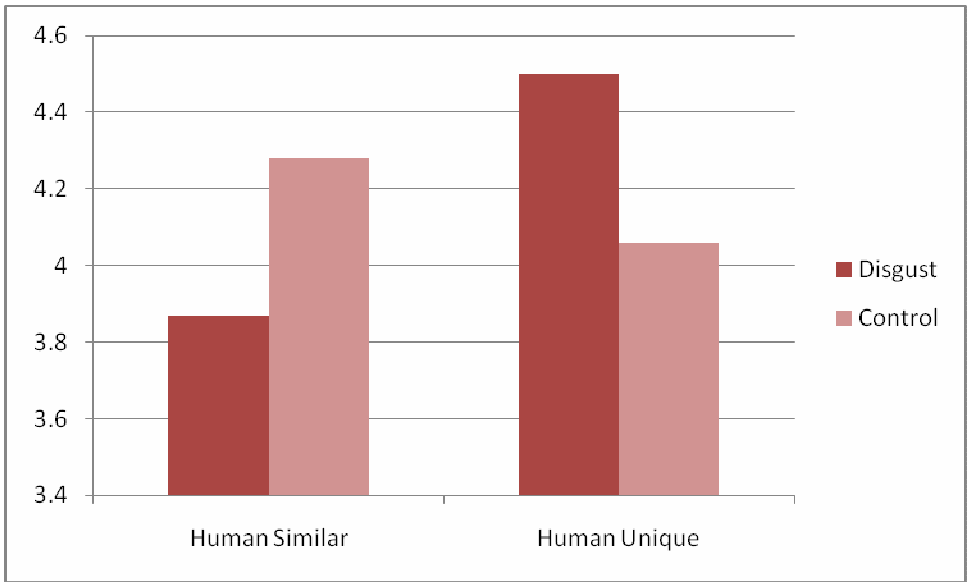

Figure 2. Disgust induction causes increased liking for human uniqueness.

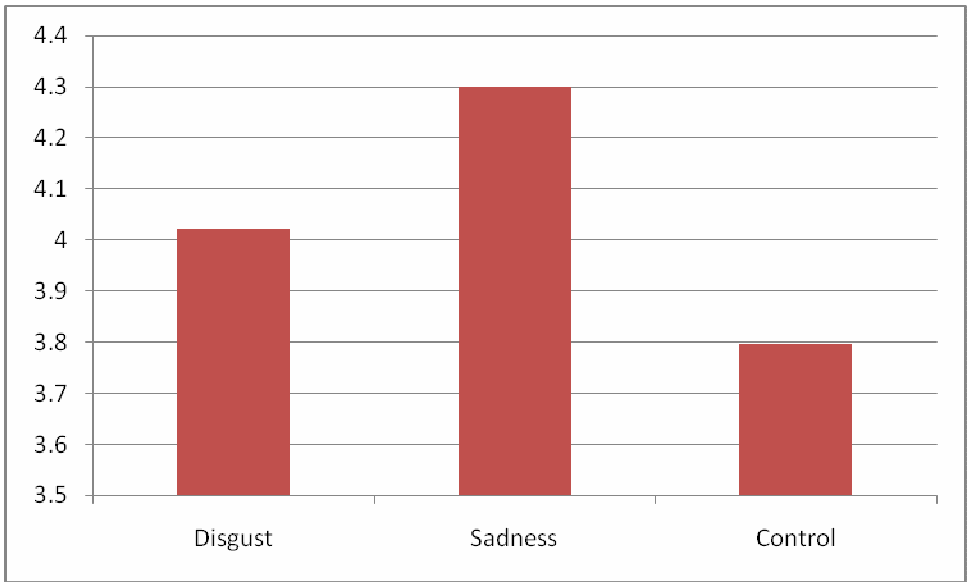

Figure 3. Text evaluation by condition. Those in the sadness condition displayed the greatest liking for the text, although this difference among groups was not significant.