Solar Eclipse Task Force

PRESS RELEASE

12 June 2024
For immediate release

Brain Waves and Sound Waves Offer New Insights into the Solar Eclipse Experience

As tens of millions of North Americans saw on April 8th, there is no more beautiful sight in the heavens than the Sun being totally eclipsed by the Moon. Even an annular eclipse like the one that occurred last October 14th, when the Moon blocked all but the Sun's outer rim to create a dazzling "ring of fire" in the sky, is spectacular enough to attract enthusiasts from around the world. Astronomers often use the word "awesome" to describe such events. But do people genuinely experience awe in response to these cosmic cover-ups? And do you have to actually *see* a solar eclipse to be moved by it? Answers to these provocative questions were shared at a press conference today at the American Astronomical Society (AAS) meeting in Madison, Wisconsin.

Measuring Awe

Dr. Kate Russo (Being in the Shadow, Queensland, Australia) is a professional psychologist and enthusiastic eclipse chaser. Combining her vocation and avocation, she's been studying the human response to solar eclipses for more than a decade. Dr. Andrew Bailey, Professor of Health & Human Performance at the University of Tennessee in Chattanooga, leads UTC's Brainwave Project, which has shown through electroencephalographic (EEG) research that exposure to nature can mitigate anxiety and have a restorative effect on people. Joining forces in Project AWE, they set out to explore the feasibility of using EEGs to objectively capture people's physical and emotional reactions to solar eclipses. Russo presented results from a pilot study conducted in Uvalde, Texas, during the October 2023 annular solar eclipse.

Under partly cloudy skies, Russo and five volunteers donned headsets equipped with sensors to record electrical activity in parts of the brain known to exhibit spikes or dips in response to stimuli that subjects report as highly engaging, sensory arousing, and strongly positive — all considered to be indicative of feelings of awe.

"Even a cloudy annular eclipse had us completely enthralled," Russo says, "with pattern shifts in brain wave activity occurring during key moments. Our electroencephalograms objectively captured our frustration and joy as the eclipse progressed, including a period of awe as the clouds parted just before annularity to reveal the 'ring of fire' for several minutes. Our work confirms the feasibility of using technology to capture 'the ineffable' — things that are difficult to put into words."

"Project AWE is the first study to use biometric technology to capture the complex emotion of awe during a solar eclipse," she continues. "This valuable groundwork paves

the way for future investigations into measuring our embodied reactions to other immersive astronomical phenomena, such as total solar eclipses, meteor showers, and the aurora."

"Capturing neurophysiological states in the field is very novel and important," adds Bailey. "New technologies and research methods can help us understand the positive impact of awe-inspiring experiences in nature on human perspectives."

Listening to Eclipses

Solar eclipses are visually stunning events, but for the blind and low-vision community, they can feel inaccessible. LightSound, developed at the Center for Astrophysics | Harvard & Smithsonian by Allyson Bieryla, Sóley Hyman, and others, is a sonification device that converts light to sound using a light sensor and MIDI board. During a solar eclipse, when connected to headphones or a speaker, LightSound — which isn't much bigger than a cell phone — emits sounds of lower pitch as the light fades and of higher pitch as the light returns.

"The project is completely open source," explains team member Dawn Davies (Hill Country Alliance, Austin, Texas), "with instructions to build and use LightSound available online in English, Spanish, and French. We ran workshops across the country where we taught volunteers to solder components and assemble the devices, and then we donated about 900 of them to libraries, schools, museums, and other organizations hosting eclipse events."

As Davies noted during the AAS press conference, the project didn't have enough LightSounds to supply all of the roughly 2,500 event organizers who requested them, so they partnered with the American Council for the Blind to host a live stream of sounds from the devices as the Moon's shadow made its way from Texas to Maine. Several thousand people tuned in.

Shortly after the April 8th solar eclipse, Shea Malhotra of French Lick, Indiana, sent the following message to the LightSound team: "Thank you all for giving my 13-year-old blind son a truly incredible experience of the total eclipse with LightSound box. It was unbelievable and magical for me, as a mom, to hear him exclaiming out loud in the same way as the rest of our sighted friends and family as he experienced the spectacular moments immediately before, during, and after totality. I also appreciated how simple and effective the device was to use and that it gave my son autonomy over his own experience. It was an incredibly meaningful experience for him and for us as his family. Thank you so much for providing this device and experience for our son!"

The LightSound Project gratefully acknowledges support from the American Astronomical Society, the International Astronomical Union, the National Science Foundation, and the Simons Foundation.

Contacts:

Rick Fienberg
Project Manager
AAS Solar Eclipse Task Force
+1 857-891-5649
rick.fienberg@aas.org

Kate Russo
Founder, Being in the Shadow
+61 467-173-859 (WhatsApp)
kate.russo@beingintheshadow.com

Andrew W. Bailey
Professor of Health & Human Performance
University of Tennessee, Chattanooga
+1 423-425-5129
andrew-bailey@utc.edu

Dawn Davies
Night Sky Program Manager
Hill Country Alliance
+1 512-663-2249
dawn@hillcountryalliance.org

Allyson Bieryla
Astronomer
Center for Astrophysics | Harvard & Smithsonian
+1 617-384-8419
abieryla@cfa.harvard.edu

Editor's Note:

Also speaking in the AAS press conference were Amir Caspi (Southwest Research Institute) and Angela Des Jardins (Montana State University), who presented results from Citizen CATE 2024 and the Nationwide Eclipse Ballooning Project, respectively. All four of the projects highlighted in the briefing, as well as five others, were featured in AAS special session 124, "First Look at Citizen Science from the 8 April 2024 Total Solar Eclipse" held on Monday, June 10th. Links to all nine presentation abstracts are available from the session webpage.