

Subscribe

Sign up for our free newsletters. [Sign Up](#)

BEHAVIOR & SOCIETY | OPINION

A Vaccination against the Pandemic of Misinformation

False beliefs, similar to those seen in Alzheimer’s patients, may result from a lack of science literacy

By Sergio Lanata, Bruce L. Miller on February 22, 2021



We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking "Accept All Cookies", you agree to the storing of cookies on your device for the described purposes. [View Our Privacy Policy](#)

[Cookies Settings](#)

[Accept All Cookies](#)

They have opted instead to favor individual freedoms over our collective common good. As a result, more people have died in the U.S. from COVID-19 than in any other country, and our nation has one of the highest per capita death rates in the world.

This dire situation represents a national call to reflect on the factors and mechanisms that shape our beliefs and behaviors as a nation in order to find ways of shifting our society's mindset from one that favors individualism at any cost, to one that also values collectivism rooted on science, especially in times of crisis. As brain scientists who study and treat people with neurodegenerative disorders such as Alzheimer's disease, we are keenly aware of the brain basis of human beliefs and behaviors.

Specific networks of neurons in the brain subservise the formation of human beliefs; neurodegenerative disorders disrupt these networks, leading to distorted beliefs that often have no basis in observable reality. These beliefs in turn trigger harmful behaviors, often to the detriment of the affected individual, their loved ones and even their community.

As we reflect on the massive spread of distorted beliefs and ensuing harmful behaviors surrounding SARS-CoV2 and the COVID-19 pandemic, we can't help but think of our nation metaphorically. What has happened to our collective *American brain*? What has caused our powerful nation to succumb to distorted beliefs that have no basis in science-based reality? What can we do as a society to protect ourselves from falling prey to harmful misinformation and conspiracy theories during the next public health crisis?

We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking "Accept All Cookies", you agree to the storing of cookies on your device for the described purposes. [View Our Privacy Policy](#)

[Cookies Settings](#)

[Accept All Cookies](#)

One unique aspect of being human is our ability to form beliefs about ourselves and our surroundings. This process begins in early childhood, and by the time we enter our teenage years, we begin to construct a strong sense of self with the beginnings of well-defined beliefs about politics, philosophy and our own uniqueness in the world. Once we reach early adulthood, we tend to seek to maintain our beliefs across the life span. This process is captured by writer William Wordsworth in his 1802 poem “My Heart Leaps Up” where he writes, “The Child is father of the Man.”

Recent studies have probed the specific mechanisms in the brain that lead to the creation and sustenance of belief. As noted by neuroscientists Ethan S. Bromberg-Martin and Tali Sharot, beliefs enable people to “build an internal model of the world for the purpose of informing their decisions to help them achieve external goals, such as gaining rewards and avoiding punishments.”

These scientists also highlight that we treat beliefs as means to achieve internal rewards, particularly emotional well-being, helping us to maintain our sense of integrity during times of uncertainty and crisis. If we could visualize uncertainty as a tear in a person’s worldview, belief is what the brain comes up with to fix this tear and to restore a person’s emotional well-being and individual integrity.

Often in clinical practice, we witness how our brain uses beliefs, even false beliefs, in order to preserve our sense of integrity and emotional well-being in the midst of uncertainty.

Many people with neurodegenerative disorders develop false beliefs, which we call

We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking “Accept All Cookies”, you agree to the storing of cookies on your device for the described purposes. [View Our Privacy Policy](#)

[Cookies Settings](#)

[Accept All Cookies](#)

What on the surface seems irrational is in reality a situation in which faulty information about the familiarity of a face leads to an internally consistent, but false, belief that allows the person to maintain an internal sense of integrity during a crisis.



Sign up for *Scientific American's* free newsletters.

[Sign Up](#)

A healthy prefrontal cortex is necessary for the proper interpretation of all data received by the brain, not only faces. But interpretation of data is not a straightforward task, even for someone with a healthy prefrontal cortex.

Careful interpretation of data requires extensive training and practice. Within neurology, for example, when health providers assess experimental pharmacological treatments, they analyze research studies, evaluate potential side effects of the drug, and consider the compound's biological activity before deciding whether prescribing the medicine is worth the risk.

The ability to evaluate data scientifically, however, is not just for the few with professional training in science or medicine, but can be learned and practiced by anyone as part of standard primary, secondary or more advanced education. Indeed, people who do not practice science can understand scientific principles and tools and apply them to their personal and professional lives.

We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking "Accept All Cookies", you agree to the storing of cookies on your device for the described purposes. [View Our Privacy Policy](#)

[Cookies Settings](#)

[Accept All Cookies](#)

Has our nation's suboptimal education weakened the prefrontal cortex of our American brain, thus leaving us susceptible to false beliefs? Low educational attainment is a risk factor for Alzheimer's disease and other forms of dementia, suggesting that high educational attainment is associated with fostering neuroanatomical conditions that protect our brain from the pathophysiologic changes of Alzheimer's disease. This remarkable scientific finding supports the idea that high quality education and science literacy physiologically and functionally strengthen the brain, protecting us from the threat of false beliefs during times of uncertainty and crisis.

Therefore, to be better prepared to fight the next pandemic of misinformation that will inevitably plague the internet during future public health emergencies, we must do the hard work of strengthening America's prefrontal cortex by igniting an educational revolution.

Scientists and educators of all disciplines and backgrounds must double efforts to improve science literacy beginning in childhood. We must work closely with politicians and the private sector to establish national policies that support science literacy throughout the life span. Beyond teaching basic concepts in science, scientific reasoning and the scientific method, we must also instill in our nation the importance of studying philosophy of science, so that our fellow Americans understand how and why we, scientists, know what we say we know and don't know.

When successful, such a revolution will enable Americans to shift from an individualistic mindset that seeks any form of information that resonates with an

We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking "Accept All Cookies", you agree to the storing of cookies on your device for the described purposes. [View Our Privacy Policy](#)

[Cookies Settings](#)

[Accept All Cookies](#)

Serggio Lanata

Serggio Lanata, M.D., M.S., holds the Roland Nyegaard, MD, Endowed Professorship in Vulnerable Populations at the University of California San Francisco (UCSF), where he directs the [Memory and Aging Center Community Outreach Program](#). He is a behavioral neurologist and assistant professor of clinical neurology at the UCSF MAC. He is also on the faculty at the [Global Brain Health Institute \(GBHI\)](#).

Bruce L. Miller

Bruce L. Miller is the A.W. and Mary Margaret Clausen Distinguished Professor in Neurology at UCSF, where he directs the [UCSF Memory and Aging Center](#) and is a director of the [Global Brain Health Institute \(GBHI\)](#). Miller is a behavioral neurologist who studies the underlying mechanisms of neurocognitive disorders. His ongoing work includes overseeing a [healthy aging program](#) and an [artist in residence program](#), both of which emphasize positive aspects of aging.

READ THIS NEXT

POLICY & ETHICS

We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking "Accept All Cookies", you agree to the storing of cookies on your device for the described purposes. [View Our Privacy Policy](#)

[Cookies Settings](#)

[Accept All Cookies](#)

ENGINEERING

50, 100 & 150 Years Ago: March 2021

March 6, 2021 — Dan Schlenoff

PUBLIC HEALTH

Coronavirus News Roundup: February 27–March 5

March 5, 2021 — Robin Lloyd | Opinion

NEWSLETTER

Get smart. Sign up for our email newsletter.

Sign Up

Support Science Journalism

Subscribe Now!

We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking "Accept All Cookies", you agree to the storing of cookies on your device for the described purposes. **View Our Privacy Policy**

Cookies Settings

Accept All Cookies

[Return & Refund Policy](#)[FAQs](#)[About](#)[Contact Us](#)[Press Room](#)[Site Map](#)[Advertise](#)[Privacy Policy](#)[SA Custom Media](#)[California Consumer Privacy Statement](#)[Terms of Use](#)[Use of cookies/Do not sell my data](#)[International Editions](#)

Scientific American is part of Springer Nature, which owns or has commercial relations with thousands of scientific publications (many of them can be found at www.springernature.com/us). Scientific American maintains a strict policy of editorial independence in reporting developments in science to our readers.

© 2021 SCIENTIFIC AMERICAN, A DIVISION OF SPRINGER NATURE AMERICA, INC.

ALL RIGHTS RESERVED.

We Value Your Privacy

We use cookies to enhance site navigation, analyze site usage & personalize content to provide social media features and to improve our marketing efforts. We also share information about your use of our site with our social media, advertising and analytics partners. By clicking "Accept All Cookies", you agree to the storing of cookies on your device for the described purposes. [View Our Privacy Policy](#)

[Cookies Settings](#)[Accept All Cookies](#)