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## COVER STORY

# All About Awe

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On an exceptionally clear night, you look up and see thousands, maybe millions, of pinprick stars. The sky seems expansive, and yet the part we see represents an infinitesimally small portion of the existing universe. Pondering this, you are overcome by an ineffable, overwhelming feeling of wonder edged with fear. This view is awesome.

We've come to use the word "awesome" to express approval or appreciation for all sorts of things, but as APS Fellow Steven Pinker noted in a recent interview with *The Atlantic*, the overuse of the term has softened its meaning. The truly awesome encounters in life don't reside in the everyday but rather in the experiences we have that are somehow magnificent and powerful. As

cutting-edge research in psychological science is beginning to show, only special kinds of objects, environments, and people elicit feelings of awe. And research suggests that awe, though mysterious, is an emotion we shouldn't take for granted, as it may have surprisingly meaningful consequences for everyday behavior and even overall well-being.

### **Mapping Form and Function**

As a concept, awe has been around for centuries, surfacing in discussions of religion and philosophy among such eminent thinkers as Edmund Burke, Immanuel Kant, and Ralph Waldo Emerson. But as APS Fellows Dacher Keltner (University of California, Berkeley) and Jonathan Haidt (New York University) observed in a seminal 2003 paper, the psychological dimensions of awe haven't received the kind of scrutiny given to other emotions.

"The field of emotion research is almost silent with respect to awe. Few emotion theorists consider awe in their taxonomies, and those who do have done little to differentiate from other states," explained Keltner and Haidt (2003, p. 297).

In mapping out the structure and function of the emotion, Keltner and Haidt proposed two essential aspects shared by experiences of awe: vastness and need for accommodation.



Thus, an awe-inducing stimulus — whether a stunning landscape, an intense religious experience, or a cloud-skimming skyscraper — gives us a sense of vastness, seeming much larger than us and the things we are used to, whether physically or metaphorically.

And, partly as a result of this vastness, awe-inducing stimuli induce a need for accommodation, a term borrowed from developmental psychological scientist Jean Piaget. By challenging our concept of ourselves and the world around us, awe-inducing stimuli force us to adjust our cognitive schema to accommodate them. No wonder, then, that we often describe these stimuli as “mind-blowing” or “earth-shattering.” They simply don't conform to our existing way of thinking about the universe.

The specific combination of these two core features, argued Keltner and Haidt, is what distinguishes awe from other positive emotions. And accumulating evidence suggests that we express this unique emotion in ways that signal specific adaptive functions.

Findings from a 2013 study coauthored by APS Fellow Michelle “Lani” Shiota (Arizona State University), Keltner, and Belinda Campos showed that, in marked contrast to other positive emotions, awe isn't signaled by smiling but rather by raised eyebrows, widened eyes, a dropped jaw, and visible inhalation. These jaw-dropping, breath-taking displays of awe could help to

enhance visual perception and moderate physiological arousal, thereby facilitating the complex cognitive processing induced by an awe-inspiring stimulus.

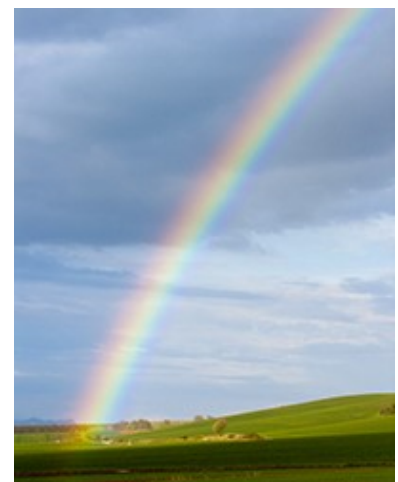
But why do we experience awe at all? Keltner and Haidt hypothesized that, from an evolutionary perspective, awe may reflect the fundamental emotional response that low-rank group members have in the presence of a powerful group leader. Such a deferential, submissive response has clear advantages in terms of ensuring one's place in a group and maintaining social hierarchies that can boost long-term chances of survival. Over time, this emotional response to powerful beings generalized to other powerful and vast stimuli, including the man-made, the natural, and the supernatural.

### **From the Sublime to the Subliminal**

The evolutionary roots of awe may seem pretty basic, but they have intriguing implications for higher-order cognition, as researchers are beginning to find.

For example, Shiota, along with psychological scientists Vidas Griskevicius and Samantha Neufeld (2010), hypothesized that awe may alter how we evaluate the persuasiveness of an argument. If awe facilitates complex cognitive processing, as Keltner and Haidt's functional account suggests, it should dampen our reliance on cognitive shortcuts when making judgments, just as negative affective states tend to do.

To test this, the researchers induced student participants to feel one of six positive emotions by having them write about a real-life experience — such as when they had looked forward to an upcoming event (anticipatory enthusiasm), had felt taken care of (attachment love), or had experienced a sweeping panoramic view for the first time (awe) — providing as much vivid detail as possible. The students were then asked to help with another task, evaluating a proposal for instituting a comprehensive exam as a requirement for graduation. The proposal always contained the same number of arguments, but some students read vague arguments that were designed to be weak, and others read detailed arguments designed to be strong. Although participants in most of the positive emotion states were easily persuaded to endorse the proposal regardless of argument quality, the awe-inspired participants found the strong arguments to be far more persuasive than the weak arguments.



These findings suggest that participants feeling awe processed the arguments more deeply than participants feeling the other positive emotions, analyzing the specific content rather than relying on the overall number of points as a heuristic to determine whether the arguments were sound.

And research published in *Psychological Science* suggests that the link between awe and high-level

cognitive processing may be seen in other domains, including how we perceive time. Researchers Melanie Rudd (University of Houston Bauer College of Business), Jennifer Aaker (Stanford Graduate School of Business), and APS Fellow Kathleen Vohs (University of Minnesota Carlson School of Management) hypothesized in 2012 that if feeling awe enables us to process rich information from our environment, it should focus our attention on what is happening in the present moment, thereby expanding our sense of time.

The researchers had undergraduate students participate in a series of supposedly unrelated tasks, which included watching a minute-long commercial for an LCD TV. The results showed that those students who watched a commercial featuring awe-eliciting content, with images of people encountering vast and mentally overwhelming subjects such as waterfalls and astronauts in space, reported feeling that they had more time at their disposal than the students who watched a commercial that featured people encountering a jubilant, colorful parade.

So, awe may focus our attention on the here and now, but research indicates that it also prompts us to think in more self-transcendent ways, shifting our focus from inward concern to an outward sense of universality and connectedness.

For example, Shiota and colleagues (2007) found that students who thought about how they felt when they encountered a “really beautiful” natural scene much more strongly endorsed feeling “small or insignificant” and “connected with the world around me” than those who wrote about a time when they felt another positive emotion. And students who were actually exposed to an awe-inducing stimulus — an enormous life-size replica of a *Tyrannosaurus rex* skeleton — were more likely to describe themselves as belonging to some sort of universal group than students who were exposed to a neutral environment.



Given that awe draws our focus to things beyond the self and makes us feel more connected on a universal scale, it's perhaps not surprising that research also has revealed a unique association between feeling awe and religiosity or spirituality. A 2008 study led by psychological scientist Vassilis Saroglou of the Université catholique de Louvain in Belgium showed that university students who were induced to feel awe-related emotions — for example, by watching a video featuring

panoramic natural landscapes — reported higher levels of religiosity compared with students who watched an emotionally neutral video about the steps for making beer. And a second study showed that students who watched the awe-inducing video reported higher levels of more general spirituality in comparison with students who were induced to feel amusement by watching a humorous video of comedy sketches.



Additional research by Saroglou and Patty Van Cappellen, now at the University of North Carolina at Chapel Hill, suggests that awe may facilitate the feelings of connectedness that often accompany religiosity and/or spirituality.

But other findings suggest that awe also may be linked to religiosity and spirituality through another form of appraisal: uncertainty. As Keltner and Haidt originally noted, the feelings of vastness and need for accommodation that come with awe aren't necessarily positive; to the extent that experiences of awe take us away from what we know and are familiar with, they can be especially discomfiting.

Psychology researchers Piercarlo Valdesolo (Claremont McKenna College) and Jesse Graham (University of Southern California) wondered whether people might resolve this feeling of uncertainty by invoking intentional or purposeful agents. Their findings, published in *Psychological Science* in 2014, showed that students who watched a video of awe-inducing nature scenes reported stronger belief in supernatural control and stronger belief in God than did those who watched either a comedic or emotionally neutral video. A second experiment revealed that this relationship was mediated by participants' intolerance for uncertainty.

Interestingly, the urge to resolve uncertainty as a result of awe may lead us to detect agentic forces in nonspiritual domains as well. The researchers found that students who watched an awe-inducing video were more likely to believe random-digit strings were created by a human (and not a computer) than were students who watched either a neutral or amusing video.

According to Valdesolo and Graham, these findings suggest that “in the moment of awe, some of the fear and trembling can be mitigated by perceiving an author's hand in the experience” (p. 177).

### **Helpful, Happy, and Healthy?**

As evidence piles up for a complex relationship between awe and cognitive processing, investigators are discovering that this emotion–cognition interaction could have profound consequences for how we respond to others and the environment around us.



Keltner illustrated this point in his talk as the Psi Chi Distinguished Speaker at the 2014 APS Annual Convention in San Francisco, highlighting findings from an experiment led by former postdoctoral fellow Paul Piff, now an assistant professor at the University of California, Irvine. An experimenter took undergraduate students to a specific spot on campus from which they were directed to look up toward either a huge stand of eucalyptus trees or a building. As expected,

the students looking at the massive trees reported feeling more awe. But the study didn't end there — the experimenter then passed by the students, tripping and dropping a bunch of pens in the process.

Little did the students know that their responses to the clumsy researcher were carefully observed, revealing that the awe-inspired students helped the experimenter pick up a greater number of pens than did the students who had looked at the building.

According to Keltner, these and other findings from his lab suggest that “awe is a very powerful trigger of prosocial behavior.”

In support of the prosocial effects of awe, Rudd, Vohs, and Aaker found that awe-inspired participants in their study reported feeling less impatient and more willing to volunteer their time to a charity than did participants who were induced to feel happy.

By making us less focused on the self and more in tune with the present moment, awe may ultimately boost our own individual well-being.

Drawing on the “broaden and build” theory of positive emotions proposed by Past APS Board Member Barbara Fredrickson, Van Cappellen and Saroglou argue that the link between awe and spirituality may, at least in part, be explained by an “upward spiral” of positive emotion that ultimately boosts well-being.

Indeed, in two studies, Van Cappellen and colleagues (2014) found that self-transcendent positive emotions, including awe, mediated the observed association between religiosity/spirituality and well-being.

And Rudd, Vohs, and Aaker found that students who read an awe-related story reported greater momentary life satisfaction. By focusing our attention on the present, Rudd and colleagues argue, awe may “amplify the savoring of pleasurable moments” (Rudd, Vohs, & Aaker, 2012, p. 1135).



Emerging research suggests that the beneficial consequences of awe may even extend to our physical health. In his talk, Keltner highlighted in-press research led by his former graduate student Jennifer Stellar, now a postdoctoral student at the University of Toronto in Canada, examining the relationship between positive emotions and levels of proinflammatory cytokines. These cytokines are cell-signaling proteins that help us to fight infection or injury. Over the long term, however, they may contribute to negative health outcomes such as cardiovascular disease and even depression.

Stellar and colleagues collected oral fluid samples from university student participants, which were analyzed for levels of a particular cytokine known as interleukin-6 (IL-6). The students also answered survey questions measuring the extent to which they experienced various positive emotions in daily life. The researchers found that dispositional awe was the strongest predictor of lower IL-6 levels. Not only that, but students who reported feeling high levels of awe that particular day also tended to have lower IL-6 levels. The research, while preliminary, suggests a pathway through which experiences of awe may influence physical health.

### **Unraveling the Mystery**

Taken together, these findings are certainly tantalizing. As Keltner and Haidt observed, awe-inspiring experiences “may be one of the fastest and most powerful methods of personal change and growth” (2003, p. 12), given that our personality traits and values tend to be difficult to change.

But there’s much about the downstream consequences of awe that remains unknown.

For example, can one awe-inspiring experience have far-reaching effects? Anecdotally, many people have described their experiences of awe as fundamentally life-changing, but only science will be able to shed light on the mechanisms by which this might happen.

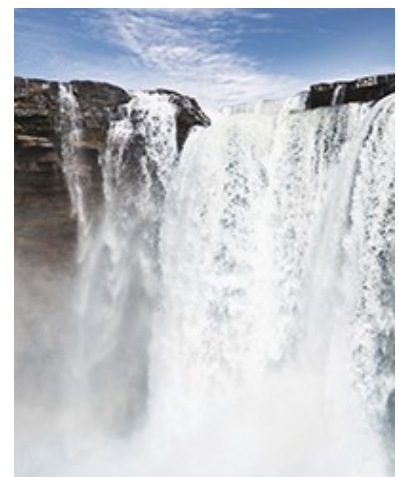
And is it possible to feel awe-inspired a lot of the time, or is it a feeling we quickly habituate to? Empirical evidence suggests that there are differences in the degree to and frequency with which people experience awe. Indeed, Shiota’s research indicates that some people are more dispositionally awe-prone than others.

These findings suggest that some people are naturally more likely to reap the benefits of awe than others. So perhaps the million-dollar question is this: Can we design interventions that harness and promote the prosocial and health-related consequences of awe?

Researchers are already trying to find out. Keltner pointed to the work of current graduate student Craig Anderson, who is leading an ongoing study looking at outdoor immersion and experiences in nature as possible modes of intervention.

It’s possible that exposing people to awe-inducing stimuli could offer a relatively low-cost, accessible tool for boosting well-being, on both individual and community levels.

And perhaps these benefits will even extend to awe researchers themselves.



“The potential power of awe, combined with the mystery of its mechanisms, may itself be a source of awe,” write Keltner and Haidt, “giving pleasure both to those who study it and to those who cultivate it in their lives” (2003, p. 12).

*Michelle “Lani” Shiota will participate in the symposium “Biological and Emotional Mechanisms of Close Relationships Across the Lifespan” at the 2015 APS Annual Convention in New York, May 21–24.*

*Steven Pinker will give the APS–David Myers Distinguished Lecture on the Science and Craft of Teaching Psychology and will be interviewed for the APS video series “Inside the Psychologist’s Studio,” both at the 2015 APS Annual Convention. This collection of interviews is free online at [www.psychologicalscience.org/itps](http://www.psychologicalscience.org/itps).*

*Belinda Campos will participate in the cross-cutting theme program “‘Give Me Your Tired, Your Poor’: Psychological Science and Immigration” at the 2015 APS Annual Convention.*

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