

Awe and Humility

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Humility is a foundational virtue that counters selfish inclinations such as entitlement, arrogance, and narcissism (Tangney, 2000). We hypothesize that experiences of awe promote greater humility. Guided by an appraisal-tendency framework of emotion, we propose that when individuals encounter an entity that is vast and challenges their worldview, they feel awe, which leads to self-diminishment and subsequently humility. In support of these claims, awe-prone individuals were rated as more humble by friends (Study 1) and reported greater humility across a 2-week period (Study 2), controlling for other positive emotions. Inducing awe led participants to present a more balanced view of their strengths and weaknesses to others (Study 3) and acknowledge, to a greater degree, the contribution of outside forces in their own personal accomplishments (Study 4), compared with neutral and positive control conditions. Finally, an awe-inducing expansive view elicited greater reported humility than a neutral view (Study 5). We also elucidated the process by which awe leads to humility. Feelings of awe mediated the relationship between appraisals (perceptions of vastness and a challenge to one's world view) and humility (Study 4), and self-diminishment mediated the relationship between awe and humility (Study 5). Taken together, these results reveal that awe offers one path to greater humility.

Keywords: humility, awe, emotion, self-concept

Humility involves holding a realistic, secure, and open view of the self as well as an appreciation of the value and contribution of others (Chancellor & Lyubomirsky, 2013). It is considered a foundational virtue because it counters selfish and socially disruptive inclinations such as entitlement, arrogance, and narcissism (Lee & Ashton, 2005; Peterson & Seligman, 2004; Tangney, 2000). The emerging literature on humility has revealed its important interpersonal benefits, including healthier social relationships (Peters, Rowatt, & Johnson, 2011) and increased altruism (LaBouff, Rowatt, Johnson, Tsang, & Willerton, 2012), as well as its personal benefits, including greater well-

being (Krause, Pargament, Hill, & Ironson, 2016) and resilience (Kesebir, 2014). Despite its centrality to many ethical systems and its numerous advantages little is known about how humility can be cultivated.

Here we hypothesize that experiences of awe generate greater humility. Our thesis is grounded in a broader literature showing that transient emotion states, such as pride, anger, and compassion, shift the self-concept and perceptions of others in systematic ways (e.g., Keltner, Ellsworth, & Edwards, 1993; Oveis, Horberg, & Keltner, 2010; Tracy, Weidman, Cheng, & Martens, 2014). We argue that when individuals encounter an entity they perceive to be vast and conceptually challenging, they feel awe (Keltner & Haidt, 2003). These feelings of awe lead to a diminished sense of self, which in turn gives rise to the broader, more complex, sentiment of humility (see Figure 1). Across five studies we examine the relationship between trait awe and humility, test the capacity for momentary experiences of awe to promote humility, and use an appraisal-tendency framework to elucidate the process that generates this effect.

Conceptualizing Humility

Humility represents a complex sentiment about the self in relation to others and the outside environment (Davis et al., 2011;

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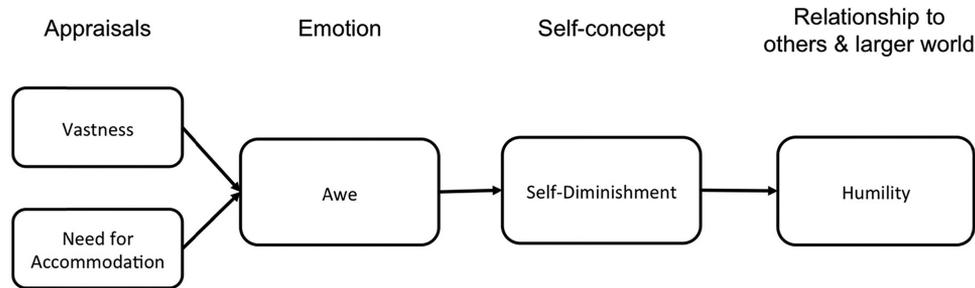


Figure 1. Appraisal-based conceptual path model depicting how experiences of awe generate greater humility.

Weidman & Tracy, in press). It has been construed as a trait (e.g., Lee & Ashton, 2004; Rowatt et al., 2006), a subjective feeling state (Weidman, Cheng, & Tracy, 2016), a cognitive tendency (Brown, 1986; Rowatt, Ottenbreit, Nesselroade, & Cunningham, 2002), an epistemic recognition of the limits of one's knowledge (McElroy et al., 2014; Roberts & Wood, 2003), and a behavior (e.g., modesty; Exline, Campbell, Baumeister, Joiner, & Krueger, 2004). However, an emerging consensus about the fundamental attributes that define humility center around two core themes: (a) a more realistic, secure, and open view of the self; and (b) a greater acknowledgment of the value and contribution of others and outside forces (Chancellor & Lyubomirsky, 2013; Rowatt et al., 2006; Tangney, 2002; Weidman, Cheng, & Tracy, 2016).

A more realistic, secure, and open view of the self includes restraint in endorsing extreme positive illusions about one's strengths, and an acknowledgment of one's limitations and weaknesses, although this does not equate to low self-esteem (Exline, 2008; Tangney, 2000; Tangney, 2002). Indeed, past studies have operationalized humility as the difference between how favorably one views oneself compared to others on various traits, with reduced differences representing greater humility (Brown, 1986; Rowatt et al., 2002). As a result, humility and its close counterpart, modesty, have been associated with reduced self-enhancement (Kurman & Sriram, 2002; Lee, Ashton, Ogunfowora, Bourdage, & Shin, 2010). Humble individuals also demonstrate greater openness and responsiveness to negative information about the self (Exline, 2008; Tangney, 2002) and experience less anxiety in response to existential threats (mortality salience) that highlight the weakness or vulnerability of the self (Kesebir, 2014).

Humility also involves turning attention outward and recognizing the value of other people and the beneficent forces that guide life (Davis, Worthington, & Hook, 2010; Tangney, 2002). Studies of trait humility, measured through the HEXACO Personality Inventory (Lee & Ashton, 2004), reveal a robust relationship with other-focused traits such as agreeableness (Ashton & Lee, 2005), and states like empathy (Davis et al., 2011). Humble individuals show stronger prosocial and egalitarian tendencies, such as the willingness to sacrifice (Exline & Geyer, 2004), assist others (LaBouff et al., 2012), share resources in economic games (Hilbig & Zettler, 2009), donate money and time to charity (Exline & Hill, 2012), and forgive others who have transgressed against them (Rowatt et al., 2006). This other-oriented focus also manifests in a deeper appreciation for the role that other people and outside forces (e.g., luck or God) play in one's own accomplishments, which may explain the relationship between humility and gratitude (Kruse, Chancellor, Ruberton, & Lyubomirsky, 2014; Kupper, 2003).

Operationalizing humility presents conceptual and measurement challenges. First, although recent theorizing on humility suggest it is a sentiment (Weidman & Tracy, in press) or a malleable state (Chancellor & Lyubomirsky, 2013), past scholars have traditionally regarded it as a stable trait, leaving little room for examinations of the transient contextual factors that may promote humility (e.g., Peterson & Seligman, 2004; Tangney, 2000). Second, trait measures of humility are often based on self-report (e.g., Lee & Ashton, 2004; Weidman et al., 2016). The problem with this approach is that those who are the most humble are likely to underreport their own humility, as it may be considered boasting (Davis et al., 2011). To circumvent this concern, other measurement approaches have captured trait humility via peer-reports (Davis et al., 2011; de Vries, Lee, and Ashton, 2008), implicit measures (Rowatt et al., 2006), and sociocognitive processes (Rowatt et al., 2002). We take a novel approach, treating humility as a dynamic state and capturing multiple forms of measurement to triangulate on this fluctuating and multifaceted construct. In the present investigation we assessed humility using self- and peer-reports, an epistemic recognition of the role of outside forces in one's own accomplishments, and a behavioral tendency to present a more balanced perspective on one's strengths and weaknesses to others, to examine whether it is promoted by experiences of awe.

An Appraisal-Based Approach to Awe and Humility

Awe is the feeling of wonder and amazement at being in the presence of something vast that transcends one's current understanding (Keltner & Haidt, 2003). Awe is part of a family of states that includes elevation, appreciation, and admiration (Keltner & Haidt, 2003; Ortony, Clore, & Collins, 1988; Stellar et al., 2017). The majority of awe experiences occur in response to nature (e.g., beautiful expansive vistas), other people who display virtuosity, magnanimity, or stature, art and music, religious experiences, and ideas (Gordon et al., 2016; Shiota, Keltner, & Mossman, 2007). In terms of subjective experience, awe is typically considered a positive emotion, although a notable subset of awe experiences are tinged with threat (Gordon et al., 2016). Theoretical and empirical accounts of awe categorize it as an epistemological and prosocial emotion (Keltner & Haidt, 2003; Stellar et al., 2017). Like other epistemological emotions such as interest, surprise, and amusement, awe tracks changes in one's understanding of the external world (Keltner & Shiota, 2003; Shiota, Keltner, & John, 2006; Shiota et al., 2007). And, similar to other prosocial emotions like gratitude and compassion, it reliably predicts increased sharing,

assistance, and generosity (Piff, Dietze, Feinberg, Stancato, & Keltner, 2015; Rudd, Vohs, & Aaker, 2012).

We propose that the process by which awe generates humility originates in the appraisals that give rise to this emotion. Our assumption is guided by an appraisal-tendency framework, which posits that emotions are elicited by distinct patterns of appraisals relevant to the individual's present context (e.g., Lazarus, 1991; Lerner & Keltner, 2001; Lerner, Li, Valdesolo, & Kassam, 2015; Oveis et al., 2010; Smith & Ellsworth, 1985). For example, fear is elicited by appraisals of threat and uncertainty in response to stimuli in the environment; anger follows appraisals of injustice caused by others. These patterns of appraisal constitute core-relational themes that define the subjective meaning of the emotion (Campos, Campos, & Barrett, 1989; Lazarus, 1991). Two such appraisals are central to awe: *perceptions of vastness*, which can refer to an entity's physical size or number, ability, prestige, power, or complexity, and *need for accommodation*, which is the process by which a person revises his or her mental schemas or creates a new one to account for the deviation between the stimuli and one's current understanding of the world.

The appraisal tendency framework is also founded upon the assumption that although emotions arise from cognitive appraisals, emotions exert independent, additional influences on subsequent behaviors and judgments (e.g., Forgas, 1995; Lerner & Keltner, 2000, 2001; Lerner et al., 2015; Schwarz, 2011). A number of studies have found that in contexts ranging from evaluative judgments of products and presidents to punitive judgments of offenders, that the subjective feeling of an emotion can readily influence responses to novel, unrelated stimuli in which the appraisals are no longer present (e.g., Carlsmith & Darley, 2002; Clore, Gasper, & Garvin, 2001; Forgas, 1995; Schwarz, 2000). Relevant empirical studies have found that an emotion's influence upon subsequent judgments is mediated both by the experience of the emotion and the eliciting appraisals (e.g., Lerner & Keltner, 2001). Therefore, in outlining the process by which awe generates humility we identify both the role of appraisals and emotion. We hypothesize that perceptions of vastness and the need for accommodation elicit the subjective experience of awe that, in turn, increases humility (see Figure 1). A significant mediation model would highlight these cognitive contributors to humility, but also the independent and more proximal effect of the experience of awe.

Awe and the Diminished Sense of Self

Although specific appraisals give rise to awe, what is it about awe that elicits greater humility? We propose that awe influences humility through its ability to generate a powerful shift in one's self-concept, which is primarily characterized by a diminished sense of self. It is widely assumed in social functional accounts of emotion that emotions influence self-relevant cognitions to enable the individual to adapt to shifting social contexts and relationship dynamics within the immediate environment (Campos, Campos, & Barrett, 1989; DeSteno & Salovey, 1997; Keltner & Haidt, 2003; Lazarus, 1991). Recent research finds that emotions can have a dramatic impact on the self-concept. For instance, pride elicits more positive or even inflated views of the self, measured through self-esteem (Tracy et al., 2014). Trait and state experiences of compassion make individuals view the self as more similar to vulnerable others (Oveis et al., 2010).

Select studies lend credence to the assertion that awe leads to self-diminishment. In a study of emotion narratives, participants' self-reported experiences of awe were uniquely associated with reports of feeling small (Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013). In other research, participants primed to experience awe more strongly endorsed feeling small, powerless, and insignificant (Gordon et al., 2016; Shiota et al., 2007) and reported smaller "perceived self-size," as captured in the size of drawings of the self and signatures (Bai et al., 2017), than those in positive emotion comparison conditions. Individuals feeling awe were also more likely to report that their concerns were more trivial, mattering less in the grand scheme of things, than those in a nonemotional control condition (Piff et al., 2015). In the present investigation, we build on these findings, showing that the influence of awe upon self-diminishment, in part, accounts for how awe leads to the complex sentiment of humility.

A diminished sense of self should give rise to humility. Self-diminishment should disrupt the tendency to make positive illusions about the self, allowing for a more accurate and realistic view of the self to emerge, and reduce ego defensiveness, encouraging openness to one's weaknesses and limitations. It also motivates a stronger focus on others, increasing one's appreciation for other people or forces (e.g., God, luck) and their role in one's own success. Therefore, we hypothesize that it is awe's ability to lead individuals to reflect on their own diminished self-concept that results in greater humility (see Figure 1).

Present Investigation

In this investigation, we present five studies using varying methodologies that examine the relationship between awe and humility.¹ First, we examined whether trait awe is associated with peer-ratings of participant's humility (Study 1) and daily reports of humility over a 2-week period (Study 2). Second, we tested the causal role of momentary feelings of awe, elicited by daily experiences, film clips, emotion recall, and nature, on humility (Studies 3–5). We also documented the impact of awe across a variety of measures of humility, including self-report (Study 2 and 5), behavioral (disclosure of one's own strengths and weaknesses to others; Study 3), and cognitive (epistemic recognition of external forces in one's own life outcomes; Study 4). In our final two studies we identify the process by which awe leads to humility (see Figure 1). We examined whether awe mediates the relationship between appraisals (perceptions of vastness and a challenge to one's world view) and humility (Study 4), and whether self-diminishment mediates the relationship between awe and humility (Study 5). In summary, in the present investigation, we test the following three hypotheses:

Hypothesis 1: Dispositional awe is associated with greater humility (Studies 1 and 2)

Hypothesis 2: Momentary experiences of awe increase humility more than neutral or positive comparison states (Studies 2–5)

Hypothesis 3: (a) Perceptions of vastness and the need for accommodation increase humility through the experience of

¹ Interested readers can see replications of these effects in other studies that do not appear in the article: (https://osf.io/4pfg9/?view_only=fff380b5893d4943bad30cb59018f7d7).

awe and (b) Awe generates humility by leading to a diminished sense of self (Figure 1; Studies 4 and 5)

Critical to our conceptual endeavor, we gathered evidence of the unique influence of awe upon humility, testing whether it was distinct from relevant personality traits (e.g., openness; Study 1) and general positive affect (Study 1, 2; for rationale, see Fredrickson, 2004; Oveis et al., 2010). We also ensured the effect of awe on humility was independent of specific positive emotions (joy/happy; Study 1, 3–5), epistemological emotions (amusement; Study 4), and prosocial emotions (compassion; Study 2), an approach that offers a strict test of our hypotheses concerning the unique influences of awe upon humility. In addition, in line with theorizing that emotions influence self-concepts and behaviors beyond the appraisals that give rise to them, we attempted to demonstrate the unique influence of awe above and beyond the appraisals that generate it (Study 4).

Study 1

Dispositional affect, which reflects the frequency and intensity with which individuals experience specific emotions, often shows similar influences upon social cognition and behavior as momentary emotional states (Lerner et al., 2015; Rosenberg, 1998). Given this, we tested the hypothesis that individuals high on dispositional awe would receive greater peer-reports of humility, captured by friends' assessments (Davis et al., 2011). Friends offer more reliable ratings of another's humility, which is difficult to observe in short interactions with strangers (e.g., Davis et al., 2010; John & Robins, 1993).

To test the uniqueness of the association between trait awe and peer-reported humility, we included two additional individual differences as covariates. The first was trait openness, a personality trait that has been associated with both awe (Shiota et al., 2006) and humility (Desimoni & Leone, 2014). The second was general positive affect (see Oveis et al., 2010) and a specific positive emotion (joy), which allowed us to disentangle awe's influence on humility from positive emotion more broadly. Finally, to ensure that attributions of humility were not reducible to a halo effect we also controlled for general liking of the participant by his or her friend.

Participants

There were 119 freshman undergraduates (36 men, 83 women) and 193 peers (63 men, 130 women) from a large west coast university who took part in this study for payment. The ethnicities that made up the participant sample were as follows: 5% African American, 17% European American, 65% Asian American, 12% Latin American, and 2% other ethnicities. Participants' ages ranged from 18 to 22 with an average age of 18.40 years old ($SD = 0.66$).

Procedure

As part of a multiphase study, participants completed online measures of demographics as well as the shortened version of the Positive and Negative Affect Scale (Watson, Clark, & Tellegen, 1988), Dispositional Positive Emotion Scale (Shiota et al., 2006), and Big Five Personality Inventory (John & Srivastava, 1999). In a laboratory session, participants nominated four friends to take a

short survey. The first two nominated peers were contacted over email and told they would be compensated \$5 dollars for filling out an online survey about the participant. If one or both of the peers failed to submit their survey responses within a week of the request, we contacted participant's third, and if necessary fourth friends. Peers who filled out the survey provided background demographic information about themselves, how much they liked their friend 1 (*not at all*) to 5 (*a great deal*), as well as their judgments about how humble, modest, polite, and arrogant their friend was on scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), along with other traits not relevant to this study.

Measures

Dispositional awe and joy. The Dispositional Positive Emotion Scale (DPES; Shiota et al., 2006) assesses the extent to which participants experience different positive emotions in their daily lives. Participants responded to 38 statements on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). We were interested in two subscales: dispositional awe and joy. The awe subscale contains six items consisting of: *I often feel awe, I see beauty all around me, I feel wonder almost every day, I have many opportunities to see the beauty of nature, I often look for patterns in objects around me, I seek out experiences that challenge my understanding* ($M = 4.96, SD = 1.01; \alpha = .84$). The joy subscale is also made up of six items such as, *on a typical day, many events make me happy* ($M = 4.80, SD = 1.05; \alpha = .85$).

Openness. The Big Five Personality Inventory (BFI) measures five broad facets of personality (agreeableness, conscientiousness, neuroticism, extraversion, and openness; John & Srivastava, 1999). We focused on the openness subscale, which measures the extent to which individuals are intellectually curious, interested in a variety of experiences, appreciate beauty, and are imaginative. Participants responded from 1 (*strongly disagree*) to 5 (*strongly agree*) for 10 items that describe the self, such as, *is original and comes up with new ideas* ($M = 3.74, SD = .49; \alpha = 0.76$).

Positive affect. We assessed general dispositional positive affect using the 10-item, shortened version of the Positive and Negative Affect Scale (PANAS; Thompson, 2007; Watson et al., 1988). Participants responded with how much they have experienced affective states such as *determined, inspired, and alert* in the past month on a scale ranging from 1 (*never*) to 5 (*always*). Five items made up the positive affect scale ($M = 3.75, SD = .57; \alpha = .72$).

Results and Discussion

Of the 119 participants, 18 did not fill out all the demographic and individual-differences variables and six participants had no peers respond to the survey, leaving 95 participants in the sample. Of these, 83 participants had peer-reports from two friends whose reports were averaged to yield a composite score for each participant, and 11 participants had a peer-report from only one peer. Peer-reports of humility, politeness, modesty, and arrogance (reverse scored) showed strong reliability for both peer 1 and peer 2 ($\alpha \geq .87$) and were, therefore, aggregated into a composite humility measure ($M = 5.61, SD = 1.09$). The interrater reliability of the four-item humility composite for the two peers was .59, measuring absolute agreement.

In keeping with Hypothesis 1, participants who reported frequent and intense experiences of awe were judged to be more humble by their friends controlling for both openness and positive affect, $r(92) = .22, p = .04$, as well as openness and a discrete positive emotion—joy, $r(92) = .25, p = .01$.² These two analyses generally remained significant when we added liking as an additional control variable, positive affect: $r(91) = .18, p = .09$; joy: $r(91) = .21, p = .05$.

Study 2

In Study 2 we turned to an experience sampling method, which offers three distinct advantages. First, we captured more ecologically valid experiences of awe that occur in daily life. Second, we measured humility as a dynamic state that can fluctuate day-to-day. Third, we examined the relationship between awe and humility at the trait (between-subjects) and state (within-subjects) levels of analysis. More specifically, aggregating daily reports of awe across days, allowed us to test whether awe-prone people reported greater humility across the 2 weeks (between-subjects experiences of awe). Examining daily variations in awe, allowed us to test whether people felt more humble on days when they reported more awe than they normally did (within-subjects variations in daily experiences of awe). We predicted that awe would be associated with greater humility in both analyses. We also controlled for the daily experience of positive affect and another prosocial emotion that shifts attention away from the self—compassion, to identify the unique relationship between awe and humility (Goetz, Keltner, & Simon-Thomas, 2010).

Method

Participants and procedure. The sample for this study was 106 of the 119 first year college students from Study 1. Participants were given a link to complete an online survey each night for 14 consecutive nights. Participants completed 1366 diaries, an average of 12.89 days per person. Seventy-two percent of the participants completed all 14 diaries.

Measures. Measures were kept brief to ensure that participants would remain motivated to complete their daily responses (Reis & Gable, 2000). Embedded among other self-report items not relevant to this study, each night participants reported how much they experienced *awe*, *wonder*, and *amazement* in addition to 13 other emotions (amusement, anger, annoyance, appreciation, anxiety, compassion, fear, happiness, moved, pride, sadness, relaxed, and warmth) ranging from 1 (*not at all*) to 10 (*as much as I have ever felt*). Awe, wonder, and amazement were aggregated to create a single measure of awe (average within-day $\alpha = .89$). Each day participants were also asked how humble they felt that day ranging from 1 (*not at all*) to 10 (*the most I have ever felt*).³

Results and Discussion

Data analysis strategy. The data from the daily diaries consisted of up to 14 data points nested within each individual. Because these nested data violate assumptions of independence, we used a 2-level model to conduct our analyses (SPSS Mixed Models, version 24). We specified a covariance matrix for errors in which variances were allowed to be heterogeneous across days and

there were autocorrelations between covariances on consecutive days. Level 1 intercepts and slopes were allowed to vary. Degrees of freedom were calculated using the Satterthwaite approximation that yields *df* that were somewhere between the number of individuals and the number of days.

Main analyses. Participants reported feeling more humble on days when they experienced more awe, $B = .18, t(176) = 6.56, p < .001$. This effect held when controlling for positive affect, $B = .07, t(1178) = 2.31, p = .02$, and when controlling for the prosocial emotion of compassion, $B = .13, t(197) = 4.71, p < .001$. In addition, including feelings of humility the previous day as a covariate revealed that the influence of daily awe upon humility was not because of people feeling more awe and humility on one day because they were already feeling more humble the day before, $B = .18, t(229) = 6.26, p < .001$.

We next examined the effects of trait (between-subjects effect) and state awe (within-subjects effect). We predicted daily humility from two orthogonal variables: a variable representing participants' average awe across the 2 weeks, as well as a person-centered awe variable in which daily experiences of awe were centered around each person's own average. Both effects were significant. As predicted by Hypothesis 1, people who tended to experience more awe across the 2-week diary reported feeling more humble relative to participants who felt less awe during those 2 weeks, $B = .42, t(104) = 4.63, p < .001$. In support of Hypothesis 2, on days when participants experienced more awe than they normally did across the 2-week period, they reported feeling more humble, $B = .16, t(80) = 4.87, p < .001$. Because the effects of state and trait awe were independently significant, we can conclude that the general tendencies toward awe as well as day-to-day fluctuations in experiences of awe both exert an influence associated with increased humility.

Study 3

In Study 3 we turned to an experimental manipulation of awe using a standardized video induction. We assessed humility as a behavioral measure—greater balance in the presentation of one's strengths and weaknesses to others. This behavioral measure represents the more socially expressive side of humility that can be assessed in ways less subject to self-report biases that problematize approaches to measuring humility. We predicted that compared with a neutral control condition, momentary experiences of awe would lead to a more balanced disclosure of one's personal strengths and weakness.

² Results did not remain significant when controlling for one of the discrete positive emotions measured in the DPES, compassion, though it did hold for all the others.

³ This study also included additional measures for other projects such as a measure of prosociality (*how much did you engage in acts today that involved helping someone else or doing something for a good cause?*), curiosity (*Today I was actively seeking as much information as I could in new situations*), and two items about well-being (*I think that I should have enjoyed the positive events that happened today more than I actually did; I feel terrible . . . terrific*). Two items additional items were included to explore the relationship between compassion and stress in daily life (*how much stress did you feel today; how would you rate your ability to handle stress*).

Method

Participants. There were 104 adults (53 men, 50 women, 1 declined to state) from Mechanical Turk who participated in this study for compensation. Participants' ages ranged from 20 to 69 ($M = 34.68$, $SD = 12.10$). The sample was 4% African American, 79% European American, 10% Asian American, 6% Latin American, and 1% other ethnicities.

Procedure. Participants were directed to a secure online website and randomly assigned to watch one of two, 2-minute videos. In the control condition, they watched a nonemotional instructional video about how to build a fence, which typically elicits low levels of all emotions except *relaxed/calm* (Stellar, Manzo, Kraus, & Keltner, 2012).

In the awe condition, participants watched a video that depicted the universe in expansive images, showing the distance between planets and stars by slowly zooming out on a view of the earth. Piloting testing of the awe video ($n = 27$) revealed that awe ($M = 5.56$, $SD = 1.42$), wonder ($M = 5.78$, $SD = 1.65$), and interest ($M = 5.63$, $SD = 1.33$) were the three most highly reported states among 17 other emotions (admiration, anger, anxiety, calm, contempt, compassion, disgust, fear, inspiration, joy, pride, sadness, shame, and warmth) measured on scales ranging from 1 (*not at all*) to 7 (*as much as I've ever felt*). While awe, wonder, and interest were elicited at similarly high levels, $t_s \leq .83$, $p_s \geq .42$, each of these emotions was reported with significantly greater intensity than the next most highly elicited emotion, admiration ($M = 5.00$, $SD = 1.86$), $t_s \geq 2.05$, $p_s \leq .05$.

After participant's watched the video, they wrote for two minutes about their strengths and weaknesses, starting with their strengths, imagining that they would discuss these personal qualities with a person they just met, to augment the interactive nature of the online setting. A visible timer counted down to zero on the screen to help them manage their time. After the data was collected, two coders who were blind to condition read all participants' responses and counted the number of strengths and weaknesses that participants mentioned. Intraclass correlation coefficients (ICCs) measuring absolute agreement among raters were greater than .75. The average of both coders was used as the number of strengths and weaknesses listed.

Participants then reported how much happiness and fear as well as awe, wonder, and amazement they felt from 1 (*not at all*) to 7 (*very much*), which were made into a composite ($\alpha = .96$). In this study the awe video elicited greater awe ($M = 5.82$, $SD = 1.18$), $t(84) = 12.18$, $p < .001$, and happiness ($M = 4.66$, $SD = 1.70$), $t(86) = 5.30$, $p < .001$, than the neutral video (awe ratings: $M = 2.29$, $SD = 1.49$; happy ratings: $M = 2.77$, $SD = 1.64$).

Results

Fourteen participants did not follow the directions in the writing section, and four participants listed a number of strengths and weaknesses that were more than 3 SD s from the mean. These participants were excluded from the analyses, leaving a final sample of 85 participants.

The number of strengths and weaknesses participants described were positively skewed; therefore, we log transformed these variables. To calculate the balance between disclosing strengths versus weaknesses, we divided strengths by weaknesses and log transformed that variable, which was also skewed. Participants in the

awe and neutral conditions had a different balance between disclosing their strengths and weaknesses, $t(84) = 2.38$, $p = .02$. More specific analyses revealed that participants in the awe condition discussed significantly fewer strengths ($M = 1.20$, $SD = .53$) before choosing to write about their weaknesses than participants in the neutral condition ($M = 1.48$, $SD = .44$), $t(84) = 2.64$, $p = .01$, though there was no effect of condition on the number of weaknesses participants listed (awe: $M = .82$, $SD = .58$; neutral: $M = .79$, $SD = .49$), $t(84) = .27$, $p = .79$.⁴ In support of Hypothesis 2, our awe-induction led individuals to behave in a more humble fashion as evident in the choice to disclose fewer personal strengths before moving onto their weaknesses.

Given that the awe video elicited both awe and happiness to a greater degree than the neutral video, we assessed whether awe was a better predictor of humility than happiness. We conducted a multiple regression with awe and happiness as predictors of humility, controlling for condition (0 = neutral, 1 = awe). Neither awe, $\beta = -.04$, $t(84) = 0.14$, $p = .89$, nor happiness, $\beta = .19$, $t(84) = 1.50$, $p = .14$, were significant predictors. Therefore, we were unable to demonstrate the unique contribution of awe, because self-reports of this emotion did not predict humility.

Study 4

To ensure our effects would generalize across different awe-elicitors (e.g., nature, people, art, etc.), in Study 4 participants recalled awe experiences, a method known to effectively evoke discrete emotional states (Gordon et al., 2016). We included amusement as a comparison condition, to identify whether our effects were unique to awe and not a closely related positive emotion that also involves violations of expectations and shifts in knowledge (Shiota et al., 2006).

We also extended the results of our prior studies by focusing on an epistemic measure of humility, namely, greater willingness to acknowledge the role of outside forces (other individuals, God, luck) in one's personal accomplishments (McElroy et al., 2014; Roberts & Wood, 2003). This measure reflects the other-oriented side of humility and allows us to measure humility in a more subtle fashion that is less likely to activate social desirability concerns. We predicted that awe would lead to increased recognition of the external forces shaping life's outcomes.

We also examined the first steps of the process that we propose leads to humility. We argue that two appraisals—vastness and need for accommodation, promote humility through eliciting feelings of awe (see Figure 1). A significant mediation model would reveal these cognitive contributors to humility and the independent and more proximal relationship of the subjective experience of awe to humility.

Method

Participants. There were 598 adults (298 men, 291 women, 9 declined to state) from Mechanical Turk who participated in this

⁴ When we examined the number of strengths and weaknesses including the participants who did not follow directions all our effects remained significant, $t(98) = 2.09$, $p = .04$. Our effects were also significant when using the original number of strengths and weaknesses before it was log transformed, $t(84) = 2.34$, $p = .02$.

study for compensation.⁵ Participants' ages ranged from 18 to 73 ($M = 34.81$, $SD = 10.94$). The sample was 9% African American, 72% European American, 9% Asian American, 7% Latin American, and 3% other ethnicities.

Procedure. Participants were directed to a secure online website. They took part in the study on their own personal computers and were randomly assigned to one of three conditions. In the control condition, they recalled the last time they went to the grocery store to get food. In the amusement condition, they recalled a time in which they felt amusement, which was defined as finding something funny or silly. In the awe condition, they recalled a time in which they felt awe, which was defined as feeling wonder or amazement. Participants described the details of the event and their accompanying feelings for 1.5 minutes, before the survey page automatically moved them forward.

To assess awe-related appraisals, participants were asked how much they agreed with the following statements about the recalled experience: (a) they felt a sense of vastness, (b) their world view was challenged, and (c) they saw the world differently, on scales ranging from 1 (*disagree strongly*) to 7 (*agree strongly*). Ratings on the last two items were combined to create an appraisal of need for accommodation ($\alpha = .92$).

Participants next reported the extent to which they felt awe, wonder, and amazement ($\alpha = .95$), joy, and amusement on 1 (*not at all*) to 5 (*very much*) scales. The amusement condition elicited significantly higher levels of amusement than the other two conditions, $t_s \geq 10.25$, $p_s < .001$, whereas the awe condition elicited significantly higher levels of awe, $t_s \geq 15.04$, $p_s < .001$, and joy, $t_s \geq 3.28$, $p < .001$, than the other two conditions (see Table 1 for means).

Participants then indicated to what extent they believed that they, other people, or external forces (God or luck) contributed to their own achievements/accomplishments. They did so using a slider scale that ranged from 0–100% and by assigning numbers to each of the three causes so that they, in total, added up to 100%. For purposes of clarity, we asked participants to rate other people and outside forces separately, but then combined these two values into one measure of external forces. Lastly, participants in the awe condition categorized the elicitor they wrote about as either nature, building or architectural structure, another person, myself, art/music, God or spiritual figure, something magical, idea or concept, or other.

Results and Discussion

Participants differed in the degree to which they recognized the influence of outside forces (people and external causes) in their own accomplishments, $F(2, 593) = 11.48$, $p < .001$. Participants

who recalled an awe experience reported a significantly larger amount of their success coming from external forces compared with the self ($M = 55.28$, $SD = 25.89$) than those who wrote about a neutral ($M = 44.03$, $SD = 21.50$), $t(593) = 4.78$, $p < .001$, or amusing experience ($M = 50.27$, $SD = 23.79$), $t(593) = 2.12$, $p = .03$. In keeping with Hypothesis 2, recalling awe experiences led to greater humility compared with neutral or amusement conditions.

To explore whether our effects were driven by the type of awe elicitor, we grouped elicitors into three categories: (a) outside forces (people and external causes), which included elicitors like another person, God/spiritual figure, or something magical (35% of entries); (b) the self (10% of entries); and (c) nonsocial elicitors, which included nature, architecture, art/music, idea/concept, other (56% of entries). Across these three categories of awe elicitors, there were no significant differences in the degree to which participants recognized the influence of outside forces in their own accomplishments, $F(2, 184) = 2.02$, $p = .14$.

Given that the awe recall condition elicited both awe and joy to a greater degree than the comparison conditions, we assessed whether awe was a better predictor of humility than joy. We conducted a regression with awe, joy, and dummy coded condition variables for the neutral and amusement condition predicting our measure of humility. We found that awe was a marginally significant predictor of humility, $\beta = .15$, $t(585) = 1.86$, $p = .06$, whereas joy was not $\beta = -.04$, $t(585) = 0.55$, $p = .58$, suggesting a unique contribution of awe in generating humility.

Next we used two separate mediation analyses to test whether perceptions of vastness and need for accommodation (NFA) generated humility, through eliciting awe. In our analyses we combined the amusement and neutral conditions.⁶ We conducted a bootstrapped serial mediation with 5,000 samples using Process Model 6 (Hayes, 2013; Preacher & Hayes, 2008), to test mediation paths in succession rather than simultaneously. We found support for a significant pathway from condition manipulation (amusement and control conditions = 0, awe condition = 1) to humility via perceptions of vastness, and subsequently awe (95% confidence interval [CI] [.02, 1.34]), controlling for NFA (see Figure 2). We also found support for a significant pathway from condition manipulation (amusement and control conditions = 0, awe condition = 1), to humility via NFA, and subsequently awe (95% CI [.01, .96]), controlling for perceptions of vastness (see Figure 2).

⁵ An initial wave of data (272 participants) was collected. An additional wave of data collection of roughly the same size (326 participants) was then conducted after initial analyses revealed the marginal effects for our main variables of interest comparing awe and amusement (contribution of external forces to personal accomplishments), suggesting a smaller effect size (Cohen's $d = .20$). There was no interaction between round of data collection and condition in predicting our main variable of interest, $F(2, 590) = .55$, $p = .58$.

⁶ We combined our control conditions in our mediation for two reasons. First, though we had expected awe and amusement may elicit equivalently high ratings of NFA because both are epistemological emotions, we found that awe ($M = 4.72$, $SD = 1.63$) elicited significantly greater levels of NFA than amusement ($M = 2.29$, $SD = 1.43$), $t(591) = 12.23$, $p < .001$. Therefore, we had no a priori predictions about how our path model, specifically the role of appraisals (of vastness and NFA), would differ when comparing awe to amusement versus a neutral state. Second, testing a complex serial mediation model requires a large sample size, which would be best suited by using the entire sample in our analyses (Fritz & MacKinnon, 2007).

Table 1

Emotion Means Each Recall Condition

Emotion	Recall condition			Omnibus F
	Awe	Amusement	Neutral	
Awe	4.43 (.78)	2.95 (1.20)	1.61 (.91)	415.46
Amusement	3.13 (1.33)	4.45 (.85)	1.98 (1.12)	229.14
Joy	4.23 (1.02)	3.86 (1.18)	1.98 (1.17)	244.22

$p < .001$ for each F value.

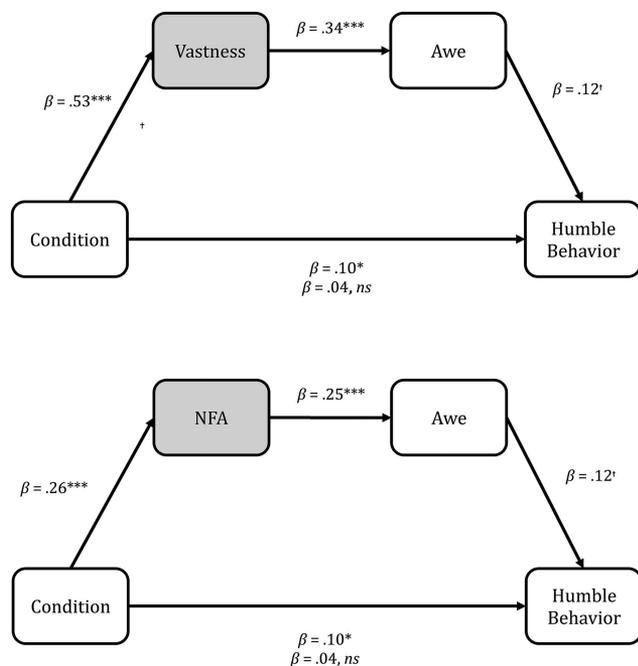


Figure 2. Perceptions of vastness and the need for accommodation (NFA) each play a unique role in generating awe, and subsequently humble behavior. The analysis with vastness controls for NFA; the analysis with NFA controls for vastness. Condition is 0 for the control conditions (amusement and neutral) and 1 for the awe condition.

Importantly, neither of the path models in which we reversed the order of the appraisal and the emotion was significant (NFA controlling for vastness: 95% CI $[-.45, 1.14]$ and vastness controlling for NFA: 95% CI $[-.75, 1.40]$), suggesting that awe is an important mediator between appraisals and humility rather than the other way around. In support of Hypothesis 3, appraisals of vastness and NFA both promoted humility through eliciting awe. The mediation results should be interpreted with caution because we measured our variable at roughly the same time.

Study 5

In Study 5, we induced awe outside of the laboratory setting, relying on an expansive view of nature and measured humility with self-report. We also tested the second part of our proposed process model. Specifically, we examined whether self-diminishment explained the influence of awe on humility (see Figure 1).

Method

Participants. There were 93 undergraduates (24 men, 69 women) from a large west coast university who participated in this study for credit in a psychology class. The sample was composed of 2% African American, 29% European American, 37% Asian American, 13% Latin American, and 19% other ethnicities. Participants' ages ranged from 18 to 32 with an average age of 20.43 years old ($SD = 2.39$).

Procedure. Participants arrived in the lab individually or in groups of two. They filled out demographic information and then

walked with the experimenter to one of two locations on the university's campus that were equivalently distant from the lab and offered a pleasant view outside. In the control condition participants stopped outside a library where they were asked to spend 4 minutes looking at their surroundings. In the awe condition they were brought to a tower at the center of campus. They took an elevator to the top level of what is known as the Campanile, a bell and clock-tower that rises to 200 feet from the ground and has an expansive view of the UC Berkeley Campus, San Francisco Bay, the city of San Francisco, and the Golden Gate Bridge (see Figure 3). At the top, they were asked to spend 4 minutes looking out each of the four sides of tower.

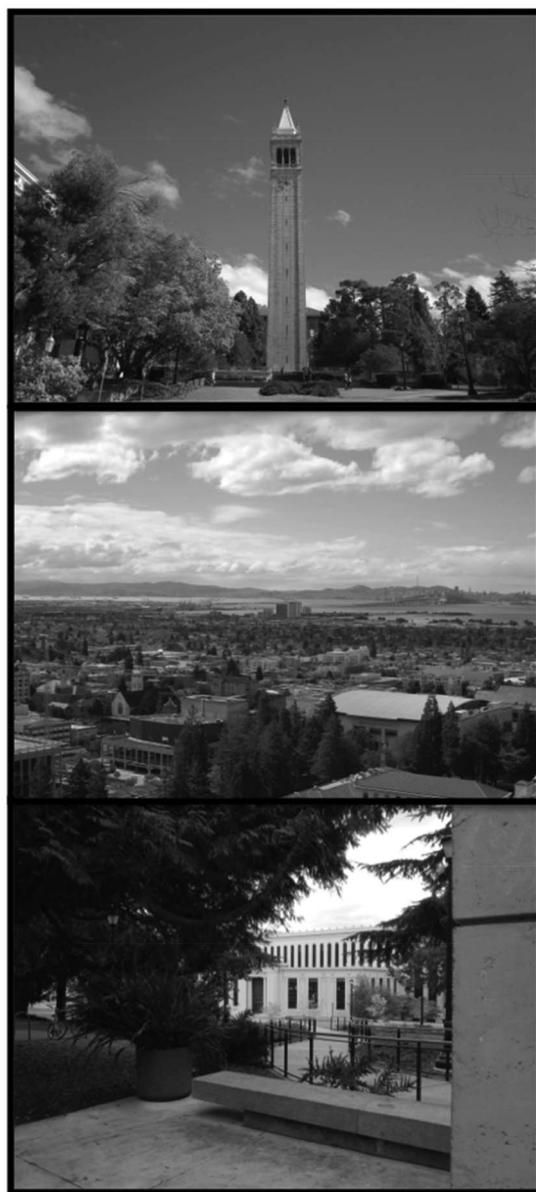


Figure 3. Pictures of the bell and clock-tower (top), the view from the bell and clocktower (awe condition; middle), and the view from the library (control condition; bottom).

Participants rated how much they felt awe and wonder ($\alpha = .71$) in addition to 12 other emotions (anger, anxiety, calm, compassion, contempt, fear, inspiration, interest, joy, pride, sadness, and warmth) ranging from 1 (*not at all*) to 7 (*as much as I have ever felt*) to reduce demand effects. Awe was the most highly reported emotion while participants were at the top of the bell and clock-tower ($M = 5.26, SD = 1.17$), and was significantly higher than in the control condition ($M = 3.87, SD = 1.35$), $t(91) = 5.14, p < .001$. A series of t tests, with a family wise correction ($p = .003$), revealed that joy ($M = 4.89, SD = 1.56$), $t(91) = 3.19, p = .002$, and pride ($M = 4.24, SD = 1.65$), $t(91) = 3.13, p = .002$, were also significantly greater in the awe condition than the control (joy: $M = 3.78, SD = 1.72$; pride: $M = 3.11, SD = 1.75$).

Given time constraints at the top of the bell and clock-tower, participants responded to one item measuring self-diminishment: *I currently feel small in comparison to what I was watching*. This face valid single-item was adapted from early studies of awe (Shiota et al., 2007) and is highly correlated with established self-diminishment items ($r_s > .63$; Piff et al., 2015).⁷ Participants also reported how humble they felt ranging from 1 (*not at all*) to 5 (*extremely*). Finally, they were brought back to the lab room, debriefed, thanked, and released.

Results and Discussion

In keeping with Hypothesis 2, we found that participants reported feeling more humble at the top of the bell and clock-tower ($M = 3.57, SD = 1.02$) than the control location ($M = 2.65, SD = 1.16$), $t(90) = 3.89, p < .001$. Given that our awe induction also elicited greater joy and pride than our control, we conducted a multiple regression including awe, pride, joy, and condition (neutral = 0, awe = 1) as predictors of humility. Awe predicted humility, $\beta = .37, t(87) = 3.22, p = .002$, but joy and pride did not, joy: $\beta = .08, t(87) = 0.73, p = .47$, pride: $\beta = .16, t(87) = 1.35, p = .18$. These results further speak to the unique influences of awe upon humility.

We next conducted a serial mediation analysis with the same constraints as Study 4. We found a significant path from the in vivo induction condition (neutral = 0, awe = 1) to humility, via awe and self-diminishment (95% CI [0.004, 0.22]; Figure 4). In keeping with Hypothesis 3, our serial mediation findings support the claim that awe led to self-diminishment, which in turn gave rise to humility. As in our prior study, caution must be taken when

interpreting this model as our measures were assessed at the same time.

General Discussion

In the present investigation we present five studies that revealed, across measures and methodologies, that awe promotes humility. In keeping with our first hypothesis, we uncovered a positive relationship between trait awe and humility. More specifically, people prone to awe were perceived by their peers as more humble (Study 1) and reported feeling more humble over a 2-week period (Study 2).

Turning to our second hypothesis, momentary experiences of awe in daily life were associated with feeling more humble (Study 2). Experimental manipulations of awe via videos (Study 3), emotion recall (Study 4), and in vivo experiences of awe outside (Study 5), also led participants to greater humility. These effects were observed when humility was measured via self-reports, behavioral expressions of a more balanced view of one's strengths and weaknesses (self-relevant humility), and epistemic recognition of the external forces that contribute to one's accomplishments (other-oriented humility).

Our third hypothesis concerned the process by which awe increases humility, and was rooted in recent theorizing upon emotion-related appraisals and ensuing social cognition (Lerner et al., 2015; Schwarz, 2011). In keeping with this theorizing, our studies provided evidence that appraisals of vastness and the need for accommodation generated humility through experiences of awe (Study 4) and that awe led to humility through self-diminishment (Study 5). Although past work as implicated the small self in outcomes related to awe, this is the first empirical work to trace the process of awe from appraisals to outcomes like humility, though we did not test the entire path model within a single study.

The findings from the present investigation dovetail with an expanding line of inquiry that demonstrates that emotions not only function to influence behavior, but also change the self-concept and broader patterns of thought about one's relationship to others and the outside world. Unlike pride, which gives rise to an inflated self-concept and subsequently as sense of superiority and dominance over others (Cheng, Tracy, & Henrich, 2010), awe shifts self-perception in the opposite direction, causing an individual to fully appreciate the value of others and see themselves more accurately, evoking humility.

Toward a Science of Humility

The present research makes important contributions to the emerging science of humility (Chancellor & Lyubomirsky, 2013; Tangney, 2002). Although most studies have focused on humility as a trait in service of understanding the *humble person*, the present research clearly reveals that humility is also a dynamic state, shifting according to fleeting emotions and emotionally evocative contexts and over the course of moments and days. By focusing on humility in this way, purchase is gained in understanding the sources of variation in this

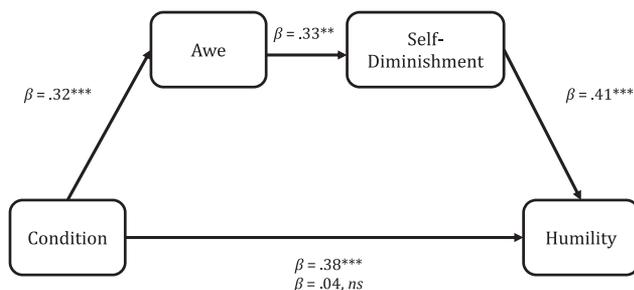


Figure 4. Condition (0= control condition, 1= awe condition) manipulation gives rise to awe, leading to self-diminishment, and subsequently humility in Study 5.

⁷ This correlation uses data from a study that was not included in the final version of this article but is available on the OSF website for this project; the study is called manipulating vastness. This study also included additional measures for other projects such as the items were feeling powerless, control, interconnected, in the presence of something greater than myself, and curiosity.

striking human tendency. Studies 3 and 4 also further refine an understanding of the construct of humility. Humility has clear, observable outcomes that can be studied in different cultures and age groups: a more balanced presentation of one's strengths and weaknesses to others, defined by a reduced perseveration on personal strengths and a greater recognition of the contributions of external forces in one's own accomplishments. These findings should be useful to scientifically capturing a construct, which presents contradictions and paradoxes when measured with self-report.

Across studies, we found that experiences of awe when visualizing the universe, when looking out over an expansive view, and during more quotidian experiences (e.g., taking in a beautiful sunset as reported in a daily diary), led to shifts in humility. It would seem that perceptions of vastness and the need for accommodation contribute to increased humility through generating awe. These findings point to unanswered questions. When music or art connotes vastness are people likely to feel humble during such aesthetic experiences? Might our data help shed light on how religious or spiritual experiences, rituals, and practices lead to increases in humility (e.g., Saroglou, Pichon, Trompette, Verschueren, & Dernelle, 2005; Shariff & Norenzayan, 2007)?

The Expanding Science of Awe

In earlier scientific theorizing about awe and in much earlier philosophical treatments, it has been claimed that awe enables individuals to fold into social hierarchies and social collectives (Durkheim, 1887/1972; Keltner & Haidt, 2003). A similar argument has been made in recent theoretical analyses of religion and spirituality, which are a potent catalyst and occasion for experiences of awe (e.g., Shariff & Norenzayan, 2007; Wilson, 2010). Critical to folding into social groups are solutions to what has been called the cooperation problem: that mechanisms of different kinds must motivate individuals to subordinate their own personal self-interest for the interests of the group (Feinberg, Willer, Stellar, & Keltner, 2012; Keltner, Kogan, Piff, & Saturn, 2014; Sober & Wilson, 1998). Ultimately, solutions to the cooperation problem require a balance between self-interest and the interests of others. And awe would appear to be one way to encourage this balance through humility, which ultimately is beneficial for groups. Although awe has previously been linked to prosociality (Piff et al., 2015), which would also achieve this aim, humility offers unique and independent pathways to social cohesion through diminishing the importance of the self and emphasizing the value and concerns of others. Humility independently predicts enhanced relationship quality (Peters, Rowatt, & Johnson, 2011), reduced self-enhancement (Kurman & Sriram, 2002; Lee et al., 2010), and reduced narcissism (Ashton & Lee, 2005). In light of these findings, the present research provides compelling evidence for one of the central theoretical claims about awe found in philosophical and social scientific analysis, that awe enables the individual to fold into social collectives by curbing self-interest.

It will be essential to extend the present investigation's findings to other cultures. Awe may be experienced more strongly, and more in interpersonal contexts, in collectivist cultures, which are characterized by stronger hierarchies and a greater focus on others. This claim would have important implications for humility, which is believed to be more frequent in interdependent cultures (Markus & Kitayama, 1991). Scholars argue that individuals in these cultures value humility more greatly as it helps individuals live harmo-

nously in groups without prioritizing particular individuals (Markus & Kitayama, 1991; Weisz, Rothbaum, & Blackburn, 1984). Modesty biases are more pronounced in interdependent cultures, in contrast to the self-enhancement bias shown by in independent cultures (Spencer-Rodgers, Peng, Wang, & Hou, 2004). These findings raise the intriguing possibilities that the tendency to experience greater humility may be associated with stronger experiences of awe or make interdependent individuals more likely to react to awe with greater feelings of humility—both predictions in need of testing.

And finally, it is important to bear in mind the less desirable social outcomes that might be produced by the influences of awe upon humility. Intensive awe experiences have been thought to be part of the "Cult of Personality" that enabled the totalitarian regimes of Hitler and Stalin (Overy, 2004), belonging to cults, and the obsessive following of pop culture figures. All may involve extreme forms of humility, which attenuate more self-assertive, individualistic tendencies that inspire critique of a current social hierarchy.

Conclusion

Humility, central to having a realistic and secure sense of the self alongside an appreciation of the value and contributions of others, represents a vital virtue at the foundation of morality and key to living in social groups (Peterson & Seligman, 2004). Awe, which arises as one confronts the vastness and complexity of the world, helps individuals gain perspective on their importance and place within it.

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