

## **COVID-19: The amygdala detects and responds to danger, but the conscious mind experiences fear**

**Here's what's really going on inside the brains of panicked shoppers**

by [Charlie Smith](#) on March 18th, 2020 at 3:35 PM

Three days after the World Health Organization characterized the spread of COVID-19 as a pandemic, Costco's underground parking lot in downtown Vancouver was jammed with vehicles.

Just a half-hour after opening, one man could be seen emptying a huge shopping cart full of toilet paper into his trunk.

A few minutes later, a seemingly endless parade of exiting customers whizzed by with more shopping buggies. They, too, were laden with monstrously large packages of toilet paper.

When some were approached, their fear was palpable. They were in no mood to be interviewed.

That's because they were in too much of a hurry to reach their vehicles and get the hell out of danger.

A few hours later, in a London Drugs on the West Side of the city, the toilet paper had already disappeared. Two days later, in a Safeway on West 4th Avenue, customers were being limited to one package.

The pandemonium in grocery and drugstore aisles suggests that something quite unusual is going on inside people's brains.

Elisabeth Zoffmann, a retired UBC clinical associate professor of psychiatry, described the mass buying of toilet paper across North America as "the most lemminglike behaviour I've ever seen".

Zoffmann, who has a keen interest in the behaviour of crowds, sees parallels between this activity and how people lose their "thinking brains" in sports riots. A similar phenomenon also occurs during massive and emotional religious events in other parts of the world, where some have been crushed or killed in the bedlam.

“The hysterical purchasing of masses of toilet paper defies logic,” Zoffmann told the *Straight* by phone from her home on Vancouver Island. “Nowhere has anybody said that the illness [COVID-19] is a diarrhea illness. It’s not marked by diarrhea. That’s the only reason why you would want toilet paper.”

She added that this isn’t the only “instinctive, impulsive, and overwhelmingly irrational” act associated with the pandemic. There’s also the run on paper masks, which public-health experts have repeatedly advised people not to wear.

It’s still necessary to use hands to adjust and take off the mask. And if the person’s hands aren’t clean, Zoffmann said, those wearing masks are more apt to contract the virus.

“If there is a droplet spread and it stuck to your mask, one moist breath is a great medium for it to keep going into your body,” she noted.

Video: There have been tussles over toilet paper in some stores.

## **Experts speak to the conscious part of the brain**

Zoffmann attributed the panic buying of hand sanitizers, masks, and canned food to evolutionary biology.

She explained that the forebrain developed long after other parts of the brain. The forebrain includes the cerebral cortex, which is associated with complex thinking and voluntary motor activities.

This part of the brain is engaged when people are reading information distributed by health organizations outlining the importance of keeping a distance from others, frequent hand-washing, and not touching one’s face to prevent contracting COVID-19.

The forebrain also processes comments by experts who say that about 80 percent of people who develop the disease will not get very sick. That can alleviate some of the conscious fears, though it’s worrisome that a smaller percentage become gravely ill.

As of this writing, there have been 7,961 deaths in the world. The country with the highest prevalence, Italy, has 0.005 percent of the population infected.

Moreover, when experts note that the vast majority of those who die are elderly, one might assume that it would also diminish the personal fears of millennials—if not their worries about friends with compromised immune systems or their parents and grandparents.

Similarly, the forebrain can process broader information about the pandemic, such as the success that Singapore, Taiwan, Hong Kong, and South Korea have demonstrated in preventing the catastrophes that have unfolded in Italy and parts of China.

A negativity bias, however, leads human beings to fear the absolute worst scenario, even though COVID-19 is not affecting each country in the same way. That bias was reinforced by one particularly frightening interview.

On Joe Rogan's podcast, the University of Minnesota's director of the Center for Infectious Disease Research and Policy, Michael Osterholm, predicted 96 million cases of COVID-19 during the next three to seven months.

Osterholm also forecast 48 million hospitalizations and more than 480,000 deaths, which would be a 60-fold increase over the number to date.

Zoffmann pointed out that many people actually don't use their forebrain very often. Instead, they do things without deliberating, relying instead on their intuition.

"There's a perfectly functioning brain underneath the forebrain, which immediately takes in visual, auditory, and other such clues, knits them together—makes sense of them—and, if necessary, directs an impulse of action," she insisted. "It's heavily influenced by other brains around it doing the same thing."

Mass behaviour isn't uncommon in the animal kingdom. Schools of fish, flocks of birds, and herds of mammals suddenly dart in the same direction when a predator is in their midst.

Zoffmann said humans don't have to be in proximity to respond in a similar manner to perceived threats, especially when their senses are being overwhelmed, inhibiting their forebrain from functioning properly. Constant television news coverage of the pandemic, for example, can elevate stress. "You can create mobs through social media," she emphasized.

In the meantime, the mass buying of canned goods isn't making life any easier for food banks. In Metro Vancouver, Backpack Buddies, which feeds 1,300 low-income schoolchildren on weekends, has issued a plea for people to think of their neighbours. That's because it's no longer able to receive the food that it has ordered.

"It's of utmost importance to the community that we don't lose sight of the most vulnerable and we need to keep them at the front of our minds when we're buying on the shelf," Backpack Buddies cofounder Emily-anne King told the *Straight*. "Maybe buy an extra can that you can donate somewhere."

## Amygdala detects danger

But what accounts for the fear on the faces of some panic buyers leaving the Costco store in Vancouver? One of the world's leading authorities on the neuroscience of fear is Joseph LeDoux, the Henry and Lucy Moses Professor of Science at NYU and the author of several books, including *The Deep History of Ourselves: The Four-Billion-Year Story of How We Got Conscious Brains*.

When contacted by phone in Callicoon, New York, LeDoux confessed that, just like everyone else, he's "scared shitless" by the novel coronavirus. That's due in part to his age: he's 70 years old, elevating his risk of mortality were he to contract COVID-19.

For almost 40 years, he's been studying the amygdala, an almond-shaped part of the brain where neural activity increases in response to threats. That, in turn, leads to body responses, such as an increased heart rate. He explained that this occurs beneath the level of consciousness.

"The amygdala is not a fear centre," LeDoux said. "It's a system in the brain that detects and responds to danger. But fear is our awareness that we're in danger."

In a 2016 paper, "Using Neuroscience to Help Understand Fear and Anxiety: A Two-System Framework", LeDoux and Daniel Pine maintained that "research on threat processing has not led to significant improvements in clinical practice."

They used the term *fear* to describe feelings that occur when a threat is perceived to be immediate or imminent, such as with the novel coronavirus. *Anxiety* was defined to describe feelings "when the source of harm is uncertain or is distal in space or time".

In the paper, which was published in the *American Journal of Psychiatry*, LeDoux and Pine argued that there is little understanding of the "two-system framework". On the one hand, they stated that there are behavioural responses and accompanying physiological changes in the body, which largely occur unconsciously. Then there are conscious, self-reported states of fear and anxiety.

"You have these prefrontal circuits," LeDoux said. "They are able to conceptualize that you are in danger. The harm is going to happen to you. If you don't know the snake is going to bite you, then you're not afraid. Fear has to be that involvement of you as part of the experience."

This is, in fact, a reflective awareness of oneself, something that retired University of Toronto cognitive neuroscientist Endel Tulving called auto-noetic consciousness. That involves a higher level of brain calculation.

“It’s not just the past and the future but *your* personal past and *your* personal future,” LeDoux said. “That’s a very complicated thing.”

His research builds on that of 19th-century English naturalist and biologist Charles Darwin, who pointed out that humans inherited ancient systems from animals. LeDoux and Darwin part ways, however, over Darwin’s conclusion that because an animal and a human being behave in a similar way, they must share the same feelings.

Darwin’s viewpoint has contributed to others concluding that the ancient brain circuit makes people feel fear and drives the response. But LeDoux said that this overlooks the role of conscious experiences, including working memory, which holds diverse pieces of information.

“Bacteria don’t have any fear when they detect and respond to danger,” LeDoux declared. “They’re just protecting themselves and surviving. The same thing with our amygdala. It allows us to detect danger and to stay alive. But fear is a much more recent thing in our brain.”

That leads to the obvious question: why are so many people loading up on toilet paper?

“I don’t mean this in a dismissive or demeaning way, but it’s all in your head,” LeDoux said with a chuckle. “It’s how we understand what’s going on.”

Moreover, he said, a sense of peril can be generated top-down from the conscious mind.

“Once that thought is there, we’re running with it. That stuff fills your mind and you can’t get it out. It’s contagious. Fear is very contagious between people.”

Neuroscientist Joseph LeDoux says that fear is very contagious. DIEMUT STREBE

LeDoux and Pine aren’t the only researchers to advance a two-system framework for understanding how the human mind functions. Princeton University professor emeritus and Nobel Prize winner Daniel Kahneman has long maintained that there are two modes of thinking, which he describes as “system one” and “system two”.

In his 2011 bestseller, *Thinking, Fast and Slow*, Kahneman described system one as “intuitive”, performing automatic activities. System two is deliberative and involves the exertion of effort, which can be impaired when there are too many stimuli.

People who develop a great deal of expertise in a subject, such as practising anesthesiology or playing chess, develop intuitive responses to a set of circumstances, based on past feedback. Things that might involve deliberative thought for most of the population become effortless and automatic for them.

The same can be said of driving. Over time, a motorist learns intuitive responses to situations that would cause a novice to respond with a great deal of deliberative thought.

In a videotaped message to Google employees on YouTube, Kahneman noted that there are certain situations, like turning left into traffic, that should never be done intuitively.

One of the drawbacks of intuition, Kahneman says in the video, is that people’s conclusions in system one are not necessarily true. They are also often confident in judgments that are not necessarily true.

“Subjective confidence, which is closely related to the probability of being correct, is actually not a judgment at all,” Kahneman says. “It is a feeling.”

But if the mind constructs a coherent story, he adds, confidence remains high.

“Now, this is disastrous in some ways because you can make a very coherent story out of very little information and out of information that is not reliable.”

Like emptying store shelves of toilet paper because of a pandemic that will not give people the runs and has so far infected a very small percentage of Canadians.

Retired psychiatrist Elisabeth Zoffmann said that Kahneman’s book encapsulates her ideas about the biological basis of mass behaviour by human beings.

“I’ve always said it should be required reading for anybody who can read,” she said. “It is a biological reality that we have a new brain that has the capacity to stop and think. But mostly what it does is play catch-up to the instant decisions made by the older brain.”