THE DYNAMICS OF ANIMAL SIMILARITY AND CULTURAL WORLDVIEW DEFENSE

by

Uri Lifshin

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As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Uri Lifshin, titled: "The Dynamics of Animal Similarity and Cultural Worldview Defense" and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

_____ Date: (4/18/2017)
Jeff Greenberg

_____ Date: (4/18/2017)
John JB Allen

_____ Date: (4/18/2017)
Jeff Stone

_____ Date: (4/18/2017)
Daniel Sullivan

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

_____ Date: (4/18/2017)
Dissertation Director: Jeff Greenberg

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SIGNED: Uri Lifshin

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Note. * PSA = perceived similarity to animals, ** DTA = death thought accessibility.

Abstract

According to Terror Management Theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986) a key function of cultural worldviews is facilitating people's belief that they are different from animals and therefore more than physical creatures fated to obliteration upon death. We sought to investigate the relationship between peoples' perceived similarity to animals (PSA) and their investment in their ingroup cultural-worldviews, creativity and personal achievement, as ways of managing their awareness of death. We focused on four central hypotheses: (1) high faith in cultural worldviews should reduce PSA; (2) people who view themselves less similar to animals (low-PSA) should be more invested in their cultural worldview, especially after death primes; (3) people who view themselves as more similar to animals (high-PSA), should invest more in personal achievement and creativity as a terror management strategy and (4) be more prone to experience anxiety, particularly after a threat to their creativity. Supporting Hypotheses 1 and 2 we found that: validation of cultural worldviews reduces PSA (Study 1); low-PSA individuals cared more about their ingroup identity and worldviews and perceived other cultures as more different (Studies 2a-2b); after death primes low-PSA individuals defended their groups' cultural worldview more (Studies 3-4), and liked people from other cultures less (Studies 5-6). Hypothesis 3 was partially supported: PSA was positively correlated to importance of creativity, openness and performance on a creativity task (Studies 7, 9 and 10), but it was not correlated with self-reported or projected need for achievement (Studies 7 and 8), or with creative story writing (Studies 8). Hypothesis 4 was also partially supported: PSA was positively related to trait-anxiety (Study 9), and to levels of death thought accessibility (Study 10), and high-PSA individuals experienced more anxiety after receiving negative feedback about their creativity (Study 10). The implications these findings to the field of social psychology are discussed.

Introduction

Culture serves numerous functions in our lives. According to Terror Management Theory (Greenberg, Pyszczynski, & Solomon, 1986) an important function of cultural worldviews is to provide its subscribers with a sense that they may transcend death, either literally or symbolically. In most cultures, acquiring a sense of death transcendence necessitates some degree of differentiation from animals and disassociation from our physical bodies (e.g., Becker, 1973, 1975; Brown, 1959, Goldenberg, Pyszczynski, Greenberg, & Solomon, 2000). It is our animal-like-body that dies and decays and so to transcend death we must somehow transcend it. Cultures provide us with ways to do so, by enabling us to feel like we are more than just mortal creatures; that we are valuable members of a meaningful universe with histories and symbolic meaning that may endure well beyond our lifespan.

Previous research supported the TMT hypotheses regarding the death-suppressing function of cultural worldviews as well as that of disassociation from animals, by showing that thinking about death motivates people to both defend their cultural worldview and to deny their similarity to animals (e.g., Goldenberg et al., 2001; Greenberg et al., 1990). However, the relationship between these two terror management strategies has not been empirically tested. In the current research we tested the TMT hypothesis that investment in cultural worldviews indeed helps people reduce their Perceived Similarity to Animals (PSA).

Although most people may need to reduce their PSA to manage the awareness of death, people also differ in the degree to which they perceive themselves as similar to other animals in general. Some people might reject the notion that they are similar to other animals altogether (i.e., low-PSA individuals), while others may be more willing to entertain the idea that they are animals in their essence (i.e., high-PSA individuals). While this individual difference may

constitute a core belief for many individuals, very few studies have previously investigated the effect that PSA may have on human attitude and behaviors. In the current research we examined several novel hypotheses regarding the effect of PSA on investment in cultural worldviews, as well as in creativity and personal achievement. Included among these are: how PSA may be related to the degree of investment in the ingroup's cultural worldviews and to attitudes toward foreign cultural worldviews, how PSA may relate to investment in creativity and personal achievement as a symbolic immortality striving strategy, and how PSA may be related to the neuroticism and the experience of anxiety. Illuminating the dynamics of PSA and cultural worldviews and the predictive value of PSA as both an outcome and a basic individual-difference variable, may promote the scientific understanding of various social psychological phenomena including cultural worldview defense, prejudice, intergroup conflicts, achievement motivations, creativity, anxiety, and other social attitudes and behaviors.

A problematic existence

Building on the works of Søren Kierkegaard, Sigmund Freud, Carl Jung, Otto Rank, Franz Kafka, Paul Tillich, Norman Brown, Wilhelm Reich, Robert Lifton and many others, Ernest Becker (1971, 1973, 1975), illuminated a fundamental aspect of the human condition: that we all have a conflict between the fact that we are alive and the fact that we are animals that will die and return to dust. Becker's insights regarding this basic irony in man illustrates how human self-awareness contains a problem—a potential for overwhelming anxiety. To cope with this anxiety, humans try to repress and compensate for their mortal and fragile being, by denying their animal nature:

> "…. man wants above all to endure and prosper, to achieve immortality in some way. Because he knows he is mortal, the thing he wants most to deny is this mortality.

> Mortality is connected to the natural animal side of his existence; and so man reaches beyond and away from that side. So much so that he tries to deny it completely (Becker, 1975, p. 92).

According to Becker's analysis, this inevitable psychological conflict, between the desire to live and the awareness of mortality, led humans to use their cognitive ability to create death-transcending —uniquely human—cultures, which provide them with a way to feel that they are in a sense immortal, and that they are qualitatively different from all the animals that are constantly dying around them. Cultural worldviews provide people with hopes for literal and symbolic immortality and helps people feel like they are not just physical creatures who are destined to die and decay.

Becker's hopes (e.g., 1973; 1975) were that "a new science of man", would consider these truths in humans —that we needs to deny our mortality and that culture and spirituality is needed for this — and would use this knowledge to ultimately improve the human condition in some way. Greenberg, Pyszczynski and Solomon (1986) proposed that Becker's ideas were indeed well-suited to explain many findings in social psychology, including the universal need to defend cultural worldviews and to achieve and maintain self-esteem.

Toward "a new science of man": Terror management theory

Terror management theory (TMT; Greenberg et al., 1986; Solomon, Greenberg, & Pyszczynski, 2015) starts with the proposition that, like all other animals, humans are predisposed to preserve life and avoid death. However, humans are also cognitively able to understand that they will eventually die in the future. This awareness of mortality holds within it a potential for debilitating anxiety. To avoid this anxiety, humans immerse themselves in cultural worldviews that provide them with meaning, value, order, purpose, and with the feeling that they

may somehow transcend death and achieve immortality. Immortality can be symbolic, for example through national identification, art, achievements, and the memories of future generations; or it can be literal, for example through in an immortal soul that will continue to exist after death (e.g., Greenberg et al., 1986; Florian & Mikulincer, 1998a; Lifton, 1979). Self-esteem, according to TMT, is the degree to which people feel like they are living up to the standards of the cultural worldviews, and are therefore worthy of some form of immortality. Thus, according to TMT self-esteem is an anxiety buffer: the more people have self-esteem the more they feel protected from death and anxiety (e.g., Greenberg et al., 1992).

In the next section, we briefly reviewed two major lines of research guided by this framework: one that relates to the human need to defend their cultural worldview, and one that regards the human need to disassociate from themselves and from other life forms. Then we integrate these two processes into a more inclusive model.

Cultural worldview defense. According to TMT, cultural worldviews are "humanly created and transmitted beliefs about the nature of reality shared by groups of individuals", which buffer against anxiety by "providing standards of value that are derived from that meaningful conception of reality and by promising protection and death transcendence to those who meet those standards of value" (Greenberg, Pyszczynski, & Solomon, 1997, p. 65). One way in which TM researchers empirically tested the idea that cultural worldviews function to manage death related concerns, is by testing the mortality salience (MS) hypothesis, which states that: "if a psychological structure [e.g., cultural worldviews] provides protection against the potential for terror engendered by knowledge of mortality, reminding people of their mortality should increase their need for protection provided by that structure" (Greenberg et al., p. 72). In a seminal study testing this hypothesis, Greenberg et al (1990) found that American participants

showed a greater preference for a pro-America author over an anti-America author (pro U.S. bias) after thinking about death compared to a control condition. In another experiment, after MS, Christian participants evaluated a Christian (in-group member), more positively, and a Jew (out-group member) more negatively, compared to a control condition.

The link between MS and cultural worldview adherence as well as aggression towards outgroups that have different cultural worldviews has been further supported by hundreds of experiments from different cultures across the world (for reviews see: Greenberg, Vail, & Pyszczynski, 2014; Motyl, Vail, & Pyszczynski, 2009; for a meta-analysis see Burke, Martens & Faucher, 2010). Importantly, in most studies these effects were found to be unique to thinking about death, rather than on neutral, or negative control topics (e.g., Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994; Martens, Burke, Schimel, & Faucher, 2011; Pyszczynski, Greenberg, Solomon & Maxfield, 2006; Shepherd, Kay, Landau, & Keefer, 2011). Moreover, the MS hypothesis has been supported via a variety of ways including: subliminal priming of death related words, proximity to a funeral parlor or cemetery, invitation flyers with death related words on it, skull T shirts, search puzzles containing death words, and more (e.g., Greenberg et al., 2014).

Further support for the death denying function of cultural worldviews was obtained by testing the death thought accessibility (DTA) hypothesis. According to the DTA hypothesis, if psychological structures (e.g., self-esteem and cultural worldviews) provide protection against the thought of death, then undermining them should increase the accessibility of death-related thoughts (e.g., Hayes, Schimel, Faucher, & Williams, 2008). In support for this hypothesis, studies found that threatening the validity of people's cultural worldviews or sense of self-esteem causes an increase in the accessibility of death-related thoughts in consciousness outside of focal

awareness (Hayes et al, 2008; Schimel, Hayes, Williams, & Jahrig, 2007; For a review, see: Hayes, Schimel, Arndt, & Faucher, 2010).[1]

TMT has explained why people go to great lengths to protect their cultural worldview: because it provides them protection from the potentially anxiety provoking awareness of death. While TM researchers further investigated the dynamics of terror management in regard to self-esteem and cultural worldviews, as well as investigated other ways in which people may gain protection form death (e.g., through romantic partners and other significant attachment figures: Mikulincer, Florian & Hirschberger, 2003), a growing body of terror management research was developing in another important direction. This was the research that looked at the relationship with the body and with the natural environment. We now turn to review it briefly.

The denial of human-animal similarity. Following Becker's insights, about the human need to deny creatureliness, Goldenberg and colleagues (2000) hypothesized that much of the human effort to distinguish ourselves from the rest of the living world is aimed at reducing death awareness. Goldenberg et al. (2001) empirically supported these ideas by showing that MS (compared to controls) increased participants disgust sensitivity to images related to human creatureliness (e.g., human body products) and animals. In a second experiment, MS caused participants to prefer essays that describe humans as distinctly different from animals over essays that portray humans as similar to other animals. In a related study, Cox, Goldenberg, Pyszczynski and Wiese (2007), found that while strongly disgusting stimuli always resulted in higher levels of DTA, mildly disgusting stimuli increased DTA only when participants where led to think about the similarities between humans and animals – which emphasized the creature-like nature of humans. Goldenberg, Cox, Pyszczynski, Greenberg and Solomon (2002), showed that thinking about the similarities between humans and animals increased accessibility of death-

related thoughts after thinking about the physical (but not romantic) aspects of sex, and that MS primes led participants to be less attracted to the physical aspects of sex if they were primed with thoughts of human-animal similarity, but not with human animal differences. In yet another series of studies, Goldenberg et al (2006) found that thinking about death causes neurotic individuals to withdraw from physical sensation, illustrating that the need to repress awareness of death and creatureliness can drive humans to disassociate from their own bodies (for reviews see: Goldenberg, Heflick, Vaes, Motyl, & Greenberg, 2009; Goldenberg, 2012).

The human motivation to distance themselves from animals is not directionless; in order to successfully deny the fact that we are going to die like animals do, we need to feel like we are better than them. We need to think that we are on top and they are on the bottom. To feel superior to death, we need to feel superior to animals and every other living thing in the environment. To test this point, Soenke, Greenberg and Lifshin (in press), found that having participants read about dolphins being smarter than humans increased DTA, and that people were more critical of this possibility after they are reminded of mortality. Further work in the framework of TMT has directly demonstrated how, in support for Becker's analysis, death-related concerns drive humans to want to aggress against and even destroy other animals (for a review see Marino & Mountain, 2015). Beatson and colleagues (Beatson & Halloran, 2007; Beatson, Loughnanb, & Halloran, 2009) found that after thinking about mortality and human creatureliness, people (pet owners included) have more negative attitudes towards companion animals. Lifshin, Greenberg, Sullivan, and Zestcott (2017) found that people high in support for the killing of animals report less fear of death, and that subliminal death primes elevate support for the killing of animals (unless their self-esteem is boosted). Furthermore, support for the killing of animals after subliminal death primes was associated with an increased sense of power

and invulnerability. This point is also supported by other lines of research showing that less perceived animal similarity is associated with more feelings of superiority over animals (e.g., Amiot & Bastian, 2017; Costello & Hodson, 2010), which have been found to be negatively related to fear of death and death related anxiety (Lifshin et al., 2017).

Animal disassociation and cultural worldview defense

We have seen evidence from TM research that humans manage the potential for death anxiety by disassociating themselves from other animals *and* by defending their cultural worldviews, sometimes by associating other threatening individuals with animals (through dehumanization). The question is whether or not these two TM strategies are dependent upon each other, and if so then how.

According to Becker (e.g., 1971, 1973, 1975) and TMT (Greenberg et al, 1986; Goldenberg et al., 2000, 2001) cultures function to reduce human-animal similarity. Thus, people who are more invested in their cultural worldviews should feel less like animals, and a validation of cultural worldviews should reduce people's PSA (Hypothesis 1).

Furthermore, considering that denying similarity to animals serves a terror management function, if indeed cultural identity contributes to denying similarity to animals, then people who generally view themselves as dissimilar to animals (low PSA) should be more invested in their cultural worldviews, particularly when death is primed and they need to manage the terror of death and reduce PSA. Thus, people low on PSA should be more defensive of their cultural worldviews after MS. Moreover, since cultural worldviews vary and worldview defense sometimes takes the form of derogating other worldviews (e.g., Greenberg, 1990; McGregor et al., 1998), people low in PSA may express more prejudice toward other cultures (Hypothesis 2). Especially when motivated by threatening thoughts of death, a low-PSA person presumably

considers their ingroup to be more "human" and an outgroup to be more "animal-like", exacerbating perceived group differences (e.g., Vaes, Heflick, & Goldenberg, 2010).

In contrast to the higher investment in the groups specific cultural worldviews by low-PSA individuals, persons high in PSA may be more likely to include a variety of human groups under the common identifier of "human animals," and thus be comparatively less likely to show prejudice (even under threat). Indeed, studies have shown that reducing the perceived essential gap between humans and animals reduces prejudice towards immigrants (e.g., Costello & Hodson, 2010, 2012).

Animal similarity and the "creative solution"

If high-PSA individuals are indeed less invested in and dependent on their specific cultures for terror management compared to low-PSA individuals, then what terror management strategy do high-PSA individuals use? One possibility is that high-PSA individuals may be more invested in promoting their personal self-legacy as a way to gain a sense of symbolic immortality. Some terror management strategies might depend less on specific cultural worldviews. For example, people can gain a sense of immortality through becoming famous (e.g., Greenberg et al. 2010), investing in their professional careers (Yaakobi, 2015), in art (e.g., Landau, Sullivan, & Solomon, 2010; Perach & Wisman, 2016) or in sports (Greenberg & Weise, 2010; Zestcott, Lifshin, Helm, & Greenberg, 2016). If high-PSA individuals are less invested in the their cultural worldviews as a way to manage the terror of death, they may be more interested in sticking out from their cultures, by being creative and achieving great things in science, art, sports, literature or business. They may be more motivated to extend their influence beyond their specific cultures and make their mark globally as individuals. Indeed scholars like Otto Rank (e.g., Rank & Atkinson 1932), and Ernest Becker recognized that in order to managing

existential concerns via creative solutions often requires a degree of separation from the cultural worldview:

> "The key to the creative type is that he is separated out of the common pool of shared meanings. There is something in his life experience that makes him take in the world as a problem; as a result he has to make personal sense out of it." (Ernest Becker, 1973, p. 171)

Becker notes that the creative individual is somewhat separated from the "common pool of shared meanings". He suggests that creative people invest in their own achievement and in personal creativity rather than in the goals of the shared cultural worldview. This idea fits well with research conducted in the framework of TMT that shows how, at least among participants who are not professional artists, creative activity might increases feelings of guilt and desire for social connectedness (e.g., Arndt, Greenberg, Solomon, Pyszczynski, & Schimel, 1999; Arndt, Routledge, Greenberg, & Sheldon, 2005). Perhaps individuals who are less dependent on their own groups' cultural worldview for terror management, like high-PSA individuals, may thus feel more liberated to peruse creative goals in their life. Indeed some evidence suggests that being creative reduces worldview defense after MS primes (e.g., Routledge, Arndt, & Sheldon, 2004), and that MS primes can increase creativity for some at least among people who are low on personal need for structure (e.g., Routledge & Juhl, 2012). Accordingly, it makes sense that if high-PSA individuals are less invested in their group's cultural worldviews, they would be more motivated to promote and express *themselves* (rather than their group) and try to achieve their sense of symbolic immortality in more creative ways. Furthermore, high-PSA individuals might be especially concerned with their personal achievement and creativity when death thoughts are salient and they need to gain a protective sense of immortality.

Aside from noticing the tension between creativity and connectedness to the shared worldview, Becker also notes that the world is a more problematic place for the "creative" individuals. The separation from the cultural worldview may allow individuals to stick out more, but sticking out from the traditional cultural worldviews and being more creative may make high-PSA individuals more vulnerable to anxiety and existential concerns, because it also means that they are less likely to use their cultural worldviews to repress their awareness of death. Furthermore, the "creative solution" to the problem of death might be a less stable solution, compared to the solutions that are provided by cultural worldviews (e.g., nationalism and religiosity). While people may feel protected by their cultural group identities by simply following the normative course of action (e.g., Jonas, Schimel, Greenberg, & Pyszczynski, 2002; Jonas et al, 2002; Jonas et al., 2008; Jonas & Fritsche, 2012), promoting ones self-legacy based on creative achievements often requires the person to actually be successful and creative in what they are doing, and this might not always work out. Thus, if people who perceive themselves as more similar to other animals invest more in creativity and personal achievement, they should overall be more susceptible to experience anxiety, particularly after experiencing personal failure or when their sense of creativity is undermined. At the same time, low-PSA individuals might experience less anxiety after a threat to their creativity, because even when they fail in their creative endeavors, they may still rely on their cultural worldviews as an anxiety buffer. It is therefore reasonable to hypothesize that those high in PSA would also be more likely to experience anxiety in their lives, particularly after their sense of achievement or creativity is threatened or undermined. Finally, considering that creatureliness primes that involve animal similarity have been shown to increase DTA (e.g., Cox et al., 2007; Goldenberg et al., 2001), people who generally consider themselves as similar to animals, and are less repressing of their

creatureliness, may simply think about death more often than those who deny their similarity to animals, and this may increase their overall anxiety as well.

The current research

The foregoing theoretical analysis yields four hypotheses that have not yet been tested in the TMT literature:

Hypothesis 1: If cultural worldviews help reduce PSA, then high faith in cultural worldviews should reduce PSA.

Hypothesis 2: If low-PSA individuals are more dependent on their cultural worldviews to reduce their PSA, then they should be highly invested in them and hence more likely to (a) defend their cultural worldview, and (b) have negative attitudes towards people from other cultures, especially after MS or other death primes.

Hypothesis 3: If high-PSA individuals are less invested in their cultural worldviews, then they should invest more in creativity and personal achievement, especially after MS.

Hypothesis 4: If high-PSA individuals are less invested in their cultural worldviews, and are more dependent on their creativity and personal achievements for terror management, then they should (a) be more prone to experience anxiety in general and (b) have higher levels of DTA and state anxiety after their sense of creativity is threatened or undermined.

In the current studies we systematically investigated these novel hypotheses regarding the interplay between PSA and worldview defense. In Study 1 we tested Hypothesis 1 by examining whether affirmation of cultural worldviews reduces PSA. Studies 2-6 tested Hypothesis 2 in a variety of ways. In Studies 2a and 2b, we correlationally tested whether people who generally deny their similarity to animals are more invested in their cultural worldviews (Hypothesis 2a), and perceive people from other cultures as less similar to themselves (Hypothesis 2b). In Studies

3 and 4 we tested whether low-PSA individuals would defend their cultural worldview more after death primes (Hypothesis 2a). Studies 5 and 6 investigated whether, after MS, low-PSA individuals are comparatively more likely to express prejudice towards people with different cultural worldviews, compared to high-PSA individuals (Hypothesis 2b). In Study 7 and 8 we tested Hypothesis 3 by examining whether high-PSA individuals are more likely to report caring more about being creative and achieving unique accomplishments (Study 7) and if after MS, high-PSA individuals express higher levels of need for achievement and are more creative in their responses to a Thematic Apperception Test, compared to low-PSA individuals (Study 8). Lastly, Studies 9 and 10 tested Hypothesis 4 by examining whether high-PSA individuals are more likely to score high on trait anxiety and neuroticism (Study 9; Hypothesis 4a), and if high-PSA individuals would have higher levels of DTA and state anxiety after experiencing a threat to their sense of creativity (Study 10; Hypothesis 4b).

Study 1: Affirmation of ingroup cultural worldview and PSA

The purpose of Study 1 was to provide empirical support for the idea that culture functions, in part, to help humans feel that they are different from other animals (e.g., Goldenberg et al., 2000). If this is true then affirming and bolstering people's ingroup cultural worldviews should reduce their PSA.

To experimentally test this hypothesis, we presented American participants with an article that provided an affirmation of the American worldview (or with an article affirming a different culture), and subsequently measured the degree to which they feel similar to other animals. We predicted American participants who read a validation of the American worldview would rate themselves as less similar to other animals compared to American participants in the control condition.

Method

Participants. Fifty nine University of Arizona introductory to psychology students, who reported in a prescreening survey that they are American and that they care about their American identity (on a level of at least 5 out of a 9-point scale) participated in the study for course credits. After removing the results of two participants who were suspicious about our cover study; two participants who had other procedural errors; and one participant who had extreme scores on our PSA premeasure (Z = -2.59), the data from 54 participants (31 females) were analyzed (M_{age} = 19.20, *SD* = 2.65). [2]

Materials and procedure. The experiment was introduced as a study on memory and personality, which would require participants to read a short article, fill out some measures of personality, and then recall information from the article that they read.

Prior to conducting the study, we measured the preexisting levels of PSA as well as importance of American identity ("How important to you is your identity as an American?"; *1 = Not at all – 9 = Very much so*), importance of religious beliefs (*1 = not at all important – 9 = Very important*) and political attitudes (*1 = Very conservative*; *9 = Very liberal*), in a pre-screening survey. PSA was measured using a single item: "Please rate how similar you think you are to other animals"; *1 = Not at all similar, 9 = Very similar*. The PSA measure was adopted from prior research on attitudes and behaviors towards non-human animals (e.g., Lifshin et al., 2017; Martens, Kosloff, Greenberg, Landau, & Schmader, 2007).

Participants were randomly assigned to read either an article praising the United States, entitled "Why America is still the best country in the world" or a control article that praising New Zealand. The article was based on a blog entry listing 10 reasons to be proud of the United States (Danelek, 2012) and was edited to fit the purpose of the study (See Appendix 1 in the

supplementary materials). The pro-U.S. article listed 10 reasons why America is great (e.g., its culture; creativity and innovation, generosity; the fact that there is freedom of religion). The control article focused on similar qualities with regard to New Zealand. Both articles contained a large picture of the relevant country's flag and were matched on word length.

PSA in-session (our outcome of primary interest) was measured using the same item administered during the prescreen survey. We also included 2 items measuring a general view of human-animal similarity ("Humans and animals are fundamentally the same" and "Humans are fundamentally different from animals", *1 = completely agree*, *9 = completely disagree*").

To aid the cover story that the study is about personality and memory, the participants completed the 60-item PANAS-X (Watson & Clark, 1991), the morningness-eveningness questionnaire (Horne, & Östberg, 1976) and several questions pertaining to the participants memory of the article (e.g., "What was the title of the article?"; "Please list one fact that you remember from the article").

Results and discussion

Preliminary analyses indicated that there were no differences between the experimental groups in our premeasures of PSA (M = 5.66, SD = 1.66), political orientation, importance of being an American, religiosity, or age (all ts < 1.6, ps > .110).

A MANOVA test for differences between the experimental conditions in perceived similarity of self to animals and general view of human-animal similarity yielded a significant effect, $F(2, 51) = 4.59$, $p = .015$, *Hotelling's Trace* = .18, $\eta p^2 = .15$. A univariate test with 5000 bootstrapping resamples revealed a significant effect on our PSA item, $t(52) = 3.03$, $p = .004$, *Cohen's d* = -.83. Participants who read the worldview-affirming article rated themselves as less similar to other animals (M = 4.73, SD = 1.56, 95%CI [4.14, 5.33]) compared to participants in

the control condition (M = 6.07, SD = 1.68, 95%CI [5.45, 6.69]). However, the condition difference was not statistically significant on our two-item composite assessing general perceived human-animal similarity, $t(52) = 1.60$, $p = .116$. Additional ANCOVA analyses showed that the differences between the groups in similarity of self to animals held if we controlled for the participants' prior levels of PSA, political views, religiosity or importance of being American (all Fs > 7.34, ps < .01, ηp^2s > .12).

These results support the Hypothesis 1 by demonstrating that affirming and bolstering ingroup cultural worldviews reduces PSA, among people who are invested in their ingroup cultural worldviews. The fact that the effect was found only on perceived similarity of the self to animals, rather than for general perceptions of human-animal similarity, suggests that this effect is about denial of one's own animality rather than that of humans in general. Indeed, often times people may dehumanize outgroups while humanizing their ingroups (e.g., Vaes et al., 2010). Thus, the perception of overall similarity between humans and animals is different than the perception that the self is similar to other animals.

Study 2a: PSA and investment in the ingroup cultural worldview

Study 2 was designed to begin to test Hypothesis 2 correlationaly. If faith in one's cultural worldview contributes to seeing oneself as different from animals, it may also be that those individuals who generally see themselves as more different from animals are more invested in their cultural worldview. Furthermore, low-PSA individuals may also see themselves as more different from people from other cultures, since they do not believe that all human groups are united by a common animal status. In contrast, those who see themselves more similar to other animals may also consider all human cultures to be more similar. [3]

Thus, we predicted that participants' PSA would be negatively correlated with investment in the ingroup's cultural worldviews (as low-PSA individuals would be more invested in their worldviews than high-PSA individuals), and that PSA would be positively related to similarity across cultures. To test these predictions, we assessed the correlations among PSA, importance of American identity, investment in religiosity and perceived similarity across cultures. [3]

Method

Participants. One thousand five-hundred and twenty-three introductory to psychology students at the University of Arizona completed the study as part of a large survey of undergraduates' attitudes, interests, concerns, and personality traits, at the beginning of the semester. The participants completed the questionnaires voluntarily during their class and received a credit toward their research requirement for their participation.

After excluding the results of participants who were not American or who had missing data on the variables of interest, the results of 1258 participants were analyzed. Of these 859 were women (68.3%), and 399 were men (M_{age} = 18.58, *SD* = 1.61). Participants' religious affiliation was as follows: 731 participants reported being Christian (58.5.8% of the sample), 210 reported being Agnostic (16.7%), 112 were Atheists (8.9%), 75 were Jewish (6%), 6 were Muslim (0.5%), 22 were Buddhist (1.7%), 5 were Hindu (0.4%), 14 were Mormon (1.1%), 73 reported "other" (5.8%), and 10 participants did not report their religious affiliation (0.8%).

Materials and procedure. The data were collected in classrooms as part of a large survey examining undergraduates' attitudes, interests, concerns, and personality traits. Participants first filled out demographic information such as gender and age; then a measure of identification with America ("How important to you is your identity as an American?") on a scale from 1 (*Not at all*) to 9 (*Very much so*); political orientation 1 (1 = *Very conservative*, 9 = *Very liberal*);

importance of religious beliefs (1 = *Not at all important*, 9 = *Extremely important*); perceived similarity across cultures ("In your opinion, how similar are people across different cultures?") from 1 (*Not at all similar*) to 9 (*Very similar*); and PSA ("Please rate how similar you think you are to other animals") from 1 (*Not at all similar*) to 9 (*Very similar*).

Results and discussion

In support for Hypothesis 2a we found that PSA was negatively correlated with importance of American identity, $r = -.12$, importance of religious beliefs, $r = -.10$, and political conservatism, $r = -.21$ (all ps < .001). Furthermore, in line with our prediction, we found a statistically significant positive correlation between PSA and perceived similarity between people from different cultures, $r = .18$, $p < .001$ (see Table 1). This relationship still held when we statistically controlled for political orientation, $r = .16$, $p < .001$, religiosity, $r = .18$, $p < .001$, and American identity, $r = .16$, $p < .001$. [4]

Moreover, a simultaneous multiple regression analysis for predicting perceived similarity between people from different cultures using PSA, political attitudes, religiosity and American identity as predictors indicated that PSA was the best predictor of this variable, $t(1250) = 5.56$, $\beta = .16$, $p < .001$ (all other βs < .12). There was also a very small difference between its zero order correlation with the cultural similarity variable ($r = .18$) and both its beta coefficient ($\beta = .16$) and partial correlation coefficient ($r_{partial} = .16$), indicating that it had a unique contribution to predicting cultural similarity. [5]

This correlational evidence provides initial support for Hypothesis 2a, which states that low-PSA individuals would be more invested in their ingroup's cultural worldviews. These findings suggest that PSA is indeed related inversely related to investment in one's in-group culture. Of course, this relationship may work both ways – we invest in our worldview more out

of existential concern, but then our worldview also tells us that we are not animals; hence worldview investment should also predict lower PSA (as in Study 1). These results also lend some support to Hypothesis 2b, which posits that low-PSA individuals would have more negative attitudes towards people from different cultures, although we did not measure attitudes towards other cultures, and we did not manipulate MS in this study. Nevertheless, as many studies in social psychology have shown, similarity, common identity and common goals play a significant role in reducing intergroup conflicts (e.g., Allport, 1954; Pyszczynski et al., 2012; Tajfel & Turner 1979, 1986). Indeed, studies conducted in the framework of TMT have shown that even subtle priming of shared experiences may reduce aggression towards outgroups, and increase peacemaking after MS inductions, and that this effect is partially mediated by perceived cultural similarity (Motyl et al., 2011). Considering this prior work in conjunction with the present findings suggests that PSA may be a novel and important contributing factor to the likelihood an individual will adopt or deviate from a common ingroup identity perception in the face of threat. We explored this possibility in the next studies.

Study 2b: PSA and investment in the ingroup cultural worldview (replication and extension of previous findings with a 4-item measure of PSA)

Study 2b was conducted in order to replicate the results of Study 2a using an extended measure of PSA that had more items. Although previous studies have measured perceived similarity to animals using a 1-item measure (e.g., Lifshin et al., 2017; Martens et al., 2007) or a 2-item scale (e.g., Amiot & Bastian, 2017), we still wanted to ensure that participants' responses on the animal scale are indeed stable in a multi-item scale, which also included a reversed item.

We also used this opportunity to add an additional measure of perception of how just and moral the group's cultural worldview is (Sullivan, Landau, Young, & Stewart, 2014), in order to

further test Hypothesis 2a. Furthermore, we also included a measure of attitudes towards Jews and Muslims as another way to partially test Hypothesis 2b.

We predicted that among American participants, PSA (measured by using either our previous 1-item measure or with a 4-item scale) would be negatively correlated with the participants' self-reported ratings of how import to them is their identity as Americans and how much they think that the American worldview is morally superior. We also predicted that PSA would be positively correlated with perceived similarity across human cultures, as well as with positive attitudes towards Jews and Muslims (among non-Jews and non-Muslim participants).

Method

Participants. One thousand eight-hundred and sixty three introductory to psychology students at the University of Arizona completed the study as part of a large survey of undergraduates' attitudes, interests, concerns, and personality traits, at the beginning of the semester. After excluding the results of participants who were not American or who had missing data on the variables of interest, the results of 1450 participants were analyzed. Of these 944 were women (65.1%), 505 were men, and one participant did not report their gender (M_{age} = 18.64, *SD* = 2.14). Participants' religious affiliation was as follows: 910 participants reported being Christian (62.8% of the sample), 207 reported being Agnostic (14.3%), 129 were Atheists (8.9%), 68 were Jewish (4.7%), 14 were Muslim (1%), 27 were Buddhist (1.9%), 11 were Hindu (0.8%), 15 were Mormon (1%), 67 reported "other" (4.6%), and 2 participants did not report their religious affiliation (0.1%).

Materials and procedure. The data were collected as in Study 2a. We used the same materials as in Study 2a, with the addition of the following measures. First, we added 3 additional items to the PSA measure: "To what extent do you think about yourself in the same

way that you think about animals?", "I think that I am completely different than animals", and "I think animals and myself are more or less the same" (*1 = Completely disagree, 9 = Completely agree*). These items had sufficient reliability in terms of internal consistency (α = .81). Notably the 1-item measure of PSA had the highest inter-item correlation (.70) among the 4 items (see Table 2 for a correlation matrix between the 4 PSA items). Second, we also included a three-item measure of perception that the American worldview is morally superior (Sullivan et al., 2014). Specifically participants reported how much they agree with each of the following three items: "The American way of life is the most moral way of life in the world", "American moral values represent universal truths", "American morals are just arbitrary and will change over time" (*1 = Strongly disagree, 9 = Strongly agree*). Finally participants reported their attitudes towards Jews and Muslims ("Please select the number that best describes your opinion of Jews", "Please select the number that best describes your opinion of Muslims"; *1 = Very unfavorable, 6 = Very favorable*). [6]

Results and discussion

In support for Hypothesis 2 we found that the 4-item PSA was negatively correlated with importance of American identity, r = -.12, perception of the American worldview as morally superior, r = -.18, importance of religious beliefs, r = -.11 political conservatism, r = -.20, and that it was positively correlated with similarity across human cultures, r = .18, all ps < .002 (see Table 3). All these correlations were also statistically significant when we used the 1-item PSA measure. Moreover, replicating the previous findings, a simultaneous multiple regression analysis for predicting perceived similarity across human cultures using PSA, political attitudes, religiosity and American identity as predictors indicated that PSA was the best predictor of this variable, $t(1443) = 6.63$, β = .18, p < .001 (all other βs < .12), and that there was also a very

small difference between its zero order correlation with the cultural similarity variable (r = .18) and both its beta coefficient (β = .18) and its partial correlation coefficient ($r_{partial}$ = .17), indicating that it had a unique contribution to predicting cultural similarity.

We then tested the correlations between PSA and attitudes towards Jews and Muslims, among non-Muslim and non-Jewish participants (N = 1335; see Table 4). The analysis showed that, as predicted, there was a weak positive correlation between PSA and favorable attitudes (less prejudice) towards Jews, r = .07, p = .007, and towards Muslims, r = .15, p < .001 (both items were correlated at, r = .69, p < .001). Again these correlations were also significant if we used the 1-item measure of PSA instead of the 4-item scale. Perceived similarity between cultures was also related to favorable attitudes towards Jews and Muslims (r = .12, p < .001, and r = .17, p < .001 respectively).

These results lend further support for Hypotheses 2a and 2b, as PSA was again negatively related to investments in the ingroup's cultural worldviews and positively related to perceived similarity across cultures and with positive attitudes towards people with different cultural worldviews (Muslims and Jews among non-Muslims and non-Jews). Furthermore, these results help establish the validity of our 1-item measure of PSA, as they show that its predictive value is not different from a 4-item scale.

In the next studies we proceeded to further test Hypothesis 2a and investigate the moderating role of PSA in how much people defend their cultural worldviews when death related thoughts are salient and their need to manage the awareness of death is high.

Study 3: PSA, mortality salience and cultural worldview defense

Study 3 was aimed at experimentally testing the moderating role of preexisting levels of PSA on cultural worldview defense after death-related primes. If —as the results of Studies 2a

and 2b suggest— people who generally deny the fact that they are animals are more invested in their unique cultural worldviews, should also be more defensive of them (Hypothesis 2a). Considering that cultural worldviews help ameliorate mortality concerns (e.g., Greenberg et al., 1990), we predicted that after MS, low-PSA individuals will more strongly defend their cultural worldview than high-PSA individuals, particularly after being reminded of their mortality.

Method

Participants. Ninety-two American University of Arizona undergraduates participated for course credits. After removing the results of 3 participants that were extreme outliers in our premeasures or that had procedural errors, the results of 89 participants (49 female) were analyzed (M_{age} = 19.1, *SD* = 2.01). Our strategy regarding targeted sample size was to follow a traditionally effective approach for MS experiments, aiming for about twenty participants per cell (e.g., Burke, et al., 2010; Martens et al., 2011).

Procedure and materials. The experiment was introduced as a study about personality and evaluation of essays on various social and political topics. As in Study 1 participants' PSA was assessed in a prescreening survey several weeks before experiment. Political orientation was also assessed in a prescreening survey using the same scale as in the previous studies.

To facilitate the cover story, participants were first presented with the Marlow-Crowne social desirability questionnaire (1960). As in most terror management research (e.g., Rosenblatt et al., 1989; Greenberg et al., 1990), the MS and control induction were presented as a personality assessment called "Projective Life Attitudes Assessment". Participants in the MS condition were asked the prototypical open-ended questions regarding their mortality: "Please briefly describe the emotions that the thought of your own death arouses in you" and "Jot down as specifically as you can, what you think will happen to you as you physically die and once you

are physically dead". In the control condition, participants responded to parallel questions about a different aversive subject — intense pain**.** To aid the cover story and to provide a delay between the MS inductions and the articles, participants completed the 60-item PANAS-X (Watson & Clark, 1991) and subsequently the Morningness and Eveningness scale (Horne & Östberg, 1976). This was done in light of previous research indicating that the effect of an MS manipulation should be measured after a short delay period between the prime and the dependent variable (e.g., Greenberg et al., 1994; Pyszczynski, Greenberg, & Solomon, 1999). The PANAS-X scale was also included to assess whether positive and negative affect are related to PSA or worldview defense.

Worldview defense was measured using the common procedure applied in terror management research (e.g., Greenberg et al 1990; 1994). American participants were presented with a pro American essay and anti-American essay (in a randomly selected order), and then responded to 5 questions regarding the essay and author (e.g., "How much do you like this person?"; "How intelligent did you think this person is?"; "How much did you agree with this person's opinions about America?") on a 1 to 9 scale, in which higher scores reflect more positive attitudes towards the author and essay. To compute a pro-U.S. bias score, we subtracted the mean score of the anti-U.S. essay's ratings (α = .93) from the mean score of the pro-U.S. scores rating (α = .90), so that higher scores would reflect preferences for the pro-U.S. essay over the anti-U.S. essay. For the American participants, a higher score on this measure represents greater cultural worldview defense.

Results and discussion

Preliminary analyses indicated that there were no differences between the experimental groups in our premeasures of PSA and political orientation, *t*s < 1.33, *p*s > .18. There were also

no significant condition effects on positive or negative affect, including fear specifically, *t*s < 1.56, *p*s > .12.

To test our prediction that a MS effect on worldview defense would be observed at low but not high levels of PSA, we conducted hierarchical regression analyses with worldview defense as our dependent variable. In the first step, we entered political attitude as a covariate (as political conservatism was positively related to pro-U.S. bias, $r = .33$, $p = .002$); in the second step we entered the independent variables: prime (MS = 1 vs. Pain = -1), and preexisting level of PSA (mean centered). In the third step we entered the prime × PSA interaction term.

The first step of the regression showed that political orientation was a significant covariate, $F(1, 89) = 10.53$, $p = .002$, $R^2_{Adj} = .10$, The second step of the regression was not statistically significant, $\Delta F(2, 85) = .44$, $p = .646$, but importantly, as predicted, the third step of the regression containing the MS × PSA interaction was significant, $\Delta F\ (1, 84) = 4.41$, $p = .039$, $R^2_{Adj} = .12$ (see Figure 1). A follow-up test of the conditional effects using the SPSS macro *PROCESS* (Hayes, 2012) revealed that after MS, low-PSA participants had a higher pro-U.S. bias score compared to high-PSA participants ($M = 3.10$ vs. $M = 1.50$, respectively), $t = 2.03$, $p = .044$. At the same time, there was no difference between low-PSA and high-PSA participants in the control condition ($M = 1.69$ vs. $M = 2.14$, respectively), $t(23) = .79$, $p = .335$. Looked at differently, although participants low in PSA, had a higher pro-U.S. bias score in the MS condition compared to the control ($M = 3.10$ vs. $M = 1.69$), $t = 2.05$, $p = .045$, there was no difference between the MS and control conditions among high-PSA participants ($M = 1.50$ vs. $M = 2.14$), $t = .79$, $p = .429$.[7]

These results support the hypothesis that dispositional PSA moderates the degree to which people defend their cultural worldview after thinking about death. In line with Hypothesis

2a, People who generally deny their similarity to animals seem to be more defensive of their cultural worldviews after contemplating mortality.

Study 4: PSA, subliminal death primes and cultural worldview defense

Study 4 was aimed at replicating the results of Study 3, using a subliminal death prime. This was done in order to replicate the effect, and also to ensure that our effects are not a result of different proximal defenses used by people who are high and low on PSA (if the delay was insufficient). It may be that people who view themselves as similar to animals imagine their personal mortality more vividly than low-PSA individuals do and that this causes them to respond differently. For example one might imagine how he or she might rot in the grave and be consumed my worms. On the other hand, a person who does not consider himself as similar to animals might be less concerned with the physical body after death. This might ultimately make death more salient to high-PSA participants. Although this might not provide an alternative explanation to the results of Study 3, as high-PSA individuals were less reactive to the MS prime than low-PSA individuals, we still wanted to ensure that the result is not a product of a different "proximal" process of conscious contemplation of one's own death for high and low PSA individuals, but a result of the "distal" unconscious motivation for terror management. According to the well-supported dual defense model (Pyszczynski et al., 1999), conscious thoughts initially activate proximal defense, whereas subliminal primes should only activate distal symbolic terror management defenses.

As in Study 3, we predicted that people who generally deny their similarity to animals will want to defend their specific cultural worldview more than participants who think that they are similar to animals, especially after subliminal exposure to death-related words.

Method

Participants. One-hundred and eleven University of Arizona undergraduates participated in the study for course credits. After excluding the results of participants who had missing data, procedural errors, were not native English speaking U.S. citizens, who saw the prime or who were suspicious about the experiment, the results of 92 participants (62 females) were analyzed (M_{age} = 18.70, *SD* = .92) .

Procedure and materials. The experiment was introduced as two short studies, one about the relationship between words and perceptual information processing and one about the correlations between different measures personality and evaluation of essays on various social and political topics. As in Studies 1 and 3 the participants' PSA was assessed in a mass screening survey several weeks before experiment.

The subliminal priming task was presented on a 64-bit Pentium 4 PC computer with a 1024 x 768 screen resolution, using the software DMDX (Forster & Forster, 2003). As in prior terror management research (e.g., Arndt et al., 1997) we used a "word relationship task" as our cover story. Participants were presented with pairs of words and were asked to indicate, as fast as they could, if these words are related to each other or not, using the left and right "shift" keys. All stimuli were presented in Times New Roman 14-point font in the center of the computer screen. The first and the third stimuli were the words for which participants were to judge the presence or absence of a relationship. These words also served as a fixation point and provided a forward and backward mask. In the subliminal death condition, the participants saw the word *DEAD* for 29 milliseconds were presented between the two mask words. In the control condition we used the word *FAIL*, which is also aversive, but not related to death. This procedure was found to be effective in previous terror management research (e.g., Arndt et al., 1997).

As in Study 3, worldview defense was measured using the pro-America and anti-America essays paradigm from Greenberg et al. (1990). Again a measure of pro-U.S. bias was computed by subtracting the ratings of the anti-American essay (α = .90) from the ratings of the pro-American essay (α = .81).

Results and discussion

Preliminary analyses indicated that the experimental groups did not differ in gender, $\chi 2(1) = 1.78$, $p = .182$, *Phi* =.14, PSA or political orientation, ts < 1, ps > .320.

To test our hypothesis that MS would have a facilitative effect on worldview defense among low-PSA individuals but not among high-PSA individuals, we conducted hierarchical regression analyses with worldview defense as the dependent variable. In the first step, we entered political attitude as a covariate (political conservatism was positively related to pro-U.S. bias, $r = .24$, $p = .022$). Next, we entered the independent variables: type of subliminal prime (*DEAD* = 1, *FAIL* = -1), and preexisting level of PSA (mean centered). In the third step we entered the interaction term between the experimental condition and PSA.

The analysis showed that political orientation was a significant covariate, $F(1, 90) = 5.43$, $p = .022$, $R^2_{Adj} = .05$. The second step of the regression was also statistically significant, $\Delta F(2, 88) = 3.13$, $p = .049$, $R^2_{Adj} = .09$, as PSA significantly predicted pro-U.S bias, $t(88) = 2.48$, $p = .015$, $\beta = -.25$. Most importantly, as predicted, the third step of the regression containing the MS × PSA interaction effect was statistically significant, $\Delta F(1, 87) = 5.01$, $p = .028$, $R^2_{Adj} = .13$ (see Figure 2). A follow-up test of the conditional effects using the SPSS macro *PROCESS* (Hayes, 2012) revealed that as predicted, in the subliminal *DEAD* condition, low-PSA participants displayed more pro-U.S. bias compared to high-PSA participants (M = 2.39 vs. M = .70, respectively), $t = 3.37$, $p = .001$. At the same time, there was no difference between low-PSA

individuals and high-PSA individuals in the subliminal *FAIL* control condition (M = 1.38 vs. M = 1.27, respectively), t = .21, p = .831. Looked at differently, although low-PSA participants had a higher pro-U.S. bias score in the MS condition compared to the control (M = 2.39 vs. M = 1.38), t = 2.03, p = .045, among those high in PSA, there were no such difference between the MS and control condition, (M = .70 vs. M = 1.27), t = 1.14, p = .256.

The results from this experiment lend further support to our hypothesis that people's general level of PSA moderates the degree to which they defend their ingroups' cultural worldviews as a terror management strategy. As in Study 3, low-PSA participants were more defensive of their ingroup's cultural worldviews, particularly after they were primed with death, supporting Hypothesis 2a.

Study 5: PSA, mortality salience and attitudes towards other cultures

In Study 5 our goal was to provide further evidence regarding the moderating role of preexisting PSA on adherence to the ingroup's cultural worldview. This time instead of examining the classic worldview defense measure, we wanted to determine if PSA would moderate responses to outgroup members who are not explicitly threatening, but are very different culturally from the American participants.

We hypothesized that people low in PSA would have more negative attitudes towards people from other cultures, particularly when death is primed (Hypothesis 2b). This is because, for people who think that they are not animals, who may be more dependent on their cultural worldviews, the existence of a cultural worldview that is very different from their own might be perceived as more threatening, especially when death is salient (e.g., Greenberg et al., 1990).

By contrast, considering that in Studies 2a and 2b we found a positive correlation between PSA and cross-cultural similarity, as well as between PSA and attitudes towards

Muslims and Jews (in Study 2b), it is possible that people high in PSA may perceive people from other cultures as belonging to the same group (i.e., animals, mammals, members of the same animal species) and consequently have more positive attitudes towards them after MS (e.g., Motyl et al., 2011). In fact, some studies show that reducing the perceived human-animal divide in a non-threatening manner (i.e., by humanizing animals rather than dehumanizing people) may reduce prejudice towards outgroup members by increasing their humanization and inclusive intergroup representations (e.g., Costello & Hodson 2010, 2012).

Therefore we predicted that after MS, low-PSA individuals will have more negative attitudes towards others who are different from them. However, we did not expect to observe this effect among high-PSA individuals, and considered it possible that these participants would even show the opposite effect, namely heightened positivity toward other human beings after MS.

Method

Participants. Sixty American University of Arizona undergraduates participated in the study for course credits. After excluding the results of 2 participants who were suspicious regarding the experiment and 1 participant who had missing data, data from 15 males and 42 females were analyzed (M_{age} = 18.89, SD = 1.26).

Procedure and materials. The experiment was introduced as a study investigating the relationship between personality and evaluation of different cultures. PSA was assessed in a prescreening survey with the 1-item measure used in the previous studies. To aid the cover story, participants were first presented with the Marlowe-Crowne social desirability questionnaire (1960) and the Mindful Attention Awareness Scale (Brown & Ryan, 2003). The MS and control induction were presented as in Study 3 using the open-ended questions regarding mortality (e.g., Greenberg et al., 1990). In the control condition, participants responded to parallel questions

about feeling uncertainty**.** To aid the cover story and to provide a delay between the MS inductions and the articles, participants completed the Morningness and Eveningness scale (Horne & Östberg, 1976) and the 60-item PANAS-X (Watson & Clark, 1991).

Participants were then presented with two articles that were taken from *The National Geographic Magazine* (Jenkins & Toensing, 2012; Benko & Larsen, 2011; see Appendix 2) and edited to fit the purpose of the study. One article was about the Meakambut people Papa New Guinea, and the other one was about the Sami people of the North Arctic Circle. [8] The order in which the articles were presented was decided randomly using *Qualtrics.com*. After reading each article, participants evaluated the different cultures using 9 items (e.g., "How much did you like the Sami [Meakambut] culture?") on a 1-9 scale. Higher scores on the scale reflect more positive evaluation of the culture. A composite evaluation of foreign cultures score was obtained by adding the two mean evaluation scores (α = .95).

Results and discussion

Preliminary analyses indicated that participants in the MS and control conditions did not differ in their gender, $\chi 2(1) = .29$, $p = .590$, *Phi* =.07, their premeasure of PSA, social desirability, political orientation, mindfulness, or positive and negative affect all *t*s < 1, *p*s > .35. Although overall participants rated the Meakambut culture more positively than the Sami culture ($M = 6.43$ vs. $M = 6.08$), $F(1, 55) = 3.75$, $p = .058$, $\eta p^2 = .06$, there was no difference in the rating of the different cultures (Sami vs. Meakambut) across the experimental condition (MS or control), $F(1, 55) = .05$, $p = .828$.

To test our hypothesis, we conducted a hierarchical regression analysis. In the first step, we entered participants' political orientation and social desirability as covariates (as people high on social desirability and those who are more liberal were more likely to rate the cultures

positively, $r = .41$, $p = .001$ and $r = .37$, $p = .004$). In the second step we entered the independent variables: experimental condition (MS = 1, uncertainty = -1), and preexisting level of PSA (mean centered). In the third step we entered the interaction term (experimental condition × PSA). The dependent variable was the composite evaluation of cultures score.

The analysis showed that the first step was statistically significant, $F(1, 54) = 9.41$, $p < .001$, $R^2_{Adj} = .23$, as social desirability and political orientation were significant covariates, (54) = 2.93, $p = .005$, $\beta = .35$, and, $t(54) = 2.52$, $p = .015$, $\beta = .30$, respectively. The second step of the regression was also statistically significant, $\Delta F(2, 52) = 4.69$, $\Delta p = .014$, $R^2_{Adj} = .32$, as there was a strong effect of PSA on ratings of cultures, $t(52) = 3.03$, $p < .005$, $\beta = .35$. More importantly, In line with our prediction, the third step of the regression that included the MS × PSA interaction was also significant, $\Delta F(1, 51) = 12.95$, $p = .001$, $R^2_{Adj} = .45$ (see Figure 3). A follow-up test using *PROCESS* (Hayes, 2012) revealed that in support for our hypothesis, in the MS condition there was a significant difference between low and high-PSA participants ($M = 10.86$ vs. $M = 14.21$, respectively), $t = 4.89$, $p < .001$. At the same time, there was no difference between low-PSA and high-PSA participants in the uncertainty comparison condition ($M = 12.67$ vs. $M = 12.25$ respectively), $t = .53$, $p = .599$. Looked at differently, while low-PSA participants rated the cultures more negatively in the MS condition compared to the control ($M = 10.86$ vs. $M = 12.67$), $t = 2.49$, $p = .016$, high-PSA participants rated the cultures more positively in the MS condition compared to the control ($M = 14.21$ vs. $M = 12.25$), $t = 2.78$, $p = .007$.

Overall these results provide further evidence supporting Hypothesis 2b, by demonstrating the role of PSA in moderating attitudes towards outgroups after a MS induction. Whereas after MS, participants low in PSA were more negative towards other cultures (compared to those in the control condition and to participants high in PSA), participants high in

PSA had more positive attitudes towards other cultures (compared to the control condition and to participants low in PSA). Thus, people who rely on their culture to feel very different from animals are motivated by MS to derogate other cultures. By contrast, people who accept their similarity to animals likely see all humans as more similar to each other, and so MS leads such individuals to like other cultures more.

Nevertheless, considering the relatively low sample size for this experiment, and our lack of a definitive *a priori* hypothesis regarding the effect of MS on high-PSA individuals, we decided to conduct Study 6 to conceptually replicate this effect.

Study 6: PSA, mortality salience and prejudice towards people from other cultures

Study 6 was conducted to replicate the effects of Study 5, using a different measure of attitudes towards people from other cultures: attitudes towards non-American Arab Muslims among American Christian participants. Considering that the Muslim and Christian worldviews are assumed to be quite different, we hypothesized that after thinking about death, Christian Americans low in PSA are likely to evaluate a non-American Muslim more negatively, and express less desire to interact with them, compared to high-PSA participants. In addition, as in Study 5, we expected that, so long as the outgroup member is not threatening, after MS, high-PSA participants may have more positive attitudes towards the outgroup member.

Participants. One hundred and ninety five University of Arizona undergraduates participated in the study for course credits. After excluding the results of 27 participants who were not Christian Americans, 1 participant who was suspicious, 10 participants with missing values or other procedural errors, and one participant who had an extreme score on our measure of prejudice ($Z = 4.41$), data from 105 females and 52 males were analyzed ($M_{age} = 18.77$, $SD = 1.22$).

Procedure and materials. The experiment was introduced as a study about personality and social interactions. Participants were told that they would fill out personality measures and then see a few random profiles of other participants, who they may interact with in a future study. The profiles were taken from previous research on prejudice (Focella, 2013) and were modified to fit the purpose of the study. To aid the cover story, participants also created a profile of their own. This profile was also used to verify the religiosity and national identification (Christian American) of the included participants.

PSA was assessed several weeks before the study using the same 1-item measure as in the previous studies. We also included a premeasure of attitudes towards Muslims used in Study 2b ("Please circle the number that best represents your opinion of Muslims"; *1 = Very unfavorable*, *6 = Very favorable*).

After completing the filler social desirability questionnaire (Crowne, & Marlowe, 1960), participants were randomly assigned to either the MS induction or a control induction with questions about uncertain bouts of intense pain. They subsequently completed the 60-item PANAS-X (Watson & Clark, 1991) and the Morningness and Eveningness scale (Horne & Östberg, 1976) as a delay.

Participants were then presented with 3 bogus profiles of other students. The profiles listed information about the students' gender, hometown, occupation, religion and age, as well as two short sentences that the students supposedly wrote about themselves (see Appendix 3). Participants first saw a profile of a female who identified as an American Christian from Phoenix, and then, in a counterbalanced order, a profile of a Christian American male from Tucson, and a non-American Muslim male from the United Arab Emirates. After seeing each profile participants answered four questions about their liking of the student and about their

motivation to interact with them ("how much do you like this student overall?", "how much would you want to meet this student?", "how much would you want to work with this student?", "how much would you want to be friends with this student?"; *1 = not at all, 10 = extremely*). Internal consistency was high for all the profiles (all $\alpha > .91$), so a mean attitude score was computed for each profile. We then computed a mean prejudice score, by subtracting the mean rating of the Muslim male from the mean ratings of the Christian male, so that positive scores represent a pro-Christian bias.

Results and discussion

Preliminary analyses indicated that participants in the MS and control conditions did not differ in their gender, $\chi 2(1) = .93$, $p = .360$, *Phi* = -.08, their PSA, premeasure of attitudes towards Muslims, social desirability, political orientation, religiosity, positive affect, negative affect or fear, all ts < 1.51, ps > .135. PSA was not significantly related to the premeasure of attitudes towards Muslims, $r = .11$, $p = .174$, and there was also no MS × PSA interaction on this premeasure as well, $\Delta F(1, 153) = .001$, $p = .969$.

To test our hypothesis, we conducted a hierarchical regression analysis. In the first step, we entered the independent variables: type of experimental condition (MS = 1, uncertainty = -1), and preexisting PSA (mean centered). In the second step we entered the PSA × MS interaction term. The dependent variable was the composite prejudice score.[9]

The analysis showed that the first regression step containing the main effects was not statistically significant, $\Delta F(2, 154) = .69$, $p = .505$. However, in line with our prediction, the second step of the regression that contained the MS × PSA interaction was significant, $\Delta F(1, 153) = 13.14$, $p < .001$, $\Delta R^2 = .08$, $R^2_{Adj} = .07$ (see Figure 4). A follow-up test using *PROCESS* (Hayes, 2012) revealed that in the MS condition low-PSA participants were more prejudiced

than high-PSA participants (M = 1.33 vs. M = .07, respectively), t = 3.62, p < .001. At the same time, there was no difference between low-PSA and high-PSA participants in the uncertainty control condition (M = .52 vs. M = .83 respectively), t = 1.20, p = *ns*. Looked at differently, while low-PSA participants expressed more anti-Muslim prejudice in the MS condition compared to the control (M = 1.33 vs. M = .52), t = 2.61, p = .01, high-PSA participants were less prejudiced after MS compared to the control (M = .07 vs. M = .83), t = 2.61, p = .01.

These results supported Hypothesis 2b and replicated the pattern from Study 5. Whereas participants low in PSA were more prejudiced towards people from other cultures after MS, participants high in PSA were less prejudiced after MS, and rated the Muslim foreign student similarly to how they rated the Christian American student. Thus it seems that not only does PSA provide insight to better understand why people may have negative attitudes towards people from other cultures, but it can also provide a route to eliminating intergroup bias and prejudice and to promoting peace.

Study 7: PSA and importance of creativity and of achieving unique accomplishments

Study 7 was designed to begin and test how high-PSA individuals manage the terror of death. Hypothesis 3, states that if people high in PSA are indeed less invested in their cultural worldviews, then they should be more invested in their personal achievement and creativity, especially when death thoughts are salient and need for terror management is high. We began testing this hypothesis in a correlational design using our mass survey sample. This correlational design allowed us to only partially test Hypothesis 3, because it only focused on the correlation between PSA and creativity and achievement under neutral conditions; it did not include a MS induction.

We also used this opportunity to further establish the discriminative validity of our PSA variable, by including three other variables that may be related to PSA: belief in the idea that humans have evolved from other animals, belief that humans are superior to other animals, and pet ownership. We predicted that these variables would not account for the effect that PSA has on importance of creativity and achievement.

Method

Participants. Eight hundred and nighty-six introductory to psychology students at the University of Arizona completed the study as part of a large survey of undergraduates' attitudes, interests, concerns, and personality traits, at the beginning of the semester. After excluding the results of participants who had missing data on the variables of interest, or who were not American, or the results of 743 participants were analyzed. Of these 475 were women (64%), 267 were men, and one participant did not report their gender (M_{age} = 19.22, *SD* = 1.64).

Materials and procedure. The data were collected as in Studies 2a and 2b. The materials included the same measures of demographics, the 4-items of PSA, importance of religious beliefs, importance of American identity and similarity across cultures, as in previous studies. We also included 2 additional items for measuring how much participants care about being creative and achieve accomplishments ("How important to you is being creative?", "How important to you is it for you to achieve unique accomplishments in your lifetime?"; *1 = Not at all*, *9 = Extremely*). In addition, we added a question about belief in human superiority over animals ("Humans are superior to other animals"; *1* = completely disagree, *9* = completely agree), questions about current and previous pet ownership (yes or no), and a question about belief in human evolution ("According to the theory of evolution, humans are a species of animal

that evolved over time from other animal species. To what extent do you believe this?"; *1 = Not at all, 9 = Completely*).

Results and discussion

To test our hypotheses we first tested the zero order correlations between PSA, the dependent variables of creativity, achievement, and importance of U.S identity, and the other discriminatory variables of current and previous pet ownership, human superiority and the belief that humans have evolved from other animals. [10] The analysis showed that PSA was negatively correlated with importance of U.S identity, $r = -.15$, $p < .001$, positively correlated with, perceived similarity across human cultures, $r = .17$, $p < .001$, and positively correlated with caring about being creative, $r = .20$, $p < .001$. However, PSA was not correlated with the item about importance of achieving unique accomplishments, $r = .05$, $p = .177$. Also as expected, PSA was positively related to belief in human evolution, $r_{spearman} = .34$, $p < .001$, and negatively correlated with belief in human superiority over animals, $r_{spearman} = -.29$, $p < .001$, but it was not related to current or previous pet ownership, rs < .05, ps > .19 (see Table 5). [11]

Both belief in human evolution and belief in human superiority were correlated with importance of U.S identity, $r = -.16$, $p < .001$, and, $r = .21$, $p < .001$, respectively. However, only belief in human evolution was also related to importance of being creative, $r = .12$, $p < .001$, and perceived similarity across cultures, $r = .17$, $p < .001$ (human superiority was not related to similarity across cultures or to importance of creativity, rs < |.05|, ps > .170, and current or pet ownership was not related to any variables, rs < |.05|, ps > .180). Because belief in human evolution mimicked the effects of PSA we wanted to test if we can differentiate between them. A simultaneous multivariate regression analysis showed that when both variables were in the model together PSA was a significant predictor of creativity, $t(740) = 5.02$, $p < .001$, $\beta = .19$, but belief

in human evolution was not, $t(740) = .84$, $p = .401$. The model for predicting importance of American identity was significant for both PSA, $t(740) = 2.77$, $p = .006$, $\beta = -.11$, and belief in human evolution, $t(740) = 3.61$, $p < .001$, $\beta = -.14$. The model for predicting similarity across cultures was significant for both PSA, $t(738) = 3.71$, $p < .001$, $\beta = .14$, and belief in human evolution, $t(738) = 3.61$, $p = .024$, $\beta = .09$ (the change in degrees of freedom resulted from the fact that two participants did not answer the question about cultural similarity).

There are however two problems with using a linear based model (e.g., linear regression) for this analysis. The first is that belief in human evolution was not normally distributed, and the second is that it was related to PSA (and thus they are not truly independent). To try to compensate for these problems we calculated the indirect effect of PSA and belief in evolution on importance of creativity or American identity via the other variable (PSA or belief in evolution), with bootstrapping with 10,000 resamples using *PROCESS* (Hayes, 2012). A larger indirect effect of PSA would support the idea that it can better explain the relationship than the belief in human evolution variable (even though they *are* both inherently related to each other).

The analyses predicting creativity indicated that PSA mediated the effect of belief in human evolution on creativity but not vice versa; the indirect effect of belief in human evolution on creativity via PSA was different from zero, $M_{effect} = .04$, 95% CI [.02, .06], and including PSA as a mediator made the effect of belief in human evolution on creativity (total effect), $M_{effect} = .06$, $t = 2.53$, $p = .011$, become not significant (direct effect), $M_{effect} = .02$, $t = .84$, $p = .401$. In contrast, the indirect effect of PSA on creativity via belief in evolution was not different from zero (and hence not significant), 95% CI [-.01, .04], and the direct effect of PSA on creativity remained significant when belief in human evolution was included as a mediator (direct effect), $M_{effect} = .19$, $t = 5.02$, $p < .001$. The analyses predicting caring about American identity indicated

that the indirect effect was different from zero both when PSA was the mediator, M_{effect} = -.03, 95% CI [-.05, -.01], and when belief in human evolution was the mediator, M_{effect} = -.05, 95% CI [-.08, -.02]. Thus these variables seem to have both a shared and a unique contribution to investment American identity. Similarly, the analyses predicting perceived similarity across cultures indicated that the indirect effect was statistically different from zero when PSA was the mediator, M_{effect} = .04, 95% CI [.01, .06], and when belief in human evolution was the mediator, M_{effect} = .03, 95% CI [.01, .06]. Thus also in this case both variables seem to have both a shared and a unique contribution to perceived similarity across cultures.

Overall these results partially support Hypothesis 3: PSA was indeed correlated with caring about being creative, but it was not correlated with caring about achieving unique accomplishments. Our results also suggest that PSA is different from the variables of perceived superiority of humans over animals, pet ownership and belief in human evolution. Although belief in human evolution (as oppose to human superiority or pet ownership) did mirror all of the correlations found with PSA, there are at least three reasons why they are different. First, while PSA was normally distributed, belief in human evolution was highly negatively skewed. Second, these variables were only moderately related, suggesting that they are mostly different variables. Third, PSA was more related to creativity than belief in human evolution and it could explain the relationship between belief in human evolution and creativity, while the opposite was not true. Nevertheless, we continued to examine this variable in our future studies to further establish the discriminatory validity of PSA.

Study 8: PSA, mortality salience, creativity and need for achievement

The purpose of Study 8 was to further test Hypothesis 3, which states that high-PSA individuals should be more invested in their personal achievement and creativity, especially

when death thoughts are salient and need for terror management is high. Although this hypothesis was only supported in regards to caring about creativity, but not in regard to caring about achievements in the previous study, we wanted to test whether the relationship between PSA and need for achievement (and creativity) may indeed exist when terror management needs are high, by manipulating MS in an experiment. We also wanted to look at a more valid measure of caring about personal achievement. We reasoned that one potential way to do this is to measure the need for personal achievement (N-Ach; e.g., McClelland, Atkinson, Clark, & Lowell, 1953), among high-PSA and low-PSA participants, after they have been primed with MS (or control). The Thematic Apperception Test (TAT) measure of need for achievement (N-Ach) was found to be consistently predictive of both self-report measures of dispositional need to achievement and with various achievement related outcomes (e.g., McClelland, Clark, Roby, & Atkinson, 1949; McClelland, Clark, Roby, & Atkinson, 1958; Spangler, 1992). Researchers have also used the TAT to measure creativity in writing (e.g., Dollinger et al., 2004; Joy & Breed, 2012). Thus we wanted to utilize the TAT task to test our hypothesis regarding both N-Ach and creativity.

We predicted that after MS, high-PSA individuals will express higher levels of need for achievement (N-Ach), and would be more creative in their writing of the stories, compared to low-PSA individuals, and compared to high-PSA individuals in the control condition. At the same time, we did not expect MS to affect need for achievement among low-PSA participants.

Method

Participants. Ninety University of Arizona undergraduates participated in the study for course credits. After excluding the results of two participants who had not responded seriously to the pictures, data from 60 females and 28 males were analyzed (M_{age} = 18.79, SD = 1.68).

Procedure and materials. Before the experiment, PSA was assessed in a prescreening mass survey, using the 4-item measure as in previous studies. The experiment was introduced as a study investigating the relationship between personality and evaluation of different pictures. As in the previous experiments, the participants completed the materials in separate cubicles in the lab. To aid the cover story, participants were first presented with the Marlowe-Crowne social desirability questionnaire (1960). The MS and control induction were presented as in the previous Studies, using the open-ended questions regarding mortality (e.g., Greenberg et al., 1990). In the control condition, participants responded to parallel questions about feeling uncertainty**.** To aid the cover story and to provide a delay between the MS inductions and the articles, participants completed the Morningness and Eveningness scale (Horne & Östberg, 1976) and the 60-item PANAS-X (Watson & Clark, 1991).

Next the participants were presented with a subset of three pictures from the revised TAT measure of N-Ach (Blankenship et al., 2006; see Appendix 4), and were asked to spend up to 5 minutes to write a story about each picture. We selected pictures of achievement related themes which would also not include any death related imagery, to not affect our manipulation. Our decision to use only three pictures was aimed at maximizing the temporary effect that MS may have on N-Ach and creativity. The pictures themselves appeared without instructions, to allow more room for the participants to be creative (this was done in contrast to Blankenship et al., 2006 revision of the instructions for N-Ach, which included directed questions about the characters in each picture).

Coding and data reduction of the TAT stories. The stories were scored by four coders who are blind to the experimental conditions (three of the coders were also blind to the research hypothesis). The coders were three undergraduate research assistants and a graduate student (the

author of this paper). Two of the coders were two male and two were female (ages: 19, 21, 35, and 33). Each coder scored at least half of the stories written by the total 90 participant (at least 147 out of a total of 270 individual stories), and each participant's stories were scored by at least two coders (thus each story was coded at least twice).

The coding scheme was based on the revised coding TAT need for achievement (N-Ach) scoring manual made available by Blankenship et al (2006). Each picture was coded for the following 11 categories: standard of excellence, unique accomplishment, long term involvement, stated need, instrumental activity, positive anticipatory goal state, negative anticipatory goal state, positive affective goal response, negative affective goal response, blocks to achievement, and the bonus category achievement theme that is often used in calculating N-Ach (e.g., Cramer, 2004; McClelland et al., 1958). Coders were instructed to score points for each category as many times as needed for each story (aside from the "theme" category that could only get one point). However, considering that some researchers only allow 1 point scored in each category in each story (i.e., each story can get a maximum score of 11; e.g., Cramer, 2004), we also calculated a total N-Ach score for each participant which was based on a one-point per category scheme (an "exclusive" version). Thus we ultimately tested our hypotheses using these two N-Ach scales (these scales were highly correlated, $r = .81$, $p < .001$). Inter-coder reliability (K) was established by averaging the correlations between all four coders, $K_{Average} = .83$ (all rs $> .77$, ps $< .001$). Alpha Cronbach statistic for internal consistency between coders was very high, $\alpha = .95$, but it only calculated for the 30 participants (i.e., 90 stories) that their stories were scored by all four coders. A similar average correlation score between coders was found in regard to the more exclusive N-Ach measure ($K_{Average} = .80$) and there was also a high inter-item correlation of coders using 30 participant's ($\alpha = .94$). The inter-item reliability of all the different N-Ach items

was sufficient (α = .75). [12] We also calculated the inter-item correlation in N-Ach between the three different TAT pictures, α = .80.

Creativity of the story was scored on a 4-point scale with the following values: *1 = not at all creative, 2 = a little bit creative, 3 = moderately creative, 4 = uniquely creative*. Inter-coder reliability (*K*) was again established by averaging the correlations between all four coders, $K_{Average}$ = .82 (all *r*s > .71, *p*s < .001). Alpha Cronbach statistic for internal consistency was very high, α = .95, but it was again calculated only with the 30 participants that their stories were scored by all four coders. In addition, we added a creativity theme category in which each story can receive 1 point that was added to the summery. Notably only a few participants had a score on this category. We tested our hypothesis both with and without the theme bonus. Lastly, we also counted the number of words in each story as an additional measure that may reflect vocabulary sophistication and/or investment of effort (e.g., Joy & Breed). The average number of words participants used to describe the stories was 87.71 (*SD* = 47.61). [13]

Results and Discussion

Preliminary analyses indicated that participants in the MS and control conditions did not differ in their gender, $\chi 2(1) = .03$, $p = .868$, *Phi* =.02, their premeasure of PSA, social desirability, or positive and negative affect, all *F*s < 1.8, *p*s > .180.

Preliminary analyses also indicated that creativity and N-Ach were highly correlated ($r = .71$, $p < .001$), also when N-Ach was measured with a 1-point per category scale ($r = .67$, $p < .001$). The mean number of words that participants used to describe the pictures was also highly correlated with both measures of N-Ach (*r*s > .61, *p*s < .001) and with the ratings of creativity ($r = 81$, $p < .001$).

To test our hypothesis we conducted a series of hierarchical regression analyses. In the first step, we entered the independent variables: level of preexisting PSA (mean centered) and type of experimental condition (MS = 1, uncertainty = -1). In the second step we entered the PSA × MS interaction term. The dependent variables were the participants' total N-Ach (either the inclusive or the exclusive total scores) and their creativity ratings (a separate analysis was conducted for each dependent variable). [14]

Theses analyses did not yield any significant effects, all Fs < 1, ts < 1, all ps > .5. There were also no clear patterns in the means of the dependent measures that supported our hypothesis. There was a very weak pattern in which high PSA-participants had the lowest score on N-Ach and the highest score on creativity, but these differences were not even close to being statistically significant. Similar null results were obtained also if we looked at total number of words as a dependent variable (see Table 6).

We then also conducted exploratory analyses with the N-Ach and creativity scores for each picture separately. [15] Theses analyses did not yield any significant effects, all Fs < 2.3, all ps > .13. Similarly, there was no significant difference in the total number of words participants used in the stories, all Fs < 1, ps > .380.

Overall these results did not support our hypothesis regarding the interactive effect of PSA and MS on need for achievement and creativity. Neither PSA nor MS were related to the participants' scores of need for achievement or creativity ratings in our three TAT stories.

There are several different explanations to this null effect. One explanation is that PSA and MS simply do not affect N-Ach and creativity. This possibility corresponds with our previous null findings regarding the zero order correlational between PSA and caring about achieving unique accomplishments in Study 7. However they do not align with our correlational

results between PSA and caring about being creative in Study 7. If our current measure of creativity in the TAT stories is a valid measure of creativity, then it may be that high-PSA individuals care more about creativity, but they are not *actually* more creative. We tried to address this possibility in Study 10. However, it is also conceivable that our null results with the regard to creativity can be explained by the fact that our measure was not an entirely valid measure of creativity, in contrast to the TAT measure of N-Ach (although the TAT N-Ach measure has also received much criticism, e.g., Entwisle, 1972; Kraiger, Hakel, & Cornelius, 1984). Thus we feel more confident that this null effect is true in regard to N-Ach, than we are in regard to creativity (as other kinds of TAT-based tests are often used to assess creativity, e.g., Wakefield, 1986). Still, another possible explanation is that the null effect had something to do with our specific methodology. For example, it might be that our decisions to use only 3 stories (instead of 5 or 6) for the TAT had backfired and prevented us from detecting true differences in N-Ach or creativity. It may also be that the specific pictures that we choose were too focused on an achievement theme and therefore made it more difficult to assess pure need for achievement, or that it did not allow much space from measuring creativity (which some researchers measure using a blank TAT card; e.g., Wakefield, 1986).

In any case, considering that we did not find any effects of PSA on N-Ach, but that we did find a relationship between PSA and caring about being creative (in Study 7), we preceded to focus on creativity more than on need for achievement for our subsequent studies.

Study 9: PSA, anxiety, neuroticism and other personality variables

Study 9 was designed to begin to correlationally test Hypothesis 4a, which states that high-PSA individuals should be more prone to experience anxiety in general. High-PSA participants may be more exposed to experiencing anxiety, because (1) admitting that they are

animals exposes them more to thoughts of human creaturliness and therefore to death related cognitions (e.g., Cox et al., 2007; Goldenberg et al., 2001), (2) they are less invested in their death anxiety-buffering cultural worldviews (as evidence from studies 2a and 2b suggests), and (3) their solution to obtaining a sense of immortality might be less stable, as it depends more on their ability to be creative. Thus overall high-PSA individuals should be more prone to feel anxiety in general, compared to low-PSA individuals. Accordingly, we predicted that PSA will be positively correlated with self-report measures of trait level anxiety and neuroticism.

In addition to expecting a linear relationship between PSA and anxiety and neuroticism, we also hypothesized that there may be a U-shape curvilinear relationship between these variables, as people who are either very high or very low on PSA may experience the most anxiety and be more neurotic. This explanation is based on Becker's (e.g., 1973) analysis, which based on the work of Sigmund Freud, Otto Rank and Norman Brown, conceptualized *neurosis* as a result of either too much repression or too little repression. In a way, PSA may be used as a proxy for repression because low PSA individuals are in fact repressing the (threatening) idea that they are animals. They may therefore be more neurotic (and have higher levels of neuroticism) because they need to defend their cultural worldviews more rigidly. They may also be experience more anxiety whenever their worldviews are threatened, and worldviews are often threatened. On the other hand, as noted above, high-PSA individuals may experience more anxiety overall because they are less defended by common cultural worldviews (i.e., too little repression). In relation to this perspective on the potential relationship between PSA and repression, we also wanted to test whether low-PSA individuals are more likely to be identified as "repressors" — those who are high on social desirability but low on anxiety (high defensive low anxiety) — as it is conceptualized in personality research (e.g., Singer, 1990; Weinberger,

Schwartz, & Davidson, 1979). Although this conceptualization of repression is somewhat different and perhaps more superficial compared to the one of Brown (1959) and Becker (e.g., 1971, 1973) alluded to above, these concepts are still close.

We also used this opportunity to further establish the validity of PSA and its effects. First, we also wanted to conceptually replicate the results from Study 7, in which PSA was related to caring about creativity (Hypothesis 3), by testing if high-PSA individuals score higher on the openness factor in the big five inventory (BFI; John & Srivastava, 1999), which is inherently related to caring about creativity and being creative. The connection between openness and creativity is evident both at face value of almost all the items that compose this factor ("I see myself as someone who… *is original, comes up with new ideas*; *is ingenious, a deep thinker*; *has an active imagination*; *is curious about many different things*; *is inventive*; *values artistic, aesthetic experiences*; *Likes to reflect, play with ideas*; *is sophisticated in art, music, or literature*) and in research that has shown that this openness subscale relates to actual creativity (e.g., Dollinger, Urban, & James, 2004; King, Walker, & Broyles, 1996; McCrae, 1987). Second, we wanted to further test the discriminatory validity of PSA, by testing its correlations with other theoretically unrelated variables, such as factors from the big five personality inventory, as well as to other variables like narcissism, or social desirability. We also expected that other factors that may relate to PSA like belief in the idea that humans evolved from other animals or levels of disgust sensitivity, would not produce the same effects that PSA does, or would not fully account for the effects of PSA on anxiety, neuroticism and openness.

Method

Participants. One hundred and seventy introductory to psychology students at the University of Arizona completed the study online for course credits. After excluding the results

of three participants who had missing data and two participants that did not responded seriously to the materials, data from 165 participants were analyzed. Of those, 88 were females, 41 were males, and 36 participants did not record their gender due to a technical error.

Procedure and materials. The Study was presented as a short pilot study investigating the relationship between different types of psychological measures. Participants completed the study online using the software *Qualtrics.com*. After signing an informed consent, participants first filled out the 44-item big five personality inventory (BFI: neuroticism, agreeableness, extraversion, openness, agreeableness, conscientiousness; John & Srivastava, 1999), then the 4-item measure of animal similarity (α = .83), the measure of believe in the human evolution used in Study 7, the 21-item Beck Anxiety Inventory (BAI; Beck & Steer, 1993), the 12-item social desirability ("lie") subscale of the Eysenck personality questionnaire (EPQ-lie; Eysenck & Eysenck, 1975), and the 41-item narcissistic personality inventory (NPI; Raskin, & Hall, 1981). Lastly, participants filled out a 21-item measure of disgust sensitivity (Tybur, Lieberman, & Griskevicius, 2009) that includes three factors of disgust: pathogen (α = .78), sexual (α = .84) and moral (α = .82).

Results and discussion

To test our hypothesis we first conducted a correlational test for the zero order correlations between PSA, with the main dependent variables: trait anxiety (BAI), neuroticism, and openness, as well as with the other variables: the other 3 factors of the BFI (agreeableness, conscientiousness and extraversion), the EPQ-Lie for social desirability, believe in the human evolution, and the measures of disgust sensitivity. This analysis showed that, as predicted, PSA was positively correlated with trait anxiety (BAI), r = .18, p = .025, and with openness, r = .33, p < .001. However, PSA and neuroticism were not linearly related, r = .10, p = .206 (see Table 7).

Looking at the other variables, PSA was not related to narcissism or social desirability (*r*s > .01, $p > .920$), or to the other big five factors of extraversion, $r = .05$, $p = .466$, or conscientiousness, $r = -.15$, $p = .143$, although there was a nearly significant negative correlation between PSA and agreeableness, $r = -.14$, $p = .074$. Moreover, as expected PSA was positively related to the question about belief that humans developed from other animals, $r_{spearman} = .39$, $p < .001$. [16] PSA was also mildly negatively correlated with two of the subscales of the disgusts sensitivity; sexual disgust, $r = -.17$, $p = .033$, and pathogen disgust, $r = -.15$, $p = .063$, but not with moral disgust, $r = -.06$, $p = .475$.

We then tested for a curvilinear relationship between PSA, the BAI trait anxiety, neuroticism, as well as between PSA and other variables, using the hierarchical regression analyses with a quadratic term, and compared the model with this term to the linear model and the cubic model. The analysis predicting neuroticism was not statistically significant for the linear model, $F(1, 163) = 1.64$, $p = .206$, $R^2 = .01$, it was significant for the quadratic model, $\Delta F(1, 162) = 3.57$, $p = .045$, $R^2 = .04$, $\beta = .17$ ($p = .033$), and was again not significant for the cubic model $\Delta F(1, 161) = 2.09$, $p = .103$, $R^2 = .04$. This suggests that the relationship between PSA and neuroticism is indeed a U-shaped (concave upward) curvilinear relationship (see Figure 5). The analysis predicting trait anxiety (BAI) from PSA was statistically significant for both the linear, $F(1, 163) = 5.26$, $p = .023$, $R^2 = .03$, $\beta = .17$ ($p = .026$), and the quadratic model, $\Delta F(2, 162) = 3.51$, $p = .032$, $R^2 = .04$, $\beta = .10$ ($p = .188$), although the slope coefficient were not statistically significant (see Figure 6). The cubic term was not significant for BAI, $F(3, 161) = 2.33$, $p = .076$, $R^2 = .04$. This suggests that perhaps the curvilinear model does not add much explanatory power over the linear model in predicting trait anxiety from PSA. The relationship between PSA with openness was significant both the linear $F(1, 163) = 20.14$, $p < .001$, $R^2 = .11$,

β = .41, (p = .003), the quadratic model, $\Delta F(2, 162) = 10.91$, $p < .001$, R^2 = .12, β = .10, (p = .188), and the cubic model, $\Delta F(3, 161) = 7.43$, $p < .001$, R^2 = .12, β = -.10, (p = .460), but also here the slopes coefficients only statistically significant in the linear model. There was no curvilinear relationship between PSA and agreeableness, conscientiousness, and extraversion, Fs < 1.7, ps > .19. There was also no hint of a relationship between PSA and narcissism (NPI) and social desirability (EPQ-lie), Fs < 1. ps > .750. The relationship between PSA and the sexual disgust was linear, $F(1, 163) = 4.62$, p = .033, R^2 = .03, rather than curvilinear, $\Delta F(2, 162) = 2.65$, p = .074, R^2 = .03, and the same was true for pathogenic disgust: the linear model, $F(1, 163) = 3.51$, p = .063, R^2 = .02, was better than the quadratic one, $\Delta F(2, 162) = 2.51$, p = .117, R^2 = .03. Moral disgust was not linearly related to PSA, $F(1, 163) = .05$, p = .475, although there was a weak hint of a curvilinear pattern, $\Delta F(2, 162) = 1.55$, p = .216, β = .10 (p = .110), where high and low PSA participants were more concerned with moral disgust than those in the middle (the cubic model was not significant as well, $\Delta F(3, 161) = 1.26$, p = .292).

We then turned to conduct analyses differentiating PSA from the question about belief in human evolution. First, repeating the former analyses with this variable instead of PSA indicated that unlike PSA, belief in human evolution did not have any monotone, linear or curvilinear relationship with anxiety (BAI) or neuroticism, all Fs < 1, p > .33, $r_{spearman} < |.1|$, ps > .220. However, like PSA, belief in human evolution was positively related with openness, $r_{spearman}$ = .25, p = .001, and negatively correlated with sexual disgust, $r_{spearman}$ = -.37, $p < .001$. Second, when we included PSA and belief in human evolution in the same simultaneous regression model predicting openness, PSA remains a significant predictor, $t(162) = 3.74$, $p < .001$, β = .30, while belief in human evolution becomes a non-significant predictor of openness, $t(162) = 1.01$, p = .311, β = .08. Moreover, because belief in human evolution was not normally distributed we

also used a non-parametric statistic based on bootstrapping with 10,000 resamples to try and compare the alternative mediational effects that belief in human evolution and PSA had openness. These analyses indicated that PSA mediated the effect of belief in human evolution on openness but not vice versa; the indirect effect of belief in human evolution on openness via PSA was different from zero, M_{effect} = .03, 95% CI [.01, .05], and including PSA as a mediator made the previously statistically significant effect of belief in human evolution on openness (total effect), M_{effect} = .04, t = 2.58, p = .011, become not significant (direct effect), M_{effect} = .02, t = 1.07, p = .31. In contrast, the indirect effect of PSA on openness via belief in evolution was not different from zero (and hence not significant), 95% CI [-.01, .03], and the direct effect of PSA on openness remained significant when belief in human evolution was included as a mediator (direct effect), M_{effect} = .11, t = 3.74, p < .001. This suggests that PSA was a better predictor of openness than belief in human evolution (although these variables are inherently interrelated).

Finally, we wanted to test whether low-PSA individuals are more likely to fit the category of "repressors" – those who are high on social desirability and low on anxiety (e.g., Weinberger et al., 1979). To test this we coded people who had a Z score of above 0 on social desirability (EPQ-lie scale) and those who scored less than 11 on the BAI scale (equivalent to a score of 2 out of 4 on all the items). This method identified 49 participants as repressors. We then conducted a t test (using bootstrapping with 5,000 resamples) between participants labeled as repressor and those not labeled repressors for differences in PSA. This analysis did not yield a significant effect, $t(163) = 1.38$, p = .17 (bootstrap p = .15), although the repressor group did have lower levels of PSA (M = 4.57, SE = .21, 95% CI [4.15, 4.98]) compared to those who were not labeled repressors (M = 4.96, SE = .16, 95% CI [4.65, 5.26]).

Overall these results lend some support for Hypothesis 4a, as PSA was positively related to trait anxiety. Although the correlation between neuroticism and PSA was not linear, we did find a curvilinear relationship between PSA and neuroticism. This supports the repression-based explanation (e.g., Brown, 1959; Becker, 1973) according to which very high *and* very low PSA should be more neurotic than those in the middle, presumably because they are either too concerned about a link to other animals and so reliant on their worldviews for terror management (low-PSA individuals) or that they have less resources for terror management (high-PSA individuals). This curvilinear model was also significant in regard to trait anxiety, although in this case it seemed that the additive value of the curvilinear slope over the (positive) linear slope was not significant. In addition, although there was no statistically significant difference between participants who were identified as repressors (low anxiety and high social desirability) and those who were not, repressors did report lower levels of PSA. Further research is needed to reexamine whether or not PSA is linked to this type of conceptualization of repression.

Furthermore, in support of the uniqueness of the PSA scale, the variable of belief in human evolution was again not normally distributed (as PSA was) and did not relate to neuroticism or trait anxiety (as PSA did). Two of the three subscales of disgust sensitivity (Pathogen and Sexual) were negatively related to PSA, but this correlation was weak, indicating that these variables cannot account for the effects of PSA (they also had different patterns of relationships with the other variables). PSA was not related to narcissism or to social desirability.

These results also led some support to Hypothesis 3, as PSA was positively related to openness, which is related to creativity both at face value (with almost all of its items pertaining to creativity) and in converging with other measures of creativity (e.g., Dollinger et al., 2004; King et al., 1996; McCrae, 1987). Also here we demonstrated that PSA has a unique value as a

predictor over the related construct of belief in human evolution. While both variables were significantly related to openness, PSA was a better predictor in a multivariate regression, and it also mediated the effect of belief in human evolution on openness, while belief in human evolution did not mediate the effect of PSA on openness.

In the next study we turned to further test Hypotheses 3 and 4, by examining if high-PSA individuals will have more anxiety after receiving negative feedback about their creativity.

Study 10: PSA, negative creativity feedback, state anxiety and DTA

Study 10 further tested Hypotheses 3 and 4 experimentally. If high-PSA individuals are indeed more anxious and care more about their creativity, then they should also experience more anxiety after a threat to their creativity. Furthermore, considering that undermining a terror management strategy should increase DTA (e.g., Hayes et al, 2008; Schimel et al., 2007), if high-PSA individuals relay on creativity more as a terror management strategy (e.g., Landau et al., 2010; Perach & Wisman, 2016), then a threat to their sense of creativity should also elevate their level of DTA.

To test this possibility, we had participants with various levels of PSA complete a task that supposedly measures creativity, and then provided some of them with false negative feedback and some positive feedback about their creativity. Then we measured their level of DTA and state anxiety. We predicted that high-PSA participants in the negative feedback conditions will have a higher levels of DTA and state anxiety, compared to low-PSA participants and to high-PSA participants in the positive-feedback condition.

Aside from testing Hypothesis 4, we also took this opportunity to revisit Hypothesis 3 and the null findings regarding PSA with creativity in writing TAT stories in Study 8. One explanation was that PSA may be related to the participants desire to be more creative (as we

found in Study 7) but not to their actual level of creativity. To try and test this idea in the current study we also assessed the participants' performance in a task in which they were asked to list different uses for a brick, which was previously used as a measure of creativity (e.g., Guilford, 1975; Porath & Erez, 2009). We hypothesized that while PSA would be positively related to the participants' caring about creativity as reflected in the mass survey item and the openness scale of the BFI, it might not be related to the their actual performance on the creativity task.

Method

Participants. One hundred and nine University of Arizona undergraduates participated in the study for course credits. After excluding the results of five participants who had missing data, and eight participants who were alone in the Study, data from 63 females and 33 males were analyzed (M_{age} = 19.23, *SD* = 1.71). [17] A recent meta-analysis of DTA in the TMT literature by Steinman and Updegraff (2015) suggests that the average DTA effects are medium-to-large, depending on the type of threat (death related or not) and the amount of delay between the independent and dependent variable. Threats that are not explicitly death related seem to have a large effect when there is a short delay period after the threat induction. A G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) a-priori statistical power analysis for R^2 increase in a regression analysis, indicated that a total of 30 participants would be needed to find a large effect and 70 participants to find a medium effect, with an a priori power of .80. However, because we included two depended variables, and considering the current state of affairs in the field of social psychology and the demand to increase sample sizes, we aimed at having at least 80 participants (20 per "cell") in our final sample.

Procedure and materials. Perceived similarity to animals was assessed in a prescreening survey several weeks before the experiment, using the same 4-items as in previous studies. In

addition, we used the 1-item measure of importance of being creative from the mass survey as a manipulation check for our design. If the effect of the creativity threat is real it should bother people who care about creativity more than those who don't, and increase their anxiety and perhaps also their level of DTA. We also used a single-item premeasure of self-esteem ("I have high self-esteem"; *1 = Not very true of me*, *9 = Very true of me*) adopted from previous research (Robins, Hendin, & Trzesniewski, 2001) as a potential covariate, as it has previously found to relate to anxiety (e.g., Greenberg et al., 1992; Higgins, 1987; Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004; Rosenberg, 1965; Sowislo & Orth, 2013). Lastly, we again included the 1-item premeasure of belief in evolution used in the previous studies.

The experiment was introduced as two separate studies. The first "study" was about the relationship between the different dimensions of creativity. Participants were told that they would fill out different measures of creativity on the computer, and then also be provided with computer generated feedback based on their responses. The bogus creativity test was comprised of the big five personality inventory (John & Srivastava, 1999), personal need for structure scale (Neuberg & Newsom, 1993; Thompson, Naccarato, & Parker, 1989), and a series of questions adopted from online creativity and intelligence tests (see Appendix 5). Although we did not measure the participants' creativity, we did include one item in which participants were asked to come up with as many uses that they can for a brick ("Please write as many uses of a brick that you can think of. Please separate each idea you think of with a comma [,]"). This type of task was previously used as a measure of creativity (e.g., Frick, Guilford, Christensen, & Merrifield, 1959; Guilford, 1975; Porath & Erez, 2009), as well as a measure of motivation – in terms of how many items participants list (e.g., Harkins, 1987). Two judges who were blind to the experimental conditions then counted the number of uses they found to be uniquely creative (*K* =

.91). The final creativity score was calculated by adding the number of uses that participants list for a brick and the mean number of items that the judges rated as creative, so that higher scores indicated more creativity. We also looked at the two aspects of task performance—number of uses listed and number of uniquely creative uses rated by the coders—separately, to try and further differentiate between motivation for being creative, which is more reflected in the number of uses listed, and actual creativity as reflected in the judges' coding (considering that one can list multiple uses of a brick without actually being creative like: wall, house, door stopper). Furthermore, although the number of uses listed and number of creative items scored by the coders were highly correlated ($r = .79$, $p < .001$), they had very different means ($M = 5.96$, $SD = 3.43$, and $M = .80$, $SD = 1.36$, respectively) and thus have an unbalanced contribution to the total performance score.

At the end of the task participants were randomly assigned to receive either negative feedback (that their score is at 26.11 compared to the "typical" score of 63.42) or moderately positive feedback (that their score is at 81.82 compared to the "typical" score of 63.42). This feedback was presented using an image that outlined the participants score and a "typical score" in a graph with different dimensions of creativity (see Appendix 6)

After receiving their feedback, the experimenter provided participants with a packet of pencil-paper questionnaires, ostensibly as a part of a "second pilot study" about linguistic associations and personality. This was our way of measuring the dependent variables without arising the participant's suspicion (none of the participants suspected that the feedback was fake, suggesting that this cover story worked). Participants first filled out a measure of DTA that is often used in terror management research (e.g., Greenberg et al., 1994; Hayes et al., 2010). Specifically participants were presented with 25 word fragments and instructed to complete the

fragments with the first word that came to mind. Seven of these fragments could be completed with either a neutral or a death word. For example, one fragment consisted of the letters COFF_ _ and could thus be completed as COFFEE or as the death-related COFFIN. The possible death related word fragments were: *bury, dead, grave, killed, skull, corpse* and *coffin*. The remainder of the fragments could only be completed as neutral words. Finally, participants filled out the 21-item state anxiety subscale from the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970). Our decision to place the DTA before the state anxiety scale was aimed to increase the proximity of the DTA measure to the feedback manipulation in order to maximize its effect (e.g., Steinman & Updegraff, 2015), and also to prevent the anxiety measure from contaminating the more sensitive measure of DTA.

Results and discussion

Preliminary analyses. Preliminary analyses indicated that participants in the different feedback conditions did not differ in their gender, $\chi 2(1) = 0.52$, $p = .819$, their premeasure of PSA, self-esteem, importance of creativity, the big five personality inventory factors, PNS, or creativity on the brick task, all Fs < 2.2, ps >. 14. There was also no PSA × Feedback interaction on self-esteem and neuroticism, Fs < 1, ps > .75, suggesting that participants in the different conditions did not differ in their pre manipulation levels of these anxiety-related variables.

Manipulation Checks. We conducted a manipulation check for the design using the importance of being creative (mean centered) as a moderator to see if it interacts with our feedback manipulation to produce more state anxiety and higher levels of DTA. If the design is working as we expect, participants who cared more about creativity (in the prescreening survey) should have more anxiety and perhaps higher levels of DTA after the negative feedback condition. Neuroticism was used as the covariate in the analyses predicting state anxiety as it had

the strongest correlation with state anxiety, $r = .57$, $p < .001$. Self-esteem was also correlate with state anxiety, $r = -.40$, $p < .001$, but a simultaneous multiple regression analysis predicting state anxiety using both potential covariates indicated that while neuroticism remained a significant predictor, $t(91) = 4.92$, $p < .001$, self-esteem was not, ts < 1, ps > .335 (both variables were correlated at, $r = .55$, $p < .001$, and both were not correlated with PSA, rs < |.05|, ps > .710; using self-esteem instead of neuroticism did not change any of the effects).

The analysis predicting state anxiety yielded the expected interaction effect, as the creativity × feedback interaction was significant, $\Delta F(1, 91) = 11.22$, $p = .001$, $\Delta R^2 = .10$ (neuroticism was a significant covariate, $t = 6.05$, $p < .001$). A follow-up test using *PROCESS* (Hayes, 2012) revealed that, as expected, in the negative feedback condition participants who cared more about being creative experienced more state anxiety than those who cared relatively less about being creative ($M = 42.41$ vs. $M = 35.08$, respectively), $t(91) = 2.36$, $p = .022$. In contrast, in the positive feedback condition the difference in state anxiety between participants who cared more about being creative and those who did not was not significant ($M = 36.06$ vs. $M = 38.56$, respectively), $t(91) = 1.05$, $p = .296$. Looked at differently, participants who reported caring more about being creative reported feeling more anxious after the negative feedback condition compared to after the positive feedback condition ($M = 42.41$ vs. $M = 36.06$, respectively), $t(91) = 2.32$, $p = .022$. At the same there was no difference between the feedback conditions among participants who did not care about being creative, $t(91) = 1.29$, $p = .200$. [18] Similar results (significant interaction and simple effects) were obtained if we used the participants' reported openness (which was correlated with caring about being creative at, $r = .57$, $p < .001$) or actual performance on the creativity task (which was correlated with caring about being creative at, $r = .30$, $p = .003$).

The analysis predicting DTA from the participants premeasure of importance of being creative and the feedback condition did not yield the expected creativity × feedback interaction effect, $F(1, 92) = 1.25$, $p = .19$. However, this interaction was almost significant if we used the participants' actual creativity score on the brick task, $\Delta F(1, 92) = 3.11$, $p = .081$, $\Delta R^2 = .03$. A follow-up test using *PROCESS* (Hayes, 2012) indicated that in the negative feedback conditions, participants who scored high on the brick creativity task had higher levels of DTA compared to participants who scored low on the creativity task ($M = 1.63$ vs. $M = 1.08$, respectively), $t(92) = 1.72$, $p = .088$ (although this difference was only approaching statistical significance on a two-tailed test). At the same time, there was no difference between participants who scored high and low on the creativity task in the positive feedback condition ($M = 1.31$ vs. $M = 1.42$, respectively), $t(92) = .57$, $p = .576$.

These results suggests that our negative feedback manipulation was indeed reliably effective in terms of making people who care more about their creativity, more anxious than those who do not care about creativity and those in the positive feedback condition. This did not seem to be the case with DTA, although the pattern of the results was in the same direction.

Hypotheses testing. To test our hypothesis regarding the effect that negative creativity feedback would have on individuals high and low in PSA, we conducted a series of hierarchical regression analyses. The independent variables in these analyses were PSA (mean centered) and the feedback condition (negative = -1, positive = 1). The dependent variables were the participants DTA and the STAI (a separate analysis was conducted for each dependent variable). Neuroticism was used as a covariate in the model predicting STAI.

The analysis predicting DTA showed that the first regression step containing the main effects was statistically significant, $\Delta F(2, 93) = 3.81$, $p = .025$, $R^2_{Adj} = .05$, as PSA was positively

related to DTA, $t(93) = 2.59$, $p = .011$, $\beta = .27$. The hypothesized PSA × feedback interaction was not significant $\Delta F(1, 91) = 0.09$, $p = .9.24$. [19]

The analysis predicting state anxiety showed that the first step in the regression containing the neuroticism covariate was significant, $F(2, 94) = 45.14$, $p < .001$, $R^2_{Adj} = .324$. The second step containing the main effects was approaching statistical significance, $\Delta F(2, 92) = 2.59$, $p = .080$, as PSA was positively related to STAI, $t(92) = 2.15$, $p = .034$, $\beta = .18$. More importantly, supporting our hypothesis, the PSA × feedback interaction was significant, $\Delta F(1, 91) = 5.97$, $p = .017$, $\Delta R^2 = .04$, $R^2_{Adj} = .373$ (see Figure 7). A follow-up test using *PROCESS* (Hayes, 2012) revealed that, as we predicted, in the negative feedback condition high-PSA participants experienced more state anxiety than low PSA participants ($M = 43.94$ vs. $M = 33.98$, respectively), $t(91) = 3.27$, $p = .002$. At the same time participants high and low in PSA did not report different levels of anxiety in the positive feedback condition ($M = 37.70$ vs. $M = 36.99$, respectively), $t(91) = .31$, $p = .752$. Looked at differently, high-PSA individuals reported feeling more anxious after the negative feedback condition compared to after the positive feedback condition ($M = 37.70$ vs. $M = 36.99$, respectively), $t(91) = 2.36$, $p = .020$, but there was no difference in state anxiety between the negative and positive feedback conditions among low-PSA individuals ($M = 33.98$ vs. $M = 36.99$, respectively), $t(91) = 1.15$, $p = .256$. [20] All these results remained the same if we include self-esteem as a covariate. If we had not included any covariate the significance of the PSA × feedback interaction became only marginally statistically significant ($p = .058$), but all the different simple contrast remained significant ($p = .007$, and, $p = .033$). In contrast, supporting the unique role of PSA in the effect, these results were not obtained if we had used any of the following variables instead of PSA: self-esteem, neuroticism, personal need for structure, narcissism or belief in evolution, all Fs < 1, ps > .330.

We then turned to using the data from this study to test our hypothesis regarding the correlations between PSA, importance of being creative and actual performance on the creativity task broken down to the separate composites of performance: number of uses and ratings of creativity. [21] This analysis showed that PSA was positively correlated with the self-report measure of openness, $r = .29$, $p = .003$, the prescreening item about the importance of being creative, $r_{spearman} = .17$, $p = 0.77$ (this correlation was significant using the 1-item measure of PSA, $r = .20$, $p = .040$), and the overall performance on the creativity task, $r = .18$, $p = .059$ (this correlation was significant using the 1-item measure of PSA, $r = .25$, $p = .010$; see Table 8). [22] Looking at the different components of the creativity task separately, PSA was related to listing more uses for a brick, $r_{spearman} = .20$, $p = .037$, but not significantly related to the creativity ratings of the usages listed $r_{spearman} = .07$, $p = .454$ (both variables were not normally distributed and so a spearman rank order correlation was used). Nevertheless, the 1-item PSA measure was significantly related the creativity ratings, $r_{spearman} = .21$, $p = .031$, suggesting that the 1-item PSA predictor may be better than the 4-item measure, at least when it comes to creativity. These results are incongruent with the our previous explanation for the null results in study 8, as they suggest that PSA may be related to actual creativity, as well as to the desire to be more creative. Indeed, it is reasonable to think that those who value creative would be more likely to be creative than those who are not. This is supported by the fact that openness and caring about creativity were related to better performance on the creativity task as well.

Lastly, we wanted to try and replicate the curvilinear relationship between PSA and neuroticism that we found in Study 9. We again used a hierarchical regression analysis with a quadratic term, and compared the model with this term to the linear model and the cubic model.

In contrast to the finding in Study 9, there was no relationship between neuroticism and PSA for either the linear, quadratic, or cubic model, all Fs < 1, all ps > .560. [23]

The results of Study 10 lend further support to Hypotheses 3 and 4. High-PSA participants reported overall more anxiety and DTA compared to low-PSA participants, and felt especially more anxious after negative feedback to their creativity. However, the negative feedback did not increase DTA for high-PSA individuals, counter to our prediction. Nevertheless, the fact that the interaction between PSA and the feedback condition mirrored the interaction between caring about creativity and the feedback condition (in our manipulation check section), strengthen our ability to conclude that our findings do indeed reflect the fact that high-PSA individuals care more about creativity than low-PSA individuals. However, the fact that we only found a main effect for PSA on DTA, makes it harder to conclude that the increased investment of high-PSA individuals in creativity (at least subjectively), is a result of a terror management process per se.

Furthermore, in line with Hypothesis 3 (and the results of Studies 7 and 9) PSA was again correlated with caring about being creative, openness. PSA was also related to performance on the creativity task, at least in terms of how many uses participants listed for a brick. Interestingly, PSA was related to the ratings of how uniquely creative the uses of a brick were only when we used the 1-item measure (rather than the whole 4-item measure). This suggests that the 1-item measure of PSA is at least as good of a measure of PSA as the 4-item scale is (all the other results were roughly the same for the 1-item and 4-item PSA measure).

Finally, we were not able to replicate the curvilinear correlation between PSA and neuroticism that we found in Study 9. One possible explanation for this discrepancy is that perhaps the context of doing a study about creativity affected the way the participants responded

to the neuroticism scale. Of course, a different explanation for this null result, is that PSA is fact not related to neuroticism, and the curvilinear relationship found in Study 9 was due to a type-1 error. And yet a third explanation is that we did not detect the significant effect because we did not have enough power in Study 10 to replicate the curvilinear correlation found in Study 9, which was of small magnitude (i.e., type-2 error). Indeed an a priori power analysis using G*Power (Faul et al., 2007) indicated that a sample of 191 participants would be needed to detect an effect of this magnitude ($f^2 = .04$) using a regression model with two predictors at a power level of .80. Considering that we only had only 108 participants in our (extended) sample, we only had a post hoc power of about .56 (compared to a power of .74 in Study 9). Nevertheless, combining the data of both Study 9 and Study 10 in one data set ($N = 273$) yielded only a marginally significant quadratic effect, $F(2, 270) = 2.83$, $p = .06$, $\Delta R^2 = .021$, $\beta = .12$ ($p = .057$), while the linear and quadratic models were not approaching statistical significance ($ps > .11$). This result renders the power explanation as less plausible because if the pattern was of the same magnitude, then the effect of this larger sample should have been larger than the effect of Study 9 alone. But we still cannot confidently determinate this based on this result.

General discussion

This dissertation project was aimed at empirically testing new hypotheses derived from TMT (e.g., Greenberg et al., 1986; Goldenberg et al., 2000) regarding the human need to disassociate from other animals and feel protected from death. Based on TMT we hypothesized that cultures help people reduce their PSA (Hypothesis 1). We further hypothesized that people who generally deny their similarity to animals (low-PSA individuals) should be more invested in their cultural worldviews and will therefore be more defensive of their worldviews (Hypothesis 2a) and have more negative attitudes towards people from other cultures (Hypothesis 2b),

especially when they have an elevated need to manage death awareness (after death primes). Furthermore, we theorized that if people who generally do not deny their similarity to animals (high-PSA individuals) are less invested in their cultural worldviews, then they should invest more in their personal achievement and creativity as a way to manage death awareness (Hypothesis 3). Furthermore, considering that it may be harder to gain a sense of security and immortality via creativity or personal achievement compared to via cultural worldviews, and that PSA in itself may be threatening, we hypothesized that high-PSA individuals should be generally more prone to experience anxiety (Hypothesis 4a), and have higher levels of anxiety and death thought accessibility when they experience a threat to their creativity (Hypothesis 4b).

Our findings in the current set of studies provided support for Hypotheses 1 and 2, but only partially supported Hypotheses 3 and 4. In Study 1, we found that affirming the ingroups' cultural worldview (compared to a different cultural worldview) reduces the degree to which people perceive themselves as similar to other animals (supporting Hypothesis 1). In Studies 2a and 2b we found that, among American participants, PSA was negatively related to participants self-reports of how important to them is their identity as Americans, and how superior is the American cultural worldview (supporting Hypothesis 2a). PSA was also positively related to perceptions of similarity across human cultures, and to more favorable attitudes towards Jews and Muslims among non-Jewish and non-Muslim participants (supporting Hypothesis 2b). In Studies 3 and 4 we found that priming death related thoughts (compared to control conditions) caused low-PSA individuals, but not high-PSA individuals, to defend their cultural worldview more (supporting Hypothesis 2a). In Studies 5 and 6 found that death primes (compared to control conditions) caused low-PSA individuals to have more negative attitudes towards other cultures and to exhibit more bias against a member of an outgroup culture, while having the

opposite effect on high-PSA individuals (supporting Hypothesis 2b). In Study 7 we found that PSA was positively correlated with importance of being creative, although it was not correlated with importance of achieving unique accomplishments (partially supporting Hypothesis 3). In Study 8 we did not find any relationship between PSA and projected need for achievement based on a Thematic Apperception Test (TAT) as well as between PSA and ratings of creativity in writing stories based on the TAT pictures, regardless of whether or not death was primed (no support for Hypothesis 3). In Study 9 we found that PSA was positively related to trait anxiety and that there is a curvilinear relationship between PSA and neuroticism, in which very low and very high PSA-individuals reported higher levels of neuroticism (supporting Hypothesis 4a), although this effect was not replicated in Study 10 (perhaps due to low power). In Study 10 we found that high-PSA individuals experienced more anxiety after receiving negative feedback about their creativity (partially supporting Hypotheses 4a and 4b). However, in contrast to our prediction, high-PSA individuals did not have higher levels of DTA after receiving negative feedback about their creativity (no support for Hypothesis 4b), although they did have a higher level of DTA overall (partially supporting Hypothesis 4a). In Study 10 we also conceptually revisited the null findings from Study 8 and found that PSA was positively related to both importance of being creative and openness, as well as to higher scores on a simple creativity task (partially supporting Hypothesis 3). Throughout these studies we demonstrated that PSA had a unique predictive value as a variable, and that the effects found in these studies are not be accounted by other variables such as political orientation, religiosity, self-esteem, pet-ownership, belief in human evolution, the big five personality factors, personal need for structure, narcissism or social desirability.

Overall these results demonstrate that the belief that one is different or similar to other animals plays an important role in how people manage the terror of death. While low-PSA individuals tend to invest more in their ingroups' cultural worldviews, high-PSA individuals tend to invest more in creativity and to feel more anxiety. These results also show that PSA has a unique predictive value as a core belief variable, and that it is a reliable predictor of investment in the ingroup cultural worldview, creativity and anxiety, regardless of whether it was measured with a 1-item or a 4-item measure (as both yielded similar results in Studies 2b, 7, 9, and 10). Notwithstanding, PSA was not found to be related to need for achievement, perhaps because both low and high-PSA individuals are motivated to achieve, and because, at least in an American culture, personal achievement is in fact a major part of the mainstream cultural worldview. Thus, even if our theorizing is correct, both high and low-PSA individuals should be more motivated to achieve more: while the former group may do so to serve their personal self-legacy, the latter may do so it live up to their cultural worldviews.

This research has various potential implications. A better understanding of the relationship between PSA and investment in cultural worldviews, creativity and anxiety, may have implications for understanding a wide variety of human attitudes, feelings and behaviors.

A first implication of this study has to do with advancing our understanding of the phenomenon of investment in and defense of cultural worldviews. By showing that low-PSA is associated with more investment in and defense of cultural worldviews this research can help us better understand why people invest more or less in their ingroup cultural worldviews and are more or less defensive of them. This revelation may also shed light on other social psychological phenomena related to investment in cultural worldviews such as norm following and conformity which have been shown have terror management functions (e.g., Jonas et al., 2008; Jonas &

Fritsche, 2012). Furthermore, these findings may provide insights for understanding of other, seemingly less related cultural-psychological dynamics. For example, considering that low-PSA individuals are more invested in their cultural worldviews, they may also be more invested in various aspects of their culture. Perhaps they may be more fashionable, like popular culture more, be a more fanatic sports fan, support a more strict and moral education, and the list goes on. Moreover, our findings may help better understand the dynamics of political orientations, as PSA was consistently related to a more liberal political orientation among Americans (In Studies 2a and 2b). Studies show that people with liberal and conservatives political and religious orientations differ in their need for morals that revolve around purity and cleanness (e.g., Haidt, 2013), which are related to the denial of animal similarity and death (e.g., Goldenberg et al., 2000, 2001; Goldenberg, 2012). Indeed, some studies have found that conservatives, who report lower levels of PSA, often exhibit higher levels of ingroup bias (e.g., Jost, Glaser, Kruglanski, & Sulloway, 2003), and respond to MS primes with more aggression toward out groups (e.g., Pyszczynski et al., 2006; Weise, Arciszewski, Verlhiac, Pyszczynski, & Greenberg, 2012). Future research may test if perhaps differences in PSA between liberals and conservatives may account for some of these findings.

A second implication of this research, which is related to the prior one, is that this study may ultimately sheds more light on the dynamics of intercultural conflicts, as well as on the study of prejudice, stereotypes, and discrimination. Our theory suggests that low-PSA individuals are more defensive and prejudiced, especially after thinking about death, because they are more dependent on their own cultural worldviews to help them get rid of their animality and creatureliness. Perhaps the most horrifying example of the intimate connection between the denial of human creatureliness and aggression towards other humans are the atrocities committed

by the Nazis in World War II. The Nazis wanted to feel pure and to glorify the Aryan race and the Third Reich and become super humans (Übermensch), by exterminating the "animal-like," "impure" Jews, Gypsies, homosexuals, and disabled. As Becker noted in his *Escape From Evil* (1975), the humane attempt to the deny mortality and creatureliness is one of the main causes human evil:

> "The thing that makes man the most devastating animal that has ever stuck his neck up into the sky is that he wants a stature and destiny that is impossible for an animal; He wants an earth that is not an earth but a heaven, and the price for this kind of fantastic ambitions is to make the earth an even more eager graveyard than it naturally is" (Becker, 1975, p. 96).

In other words, Becker argues that peoples' death-denying fantasies of being more than mortal animals hold within them the most destructive forces, including those that underline the desire to kill others and to sacrifice one's own life for achieving a sense of immortality. Indeed, research in the framework of terror management theory has demonstrated that after thinking about mortality, participants were more supportive of becoming a martyrdom in the name of their worldviews (e.g., Pyszczynski et al., 2006). Our findings also suggest that high PSA has the potential to defuse intercultural tensions and prejudice. PSA was positively related to favorable attitudes towards outgroups and to higher perceived similarity across human cultures, and high-PSA individuals exhibited less prejudice overall. This information may be beneficial for developing interventions for promoting peace and reducing inter-group prejudice. Unlike the popular notion that the best solution to the problem of outgroup dehumanization during intercultural conflicts is to try and perceive outgroups as more human, this research suggests that perhaps viewing ourselves more as animals may be key in reducing intergroup conflicts and

prejudice. Future research may examine if encouraging people to become more willing to acknowledge and embrace the notion that they are in many ways similar to other animals may be a way to make people more accepting of other humans from other cultures. Indeed, many scholars and psychologists felt that people would be better off in many ways if they could, to some extent, be more accepting of their animalistic side by: confronting their own "shadow" (Jung, 1959/1981); uncovering their repressed unconscious (Freud, 1890/1936); being really "here and now" (Rank; Lieberman, 2010); being authentic (Rogers, 1951); living un-historically (Nietzsche, 1878); being able to surpass repression to a certain degree (Brown, 1959). Perhaps it can be said that humans are better off being the animal that they are?

The findings that PSA relates to positive and negative attitudes towards outgroups are also congruent with several other studies who examined how the human-animal divide may related to humanization, dehumanization and evaluations of people from outgroups (e.g., Amiot, & Bastian, 2014; Costello & Hodson, 2010, 2012; Dhont, Hodson, Costello, & MacInnis, 2014). One difference however, is that those studies focused on social dominance orientation (Pratto, Sidanius, Stallworth, & Malle, 1994), and did not address the TMT account for the why humans need to disassociate themselves from animals in the first place (e.g., Becker, 1975; Cox et al., 2007; Goldenberg et al., 2000, 2001). Although Costello and Hodson's "interspecies model of prejudice" (e.g., Costello & Hodson, 2012) provides strong evidence for the role of parental socialization in children's levels of social dominance orientation, it is also theoretically plausible that social dominance has a terror management function in itself – by making people feel more powerful, superior and just. Indeed, previous research showing that death primes can increase a variety of attitudes and behaviors related to social dominance including, support for charismatic leaders (e.g., Landau et al., 2004; Cohen, Solomon, Maxfield, Pyszczynski, & Greenberg, 2004),

system justification (Ullrich & Cohrs, 2007), political authoritarianism (e.g., Echebarria-Echabe & Fernández-Guede, 2006; Jost et al., 2007; but also see Greenberg & Jonas, 2003 for a counter argument), punishment of offenders (e.g., Florian & Mikulincer, 1997; Rosenblatt et al., 1989), belief in a just world (Hirschberger, 2006), prejudice (e.g., Greenberg et al., 1990), and need for power (Belmi & Pfeffer, 2016). Furthermore, studies in the framework of TMT have shown how death primes increase the need to for dominance over animals (e.g., Beatson, & Halloran, 2007; Beatson et al., 2009; Lifshin et al., 2017). Although some studies have looked at the interaction between the need to manage death awareness and social dominance orientation (even in the context of attitudes towards immigrants; e.g., Bassett, 2010), future research should investigate the terror management function *of* social dominance orientation itself. Another major difference between the current study and previous work on the relationship between prejudice and the human-animal relationship, is that while we measured a perceived similarity of the self to animals, the studies conducted by Costello and her colleagues (Costello & Hodson, 2012; Dhont et al., 2014) used a measure of "the human animal divide" that included both a measure of general similarity between humans and animals, and measures pertaining to human superiority over animals. It is therefore not surprising that their measure of superiority over animals is highly correlated with social dominance orientation scale because these two constructs are inherently confounded. In fact one may argue that social dominance orientation is confounded with prejudice as some of the items on that scale directly measure agreement with prejudice and discrimination (e.g., "Some groups of people are simply inferior to other groups", "It's OK if some groups have more of a chance in life than others"; It's probably a good thing that certain groups are at the top and other groups are at the bottom") and some are specifically about immigrants from outgroups ("if certain groups stayed in their place, we would have fewer

problems", "Inferior groups should stay in their place"; Pratto et al., 1994). Thus, it is not surprising that a scale that measures attitudes towards outgroups would predict negative attitudes towards outgroups. In contrast, our measure of PSA is not directly confounded with prejudice or superiority, at least on its face value, and so the idea that it can predict prejudice, based on TMT, is far less intuitive.

A third implication of this research is that it may promote our understanding of the psychological functions of creativity. Although many studies in TMT have examined how creativity may (or may not) be used to for attaining meaning and symbolic immortality (e.g., Arndt et al., 1999; Landau et al., 2010; Routledge et al., 2008; Routledge & Juhl, 2012), the results of our studies 7, 9 and 10, suggest that PSA may be a critical factor in understanding how MS may affect people's investment in creativity. According to our theoretical reasoning, because high-PSA individuals are less invested in their ingroup's cultural worldviews, they may be more inclined to pursue creativity, and need to stick out of the crowd to gain a sense of immortality. Furthermore, considering that creativity might induce guilt if it is incongruent with cultural norms and values (e.g., Arndt et al., 1999; Routledge et al., 2004, 2008), and that high-PSA individuals may be more free of the normative constrains that group's cultural worldview imposes, they may also feel more free to pursue their creative goals. Moreover, considering that creativity is often contrasted with conformity, as the creative act (in any subject) defies the normative and known routine with something new and novel (e.g., Becker, 1973; Rogers, 1954; Sheldon, 2011; Sternberg, & Lubart, 1995), if high-PSA individuals are less dependent on their worldviews, they may also feel less need to conform to its values and thus are more creative and think differently from the "crowd". These ideas also fit findings from research showing that the experience of multiculturalism can under some circumstances increase creativity (e.g., Chang,

Cheng, Wu, Wang, & Hung, 2017; Leung & Chiu, 2010; Leung, Maddux, Galinsky, & Chiu, 2008; Maddux, Adam, & Galinsky, 2010). If people have more cultural groups and more cultural worldviews they may have more flexibility to deviate from the constraints of any one of them. Notwithstanding, the fact that our hypothesis was not confirmed in Study 8, which investigated the potential interactive effect of PSA and MS on one measure of creativity, suggests that this might not be such a clear case. Further studies should investigate the interaction between MS and PSA on different measures of creativity and reexamine Hypothesis 3. Furthermore, future research may assess whether differences in the experience of guilt related to creativity, or if differences in levels of conformity, may explain differences in investment in creativity between high-PSA and low-PSA individuals.

A fourth implication of this research is that it may help further understand the experience of anxiety, and the variety of psychological disorders that might relate to it. The findings that PSA was positively correlated with trait anxiety in Study 9, and that high-PSA experience more state anxiety after receiving negative feedback about their creativity, and had overall higher levels of DTA suggest that PSA may be central to the experience of anxiety. For example it might be that high-PSA individuals are more likely to suffer from Post-Traumatic Stress Disorder (PTSD) or general anxiety disorder. Indeed according to the anxiety buffer disruption theory (Pyszczynski & Kesebir, 2011), PTSD results from a disruption in one's anxiety-buffering mechanisms (e.g., cultural worldviews, self-esteem, personal relationships), which normally provide protection against anxiety in general and death anxiety in particular. Indeed, PSA was found to be negatively related to investment in the ingroup cultural worldviews (i.e., less national identification, and less religiosity), and positively related to anxiety and DTA. On the other hand our findings that, at least in Study 9, there was a curvilinear (U-shaped) relationship between

PSA and neuroticism (and there was also a similar pattern between PSA and trait anxiety), suggest that low-PSA individuals might also susceptible to experiencing different types of psychopathology, considering that neuroticism was found to be related to stress, coping and vulnerability to psychopathology like depression or anxiety (e.g., Gunthert, Cohen, & Armeli, 1999; Muris, Roelofs, Rassin, Franken, & Mayer, 2005; Saklofske & Janzen, 1995; Spinhoven, van Balkom, & Nolen, 2011). The idea that both high and low PSA can relate to anxiety is also congruent with our experimental findings that low and high PSA are the most responsive to threat conditions: low-PSA were more defensive of their worldviews after MS and high PSA individuals experienced more anxiety after receiving negative feedback about their creativity. Thus although low-PSA individuals may not experience more anxiety, they may still be very reactive to threats that increase the potential for anxiety. This notion is congruent with the TMT reasoning that more defensive responses may are driven by the need to reduce an unconscious potential for anxiety (e.g., Arndt, Greenberg, Solomon, Pyszczynski, & Simon, 1997; Pyszczynski et al., 1999). Future research should investigate whether PSA is in fact related to psychological disorders such as anxiety or depression, while considering the possibility that this relationship may be curvilinear: as it may be that both high and low PSA individuals are more vulnerable than those in the middle.

This study has several limitations. First, our studies were conducted among a specific population: American college students. It is possible that people of different age groups or people from other countries would respond differently. Nevertheless, we have several reasons to suspect that these findings may apply broadly. First, studies have shown that dehumanization effects are global (e.g., Castano & Giner-Sorolla, 2006; Harris, & Fiske, 2011; Vaes, Paladino, Castelli, Leyens, & Giovanazzi, 2003; for reviewers see: Castano & Kofta, 2009; Haslam, 2006),

and of course modern history is all too full of examples in which out-group dehumanization contributed to war and genocide, in Europe, Asia and Africa. Studies in the framework of TMT have demonstrated that MS causes non-American participants to humanize their ingroups (e.g., Vaes et al., 2010) and also to endorse more negative attitudes towards animals after MS (e.g., Beatson, & Halloran, 2007; Beatson et al., 2009). Second, studies in indicate that the tendency to dehumanize outgroups already develops at early childhood (e.g., Costello & Hodson, 2012), while prejudice towards outgroups is also found to be consistent across early adulthood (e.g., Henry & Sears, 2009). Nevertheless, future studies should replicate these effects in different cultures, among different age populations. For example, PSA may have different effects in cultures that connect human immortality with the animal kingdom (e.g., through reincarnation), which may render animal similarity as less threatening. Moreover, it may be interesting and perhaps beneficial to study how different cultures and religions regard the relationship between humans and animals, and if that is related to their tendency to be more or less defensive and prejudice against out-groups. Perhaps this will enrich our understanding how to promote PSA in a constructive way, without inducing anxiety, DTA and defensiveness. It may also be important to examine these effects with different age groups. It may be particularly interesting to investigate the development of PSA, in relation to the development of death awareness in children. Considering that previous research has shown that some terror management defenses begins later in childhood (around the age of 11; Florian & Mikulincer, 1998b), we would expect that the need to disassociate from animals, and the relationship between PSA and investment in cultural worldviews would also intensify in that age. While studies show that prejudice related to PSA may exist in early childhood (e.g., Costello & Hodson, 2012), it would be interesting to examine how the development of mortality awareness may moderate this effect.

A second limitation of this study is that we did not manipulate PSA experimentally. The reason for this is because, at least in the context of a short experiment, TMT research shows that manipulating PSA may not actually backfire and make people think more about death (e.g., Cox et al., 2007; Goldenberg et al., 2001), or make them even more resistant to the idea that they are animals. Nevertheless, future research should investigate whether it is possible to actually change peoples "dispositional" PSA in an intervention and then test whether changing PSA in this intervention changes the way people invest in their cultural worldviews and creativity, particularly after thinking about death. Considering the potential benefits of high PSA and perceived connectedness with animals in reducing on negative bias towards outgroups reported in this research, as in other studies (e.g., Amiot, & Bastian, 2014; Costello, & Hodson, 2010, 2012), such an intervention may be useful in reducing intercultural conflicts. However, considering that higher levels of PSA were also associated with higher levels of anxiety, such intervention may also have negative "side effects". Thus, if such intervention is practical, further research would be required to better understand how it may ultimately affect peoples' psychological wellbeing.

A third limitation of this research is the fact that our hypothesis was not supported in Study 8. While the null effect of PSA on N-Ach is congruent with the null effect found in Study 7, the null effect for creativity is not congruent with the findings in 10, where PSA was related to performance on a short creativity task. The significant finding in Study 10 not only fits our theory, but is also in line with the results of Studies 7, 9 and 10 in which PSA was related to caring more about creativity and to openness (which is highly related to caring about creativity). It makes sense that high-PSA individuals would be more creative if they care more about creativity, although the correlations between these two constructs was not particularly high in

Study 10 (the correlation ranged between, $r_{spearman}$ = .25, to, $r_{spearman}$ = .30). Accordingly, although we can be relatively confident that PSA is related to caring about being creative, further research is needed to comprehensively understand how PSA relates to peoples' actual creativity in its multiple dimensions, while using several different measures of creativity (e.g., Cooper, 1991; Hocevar, 1981).

Finally the fact that in Study 10, the feedback manipulation did not increase DTA among high-PSA individuals is incongruent with Hypothesis 4b, although it is somewhat congruent with Hypothesis 4a. Indeed as a part of our reasoning we suggested that thinking about oneself as an animal may be directly related to thinking more about death, given that creatureliness primes have previously been shown to increase DTA (e.g., Cox et al., 2007; Goldenberg et al., 2001). However, one reason that we did not clearly hypothesize that there would be a zero order correlation between PSA and DTA, but that this effect would only be dependent on threat, is that in previous mass surveys (not described in this research), PSA was not correlated with a shorter (an non-validated) measure of DTA. But considering that PSA was overall positively correlated with DTA in Study 10, it is plausible that the previous null relationship that we found in the mass survey had to do with the specific measure that we used, as well as the specific context that participants were in (i.e., a large crowded classroom vs. a quite private cubicle in the lab). Further research should try and replicate the positive correlation between PSA and DTA in a more controlled environment.

Conclusion

From an existential perspective, this works highlights how the basic duality in human beings that was illuminated by Becker's (1971, 1973, 1975) analyses—that we are mortal animals on the one hand, and symbolic, death-transcending creatures on the other hand— plays a

role in central phenomena within social psychology. Perceived similarity to animals relates to the degree to which people relate themselves to their in-group cultural worldview and to other people who possess different cultural worldviews than their own. On the other hand PSA was also related to peoples' desire to be creative and to their experience of anxiety. We hope that this research will further illuminate the need to address the human-animal relationship more seriously in the study of human psychology (e.g., Amiot, & Bastian, 2014). Kurt Lewin (1952) argued that in order to really understand human beings, they should be studies within their life fields, and not in a detached manner. In the same vein, we argue that we need to pay much more attention to our psychological relations with things in our life field – animals! The fact that the scientific study of the human-animal relationship has been pushed aside from the social sciences might not be accidental, but due to the human need to suppress our awareness of death and creatureliness. We hope that this work and others like it may promote the need to have a more general and objective science of humans — one that involves our relationship with other inhabitants of our planet.

Footnotes

[1] We do not find it necessary to also expand on other central tenets in TMT such as the anxiety buffer hypothesis (For reviews see Greenberg et al, 1997; Solomon et al., 2015) and the dual process of TMT (Pyszczynski, Greenberg & Solomon, 1999; Hayes et al., 2010).

[2] Including this outlier in our analysis made our effects stronger, however, we decided to be more conservative and not include this participant in our analyses (considering that this person was in the U.S. worldview boost condition).

[3] In order to treat PSA as a somewhat stable construct, we conducted a test retest validation study for the animal similarity item, 3 weeks after we conducted our mass survey. Results indicated that the two measurements were sufficiently correlated to infer relative stability, $r = .54$, $p < .001$.

[4] There was also a very weak correlation between PSA and gender, $r = .07$, $p = .015$, but we do not further report it since this correlation did not replicate in other Study 2b ($N = 1449$) where gender was not correlated with either the 1-item measure of PSA, $r = .02$, $p = .523$, or with the 4-item measure of PSA, $r = .04$, $p = .119$. Similarly, in Study 7 ($N = 741$) gender was not correlated with either the 1-item or 4-item measure of PSA, $r = -.01$, $p = .904$, and, $r = .01$, $p = .911$, respectively. We therefore did not include gender in our correlation tables.

[5] After running the study we continued to collect data from subsequent mass surveys to replicate these effects. Repeating the regression analysis for predicting similarity across cultures via PSA, political attitudes, religiosity and American identity as predictors with a sample of 3712 American participants replicated these results. PSA was again the best predictor of this perceived similarity across cultures, $t(3708) = 14.15$, $\beta = .23$, $p < .001$ (all other βs < .08).

[6] We also included several items assessing participants' incremental and entity theories of personalities (Levy, Stroessner, & Dweck, 1998), which are related to general beliefs in essentialism (e.g., Bastian & Haslam, 2005), to ty and address the possibility that PSA relates to a more general belief in essentialism (rather than in a more specific belief in human essentialism that is concerned with terror management motives; e.g., Goldenberg et al., 2001), and that it is a general sense of essentialism (rather than PSA) that relates to attitudes towards the ingroup and the outgroup. This alternative possibility is conceivable based on previous research showing that more essentialist views are sometimes correlated with more prejudice (e.g., Bastian & Haslam, 2005; Haslam, Rothschild, & Ernst, 2002; Leyens et al., 2001; Leyens et al., 2003). However, while PSA may be conceptualized as a form of essentialism (as low-PSA beliefs are more related to essentialism) we don't think that our effects may be explained by a general cognitive tendency of essentialism, but rather by one that enables terror management (PSA).

Our analysis showed that as previous research suggests, there was a weak positive correlation between incremental theory and similarity across cultures, $r = .11$, $p < .001$, and also a weak negative correlation between entity theory and similarity across cultures $r = -.06$, $p = .030$. Entity theory was also correlated with superiority of American values, $r = .114$, $p < .001$, although neither entity or incremental theory was not related to importance of American identity, rs $< .05$ ps $> .08$. More importantly however, supporting our differentiation of PSA from general essentialism, our analyses showed that PSA (1-item or 4-item) was not related to entity or incremental theories of Personality, all rs $< |.02|$, ps $> .645$. Thus this variable cannot explain any effects related to PSA and we therefore do not address these variables further in this Study.

[7] Using political orientation instead of the PSA premeasure did not produce similar results in Study 3, F_{int} = .20, p = .62; Study 4, F_{int} = .05, p = .82; Study 5, F_{int} = 1.27, p = .26; and in Study 6, F_{int} = 2.95, p = .09.

[8] The articles were edited so that each article actually had 2 versions: in one version the culture had a holiday in which they killed animals and in the other version they had a different type of holiday. For each participant, read about one culture with a killing holiday and one without such a holiday. There was no significant difference between the experimental condition (MS or control) in ratings of the culture that has the killing holiday compared to the control holiday, F = .002, p > .95. Furthermore, using the type of culture that had the killing holiday as a covariate did not alter the results.

[9] The participants' social desirability and preexisting attitudes towards Muslims were not included in the regression model since they were not significant covariates (both ts = -1.48, ps = .14). Adding them in did not alter the results in any way. There was another participant who was an outlier in our prejudice score (Z = 3.27). Not including this participant in the results made our effects even stronger, and also made the premeasure of attitudes towards Muslims a significant covariate. However, we eventually decided to be more conservative (considering that this person was not in the MS condition) and included this participant in our analyses.

[10] The item of believe in human evolution was not normally distributed in the sample (Skewness = -8.92, Kurtosis = -2.30), as the more than 33% of the participants reported that they completely believe that humans evolved for other animals. Human superiority was also not normally distributed in the sample (Skewness = -3.22, Kurtosis = -5.18). Similarly, the variables of importance of being creative and importance of achieving unique accomplishment were not normally distributed (Skewness = -7.10 and Skewness = -13.69, respectively), as the more than

27% of the participants reported that they "extremely" care about being creative, and 40% of them reported that they "extremely" care about achieving unique accomplishments. We therefore used non-parametric statistics to tests the correlations with these variables.

Importantly the fact that the item of belief in human evolution is distributed differently than PSA, and does so in a non-normal fashion demonstrates that this variable is different form PSA (and perhaps has poorer statistical characteristics that are less compatible with parametric statistics).

[11] All these results were similar if we used the 1-item measure of PSA, although some of the correlations were slightly weaker.

[12] The categories of positive and negative affective responses scores had relatively low inter item correlations (rs < .30), and removing them slightly improved the inter-item reliability to $\alpha = .76$. We also calculated N-Ach without these items, but this did not have an effect on any of the results.

[13] One participant had an outlier score of mean words per story with a mean score of 295 words across the three stories ($Z = 4.35$), so we also examined the analysis for number of words without this participant (this also helped to make the variable of mean words normally distributed). However, excluding this participant did not affect the results in any way.

[14] The category of unique accomplishment was not used as a dependent variable by itself since it was not normally distributed in the sample, and more than 50% of the participants did not have a score in this category. If we had used this variable in a regression analyses than the pattern of the mean was against the research hypothesis, whereas high-PSA participants had lower scores in this category after MS compared to after control.

[15] A mixed subjects ANOVA of participants need for achievement scores, between the experimental condition and within the three different pictures (without PSA) showed a nearly significant interaction effect, $F = 2.23$, $p = .093$, as MS participants had lower need for achievement scores in the story about the picture with the man looking in a telescope out to space (between subject pairwise contrast were significant at, $p = .047$, and within subject contrasts were significant at, $p < .001$, and at $p = .001$). Perhaps because MS may make the topic of space more threatening.

[16] The variable of belief in human evolution was again not normally distributed (Skewness = -3.1, Kurtosis = -2.48, with 50% of participants being at the top of the scale). The BAI scale was also not normally distributed (Skewness = 2.37), however, all the results with BIA were the same when we used parametric and non-parametric correlation (Spearman rank-order correlation coefficient), or if we used a log-transformed version of the BAI (which helped addressed the skew of the item but created more kurtosis, so we preferred to use the original scale). Similarly there was no difference in the results of the polynomial regression analysis when the BAI was log-transformed.

[17] The participants who were alone were not included in the sample considering that, as we expected decision to exclude participants who were alone was taken before the analysis considering that these participants have a different experience and that they may experience more anxiety than participants who were in groups. Indeed an examination of the mean anxiety scores between participants who were alone (and excluded from the analyses) and those who were ran in groups (and were all included) indicated that those who were alone experienced overall more anxiety across the feedback conditions, $M = 42.38$ vs. $M = 38.02$, although this difference was not significant considering that only 8 participants completed the study alone, $p =$

.297. Moreover, theses participants were not equally distributed among the experimental conditions and the level of animal similarity.

[18] These results remained the same if we did not include neuroticism as a covariate, although then, in addition to the significant effects among those who cared more about creativity, there was also an opposite trend in the positive feedback condition, in which participants who reported caring more about being creative experienced less state anxiety than those who did not care about being creative (M = 33.67 vs. M = 40.12, respectively), $t(92) = 2.04$, $p = .019$. Furthermore, among participant who care relatively less about their creativity there was a non-significant pattern of means going the other direction: in which they experienced slightly more anxiety after receiving positive feedback about their creativity compared to after receiving negative feedback (M = 40.12vs. M = 34.74, respectively), $t(91) = 1.71$, $p = .092$.

[19] We also counted any other additional death related words that the participants listed (i.e., "gory") as an additional DTA item although this did not significantly affect the results (the correlation between PSA and DTA was stronger with this item). These results also did not change if we included the number of incomplete words or any other covariates.

[20] All these results were the same (and even at a higher level of significance) if we used the 1-item measure of PSA instead of the 4-item measure, supporting the notion that both scales provide a valid measure of PSA.

[21] This analysis included more participants than our main analysis (N = 108), since we were able to include participants who had missing data on our dependent variable and feedback manipulation (all these variables were recorder prior to the manipulation), as well as participants who completed the study alone (considering that we did not include state anxiety or DTA in this analysis). These results were similar if we only use the only the 96 participants who comprised

the sample in the primary analysis, although the correlations between the 4-tem PSA measure and caring about being creative as well as the performance on the creativity task became even less statistically significant. Nevertheless all the correlations remained significant for the 1-item PSA measure.

[22] The correlation between PSA and personal need for structure was only marginally significant, r = -.17, p = .085, and as previous research has shown (e.g., Kruglanski, 2004; Neuberg & Newsom, 1993), need for structure was also related to openness and to caring about creativity, r = -.29, p = .003, and, r = -.23, p = .018 (as well as with the big five factors of conscientiousness, r = .32, p = .002, and neuroticism, r = .27, p = .007). However, considering that personal need for structure was not relevant to this particular hypothesis and since it was not significantly correlated with PSA (and thus cannot mediate its effects), we did not include it in Table 8.

[23] We also used this opportunity to reexamine the null-relationship between PSA and the other big five factors. The results were similar to Study 9 as PSA was not correlated with extraversion, conscientiousness, rs < .05, ps > .08, and there was again non-statistically significant relationship between agreeableness and PSA, r = -.15, p = .115.

Tables

Table 1

Means, standard deviations and a correlation matrix between perceived similarity to animals (PSA), importance of American identity (U.S. identity), importance of religious beliefs, political conservatism and perceived similarity between cultures (PSC), in Study 2a (N = 1258).

	Measure	*1*	*2*	*3*	*4*	*M*	*SD*
1	PSA	—				5.02	1.95
2	U.S. identity	-.12***	—			6.77	1.90
3	Religiosity	-.10***	.27***	—		5.27	2.62
4	Political C.	-.21***	.32***	.23***	—	4.79	1.86
5	PSC	.18***	-.14***	.01	-.11***	5.12	1.93

Note. *** $p < .001$. PSA = perceived similarity to animals; U.S. identity = importance of American identity; Political C. = Political conservatism; PSC = perceived similarity between human cultures.

Table 2

Means, standard deviations , corrected item-total correlation, and a correlation matrix between the 4 items of perceived similarity to animals (PSA) in Study 2b (N = 1450).

	Measure	*1*	*2*	*3*	*Corrected item-total correlation*	*M*	*SD*
1	Please rate how similar you think you are to other animals	—			.70	5.05	1.87
2	To what extent do you think about yourself in the same way that you think about animals?	.61***	—		.67	4.23	2.04
3	I think that I am completely different than animals	-.55***	-.50***	—	.60	4.34	2.13
4	I think animals and myself are more or less the same	.56***	.55***	-.46***	.62	4.63	1.86

Note. *** $p < .001$. PSA = perceived similarity to animals.

Table 3

Means, standard deviations and a correlation matrix between the 4-item measure of perceived similarity to animals (PSA), importance of American identity (U.S. identity), perceptions of the superiority of the American worldview (U.S. worldview), importance of religious beliefs, political conservatism and perceived similarity between cultures (PSC), in Study 2b (N = 1450).

	Measure	*1*	*2*	*3*	*4*	*5*	*M*	*SD*
1	PSA (4-items)	—					4.89	1.60
2	U.S. identity	-.11***	—				6.93	1.91
3	U.S. worldview	-.18***	.43***	—			4.44	1.29
4	Religiosity	-.11***	.20***	.09***	—		5.40	2.64
5	Political C.	-.20***	-.29***	.32***	.26***	—	4.82	2.00
6	PSC	.18***	-.02	-.01	.03	-.12***	4.85	1.77

Note. *** $p < .001$. PSA = perceived similarity to animals; U.S. identity = importance of American identity; U.S. worldview = superiority of the American worldview; Political C. = Political conservatism; PSC = perceived similarity between human cultures.

Table 4

Means, standard deviations and a correlation matrix between the 4-item measure of perceived similarity to animals (PSA), perceptions of the superiority of the American worldview (SAWV), perceived similarity between cultures (PSC), favorable attitudes towards Jews and favorable attitudes towards Muslims, among non-Jews and non-Muslim participants in Study 2b (N = 1335).

	Measure	*1*	*2*	*3*	*4*	*M*	*SD*
1	PSA (4-items)	—				4.90	1.59
2	U.S. worldview	-.19***	—			4.54	1.30
3	PSC	.19***	-.02	—		4.86	1.78
4	Jews	.07**	-.16***	.12***	—	4.97	1.05
5	Muslims	.15***	-.26***	.17***	.69***	4.47	1.39

Note. ** $p < .01$, *** $p < .001$. PSA = perceived similarity to animals; U.S. worldview = superiority of the American worldview; PSC = perceived similarity between human cultures; Jews = favorable attitudes towards Jews; Muslims = favorable attitudes towards Muslims.

Table 5

Means, standard deviations and a correlation matrix between the 4-item measure of perceived similarity to animals (PSA), importance of being creative (creativity care), importance of achieving unique accomplishments (Ach care), importance of American identity (U.S. identity), perceived similarity between human cultures (PSC), believe in human evolution (Evolution), and belief in human superiority over animals (Superiority) in Study 7 (N = 743).

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1 PSA (4-items)	—						
2 Creativity care	.21***†	—					
3 Ach care	.06†	.39***†	—				
4 U.S. identity	-.15***	-.01†	.11**	—			
5 PSC	.17***	.11**	.01	.02	—		
6 Evolution	.32***†	.12**†	.06	-.16***†	.17***†	—	
7 Superiority	-.29***†	-.04†	-.02†	.21***†	-.01†	-.05†	—
M	4.96	7.06	7.62	6.51	5.80	6.60	5.41
SD	1.68	1.69	1.53	2.02	1.97	2.45	2.53

Note. † *Spearman rho,* * $p < .05$, ** $p < .01$, *** $p < .001$. PSA = perceived similarity to animals; creativity care = importance of being creative; Ach care = importance of achieving unique accomplishments; U.S. identity = importance of American identity; PSC = perceived similarity between human cultures; Evolution = believe in human evolution; Superiority = belief than humans are superior to other animals.

Table 6

Means of need for achievement scores (N-Ach) and creativity ratings in the TAT stories, across the participants' different levels of perceived similarity to animals (PSA; mean centered at +1 and -1 standard deviations from the mean) in the different experimental conditions (mortality salience or uncertainty salience) in Study 8 (N = 88).

	Mortality salience		Uncertainty salience	
Measure	Low PSA	High PSA	Low PSA	High PSA
N-Ach	5.13	4.75	5.32	5.13
Creativity rating	2.06	2.11	1.93	2.03

Note. No differences were statistically significant, all *p*s > .523. Low PSA and High PSA = perceived similarity at -1 and +1 standard deviations from the mean, respectively; N-Ach = need for achievement.

Table 7

A correlation matrix between the 4-item measure perceived similarity to animals (PSA), belief that humans evolved from animals (Evolution), neuroticism, openness, agreeableness (Agree), the Beck Anxiety Inventory (BAI), and the three subscales of the disgust sensitivity scale (pathogen, sexual and moral), in Study 9 (N = 165).

	Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1	PSA	—								
2	Evolution	.39***	—							
3	BAI	.16*†	-.08†	—						
4	Neurotic	.10	-.09†	.47***†	—					
5	Openness	.31***	.25**†	.16*†	.07	—				
6	Agree	-.14^{+}	-.04†	.07†	-.11	.07	—			
7	Pathogen	-.15^{+}	-.11†	.03†	.15^{+}	.02	.20**	—		
8	Sexual	-.17*	-.37***†	.14$^{+\dagger}$	.14^{+}	-.11	.21**	.43***	—	
9	Moral	-.06	-.12†	.10†	.01	-.03	.17*	.28***	.52***	—
	M	4.84	6.22	14.10	3.04	3.44	3.84	4.80	4.33	5.01
	SD	1.64	2.65	8.62	.70	.59	.51	1.05	1.43	1.12

Note. † *Spearman rho,* $^{+}$ $p < .10$, * $p < .05$, ** $p<.01$, *** $p < .001$. PSA = perceived similarity to animals; Evolution = belief that humans evolved from animals; Agree = agreeableness factor of the big five inventory; BAI = Beck Anxiety Inventory; Pathogen = pathogen disgust subscale, Sexual = sexual disgust subscale Moral = moral disgust subscale. The remaining big five factors (extraversion and conscientiousness), social desirability (EPQ-lie) and the narcissism (NPI) were not included in the table because they were not related to PSA.

Table 8

Means, standard deviations and a correlation matrix between the either the 4-item measure of perceived similarity to animals (PSA) or the original 1-item measure, and importance of being creative (Creativity care), the openness subscale of the big five personality inventory, and the performance in the creativity task broken down to the number of uses for a brick listed in the creativity task (Brick Uses) and the number of uniquely creative uses for a brick listed in the creativity task as scored by coders (Brick Creativity) in Study 10 (N = 108).

	Measure	*1*	*2*	*3*	*4*	*5*	*M*	*SD*
1	PSA (4-items)	—					4.98	1.63
2	PSA (1-item)	—	—				5.22	1.91
3	Creativity care	.17$^{+\dagger}$	.21*†	—			7.38	1.58
4	Openness	.28**	.29**	.58***†	—		3.61	.58
5	Brick Uses	.20*†	.26**†	.30**†	.29**†	—	5.96	3.43
6	Brick Creativity	.07†	.21*†	.29**†	.25**†	.75***†	.80	1.36

Note. † *Spearman rho,* $^{+}$ $p < .10$, * $p < .05$, ** $p<.01$, *** $p < .001$. PSA = perceived similarity to animals; Creativity care = prescreening measure of importance of being creative; Brick Uses = number of uses for a brick listed in the creativity task; Brick Creativity = number of uniquely creative uses for a brick listed in the creativity task as scored by coders.

Figures

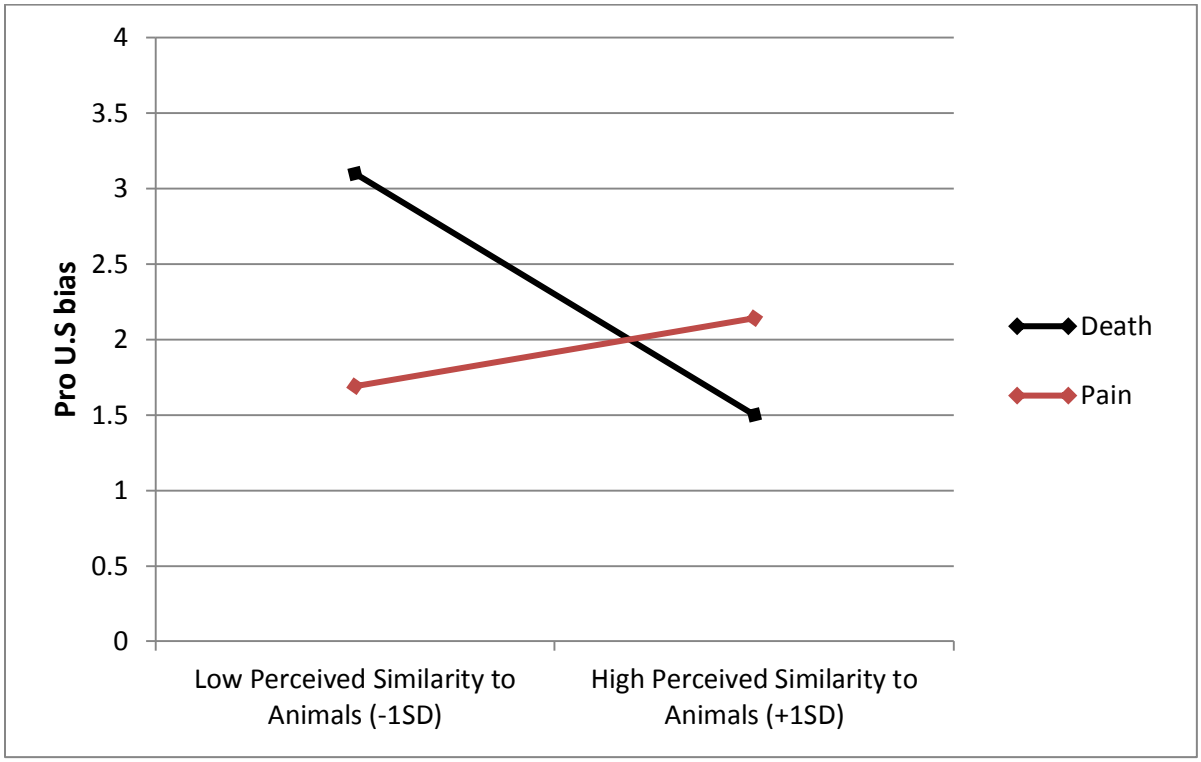


Figure 1. A figure depicting the interaction effect between the experimental condition (MS = 1, pain salience = -1) and the different levels of the participants perceived similarity to animals (centered at +1 and -1 standard deviation) on the dependent measure of pro U.S. bias (rating of a pro America essay minus the ratings of an anti-America essay) in Study 3 (*N* = 89).

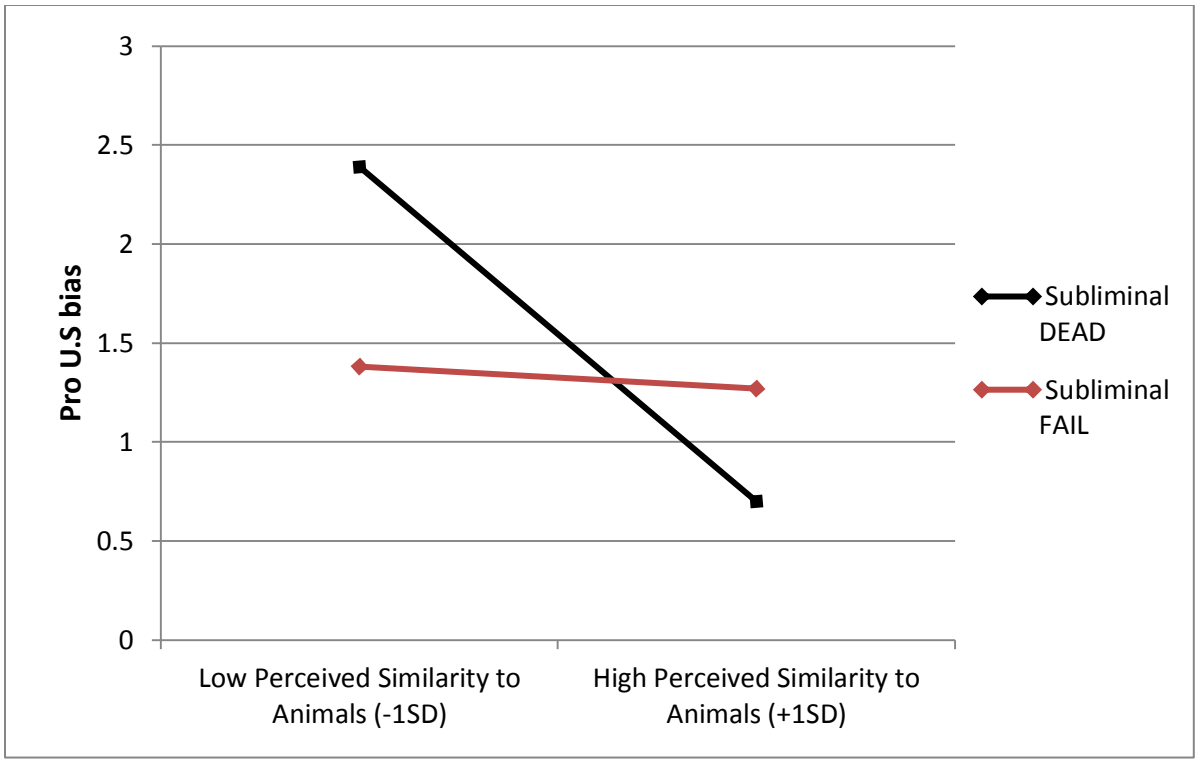


Figure 2. A figure depicting the interaction effect between the experimental condition (subliminal *DEAD* = 1, subliminal *FAIL* = -1) and the different levels of the participants perceived similarity to animals (centered at +1 and -1 standard deviation) on the dependent measure of pro U.S. bias (rating of a pro America essay minus the ratings of an anti-America essay) in Study 4 (N = 92).

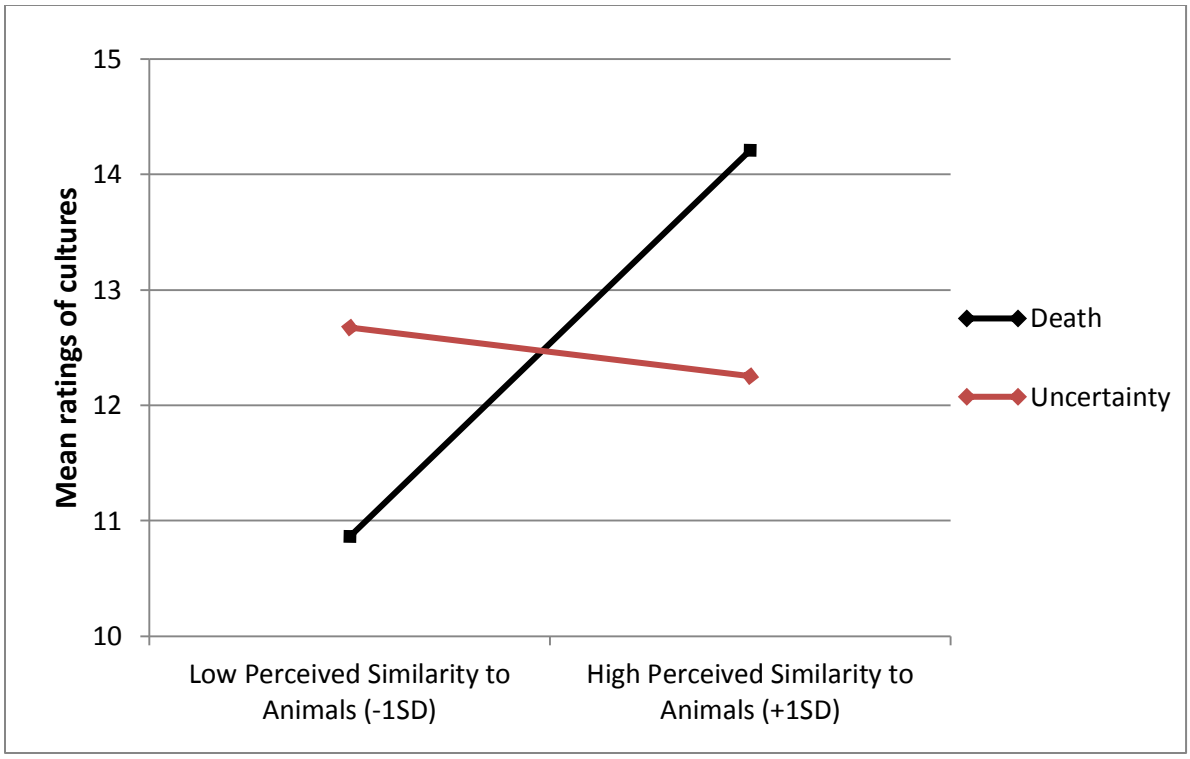


Figure 3. A figure depicting the interaction effect between the experimental condition (MS = 1, uncertainty salience = -1) and the different levels of the participants perceived similarity to animals (centered at +1 and -1 standard deviation), on the dependent measure of differences in attitudes towards other cultures in Study 5 (N = 57).

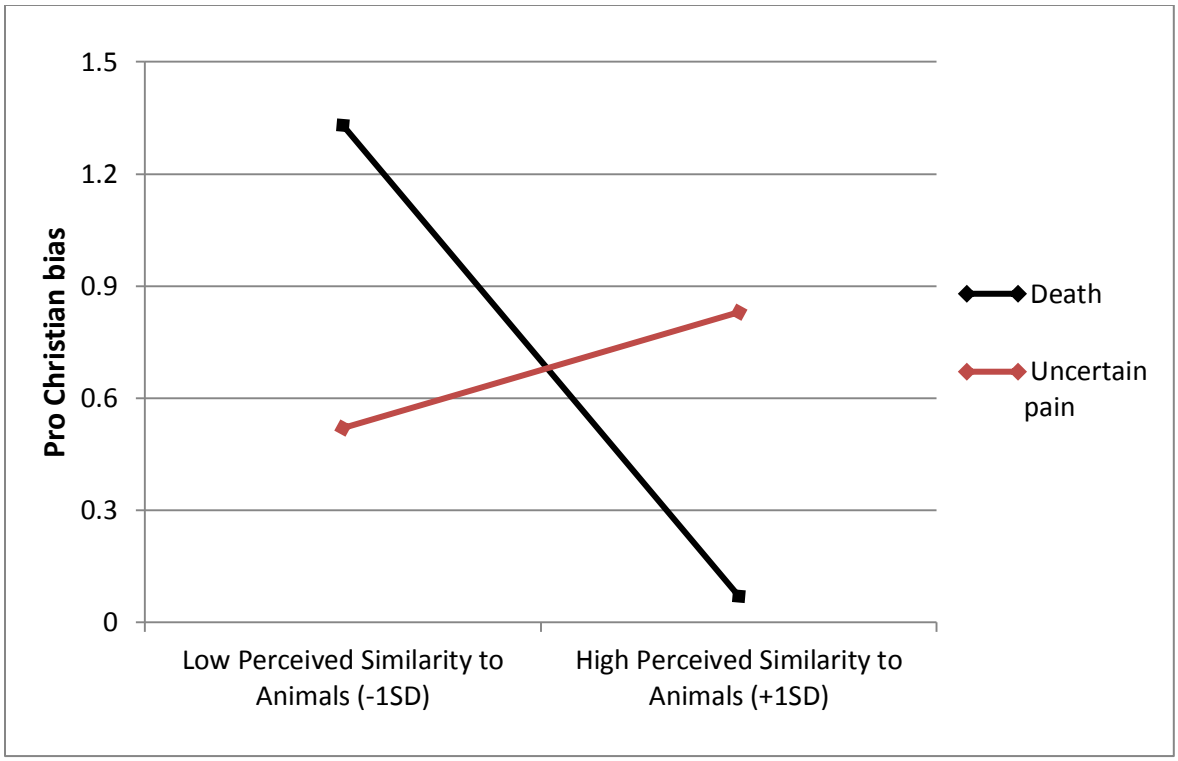


Figure 4. A figure depicting the interaction effect between the experimental condition (MS = 1, uncertain pain salience = -1) and the different levels of the participants perceived similarity to animals (centered at +1 and -1 standard deviation) on the dependent measure of the difference between the participants' rating of the Christian male target and the Muslim male target (pro Christian bias) in Study 6 (N = 157).

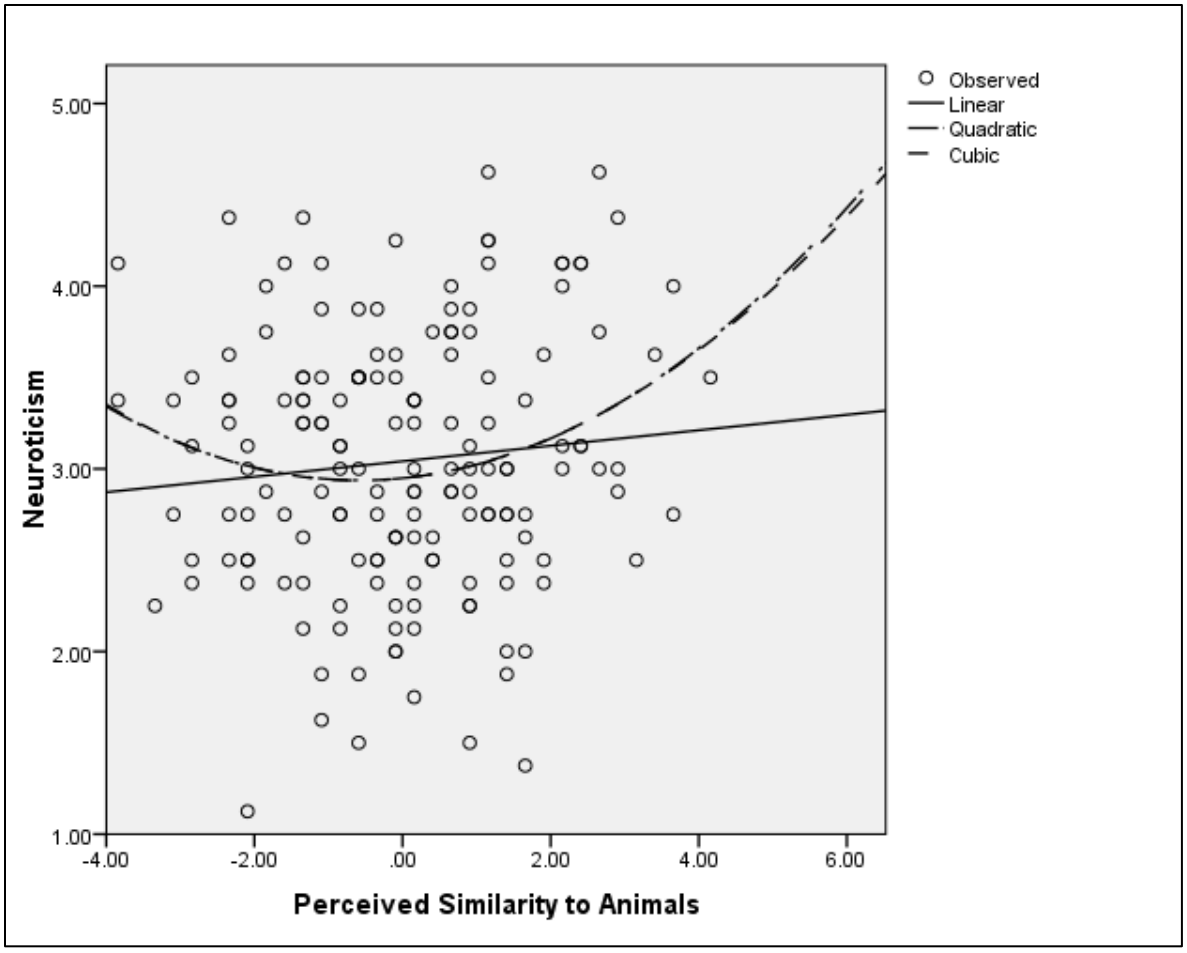


Figure 5. A scatter plot graph depicting the linear, quadratic and cubic relationship between the participants perceived similarity to animals (mean centered) and their level of neuroticism in Study 9 (N = 165). Note that only the quadratic term was statistically significant, $\Delta F(1, 162) = 3.57$, $p = .045$, $R^2 = .04$, $\beta = .17$ ($p = .033$), suggesting that the curvilinear model is the most accurate one.

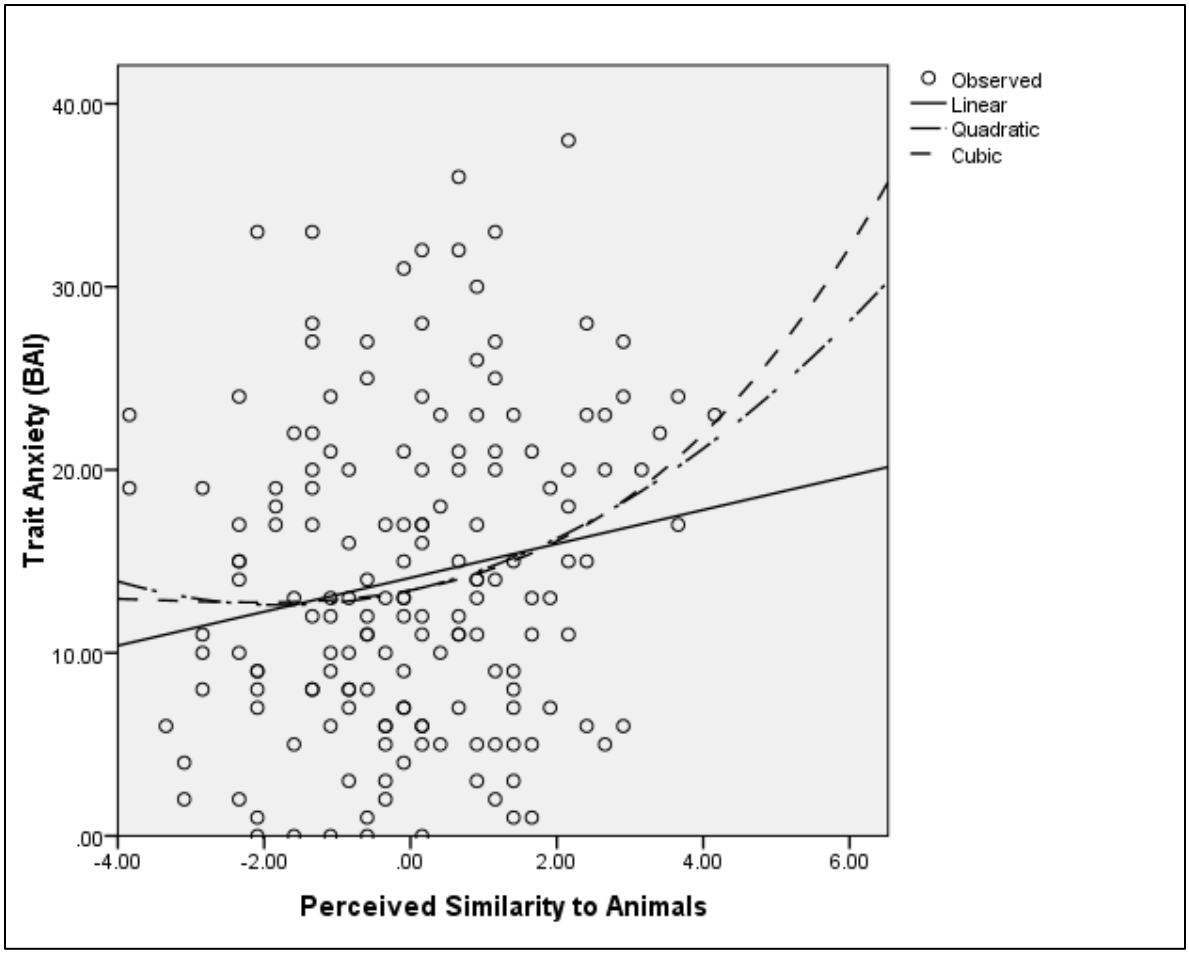


Figure 6. A scatter plot graph depicting the linear, quadratic and cubic relationship between the participants perceived similarity to animals (mean centered) and their level of trait anxiety (BAI; Beck Anxiety Inventory) in Study 9 (N = 165). Note that both the linear, $F(1, 163) = 5.26$, $p = .023$, $R^2 = .03$, $\beta = .17$ ($p = .026$), and the quadratic model, $\Delta F(2, 162) = 3.51$, $p = .032$, $R^2 = .04$, $\beta = .10$ ($p = .188$), were statistically significant, but the slope coefficient was only significant in the linear model.

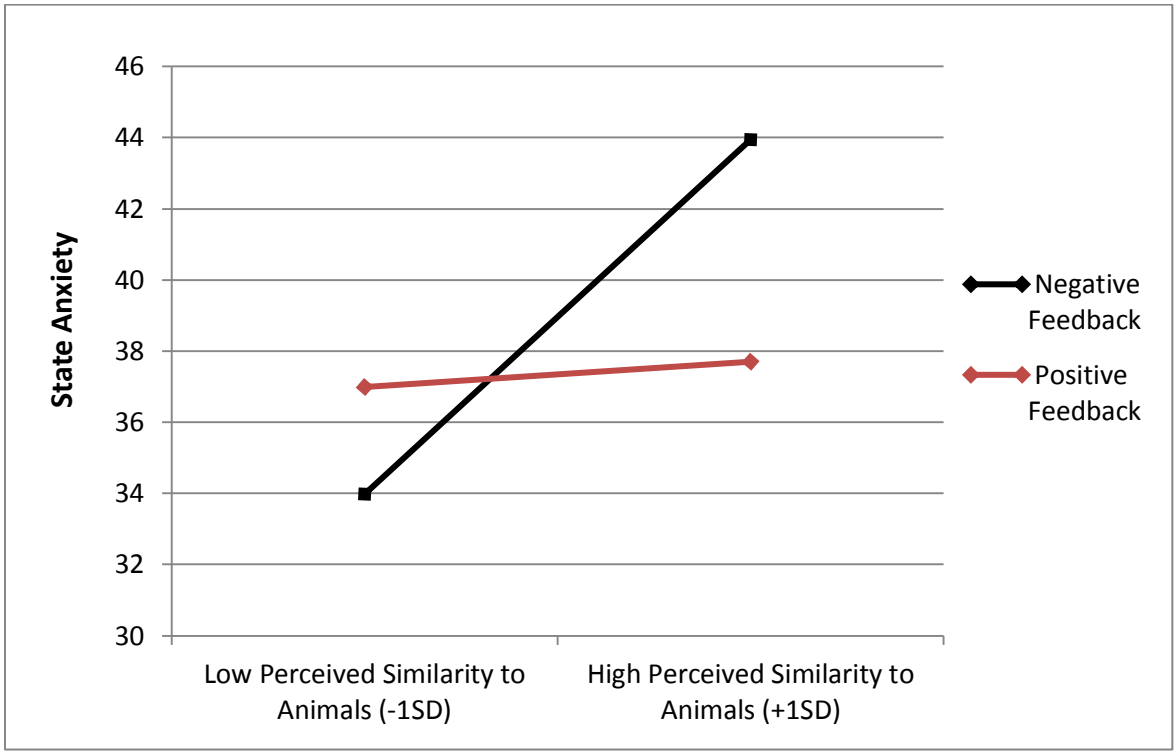


Figure 7. A figure depicting the interaction effect between the experimental condition (positive feedback = 1, negative feedback = -1) and the different levels of the participants perceived similarity to animals (centered at +1 and -1 standard deviation) on the dependent measure of state anxiety (STAI) in Study 10 (N = 96).

Appendices

Appendix1: Worldview affirming and control articles used in Study 1 (Based on an Danelek, 2012 and edited to fit the purpose of the study).

Why America is still the best country in the world

As a veteran, I thought a top ten list outlining what makes America great might be in order, especially today. Obviously, critics will be able to name exceptions to almost everything I write here, but I stand by each main point, even if there are failures to be occasionally found. And so here, in no particular order, is my list — incomplete as it may be — of ten things that makes the USA a great nation.

10. Generosity

Granted, we are a wealthy nation, so it might be expected that we would pony up first, but the amount of aid we provide other countries when compared to the rest of the industrialized world is remarkable. America contributes over 26 billion dollars annually to countries around the world (and that figure doesn't include interest-free and low interest loans). Consider, for example, that in 2011, the U.S gave Kenya and South Africa half a billion dollars each. What's truly remarkable is, we even send aid to countries that are antagonistic towards us like Pakistan, Sudan and even North Korea! What other

countries give billions of dollars of aid to countries that don't even like them?

9. Creativity, Productivity, and Innovation
The number of cutting edge inventions and refinements of existing technologies that have come out of America in the last two hundred years is staggering. Everything from the airplane (1903) and phonograph (1877), to the drinking straw (1888) and feather duster (1870), have been the by-product of American ingenuity and resourcefulness. Consider that, according to the U.S. Patent and Trademark Office, of the over 4.5 million patents issued since 1790, the United States owns over half of them, or nearly 2.5 million!

8. Freedom of Religion
Sadly, history is replete with citizens suffering religious persecution and violence at the hands of both their own government, as well as from other religious groups. This has rarely been the case in America, however, where citizens are guaranteed the right to worship as they wish—or not worship at all if that is their desire—without fear of being arrested, persecuted, or shunned by the rest of society, as is so often the case in some countries.

7. Entrepreneurial Spirit
The ability of anyone to start a business and become wealthy in this country, as compared to most other nations, is one of the hallmarks of what America is all about. The United States is replete with stories of immigrants who stepped off the boat at Ellis Island, speaking no English and carrying $10 in their pocket, and who went on to become fabulously wealthy within just a few years. Of course, there are no guarantees that everyone will succeed, but in America even if one fails, they have the chance to dust themselves off and start over again if they wish. In contrast, most other countries are so over-regulated and heavily-taxed, that it is almost impossible to start a business from the ground up, which is why we see so many people coming to this country.

6. Compassion in War
America is no stranger to war, and has suffered through nearly a dozen of them throughout its long history. However, with a couple of debatable exceptions, America has never started a war, nor has it engaged in wars of conquest, even when it had the opportunity to expand its frontiers considerably.

Further, with the exception of World War II—when, sadly, fire-bombing civilian population centers was practiced by both sides—America generally makes every effort to limit civilian casualties and collateral damage whenever possible, even at considerable cost to itself. Another of its great strengths is seen in its humane treatment of POWs, and its willingness to assist its defeated enemies to rebuild after victory. The most noteworthy example of this was the Marshall Plan that rebuilt most of Europe—particularly war-ravaged Germany—at a cost of some $44.3 billion in grants and loans over a period of five years (nearly $400 billion in today's dollars).

5. Guardianship of Democracy
America's willingness to defend democracy and prevent oppressive regimes from expanding their totalitarian rule around the world, often at great cost in terms of lives, resources, and money, is one of the hallmarks of America. Its willingness to take the lead in defending democracies whenever they are threatened, as was the case with Western Europe during the Cold War, and of getting involved in humanitarian efforts, even when they were not to our advantage to do so (such as in Somalia in 1992 or Kosovo in 1997), is legendary.

4. Ability to Right Past Wrongs
America is not a perfect country. It has made mistakes in the past, and doubtlessly will in the future. What makes it great, however, is its ability to admit when it is in error, and change the way it does

things. It's not always pretty, and it may take some time to work through the process but, once it identifies something about itself that needs to be changed—be it slavery, segregation, racism, etc.—it eventually does the right thing.

America has repeatedly acknowledged its oppression of Native Americans, and has worked diligently to redress the issue. Additionally, in 1988, Congress passed legislation that apologized for the grievous error it made in judgment when interning some 110,000 Japanese-Americans in internment camps during World War II; they even paid out $1.6 billion dollars in reparations to their descendants, to compensate for lost business and property. In contrast, many countries to this day not only refuse to make amends to those who suffered under their care, but in many cases even refuse to admit to their sordid past at all, preferring instead to live in a state of denial.

3. Ability to Meld Different Cultures

America's historic role as a melting pot of many different cultures is unique among nations on the planet, who tend to naturally segregate their populations according to race and religion. As a result, people today, of many different ethnic or religious backgrounds, proudly identify themselves as Americans. Meanwhile, in some other countries, people still identify themselves according to their culture, language, religion, or ethnicity.

2. Culture

The impact of American music, literature and entertainment on the cultures of other nations cannot be underestimated. When people turn on their television sets in Abu Dhabi, South Korea or Brazil, chances are they're watching an American sitcom or drama that has been dubbed into their language; when they turn on their radios, or plug in their iPod, there's a pretty good chance they're listening to an American singer or musician; when they go to the movies, it's often an American film they're going to see.

This has had the effect of spreading Western concepts of freedom and personal liberty around the world, igniting democratic movements and making America a driving force for change—especially among the young. They may be part of the reason that 80% of the countries on this planet are either democracies or proto-democracies; a sharp contrast to the beginning of the twentieth century, when the world's great democracies numbered fewer than a dozen. People still like what they see, which is why so many are willing to risk deportation and, in some cases, even imprisonment, to come here.

1. Beauty

There are many places of breath-taking beauty around the globe, with each country laying claim to its own natural wonders and extraordinary scenery, but no one country possesses such a broad range of natural wonders as does the United States. Stretching from California in the West, to New England in the East, the United States of America covers an area of 3.79 million square miles, making it the third largest nation on Earth, by area. Also, the U.S. is as diverse as it is huge, containing expansive national parks and vibrant cities which are visited by foreign tourists, local visitors and business travelers alike.

In what other country on the planet can you go from snow-capped mountain peaks to white sandy beaches, and from the desert to forested mountains, all within a few hours driving time of each other? That's why America is one of the top tourist attractions for foreigners; few of whom have anything like the Grand Canyon, Yellowstone, the Everglades, or Pikes Peak back home.

How popular are we? According to the U.N.'s World Tourism Organization (UNWTO), despite being separated from most other nations by the Atlantic and Pacific oceans, each year the U.S. consistently places on the list of the top ten most visited countries, with a whopping 60 million foreign visitors coming to our shores each year.

New Zealand named world's best country: prime minister welcomes Telegraph award

John Key, the New Zealand prime minister, has welcomed his country's victory in the coveted "favorite country" category of the Telegraph Travel Awards 2014, the world's biggest reader travel awards

By Jolyon Attwooll
1:54PM GMT 08 Dec 2014

New Zealand was announced as Telegraph readers' favorite country, with votes cast by almost 90,000 people in the widest-ranging travel survey of its kind.
Responding to the news, John Key, the New Zealand prime minister, described the result as "a great accolade."

"Tourism forms a significant part of our economy," he said in response to the announcement of the awards, which took place in a ceremony at the Banking Hall in central **London** earlier today.

"The winning of a prestigious award like this, voted by the public, is a great accolade for our country and bodes well for our tourism industry."

"We believe one of the real strengths of the tourism experience in New Zealand is that it lives up to the hype. "Too often a lot of people go to a destination where ultimately it is never as good as the brochure, whereas in New Zealand we think people come and get an experience that is better than the brochure." The country has now won the best country category on several occasions.

Ben Ross, Telegraph Travel's head of print, writes: "One thing remains constant – and that's the abiding love that

Telegraph readers have for one country: New Zealand.

"This is the third year in a row that the Land of the Long White Cloud has thrown its fluffy shadow over the Telegraph Travel Awards.

“Perhaps it’s because New Zealand is a country that delivers almost everything a traveler could want in one easy-to-use package. “

In honor of this reward, we have prepared a list of things that makes the New Zealand a great nation:

Peacefulness
New Zealand has been also been ranked the 2nd most peaceful country in the world. According to the 2011 Global Peace Index (GPI), the only country more peaceful than New Zealand is Iceland. The GPI ranks countries by their ‘absence of violence.’ It takes many factors into account including levels of violent crime, potential for terrorism, political stability and number of wars fought. In 2009 and 2010, New Zealand was ranked 1st. It has been in the top 5 most peaceful countries every year since the GPI began in 2007.

While New Zealand is no stranger to war, and has suffered through nearly a dozen of them throughout its long history. However, with a couple of debatable exceptions, New Zealand has never started a war, nor has it engaged in wars of conquest, even when it had the opportunity to expand its frontiers considerably.

Further, with the exception of World War II—when, sadly, fire-bombing civilian population centers was practiced by all sides— New Zealand generally makes every effort to limit civilian casualties and collateral damage whenever possible, even at considerable cost to itself. Another of its great strengths is seen in its humane treatment of POWs, and its willingness to assist its defeated enemies to rebuild after victory. The most noteworthy example of this was the countries role in helping rebuilt many of the pacific islands after World War II, in which they invested a total of $44.3 billion in grants and loans over a period of five years (nearly $400 billion in today’s dollars).

Social Progress
New Zealand currently ranks as the most socially progressive country in the world. It also came in highest on overall opportunity, a score based on personal rights, freedom, inclusion and access to advanced education.
New Zealand's progressive attitude dates back decades. In 1893, Governor Lord Glasgow signed the Electoral Act, making New Zealand the first country in the world to give all women the right to vote. By 1984, 13 percent of Members of Parliament were women, compared to 32 percent today. Plus, New Zealand was the first country to have its top three positions of power held by women at the same time.

Ability to Right Past Wrongs
Though historically Māori -- the indigenous Polynesian people of New Zealand -- have suffered from discrimination and institutional disenfranchisement, present day Kiwi culture shows how hard the public is working to overcome that dark history. Now, New Zealand incorporates indigenous traditions into many of the most prideful national events.

Subjective and objective well-being"
And that has a real impact on quality of life: Social equality contributes to a country's overall "subjective well-being" -- an important measure of community health.
New Zealand performs well in many measures of well-being, as shown by the fact that it ranks among the top countries in a large number of topics in the Better Life Index.
Money, while it cannot buy happiness, is an important means to achieving higher living standards. In New-Zealand, the average household net-adjusted disposable income per capita is 21,773$ a year, less than the OECD average of 23,938$ a year.
In terms of employment, 72% of people aged 15 to 64 in New-Zealand have a paid job, above the OECD employment average of 65%. Some 78% of men are in paid work, compared with 67% of women. People in New-Zealand work 1 739 hours a year, slightly less than the OECD average of 1 765 hours.

With more employment, and more civil rights New Zealand rates at the top 10 countries in the world in well-being.

No corruption
Transparency International's Corruption Perception index ranks New Zealand as least corrupt. While the vast majority of the 180 countries in the Corruption Perceptions Index score below five on a scale from 0 (perceived to be highly corrupt) to 10 (perceived to have low levels of corruption) New Zealand scores 9.4!

Freedom of Religion
Sadly, history is replete with citizens suffering religious persecution and violence at the hands of both their own government, as well as from other religious groups. This has rarely been the case in New Zealand, however, where citizens are guaranteed the right to worship as they wish—or not worship at all if that is their desire—without fear of being arrested, persecuted, or shunned by the rest of society, as is so often the case in some countries.

Entrepreneurial Spirit
The ability of anyone to start a business and become wealthy in this country, as compared to most other nations, is one of the hallmarks of what New Zealand is all about.

The country is replete with stories of immigrants who stepped off the boat at Ellis Island, speaking no English and carrying nothing in their pocket, and who went on to become fabulously wealthy within just a few years. In contrast, most other countries are so over-regulated and heavily-taxed, that it is almost impossible to start a business from the ground up, which is why we see so many people coming to this country.

Magnificent Maori culture
The indigenous people of New Zealand arrived more than 1,000 years ago from Polynesia, and make up around 15 per cent of the country’s population.

Auckland Museum and Wellington’s Te Papa Tongarewa offer insights into the great migrations and settlement in Aotearoa, while other treasures are in smaller museums.

Carving, weaving and tattooing are common Maori art forms, as are powerful physical performances combining waita (singing) and kapa haka (dance).

A land of adventures
The country draws amateur adventurers from all walks of life, including rock climbers, surfers, hikers, cyclists and sky divers. New Zealand relies heavily on its tourism industry, its largest industry after dairy. The country raked in nearly $10 billion from international visitors last year and tourism is responsible for almost 6 percent of total jobs in New Zealand.

Beauty
There are many places of breath-taking beauty around the globe, but few possess such a broad range of natural wonders as does New Zealand. In what other country can you go from snow-capped mountain peaks to white sandy beaches and from the desert to forested mountains and icy glaciers?

Douglas Adams, the author of Hitchhiker’s Guide to the Galaxy, probably sums up its appeal best in his book, Last Chance to See.

“Fjordland, a vast tract of mountainous terrain that occupies the south-west corner of South Island New Zealand, is one of the most astounding pieces of land anywhere on God's earth, and one's first impulse, standing on a cliff top surveying it all, is simply to burst into spontaneous applause. It is magnificent.”

"Who could fail to thrill to Milford Sound’s epic vistas, or the volcanoes of Tongariro National Park?"

Appendix 2*: *Article about the Meakambut and Sami cultures (originally taken from Jenkins & Toensing, 2012; Benko & Larsen, 2011, respectively, and edited to fit the purpose of the study) used in Study 5

Last of the Cave People

A nomadic people in Papua New Guinea were rumored to be living in remote caves in the forest.

By Mark Jenkins. Photograph by Amy Toensing

Never are there stars, as if that would be too much to hope for. Instead, beyond the rock overhang, it's pouring, waves of water relentlessly slapping the giant fronds of the jungle. It always seems to rain at night here in the mountains of Papua New Guinea. This is why the Meakambut, seek refuge in rock shelters—they're dry. Located high in the cliffs, sometimes requiring a treacherous climb up vines, caves are also natural fortresses that once protected the Meakambut from their enemies: headhunters and cannibals and bride stealers. But that was generations ago.

Our plan, to follow the Meakambut, one of the last cave-dwelling, seminomadic peoples in Papua New

Guinea, through their mountainous homeland.

The vast geographic variation of Papua New Guinea created tremendous biological diversity, which in turn was accompanied by enormous cultural diversity: more than 800 languages in a country about the size of California.

Today the country continues to conjure images of headhunters with bows and arrows, and bones through their noses. But that's about as accurate as imagining the American West filled with Indians still taking scalps.

It is only in the most deeply inaccessible regions of the country that enclaves of traditionally nomadic people, like the Meakambut, still exist. The group lives on two steep ridges hidden on the edge of the expansive northern escarpment of the Central Range.

To first search for we skim up smaller and smaller tributaries in the Sepik River basin, the floodplain that drains northwest Papua New Guinea, until we can finally strike out on foot into the mountains.
Two evenings in a row we try reaching them by jungle telephone: Three men pound the two-story trunk of a towering tree with wooden bats, the deep-voiced thumps reverberating out over the canopy. When this doesn't work, we set out on a two-day foot patrol to the group's last known whereabouts, Tembakapa, a collection of temporary huts perched on a misty ridge. It is deserted.

At noon the next day, two Meakambut men come striding into our camp—they've heard the call of the jungle phone. They recognize Joshua Meraveka, a member of Nancy Sullivan's anthropological research team who met the Meakambut on 2008, and greet him joyously, vigorously shaking his hand. He introduces them as John and Mark Aiyo—brothers, perhaps in their late 20s. John, a leader of the Meakambut, is wearing a leaf loincloth, and a beaded headband festooned with yellow feathers. Mark has striped his face with charcoal and red clay and placed ferns in his hair and yellow flower petals in his black beard.

They lay down their bows, arrows and machetes, squat by the fire, and begin rolling tobacco leaves for a smoke. Because we are with Joshua, our presence doesn't seem to bother them. He explains they have Christian names because some of their people lived in villages for a time. John and Mark are from the Embarakal group, one of perhaps four that compose the Meakambut. The rest of the Embarakal, he says, are coming down to a cave called Ulapunguna tomorrow to meet us.

We reach Ulapunguna, a rock overhang 40 feet high with fire pits and a quiver of arrows lined up against the wall. The featherless arrows are four feet long. Each has a point designed for a different prey. There are three arrows for fish, two for birds, two for pigs.

While waiting for the rest of the Embarakal, John begins to replace his bowstring and, through Joshua, explain cave life to me. The Meakambut spend several days to weeks in any rock shelter or hut before moving on. The women plant taro, pumpkins, cucumbers, cassava, bananas, and tobacco, to be harvested the next time they pass through. The men hunt or help the women make flour from sago palms.

Each of their caves has an owner and a name, and ownership is passed down from father to son. Mark and John own Ulapunguna cave. Some caves have legends, which are strictly proprietary: Only the cave owner can share its secrets.

The Meakambut have many holidays and social occasions, in which usually the men wear their warrior outfits, which include having fathers in their hair and painting their faces, and the women put on the traditional skirts, made of leaves and flowers, and braid their hair in a virtuosic manner. Usually, all the people in the village have a big meal that also includes singing and dancing.

In the beggining of summer the Meakambut have a holiday called “ekgoumando”, in which each family prepares a special kind of dish, that reflects the family heritage. The family that makes the best dish gets

to be invited to visit other families in the village for dinner over the subsequent next month – perhaps to improve the village overall cooking abilities.

Plucking his new bamboo bowstring, John indicates for me to follow him. We track through the jungle to a clearing, where he points up at a massive limestone wall."Kopao," he says.

Kopao is the Meakambut's most sacred cave. It is their creation cave, where they believe they originated, and John says he is the owner of this cave too. He will take me there tomorrow. When we return to Ulapunguna, the rest of the group has arrived.

The following day, I head to Kopao cave with John and Joshua. The trail ascends a flash flood gulley, abruptly ending at a vertical face. Without hesitation, John starts climbing the slick black stone, his toes finding pockets in the limestone. Eventually he finds a small tree protruding perpendicular to the face, knots a vine around the trunk, and lowers the end to me. We monkey up two more bands of slimy rock via slick vines before I insist we use a rope. It takes us more than two hours to climb a thousand feet. The final test is a tiptoe traverse along a glass-smooth ledge with nothing but an abyss of swirling mist beneath us.

Inside the cave are the paintings, red and black stencils of human hands. These are the prints of John's forebears. He doesn't know how old they are—they keep no record of time—but many of the prints have almost disappeared.

The Next day we follow Mark and his wife, Jelin, to the sago camp. Making sago is an arduous operation. Mark hacks out pulp from the heart of a felled palm tree; the pulp is transferred to a trough filled with water, and Jelin squeezes it against a coconut-husk filter, pressing out an orangish white paste.

By late afternoon they've collected 40 pounds of gummy sago—not bad for an afternoon's work—and we head back to Ulapunguna as the rain begins. That night it's fire-fried sago pancakes for dinner.

Just after daybreak the Embarakal group begin decorating themselves for the journey out of the mountains. The men stripe their faces with black and orange; the women blanket their skin with dots. In a climate where clothes are superfluous, this is how you dress up for special occasions.

Mark Jenkins wrote about land mines in Cambodia in last month's issue. Photographer Amy Toensing is currently documenting the Aborigines of Australia.

Sami
The People Who Walk With Reindeer

By Jessica Benko Photograph by Erika Larsen

Two hundred miles north of the Arctic Circle, near the jagged tips of Norway's crown, the sun does not set for weeks on end during the summer months, and the midnight sun bounces off fields of midsummer snow. The solstice comes and goes, but the Sami reindeer herders are too busy to pay much attention. "We're always in the middle of calf marking at this time," Ingrid Gaup says, referring to the yearly ritual in which the herding families carve their ancient marks into the ears of the new calves. In the Sami's homeland, spread across northern Norway, Sweden, Finland, and Russia, the notion of time is

untethered from the cycles of the sun and is yoked instead to something far more important: the movement of the reindeer.

Sami herders call their work boazovázzi, which translates as "reindeer walker," and that's exactly what herders once did, following the fast-paced animals on foot or wooden skis as they sought out the best grazing grounds over hundreds of miles of terrain. Times have changed. Herders are now assigned to specific parcels of the reindeer's traditional grazing territories at designated times of the year. To make the lifestyle tenable, herders need expensive all-terrain vehicles (ATVs) and snowmobiles to maintain hundreds of miles of fences between territories and move large herds in accordance with land-use regulations—even when they clash with the instincts of the reindeer. As Ingrid's husband, Nils Peder Gaup, explains, "Reindeer think with the nose, not the eyes. They go with the wind."

Like many Sami of his generation, Nils Peder went to a compulsory boarding school where his native tongue was forbidden as part of the country's "Norwegianization" policies. Sami have been given more autonomy since then, but irretrievable damage was done to their language, now spoken by a minority.

Each June, after a long journey into the mountainous tundra of northern Norway, the Gaup family waits for the herd in tepee-like structures called lávut. They will spend sleepless nights marking the calves before moving the reindeer to their summer grazing grounds in the fjords.

At the first hint of the herd's arrival, the dogs in the encampment leap to their feet, ears erect. The herd spills over a far ridge, swelling like a stream down the mountainside. Other herders crest the rise on their ATVs, driving hundreds of thundering reindeer into a makeshift stockade. Small children, stiff as starfish in their snowsuits, toddle blithely inside the corral, unfazed by the reindeer stampede around them.

The Sami have many holidays and social occasions, in which usually the men wear their skirt-like gákti jacket, and the women put on the traditional gákti dress, a fringed shawl that is fastened with 1-3 silver brooches, and boots/shoes made of reindeer fur or leather. Usually, all the people in the village have a big meal and sing “Yoiks”- song-chants and are traditionally sung slowly and deep in the throat with apparent emotional content.

In the beginning of summer the Sami have a holiday called “jákt ferie”, in which each family prepares a special kind of dish, that reflects the family heritage. The family that makes the best dish gets to be invited to visit other families in the village for dinner over the subsequent next month – perhaps to improve the village overall cooking abilities.

"I teach reindeer work to all of my children," says Nils Peder, as he guides his youngest son in marking a calf. His older children are so adept with sharp knives that they return calves to the mothers with only the faintest traces of blood on their ears. "Children must lift the culture," Nils Peder says, though he acknowledges the pressures of outside cultural influences. Herding families now live in modern homes equipped with Internet and television. Sara, the youngest of the Gaups' five children, spends much of the calf marking texting friends on her cell phone.

As herders face greater challenges, what path will girls like her choose? If reindeer herding disappears, Sami traditions may vanish too. The language itself reflects this powerful bond: The word for "herd" is eallu; the word for "life" is eallin.

Photographer Erika Larsen has been living with a Sami community in Kautokeino, Norway, since 2008 and documenting the lives of herders in Sweden as well. Read more of her story in The Moment. Jessica Benko has written for Virginia Quarterly Review and Harper's.

Appendix 3: bogus profiles of other students used in Study 6

In the following pages you will be presented with short profiles of other students. Please read each profile carefully and then answer the questions that follow. We are interested in your first impressions and gut level responses. Your honest responses would be appreciated.

(Constant Christian female)
Sex: *Female*
Hometown: *Phoenix*
Occupation: *Student*
Religion: *Christian*
Age: *19*
Question 1: Tell us a little about yourself (start with your name).
My name is Megan Green. I am in my freshmen year in the U of A. Im not sure what im going to major in yet but im considering Psychology.
Question 2: How do you spend your free time? Do you have any hobbies?
I like to go out with friends and do fun stuff. I like going to parties, hiking or watching movies.

Sex: *Male*
Hometown: *Tucson*
Occupation: *Student*
Religion: *Christian*
Age: *20*
Question 1: Tell us a little about yourself (start with your name).
My name is John Hughes. I like meeting new people, and eating good food.
Question 2: How do you spend your free time? Do you have any hobbies?
*I'm a pretty regular guy. I like to spend time with friends and listen to music.**

Sex: *Male*
Hometown: *UAE (United Arab Emirates)*
Occupation: *Student*
Religion: *Muslim*
Age: *20*
Question 1: Tell us a little about yourself (start with your name).
My name is Omar Hassan. I like sports music and having a good time.
Question 2: How do you spend your free time? Do you have any hobbies?
*I like to play basketball and soccer, to listen to music, and just hang out with my friends.**

Note. * The sentences describing the person were counterbalanced between the Christian and the Muslim males. Order of presentation was also counterbalanced.

Appendix 4: TAT pictures used in Study 8

Appendix 5: A series of questions adopted from online creativity and intelligence tests used in the bogus creativity test in Study 10

Which of these words do you think connect to both SUBMARINE and CAMERA? (Click all that apply)
- ❑ Watertight
- ❑ Film
- ❑ Lens
- ❑ Battery
- ❑ Door
- ❑ Egg
- ❑ Octopus

Which of these words do you think connect to both RADIO and KNIFE? (Click all that apply)
- ❑ Sharp
- ❑ Twist
- ❑ Steel
- ❑ Fish
- ❑ Switch
- ❑ Sea
- ❑ Telescope

Which of these words do you think connect to both CUSHION and TABLE? (Click all that apply)
- ❑ Foam
- ❑ Clock
- ❑ Load
- ❑ Towel
- ❑ Apple
- ❑ Lift
- ❑ Trumpet

Which of these words do you think connect to both CAR and TREE? (Click all that apply)
- ❑ Caterpillar
- ❑ Leaf
- ❑ Rubber
- ❑ Temple
- ❑ Dynamic
- ❑ Post
- ❑ Triangle

Which of these words do you think connect to both WET and ARMADILLO? (Click all that apply)
- ❑ Texas
- ❑ Castle
- ❑ Plug
- ❑ Rattle
- ❑ Diary
- ❑ Laptop
- ❑ Ear

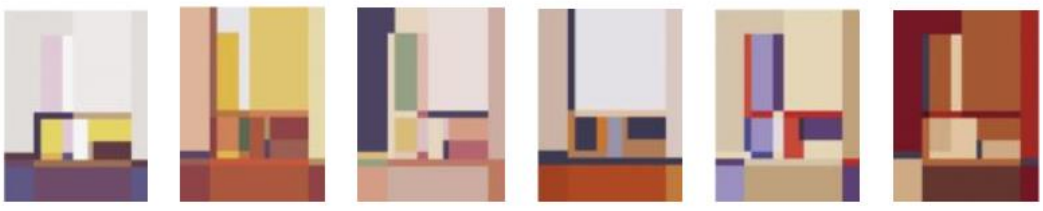
What can you see in this picture?

separate with comma (,) after each word you think of

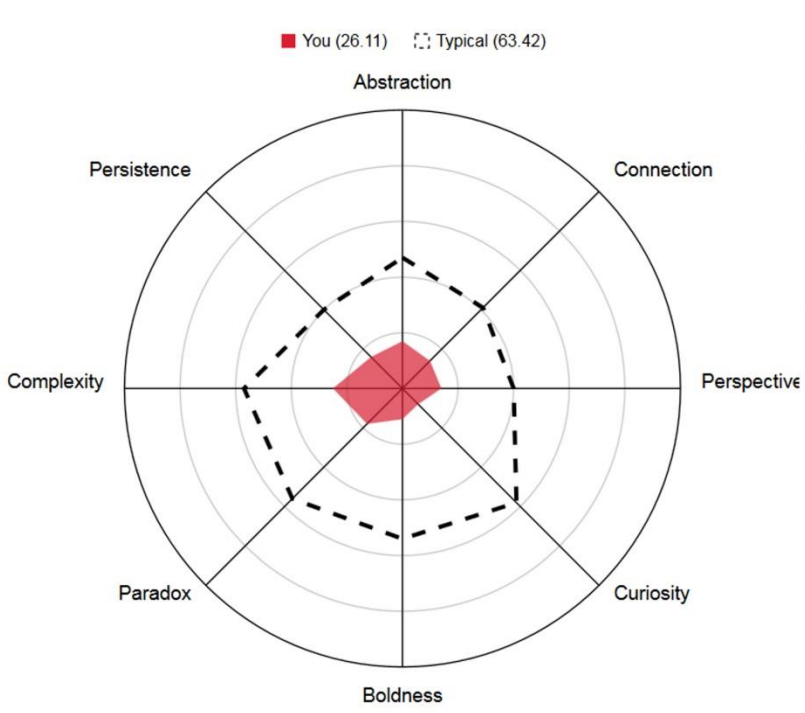
What can you see in this picture?

separate with comma (,) after each word you think of

If you had to pic one, which of the following do you prefer?



Appendix 6: Creativity feedback conditions used in Study 10



Explanation of different metrics

Abstraction The ability to abstract concepts from ideas

Connection The ability to make connections between things that don't initially have an apparent connection

Perspective The ability to shift ones perspective on a situation - in terms of space and time, and other people

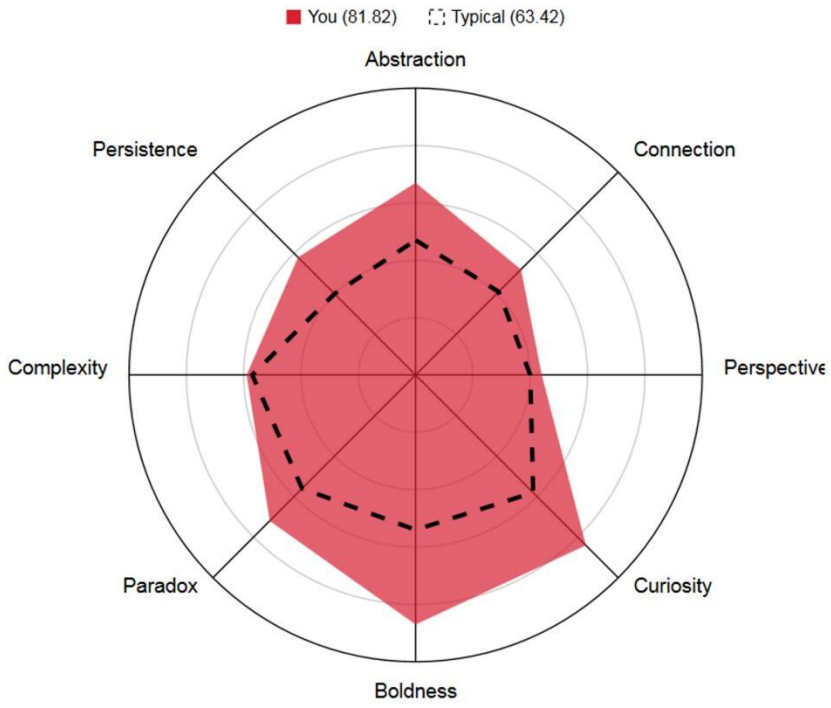
Curiosity The desire to change or improve things that everyone else accepts as the norm

Boldness The confidence to push boundaries beyond accepted conventions. Also the ability to eliminate fear of what others think of you

Paradox The ability to simultaneously accept and work with statements that are contradictory

Complexity The ability to carry large quantities of information and be able to manipulate and manage the relationships between such information

Persistence The ability to force oneself to keep trying to derive more and stronger solutions even when good ones have already been generated



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