



Why yawns are contagious—in all kinds of animals

Evolutionary biologist Andrew Gallup explains why we yawn after others

24 MAY 2022 · 5:50 PM · BY TESS JOOSSE



Mammals like cats can "catch" a yawn from others. KACPER RZEPECKI/GETTY

The mere sight of another person yawning causes many of us to open our mouths wide in mimicry. And we're not alone—other social animals, such as chimpanzees and lions, can also catch so-called contagious yawns. It's likely that all vertebrates yawn spontaneously to regulate inner body processes.

Yawning probably arose with the evolution of jawed fishes 400 million or so years ago, says Andrew Gallup, an evolutionary biologist at State University of New York Polytechnic Institute who has spent years trying to figure out why we yawn. In a paper published this month in *Animal Behavior*, he reports **some evidence** for how contagious yawns might have evolved to keep us safe. *Science* chatted with Gallup about why yawning is ubiquitous—and useful. This interview has been edited for clarity and length.

Q: First, let's address a long-standing myth: Does yawning increase blood oxygen levels?

A: No. Despite continued belief, research has explicitly tested that hypothesis and the results have concluded that breathing and yawning are controlled by different mechanisms. For example, there are really interesting cases of yawning in marine mammals, where the yawning occurs while the animal is submerged underwater and therefore not breathing.



Andrew Gallup | LYNE BROWNE

Q: So what does yawning actually do to the body?

A: Yawning is a rather complex reflex. It's triggered under a variety of contexts and neurophysiological changes. It primarily occurs during periods of state change, commonly following transitions of sleeping and waking. There's research that also suggests that yawns are initiated alongside increases in cortical arousal, so yawns themselves may function to promote alertness. And there's a growing body of research that suggests that yawning is triggered by rises in brain temperature. I've conducted a number of studies testing this in humans, nonhuman mammals, and even birds.

Q: What have those studies shown?

A: These studies show that we can reliably manipulate yawn frequency by changing ambient temperature and the brain and body temperature of the individual. In rats, we've conducted studies showing that rises in brain temperature reliably trigger yawning, [and that yawning is] followed by decreases in brain temperature.

Q: Do all animals yawn the same way?

A: We've done a number of large-scale comparative studies, where we've recorded the yawn durations from over 100 mammalian and avian species. We find that even when controlling for body size, there are very strong positive relationships between how long an animal yawns and how large and complex their brain is.



Q: One of the most curious things about yawning is that it can be contagious. Do all animals yawn contagiously?

A: We've been talking about spontaneous yawns up to this point—those are internally, physiologically driven. Contagious yawns are elicited by seeing or hearing yawns in others, and [they] have only been documented in highly social species, humans included. There's a wide variability in that response among individuals. Some individuals are very susceptible to yawn contagion, while others are not.

Q: What accounts for that variability?

A: Some studies suggest that individual differences in empathy may be contributing to this response. If we see someone yawn, and that reflexively triggers the same response in us, that could be kind of a basic indicator of empathetic processing. However, other studies have failed to show that relationship. I'm of the view that the jury's still out.

Q: So why do we yawn when we see someone else yawning?

A: Contagious yawning may have evolved to synchronize group behavior—yawns often cluster during particular times of day that coincide with transitions and activity. It also may have evolved to increase vigilance within a group. The basic rationale is that if yawning is an indicator that one individual is experiencing diminished arousal, then seeing another person yawn might, in turn, increase the observer's vigilance to compensate for the low vigilance of the yawner. The spreading throughout the group of contagious yawns might then increase the vigilance of the entire group.

I conducted a study last year that tested this. We showed people arrays of images that included threatening stimuli—images of snakes—and nonthreatening stimuli—images of frogs—and timed how fast they could pick out those images after seeing videos of people yawning or moving their mouths in other ways. After seeing other people yawn, their ability to identify and detect snakes, the threatening stimuli, rapidly improved. However, following the observation of yawning, frog detection was unaffected.

Q: You read, write, and think about yawns all day. Are you yawning all the time as a result?

A: When I first started studying this subject, I was yawning excessively. I was reading the literature and writing notes and writing papers, and I found that I was just yawning all the time. But over time, I became kind of habituated to the effects. I still yawn contagiously during social interactions, but seeing the stimuli that I use in the lab no longer produces the effect.

doi: 10.1126/science.add1629

RELEVANT TAGS:

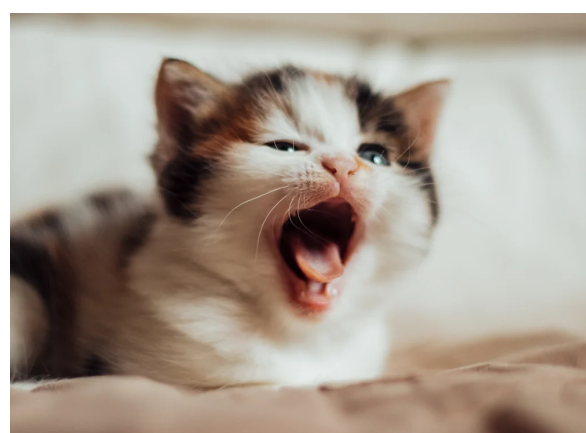
BRAIN & BEHAVIOR PLANTS & ANIMALS

ABOUT THE AUTHOR

Tess Joesse

Author

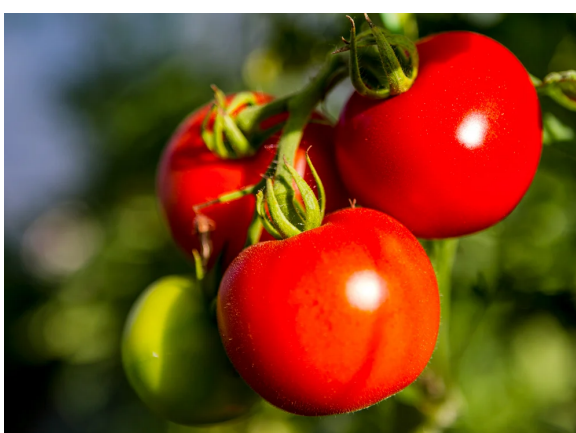
MORE FROM NEWS



24 MAY 2022
Why yawns are contagious—in all kinds of animals
BY TESS JOOSSE



23 MAY 2022
Ph.D. students demand wage increases amid rising cost of living
BY KATIE LANGRIN



23 MAY 2022
Scientists turn tomatoes into a rich source for vitamin D
BY ERIK STOKSTAD

VIEW MORE >

Got a tip for Science's news department?

CONNECT >

Subscribe to News from Science

Don't yet have access? Subscribe to News from Science for full access to breaking news and analysis on research and science policy.

SUBSCRIBE >

ADVERTISEMENT

ScienceCareers
FROM THE JOURNAL SCIENCE AAAS

**CAREER TRENDS:
Diversity, Equity,
and Inclusion**

READ MORE >

SCIENCEINSIDER

- 23 MAY 2022 | BY DAVID GRIMM
Update: Federal judge blocks controversial facility from breeding, selling dogs
- 20 MAY 2022 | BY JON COHEN
Monkeypox outbreak questions intensify as cases soar
- 20 MAY 2022 | BY GABRIEL POPKIN
Is the world's oldest tree growing in a ravine in Chile?
- 19 MAY 2022 | BY MEREDITH WADMAN
What's sending kids to hospitals with hepatitis—coronavirus, adenovirus, or both?

VIEW MORE >

ADVERTISEMENT

IMMUNOLOGY & SCIENCE PRIZE FOR IMMUNOLOGY

Are you an early-career investigator who performs transformative research in **immunology**?

APPLY TODAY

GRAND PRIZE **\$30,000**
DEADLINE: **OCT 01, 2022**

SIFTER

- 13 APR 2022 | BY ZACK SAVITSKY
Ancient human playground found inside sloth footprints
- 8 APR 2022 | BY MICHAEL PRICE
Team says it's found pieces of the asteroid that killed off the dinosaurs
- 7 APR 2022 | BY RODRIGO PÉREZ ORTEGA
Triceratops definitely fought one another, wound in 'Big John' reveals
- 7 APR 2022 | BY TESS JOOSSE
Mushrooms may 'talk' to one another with up to 50 words

VIEW MORE >

RECOMMENDED

- 28 MAY 2015 | BY KELLY SERVICK
Parakeets spread contagious yawns
- PERSPECTIVES APRIL 2020
Revealing animal emotions
- 29 MAR 2013
ScienceShot: Monkey Smiles Are Contagious
- 7 AUG 2013 | BY VIRGINIA MORELL
ScienceShot: Deciphering a Dog's Yawn

RECOMMENDED

- 28 MAY 2015 | BY KELLY SERVICK
Parakeets spread contagious yawns
- PERSPECTIVES APRIL 2020
Revealing animal emotions
- 29 MAR 2013
ScienceShot: Monkey Smiles Are Contagious
- 7 AUG 2013 | BY VIRGINIA MORELL
ScienceShot: Deciphering a Dog's Yawn

RELATED JOBS

- Postdoctoral Scholars or Staff Scientists in Macroevolution (Biomechanics, Paleontology, Ichthyology)**
Osaka Institute of Science and Technology Graduate University - Faculty Affairs Office
Osaka, Japan
- SZU Invites Applications for NSFC Excellent Young Scholars Fund (Overseas)**
Shenzhen University
Shenzhen, Guangdong (CN)
- Postdoctoral Researcher in Marine Viral Ecology (MVE Microbial Oceanographer)**
University Of Hawaii at Manoa, Department of Oceanography
Honolulu, Hawaii, USA

ADVERTISEMENT

aspire

NEWS

All News
ScienceInsider
News Features
Subscribe to News from Science
News from Science FAQ
About News from Science

CAREERS

Careers Articles
Find Jobs
Employer Profiles

COMMENTARY

Opinion
Analysis
Blogs

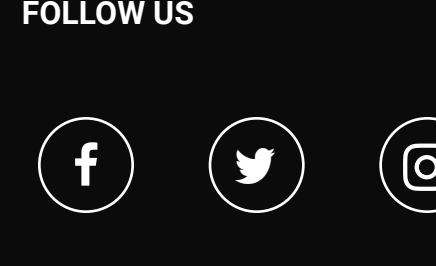
JOURNALS

Science
Science Advances
Science Immunology
Science Robotics
Science Signaling
Science Translational Medicine
Science Partner Journals

AUTHORS & REVIEWERS

Information for Authors
Information for Reviewers

FOLLOW US



LIBRARIANS

Manage Your Institutional Subscription
Library Admin Portal
Request a Quote
Librarian FAQs

ADVERTISERS

Advertising Kits
Custom Publishing Info
Post a Job

RELATED SITES

AAAS.org
AAAS Communities
EurekAlert!
Science in the Classroom

ABOUT US

Leadership
Work at AAAS
Prizes and Awards

HELP

FAQs
Access and Subscriptions
Order a Single Issue
Reprints and Permissions
TOC Alerts and RSS Feeds
Contact Us