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Running Head: OPENNESS & AWE

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Personality and Profound Aesthetic Experiences

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The materials, images, data, and supplementary materials have been archived at Open Science Framework: <http://osf.io/rykje/>. We invite readers to use the data for their own purposes.

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Abstract

Profound aesthetic experiences associated with awe—often described as a sense of wonder, amazement, fascination, or being moved and touched—have received less attention than milder states like pleasure, liking, and interest. Who tends to experience these powerful states? We suggest that openness to experience, although not normally seen as an emotional trait, is a propensity for awe-like experiences that stretch one's normal ways of thinking about oneself and the world. A sample of 103 adults took part in a two-phase study that examined the role of openness to experience in two domains: nature and music. In the first phase, people viewed 14 images of the sky and space and rated their experience of each on items related to awe, wonder, and fascination. In the second phase, people listened to a song with qualities known to evoke awe (“Hoppípolla” by Sigur Rós) and rated their experience of it afterward. Openness to experience predicted the experience of awe for both space images ($r = .48$) and music ($r = .35$), and the experience of awe was correlated across the domains ($r = .35$). The other four factors of personality had much smaller effects, and extraversion's effects were consistently near zero, indicating that awe-like experience differs from the activated positive affectivity typical of extraversion. Overall, the results support the view of openness to experience as an essentially aesthetic trait and extend it to deeper aesthetic states.

Keywords: awe; wonder; interest; openness to experience; aesthetics; emotion; personality

Openness to Experience and Awe in Response to Nature and Music:
Personality and Profound Aesthetic Experiences

“If the stars had a sound they would sound like this”

–Mari Myren, in reference to the Scottish post-rock band Mogwai

Compared to its traditional focus on the fine arts, modern research on aesthetics has a broader and more democratic sense of what counts as aesthetic experience. Many of the aesthetic pleasures of everyday life come from what Whitfield and de Destefani (2011) call *mundane aesthetics*, such as the paint colors people choose for their walls (Whitfield & de Destefani, 2011), the buildings they inhabit ([Vartanian et al., 2013](#)), the designed objects and consumer products they use ([Demir, Desmet, & Hekkert, 2009](#)), and the natural world itself. But against this backdrop of brief and mild aesthetic experiences are profound states, experiences that are rare, intense, and memorable. Many people, for example, report museum visits as life-altering and unforgettable (J. K. Smith, 2014), describe aesthetic encounters with nature that resemble moments of epiphany and transformation (Cohen, Gruber, & Keltner, 2010), and remember, years later, strong experiences of music that deeply affected them ([Gabrielsson, 2011](#)).

These profound aesthetic experiences haven't received much attention in aesthetics research. One reason is that profound experiences are rare compared to states like enjoyment and interest, so it's probably fitting that most research focuses on people's most common experiences. But while rare overall, some people seem much more likely to experience them than others. In the present research, we explore individual differences in the tendency to experience the family of states related to awe, wonder, and fascination. Many models of personality anchor traits in human

emotions, such as the tendency to experience particular states ([Watson, 2000](#)) or to think in ways that evoke or maintain certain emotions ([Kuppens & Tong, 2010](#)). We focus on *openness to experience*, a trait central to aesthetics but not generally viewed as an “emotional trait” (Pytlik Zillig, Hemenover, & Dienstbier, 2002). After reviewing the role of openness to experience in awe-like experiences, we present a laboratory study that examines its relationships with the experience of awe across nature and music, two distinct domains.

Awe

In the modern study of emotion, conceptions of awe can be traced to Tomkins (1962), who suggested a dimension of emotion labeled *interest–excitement*. At lower intensities, people are mildly intrigued and interested; at higher intensities, people are fascinated, absorbed, and gripped. Izard (1977) elaborated on this approach, describing the *interest–excitement* pole as “being engaged, caught-up, fascinated, curious” (p. 216). Awe was formally examined in an influential article by [Keltner and Haidt \(2003\)](#), who suggested that the cognitive components of awe can be distilled into two factors. The first, *vastness*, reflects an appraisal that something is massive (literally or figuratively); the second, *accommodation*, reflects a shift in one’s knowledge in light of the new experience. Recently, Campos et al. (2013, p. 49) pointed out that *vastness* and *accommodation* resemble the factors that promote interest—*novelty* and *comprehensibility* ([Silvia, 2005, 2006, 2008](#))—albeit at much more extreme levels. This resemblance provides some support for Tomkins’s and Izard’s notion that consuming fascination is the intense form of interest (Izard, 1977).

The phenomenology of awe is difficult to describe, but most readers will recognize the experience. Three typical elements of awe are *connectedness*, *smallness*, and *transcendence* ([Bonner & Friedman, 2011](#); Nusbaum & Silvia, 2014). People commonly describe such experiences

as time of heightened connectedness: they feel less isolated, less singular, and more related to something bigger, sometimes to the point that they feel engulfed or consumed ([Rudd, Vohs, & Aaker, 2012](#)). At the same time, they describe feeling small and humbled in the face of the vast awe-inspiring thing ([Campos et al., 2013](#)), like the self has shrunk, as well as feeling transcendent, like they have been elevated from their mundane concerns and put in touch with something deep or numinous ([Schneider, 2004, 2009](#)).

The emotional quality of awe is captured with words like *amazement*, *elevation*, *fascination*, and *wonder*. Chills—visible as goose bumps, usually on the scalp, neck, back, and arms (Nusbaum et al., 2014)—are a common physiological marker of awe ([Schurtz et al., 2012](#)), and some people report crying or feeling like crying (Braud, 2001). People often describe awe experiences as giving them a sense of perspective on their life, goals, and purpose ([Bonner & Friedman, 2011](#); [Schneider, 2009](#)), which is consistent with the notion that self-change is brought about when people accommodate the new experience.

Openness to Experience as Awe-Proneness

Openness to experience—one of the major cross-cultural factors of personality ([McCrae & Sutin, 2009](#))—sits at the center of the psychology of aesthetics, creativity, and the arts. People high in openness to experience enjoy aesthetic experiences, live more creative lives, and pursue and support the arts. People low in openness to experience, in contrast, are more conventional, practical, and down-to-earth (Conner & Silvia, in press; [Kaufman, 2013](#); Nettle, 2009; Swami & Furnham, 2014).

Openness to experience is a complex, heterogeneous trait. For the most part, the nature of the other major factors of personality are relatively uncontroversial ([Ashton, Lee, & de Vries, 2014](#)). The nature of openness, however, remains an active area of debate in personality

psychology. Personality models have proposed many different structures of openness to experience, each of which implies a different sense of the trait. DeYoung's model, for example, proposes a structure with only two facets: *openness* and *intellect* (DeYoung, Grazioplene, & Peterson, 2012). Other models propose four, such as the HEXACO model (*aesthetic appreciation, inquisitiveness, creativity, and unconventionality*; Ashton & Lee, 2007) and Kaufman's (2013) model (*explicit cognitive ability, intellectual engagement, affective engagement, and aesthetic engagement*). Other models have six facets. Woo et al. (2014) propose facets of *intellectual efficiency, ingenuity, curiosity, aesthetics, tolerance, and depth*. And the original NEO model, perhaps the best known model of openness to experience (McCrae & Costa, 2008), has six facets: *openness to fantasy, aesthetics, actions, ideas, values, and feelings*.

One of the NEO's facets—openness to feelings—stands out. For one, of all the models of openness to experience, it is the only one that is explicitly emotional. People high in this facet experience a broader range of emotions, accept their emotions, and experience complex emotions more often (Terracciano, McCrae, Hagemann, & Costa, 2003). People low in the facet, in contrast, experience a narrower range of emotions that are more easily described in terms of positive and negative valence (Terracciano et al., 2003). When paired with the aesthetics facet found in most openness models—an appreciation for art, beauty, and less conventional domains and forms of art—the feelings facet implies that people high in openness to experience are much more likely to experience subtle, complex, and uncommon aesthetic emotions.

Awe certainly qualifies, and several studies suggest that people high in openness to experience are more likely to experience the cluster of awe-related emotions. People higher in openness to experience report experiencing awe more often, as measured via a self-report scale (Shiota, Keltner, & John, 2006). People higher in openness to experience also get chills from music

more often (Colver & El-Alayli, in press; Nusbaum & Silvia, 2011b), and they report feeling touched and absorbed more often by the arts (Silvia & Nusbaum, 2011). McCrae (2007) reported a reanalysis of an item in the NEO scale that asks about chills. In a sample of over 50 cultures, the chills item had one of the highest item-total correlations with the total openness to experience scale, suggesting that chills was a strong cross-cultural marker of openness to experience.

Unlike some of its five factor fellows, openness to experience is not generally represented as an emotional trait, according to content analyses (Pytlik Zillig et al., 2002). The core of neuroticism is the tendency to experience negative emotions (Widiger, 2009), particularly activated negative states like anxiety (Watson, 2000). Likewise, for extraversion (Wilt & Revelle, 2009), the tendency to experience activated positive states is probably more fundamental than features like gregariousness and social confidence (Watson, 2000). Extraversion is particularly notable for our purposes because extraverted people are much more likely to experience intense positive states, such as excitement, joy, and enthusiasm (Fleeson, Malanos, & Achille, 2002; Lucas, Le, & Dyrenforth, 2008; Shiota et al., 2006). As a result, extraversion is a credible alternative trait for understanding profound states like awe, which are experienced as both intense and rewarding (Bonner & Friedman, 2011). Braud's (2001) concept of *wonder-joy*, for example, is an awe-like experience that is both profound and euphoric.

The Present Research: Stars and Sound

In the present research, we examined the role of openness to experience in profound aesthetic states. We sought to extend past work in three significant ways. First, nearly all research on openness to experience and awe has been retrospective: people have provided self-reports of how they typically feel (e.g., Shiota et al., 2006; Silvia & Nusbaum, 2011). Laboratory studies that manipulate what people are exposed to and then measure feelings in the moment can avoid the

many pitfalls of retrospective reports of emotional experience, such as the application of lay theories of how emotions work and the ease of retrieving emotional events (e.g., Innes-Ker & Niedenthal, 2002; Levine & Safer, 2002).

Second, to assess the generality of openness to experience's links with awe, the participants were exposed to potentially awe-inspiring things in two distinct domains: nature and music. Nature and music are two common domains in which people report experiencing awe (Cohen et al., 2010; Gabrielsson, 2011), so they are good places to start for evoking awe in a laboratory setting. For nature, we took some inspiration from recent work on the aesthetic experience of deep space images (L. F. Smith, 2014; L. F. Smith et al., 2011). Participants viewed a series of images of the sky and space, and they reported their experience of awe-related feelings for each. For music, we drew from musicological work on features of songs that provoke chills and goosebumps (e.g., Huron, 2006; Sloboda, 1991). Participants listened to a song ("Hoppípolla" by Sigur Rós) and reported awe-related feelings afterward. Examining the generality of awe involves two things: evaluating whether awe from nature covaries with awe from music, and evaluating whether openness to experience is the "third variable" that explains why they are related (i.e., people high in openness are more likely to report awe in both domains, thus accounting for their correlation).

And third, we wanted to evaluate openness to experience in light of credible alternative traits. As noted earlier, models of extraversion emphasize its essentially emotional character: extraverts experience activated positive emotions much more often (Lucas et al., 2008; Watson, 2000). Awe experiences are often described as positive "peak experiences" that can be euphoric (Gabrielsson, 2011; Schneider, 2004, 2009). Discriminating openness to experience from extraversion—a more widely studied and understood trait—is critical for developing a view of

openness to experience as a propensity to experience the family of profound, awe-like emotions. The participants thus completed a comprehensive assessment of personality, which allowed us to examine whether openness to experience uniquely predicted awe.

Method

Participants and Design

The sample consisted of 103 adults (83 women, 20 men) who volunteered and received credit toward a research option in a psychology class. The sample was young (M age = 18.65 years, $SD = 1.08$) and racially and ethnically diverse: 35% African American, 64% European American, and 4% Hispanic/Latino (people could choose more than one category or decline to choose any). Several people had been excluded from the final sample of 103: 8 because they did not speak English natively, 2 because of technical failures mid-study, and 2 because of elevated scores on an infrequency scale that indicates likely inattentiveness (see Maniaci & Rogge, 2014; McKibben & Silvia, in press).

Procedure

The questionnaires, research materials, and raw data have been archived at Open Science Framework (<http://osf.io/rykje/>). Each person took part individually. After providing informed consent, people learned that the study was about people's emotional responses to a wide range of things, from pictures to music, and how personality might relate to people's experiences.

Assessment of personality and other individual differences. The five major factors of personality were assessed with the NEO FFI (McCrae & Costa, 2007), a 60-item scale that assesses each factor with 12 items. People completed each item on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). Of the 12 NEO FFI openness to experience items, one is the "chill or wave of excitement" item analyzed by McCrae (2007).

As a supplemental measure, we included the Dispositional Positive Emotion Scales (DPES; [Shiota et al., 2006](#)), a 38-item scale that measures the typical experience of *amusement* (“I am very easily amused”), *awe* (“I feel wonder almost every day”), *compassion* (“I often notice people who need help”), *contentment* (“I am at peace with my life”), *joy* (“I often feel bursts of joy”), *love* (“I love many people”), and *pride* (“I am proud of myself and my accomplishments”). People complete each item on a 7-point response scale (1 = *strongly disagree*, 7 = *strongly agree*). We were particularly interested in the awe subscale, which has been used in recent aesthetics work (e.g., [Güsewell & Ruch, 2014](#)). We also included the Unusual Aesthetic Emotions scale ([Silvia & Nusbaum, 2011](#)), a 10-item scale that asks how often people experience states like wonder, goose bumps, and being moved. The items were assessed with reference to music (e.g., “When listening to music, how often do you feel touched?”); each item used a 7-point response format (1 = *Never or Rarely*, 7 = *Nearly Always*). The scale has three subscales—chills, feeling touched, and absorption—and it has been used in cross-sectional self-report work on openness to experience ([Silvia & Nusbaum, 2011](#)).

Phase 1: Viewing images of the sky and space. People first viewed a series of 14 images of the sky and space. The set of images included photographs of the sky and space taken from Earth, images of the moon and stars visible from Earth, and deep-space Hubble images of stars. The images were taken from the NASA Photojournal site (<http://photojournal.jpl.nasa.gov>) and the NASA Astronomy Picture of the Day site (<http://apod.nasa.gov>). The images can be viewed at this project’s Open Science Framework archive (<http://osf.io/rykje/>).

Each image was presented for 30 seconds, and the images appeared in the same fixed order for all participants. After each one, people completed a series of 11 self-report items referring to their emotional experience of the picture. People were asked “Did you find this picture...”

followed by items for *interesting*, *amazing*, *awe-inspiring*, *beautiful*, *moving*, *profound*, *intense*, *boring*, *confusing*, and *frightening*. An additional item asked “Did this picture give you *chills* or *goosebumps*?” People responded to each item using a 7-point (1 = *not at all*, 7 = *very much*) scale.

Phase 2: Listening to music. After viewing and rating the images, people completed around 8 minutes of questionnaires before starting the music-listening phase of the study. In this phase, people sat and listened to a song selected by the experimenter and then rated it. The song was “Hoppípolla,” from the *Takk...* album of the Icelandic band Sigur Rós. The song was picked because it realizes many of the factors that theories of aesthetic chills discuss, such as a large sonic envelope, use of crescendo, and major shifts in energy and volume (Huron & Margulis, 2010; [Sloboda, 1991](#)). The song had the additional virtues of being relatively obscure (only 1 participant noted having heard it before) and having lyrics in Icelandic. None of our participants reported understanding Icelandic, so variation in the ability to understand the meaning of the lyrics doesn’t confound people’s emotional reactions to the song.

The song took roughly 4.5 minutes. People listened to the song on headphones and could adjust the volume themselves to a comfortable listening level. Afterward, they completed a series of self-report items. Six of the questions referred to their emotional experience of the song. People were asked, “How *interesting* / *moving* / *intense* / *relaxing* / *enjoyable* was this song?” (1 = *not at all*, 7 = *very much*) as well as “Did this song give you *chills* or *goosebumps*?” (1 = *no, not at all*, 7 = *yes, definitely*). People were also asked to rate how *loud*, *complex*, and *familiar* they found the song (1 = *not at all*, 7 = *very much*), as well as how *closely* they were listening to the song (1 = *not at all*, 7 = *very closely*) and how *similar* the song was to what they normally listened to (1 = *not at all*, 7 = *very similar*).

Results

Data Reduction and Analytic Approach

Internal consistency was good for the NEO FFI openness to experience scale's scores ($\alpha = .75$) and for the other factors' scores (conscientiousness $\alpha = .82$; extraversion $\alpha = .77$; agreeableness $\alpha = .83$; neuroticism = $.81$). Likewise, scores for the awe subscale ($\alpha = .77$) of the Dispositional Positive Emotion Scales and for the chills ($\alpha = .85$), touched ($\alpha = .71$), and absorbed ($\alpha = .81$) subscales of the Unusual Aesthetic States scale showed good internal consistency.

The data were analyzed with Mplus 7.3 using maximum likelihood with robust standard errors. The self-report scales and ratings of the pictures and song had few missing values; the variables with the most missing data were nevertheless 98.1% complete. The data and Mplus input have been archived at Open Science Framework (<http://osf.io/rykje/>) for readers who wish to run their own models.

Our analytic plan involved two major pieces. First, we examined how openness to experience predicted people's experience of awe from the space images and from the song. Second, we explored whether awe in response to space images and to music were correlated, and whether openness to experience explained why. Consistent with Cumming (2014) and others, we emphasize effect sizes over inferential tests, although both are reported—the magnitudes of effects, not their simple significance, is important to our claim that openness to experience is fundamental to profound aesthetic experience. For correlations in the r metric, we used the common $r = .10/.30/.50$ benchmarks for small/medium/large effect sizes (see Cumming, 2012); 95% confidence intervals around the correlations are in square brackets.

Emotional Responses to Space Images

Did people high in openness to experience report more awe from the images of the sky and space? We first explored correlations between the many emotion ratings that people gave for

each picture. Because people rated 14 pictures, we could calculate both within-person correlations (e.g., how a person's *awe* score changes as his or her *moving* score changes) and between-person correlations (e.g., how average *awe* and *moving* scores covary in the sample), which are shown in Table 1. A coherent cluster of awe-related experiences emerged from the ratings: amazing, awe-inspiring, beautiful, interesting, intense, moving, profound, chills, and boring (reverse-scored) were used to form an average “profound experience” composite.

As expected, openness to experience strongly predicted profound emotional responses to the space images. Table 2 shows the correlations for each individual item and for the average of the 9 profound experience items. As expected, openness consistently had the largest correlations with the individual ratings compared to the other four factors. Notably, extraversion—a trait associated with sensation-seeking, reward responsiveness, and high positive affectivity ([Depue & Collins, 1999](#); [Watson, 2000](#))—had near-zero relationships with ratings of profound experiences, suggesting that such experiences reflect something other than simple liking or enjoyment. When the 9 individual items are averaged, openness to experience had a large effect size ($r = .48$ [.32, .64], $p < .001$) and the largest effect of the five factors, but the effect for extraversion was essentially zero ($r = -.02$ [-.20, .17], $p = .880$).

Emotional Responses to Music

Did openness to experience have similar effects on emotional responses to music? Table 3 shows the correlations between ratings of the song and the five personality factors. As before, we averaged the items most closely linked to the family of awe-like experience (chills, moving, interesting, and intense) into an average “profound experience” variable. As it did with the space images, openness emerged as the strongest predictor of aesthetic experience of the song, both for most of the individual ratings and for the averaged variable. For average profound experience,

openness had a medium effect size ($r = .35$ [.19, .51], $p < .001$) and the largest effect of the five factors. Extraversion, in contrast, had a small effect ($r = .10$ [-.10, .29], $p = .346$).

Some notable findings appeared for the other personality traits and ratings. First, openness to experience had the largest effects of the five factors on the items related to whether the song seemed familiar to them, whether it resembled the kind of music they usually listened to, and how closely they listened to the song. These effects are consistent with past work on how openness to experience correlates with musical preferences and engagement (e.g., [Beaty et al., 2013](#); Nusbaum & Silvia, 2011b). Second, as one would expect, personality didn't appreciably predict how loud or complex people found the song. And third, extraversion again had small, near-zero effects for the family of awe experiences.

Awe Across Domains

How general was the experience of awe across domains? Our final model explored the correlation between the average "profound experience" scores for the space images and the song. The correlation between awe in response to the space images and in response to the song was medium in size, $r = .35$ [.16, .54], $p < .001$, so there was some cross-domain generality in people's tendency to experience awe. If openness to experience at least partly explains the correlation of awe across domains, then including openness as a predictor should shrink the relationship. As Figure 1 shows, the residual correlation between awe for the images and the song declined to $r = .22$ [.01, .42], $p = .039$, which remained significant. This value is smaller than before but not trivially small, falling between small and medium in effect-size terms, so openness to experience explains some but not all of why awe covaries across different domains.¹

Discussion

The present research examined openness to experience as a propensity to experience a

family of profound aesthetic emotions, such as awe, wonder, fascination, being moved, and feeling touched. To avoid retrospective reports of how often or intensely people experience such states, we created situations in the lab that could potentially spark feelings of awe. Overall, our expectations were supported. Openness to experience significantly predicted awe-like experiences of both the images of the sky and space and of the song. It's interesting that the effect size was appreciably larger for the space images ($r = .48$ [.32, .62]) than for the song ($r = .35$ [.17, .51]). One reason might be methodological: people rated 14 images but only one song, so the image data ought to be more reliable. Another could be that people have much more variability in their musical preferences. Even though people high in openness to experience tend to like reflective and unconventional music (Nusbaum & Silvia, 201b), this category includes many distinct genres, from highbrow genres (e.g., classical, opera, and jazz) to obscure indie and electronic genres (Rentfrow & Gosling, 2003). In any case, both of the relationships are statistically significant and large enough to be meaningful when seeking to understand why people vary in the experience of awe.

For both nature images and music, openness to experience emerged as the only important predictor of awe. It significantly predicted most of the individual items that captured the family of awe-like states, and of course it predicted a composite of the items. The effects of other traits, primarily extraversion, were explored as well. Extraversion strongly predicts feeling joyful, enthusiastic, and energetic (Watson, 2000), all states that resemble the intense and occasionally euphoric character of awe (Bonner & Friedman, 2011; Braud, 2001). Nevertheless, extraversion had essentially no relationships with the aesthetic experience of the images or music. The discrimination between openness to experience and extraversion supports models of awe that emphasize awe as a distinct emotion from happiness and joy (Keltner & Haidt, 2003) and that

emphasize its similarity to other knowledge emotions, such as interest, surprise, and confusion ([Silvia, 2010](#)).

As expected, the experience of awe covaried across the domains. People who reported more intense awe from the images reported more intense awe from the song, so there was some consistency across the contexts. We had suspected that openness to experience was the “third variable” that explained the correlation of awe from nature and from music. Including openness to experience as a predictor reduced the correlation between awe from images and music substantially—but not entirely—so openness to experience is an important (but not the only) reason why people who experience awe in one context are likely to experience it in another.

The psychology of art and aesthetics has long seen openness to experience as a central trait. Openness affects aesthetic experience through many pathways: people high in openness have more knowledge about the arts, value art more, are more easily interested in unusual things, and appraise art in ways that bring about rich experiences (e.g., [Silvia, 2007](#); Swami & Furnham, 2014). The present research suggests a broader role for openness to experience in aesthetics. Beyond the knowledge and values that they bring to art, people high in openness to experience bring a propensity to experience emotions that are rarely experienced by people low in openness ([Terracciano et al., 2003](#)). If we view traits as “thresholds” for behaviors and experiences (Feist, 2006), then we can view openness to experience as, in part, a lower threshold for experiencing states like awe and wonder. For example, a small cluster of people report never having experienced chills from music ([Sloboda, 1991](#)), and this group is substantially lower in openness to experience (Nusbaum & Silvia, 2011b). Openness to experience thus shifts the kinds of emotional experiences that people typically have in response to the arts, not just the amounts.

What other traits, however, might be important? One direction would be to look at traits

below global openness to experience. The O/I model ([DeYoung et al., 2012](#)), for example, proposes that Openness and Intellect are the primary facets below openness to experience. One would expect, from past work, that Openness (the facet associated with creativity and aesthetic interests; [Nusbaum & Silvia, 2011a](#)) would be more important for the experience of states like awe. Another direction would be to explore traits associated with attention, such as proneness to absorption ([Tellegen & Atkinson, 1974](#)) and dissociative states ([Bernstein & Putnam, 1986](#)). Finally, it would be worth studying if acquired expertise in a domain makes it easier or harder to experience states like awe. On the one hand, experts have a wealth of knowledge that allows them to find meaning and distinctions in events that seem obscure to novices; on the other hand, experts can easily become inured and acclimated to things that would strike novices as impressive.

A major task for future research is clarify how awe relates to similar states. Emotion research typically views emotions as members of distinct families that share a theme or as members of fuzzy categories that vary in their typicality of the category (see [Ekman, 1992](#); [Shaver, Schwartz, Kirson, & O'Connor, 1987](#)). Emotions within a family share a set of core features but vary in other ways, such as in intensity, context, or secondary appraisals. Developing models of awe's family tree would lend insight into its features. A few families have been proposed. [Ortony, Clore, and Collins \(1988\)](#) suggested a family of *appreciation emotions* involving esteem, respect, and awe. Others have placed awe in a family of knowledge emotions—along with interest, surprise, and confusion—that share the core feature of involving appraisals of one's own knowledge, such as whether something violates one's mental model of the world and whether one has the ability to understand what is happening ([Keltner & Shiota, 2003](#); [Silvia, 2009, 2010](#)). Another possibility is a family of elevated interpersonal emotions ([Algoe & Haidt, 2009](#)), such as gratitude, elevation, and inspiration ([Thrash & Elliot, 2003](#)). None of these families, however,

address states like feeling touched (Silvia & Nusbaum, 2011), being moved ([Kuehnast et al., 2014](#)), beauty ([Armstrong & Detweiler-Bedell, 2008](#)), and the sublime (Scruton, 2009), although they could probably be viewed as members of a family of knowledge emotions.

One tradition of emotion research has examined people's emotion categories as a way of clarifying how different emotions relate ([Shaver et al., 1987](#)). People's concepts of emotions should reasonably reflect their experience of them, so studies of the conceptual structure of emotion can lend some insight into the structure. Several recent studies are good examples of this approach. [Kuehnast et al. \(2014\)](#) examined the conceptual structure of "being moved." Being moved was associated with aesthetic contexts and major interpersonal events (e.g., births, deaths, weddings), and it was associated with both positive (e.g., joy) and negative emotions (e.g., sadness), which suggests that it is not simply either. In a related series of studies, Menninghaus et al. (in press) suggested that being moved had both joyous and sad variants, and that people typically experienced it as an intense state. In short, it seems productive to view awe as part of a family of intense, elevated states—perhaps a category with being moved as the prototypical experience—with awe being distinguished from some of its siblings by its associations with nature and the arts, and with its tendency to motivate people to become immersed and absorbed ([Bonner & Friedman, 2011](#)). Additional linguistic and conceptual research would help clarify the internal structure of this family.

Finally, the present research suggests a larger role for states like awe in models of aesthetics. Religious studies, cultural anthropology, and philosophy have long discussed concepts related to profound, self-altering experience, such as epiphany, ecstasy, and rapture (e.g., Eliade, 1964; [Goodman, 1988](#)). Such experiences have occupied a smaller place in psychological theories of aesthetics, although interest in them is clearly increasing (e.g., [Gabrielsson, 2011](#); Kuehnast et

al., 2014; J. K. Smith, 2014; L. F. Smith, 2014). Qualitative and narrative methods typically describe awe in its most intense forms, such as people's reports of profound, memorable, and life-altering experiences (e.g., [Schneider, 2009](#)). Focusing on highly intense awe has probably discouraged laboratory research by making awe seem too rare and eccentric to be captured in the lab. The present research, like other recent studies ([Hanich, Wagner, Shah, Jacobsen, & Menninghaus, 2014](#); [Rudd et al., 2012](#); [Schurtz et al., 2012](#); [Shiota, Keltner, & Mossman, 2007](#)), suggests that states like awe can be productively manipulated in controlled environments, but only at lower intensities. Studying weaker experiences makes awe more amenable to lab methods, but it's important that researchers use the rich scholarship on awe from other methods and traditions to place the findings from low-intensity and small-scale lab research in context ([Silvia, 2012](#)).

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Footnote

1. As an aside, the Awe subscale of the DPES, as one would expect, did correlate with self-reported profound experience for both the space images ($r = .45$ [.09, .54], $p < .001$) and the song ($r = .21$ [.01, .41], $p = .041$). Likewise, the UAE scale, which was completed with reference to how often people experience the states while listening to music, did correlate with self-reported profound experience to music ($r = .20$ [-.01, .41], $p = .058$); among the subscales, the effect was largest for the absorption facet ($r = .29$ [.10, .48], $p = .003$) instead of the chills ($r = .12$ [-.08, .32], $p = .234$) and touched facets ($r = .12$ [-.08, .32], $p = .247$). As in past research (Nusbaum & Silvia, 2011; Shiota et al., 2006; Silvia & Nusbaum, 2011), openness to experience correlated substantially with the DPES Awe subscale ($r = .53$ [.41, .65], $p < .001$), with the overall UAE scale ($r = .43$ [.26, .60], $p < .001$), and with the UAE absorption ($r = .39$ [.22, .55], $p < .001$), chills ($r = .36$ [.18, .54], $p < .001$), and touched subscales ($r = .35$ [.16, .53], $p < .001$). Although not surprising, these findings do offer support for the validity of these fairly new scales.

Table 1

Emotional Experience of Space Images: Within-Person (Above Diagonal) and Between-Person (Below Diagonal) Correlations
Between Ratings

Rating	1	2	3	4	5	6	7	8	9	10	11
1. Amazing	1	.76	.77	.76	.59	.61	.55	.31	-.59	-.02	.15
2. Awe-Inspiring	.81	1	.67	.65	.58	.71	.65	.37	-.48	-.05	.20
3. Beautiful	.87	.73	1	.65	.49	.57	.45	.22	-.57	-.08	.04
4. Interesting	.84	.69	.75	1	.54	.54	.50	.30	-.63	.07	.16
5. Intense	.58	.65	.43	.46	1	.61	.69	.38	-.41	.14	.37
6. Moving	.68	.82	.61	.54	.70	1	.68	.41	-.40	.04	.25
7. Profound	.59	.75	.48	.48	.75	.79	1	.41	-.34	.09	.30
8. Chills/ Goosebumps	.27	.38	.18	.24	.34	.46	.42	1	-.20	.11	.37
9. Boring	-.63	-.49	-.64	-.64	-.23	-.36	-.22	-.09	1	.05	-.03
10. Confusing	.14	.07	.05	.21	.27	.21	.20	.21	.14	1	.29
11. Frightening	.16	.33	.08	.16	.46	.41	.40	.50	.14	.52	1

Note. $n = 103$. Each item was asked 14 times, once per image. Within-person correlations are above the diagonal; between-person correlations are below the diagonal. Descriptive statistics for the individual space images are posted as supplementary findings on Open Science Framework: <http://osf.io/rykje/>.

Table 2

Emotional Experience of Space Images: Descriptive Statistics and Correlations with Personality

Rating	<i>M</i>	<i>SD</i>	Min, Max	Openness to Experience	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Average Profound Experience	4.21	.86	1.53, 6.37	.48*	.10	-.02	.19*	.20*
Amazing	4.79	1.10	1.36, 7.00	.45*	.07	.00	.23*	.18
Awe-Inspiring	4.03	1.16	1.14, 7.00	.45*	.08	-.09	.22	.14
Beautiful	5.06	1.01	1.57, 7.00	.41*	.05	.03	.20*	.19*
Interesting	5.21	1.06	1.93, 7.00	.41*	-.03	.00	.17	.13
Intense	4.03	1.25	1.00, 7.00	.36*	.01	.02	.18	.18
Moving	3.56	1.19	1.00, 6.93	.35*	.09	.00	.10	.18
Profound	3.58	1.27	1.00, 7.00	.34*	.16	-.06	.13	.10
Chills/Goosebumps	2.09	1.03	1.00, 5.36	.19*	.20*	.09	-.01	.13
Boring	2.47	.83	1.00, 5.36	-.41*	-.02	.09	-.13	-.20*
Confusing	2.52	1.00	1.00, 5.29	.01	-.19	.00	-.12	.27*
Frightening	2.08	1.05	1.00, 5.64	.05	-.09	-.02	.00	.11

Note. * $p \leq .05$. $n = 103$. The coefficients are between-person correlations between personality scores and ratings averaged across the 14 pictures.

“Average profound experience” is the average of 9 items: amazing, awe-inspiring, beautiful, interesting, intense, moving, profound, chills, and boring (reverse-scored).

Table 3

Personality's Correlations with Responses and Ratings for the Song "Hoppípolla"

Rating	<i>M</i>	<i>SD</i>	Min, Max	Openness to Experience	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Average Profound Experience	4.24	1.52	1, 7	.35*	.17	.10	.16	.07
Moving	4.39	1.75	1, 7	.19	.18	.10	.09	.04
Interesting	5.00	1.72	1, 7	.31*	.22*	.09	.20	.01
Intense	4.25	1.72	1, 7	.25*	.05	.08	.14	-.04
Chills/Goosebumps	3.31	2.19	1, 7	.38*	.12	.06	.11	.19*
Enjoyable	4.78	1.91	1, 7	.24*	.17	.08	.16	.02
Relaxing	4.78	1.70	1, 7	.10	.01	.13	.14	.10
Familiar	1.68	1.44	1, 7	.20*	-.04	-.02	.09	.06
Complex	4.68	1.69	1, 7	.17	.18	.17	.09	-.14
Loud	4.42	1.31	1, 7	.16*	.11	.10	-.01	.00
Similar to Usual Music	2.89	1.89	1, 7	.40*	.00	-.01	.29*	-.10
Listened Closely	5.44	1.35	2, 7	.30*	.11	.09	.14	.07

Note. * $p \leq .05$. $n = 103$. The coefficients are between-person correlations between personality scores and ratings of the song.

"Average profound experience" is the average of moving, interesting, intense, and chills.

Figure 1. Standardized effects and 95% confidence intervals for the effect of openness on emotional responses to space pictures and music.

