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# Awesome awe: The emotion that gives us superpowers

Awe is so powerful it alters your sense of self, connects you with humanity and boosts your mind and body. And there's a surprising way to get more of it

Stephen Alvarez/National Geographic Creative

By **Jo Marchant**

HAVE you ever been stopped in your tracks by a stunning view, or gobsmacked by the vastness of the night sky? Have you been transported by soaring music, a grand scientific theory or a charismatic person? If so, you will understand US novelist John Steinbeck's response to California's giant redwood trees, which can soar more than a hundred metres towards the sky. "[They] leave a mark or create a vision that stays with you always," he wrote. "From them comes silence and awe."

Philosophers and writers have long been fascinated by our response to the sublime, but until a few years ago, scientists had barely studied it. Now they are fast realising that Steinbeck was right about its profound effects. Feeling awestruck can dissolve our very sense of self, bringing a host of

benefits from lowering stress and boosting creativity to making us nicer people.



Yet in the modern world, the value of the word awesome has plummeted – almost anything can now acquire the epithet. At the same time, we risk losing touch with the most potent sources of awe. The good news is that there are ways to inject more of it into our everyday lives. You needn't be religious. All you need is an open mind – although a willingness to try psychedelic drugs may help.

But what exactly is awe and where does it come from? "It's a subjective feeling rooted in the body," according to psychologist and pioneering awe researcher Dacher Keltner at the University of California, Berkeley. In 2003, he and Jonathan Haidt, now at New York University, published the first scientific definition. They described awe as the feeling we get when confronted with something vast, that transcends our frame of reference and that we struggle to understand. It's an emotion that combines amazement with an edge of fear. Wonder, by contrast, is more intellectual – a cognitive state in which you are trying to understand the mysterious.

You might think that investigating such a profound experience would be a challenge, but Keltner insists it's not so hard. "We can reliably produce awe," he says. "You can get people to go out to a beautiful scene in nature, or put them in a cathedral or in front of a dinosaur skeleton, and they're going to be pretty amazed." Then, all you need is a numerical scale on which people can report how much awe they are feeling. Increasingly, studies are including a physiological measure too, such as the appearance of goosebumps – awe is the emotion most likely to cause them, and second only to cold as a source.

In this way, Keltner and others have found that even mild awe can change our attitudes and behaviour. For example, people who watched a nature video that elicited awe – rather than other positive emotions such as happiness or pride – were subsequently more ethical, more generous and described themselves as feeling more connected to people in general. Gazing up at tall eucalyptus trees left others more likely to help someone who stumbled in front of them. And after standing in front of a *Tyrannosaurus rex* skeleton, people were more likely to describe themselves as part of a group. It might seem counterintuitive that an emotion we often experience alone increases our focus on others. But Keltner thinks it's because awe expands our attention to encompass a bigger picture, so reducing our sense of self.

"The desert is so huge, and the horizons so distant, that they make a person feel small," wrote Paulo Coelho in *The Alchemist*. He was right. In a large study, Keltner found that after inspiring

awe in people from the US and China, they signed their names smaller and drew themselves smaller, but with no drop in their sense of status or self-esteem. Similarly, neuroscientist Michiel van Elk at the University of Amsterdam, the Netherlands, found that people who watched awe-inducing videos estimated their bodies to be physically smaller than those who watched funny or neutral videos.

The cause of this effect might lie in the brain. At the annual meeting of the Organization for Human Brain Mapping in Vancouver, Canada, in June, van Elk presented functional MRI scans showing that awe quiets activity in the default mode network, which includes parts of the frontal lobes and cortex, and is thought to relate to the sense of self. "Awe produces a vanishing self," says Keltner. "The voice in your head, self-interest, self-consciousness, disappears. Here's an emotion that knocks out a really important part of our identity." As a result, he says, we feel more connected to bigger collectives and groups.

The notion of transcending the self has traditionally been associated with religious or mystical experiences. "Immenseness, infinitude, indescribability are some of the classical characteristics of mystical experiences that leave a person with a very powerful sense of awe," says neuroscientist Andrew Newberg at the University of Pennsylvania, who studies how religion affects the brain. For Keltner, this is one reason why awe was so little studied until recently. "People felt like awe is really about religion and psychologists were loathe to study religion," he says. But after interviewing thousands of people around the world about their experiences, he believes it's a mistake to see awe as inseparable from God. "Even in really religious countries, people are mainly feeling awe in response to other great people and nature," he says. "People have always felt awe about non-religious things. It's available to atheists in full force." Newberg, who is studying the awe felt by astronauts (see "Out of this world"), agrees. "You don't have to have any given belief system in order to have these experiences," he says.

**Nature is a more powerful source of awe than religion**
Christopher Kimmel/Aurora

Instead, Keltner believes that awe predates religion by millions of years. Evolution-related ideas are tough to back up, but he argues that responding to powerful forces in nature and in society through group bonding would have had survival value. Chimps show signs of awe, such as goosebumps, during thunderstorms, he notes. "I think the central idea of awe is to quiet self-interest for a moment and to fold us into the social collective."

It's an instinct that has been co-opted for political ends throughout history, for example in grandiose structures from the pyramids of Egypt to St Peter's Basilica in Vatican City, or even Trump Tower. "Awesome art and architecture have long been part of the apparatus by which people have been controlled, both socially and psychologically, and kept in their place," says Benjamin Smith, an expert in rock art at the University of Western Australia. "The finding that awe diminishes our sense of self fits perfectly with this history."

Despite these darker associations, there's mounting evidence that feeling awe also has personal benefits. First, focusing on the bigger picture rather than our own concerns seems a powerful way to improve health and quality of life. Keltner's team has found that feeling awe makes people happier and less stressed, even weeks later, and that it assists the immune system by cutting the production of cytokines, which promote inflammation. Meanwhile, a team from Arizona State University found that awe activates the parasympathetic nervous system, which works to calm the fight or flight response. Researchers at Stanford University, California, discovered that experiencing awe made people feel as if they had more time – and made them more willing to give up their time to help others.

Awe also seems to help us break habitual patterns of thinking. The Arizona team discovered that after experiencing awe, people were better able to remember the details of a short story. Usually, our memories are coloured by our expectations and assumptions, but awe reduces this tendency, improving our focus on what's actually happening. Researchers have also reported increases in curiosity and creativity. In one study, after viewing images of Earth, volunteers came up with more original examples in tests, found greater interest in abstract paintings and persisted longer on difficult puzzles, compared with controls.

In the modern world, though, we're more likely to be gazing at our smartphones than at giant redwoods or a starry sky. And Keltner is concerned about the impact of our increasing disconnection from nature, one of the most potent sources of awe. "I'm struck by how awe makes us humble and charitable," he says. "Is that why we have so much incivility and hatred right now in the US? I think we should be asking these questions."

## "Feeling awe makes people happier and less stressed, even weeks later"

Keltner warns of a lack of opportunities for awe in poor communities as well as education, with its focus on test results rather than exploration. "We are taking that away from our kids and that is a very serious problem."

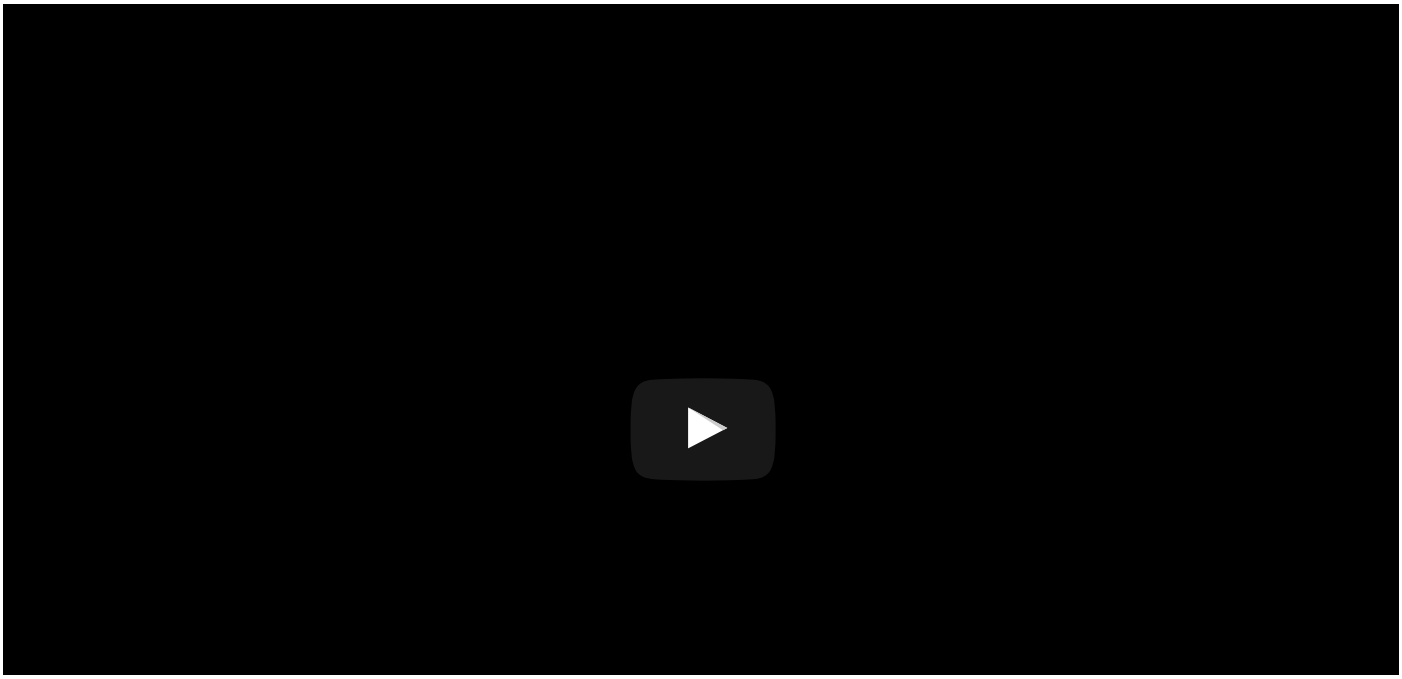
Kenneth Tupper, a philosopher of education at the University of British Columbia, Canada, agrees. "The institution of modern schooling is very well designed to not evoke experiences of wonder and awe," he says. This can leave teenagers feeling "jaded and disenchanted", without a sense of

connection to anything larger than themselves. To counter such alienation, he suggests, self-obsessed Western societies might consider an unconventional way to rekindle awe, taking a lesson from traditional societies. Many of these use plant and fungus-based psychedelic drugs such as ayahuasca, peyote and psilocybin mushrooms to expand the mind and forge a connection to something bigger than the self, he notes. "These kinds of experiences are extremely highly valued." Tupper thinks we could all benefit from similar rituals.

That's not as crazy as it might sound, according to Robin Carhart-Harris at Imperial College London. Through brain scanning, he and others have found that psychedelic drugs such as psilocybin and LSD reduce activity in the default mode network – just as awe does. In addition, boundaries between normally segregated bits of the brain temporarily break down, boosting creativity. Study participants who take psychedelics often describe being struck by vastness, and report an altered sense of self – to the point where it may disappear completely. "My feeling is that it's the same thing," says Carhart-Harris. "Psychedelics are hijacking a natural system and fast-tracking people to these experiences of awe."

There's growing interest in using psychedelics to treat anxiety and depression, but Carhart-Harris argues that if taken in a safe and controlled environment, a dose of psychedelic awe could benefit healthy people too. "You can be more well," he says. "You can just feel calm and content and integrated and connected." This idea gains support from trials of more than 100 healthy volunteers. Roland Griffiths and his colleagues at Johns Hopkins University in Baltimore, Maryland, found that those who took a single dose of psilocybin rather than a placebo reported feeling happier and more altruistic afterwards. They still had higher well-being and life satisfaction more than a year later.

Keltner says this is important work. "Psilocybin should not be stigmatised," he says. It's a potent source of awe, but there are plenty of other ways you can increase your awe quotient, he adds. First, you should raise your expectations. Put aside the myth that awe is rare, says Keltner. His surveys reveal that people feel low-level awe on average a couple of times a week. Then, think about what you find awe-inspiring. Everyone is different, but whatever does it for you, try to make it part of your everyday experience: when you're choosing which route to walk to work, which book to read or what movie to see. "Don't think it takes big bang conversions to get five minutes of awe," he says. "Find your sources and go get it."



## Out of this world

When NASA astronaut Chris Hadfield stepped out of the International Space Station for his first spacewalk, it was the culmination of decades of preparation. Yet he was totally unprepared for "the raw, omnipresent beauty" of our home planet. "It was stupefying," he told an audience in London in 2014. "It stops your thought."

Hadfield isn't the only one to have his mind blown by a trip into space. In fact, the phenomenon is so common it has a name: the overview effect. It's a powerful example of awe, according to neuroscientist Andrew Newberg at the University of Pennsylvania. Having collected astronauts' accounts of the effect, he now hopes to work with commercial space flight companies to study what such experiences do to travellers' brains. "We've drawn up ideas," he says. One possibility would be to scan people's brains before and after space flight to see what changes occur. Another would be to figure out a way to scan them while in space.

Meanwhile, researchers at the University of Central Florida's Institute for Simulation and Training have been bringing the overview effect down to Earth. They took more than 100 people on a virtual trip to space, and found that they reported similar impacts to real astronauts, including tranquillity, elation, increased altruism and feeling small. Viewing Earth triggered stronger awe than views of deep space. And the less religious they were, the more awe they felt.

There's a growing realisation that awe has all sorts of benefits for individuals and society. Whether through space tourism or virtual reality, Newberg hopes that having more people experience the awesomeness of space might lead to greater compassion and a more collaborative society on Earth. As Hadfield put it: "We're all crew on the same spaceship. As soon as we can start to see ourselves that way, we will advance tremendously."

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