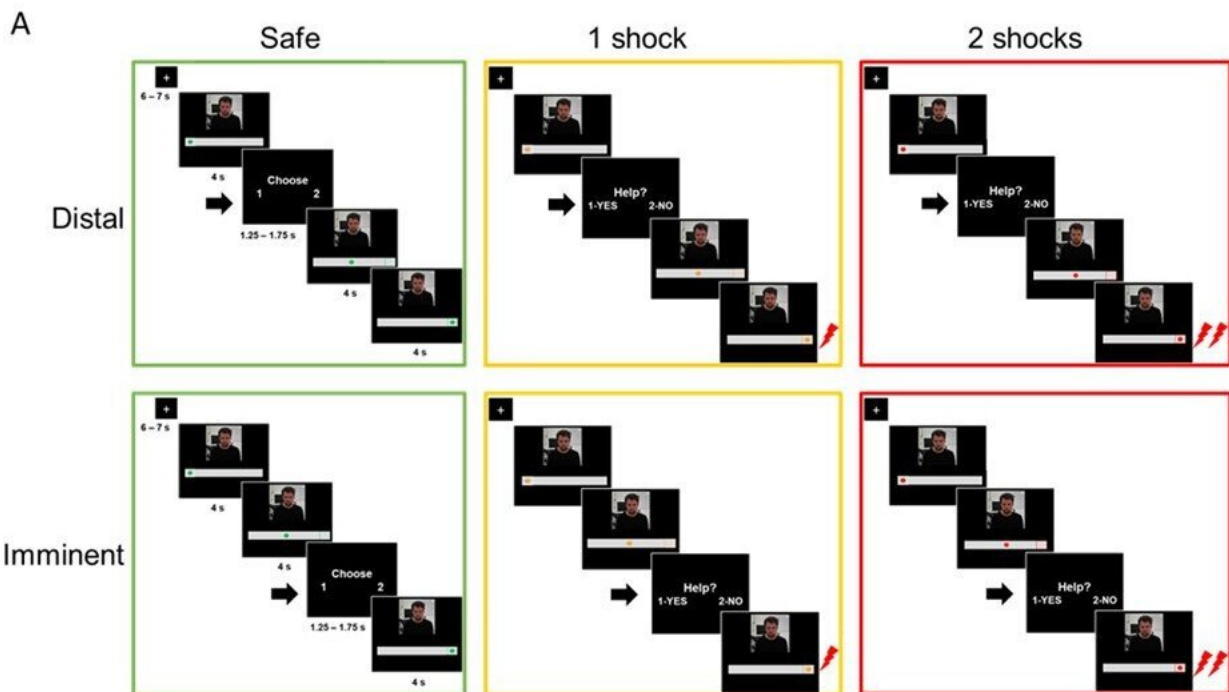# Exploring how the brain works when we choose to help someone in danger

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Outline of the experimental tasks. (**A**) fMRI helping under threat task. Participants saw the co-participant on the screen, together with a visual cue signaling threat (an upcoming shock). There were three threat levels: safe (0 shocks, green circle), moderate threat (1 shock, yellow circle), and high threat (2 shocks, red circle). In each trial of the task, the circle started static on the left (4

s), and then moved to the right (4 s). Participants were prompted to decide whether they wanted to help the co-participant or not (1.25–1.75 s) either in the beginning of trial (distal) or right before the moment of shock delivery (imminent). Therefore, the available time to make a decision was identical in distal and imminent threats. If participants decided to help, there was a 70% chance both themselves and co-participant would receive shocks; if they decided not to help, the co-participant would always receive a shock, and the participant would not. Decisions prompted on safe trials were to arbitrarily choose to press 1 or 2, since no shocks would be administered. (**B**) After the fMRI task, outside the scanner, participants re-watched clips of the co-participant presented during the scan, and were asked to rate how much 'discomfort, anxiety or uneasiness' he was experiencing in each clip on a 9-point scale. They also presented images of the threat cues and asked to rate, on the same scale, how threatened they felt themselves when they saw those images during the scan. Credit: *eLife* (2022). DOI: 10.7554/eLife.78162

How do people decide whether to intervene and help others in danger? Researchers at Karolinska Institutet in Sweden now show that the same system in the brain that enables us to avoid danger is also activated during selfless, helping behavior. The results are published *eLife*.

"Our findings indicate that the brain's defense system plays a greater role in helping behavior than was previously thought. These results contradict the conventional wisdom that we need to suppress our own fear system in order to help others who are in danger," says Andreas Olsson, professor at the Department of Clinical Neuroscience, Karolinska Institutet and the study's last author.

The capacity for empathy for the distress of others has long been considered the driving force of helping. But when we decide to help someone who is in danger, we have to consider not only the other person's distress but the risk we pose to ourselves by helping—for

example, by rushing into a burning building to save someone or helping someone who fell on a train track.

Measured brain activity

Studies in other animals suggest that the brain's defense systems are important for helping others, but very little is known about these processes in humans. Researchers from Karolinska Institutet have now investigated this in more detail.

The study included 49 healthy volunteers who were asked to decide whether they wanted to help another, unknown person avoid the discomfort of a mild electric shock. But if they decided to help the person, there was a risk that they might receive a shock themselves. The unknown person was visible to the participant on a screen. During the task, the activity in the participants' brains was imaged with an fMRI scanner.

The participants were also told how soon the shock would be delivered, so that the researchers could measure their reactions relative to the proximity of the threat.

An evolutionarily ancient region of the brain

"The results show that the systems in the brain that make it possible for people to avoid danger are also involved in this type of selfless, helping behavior towards other, unknown, individuals. For example, we see that an evolutionarily ancient region of the brain, the amygdala, which is known to be responsible for basic defense behaviors, is associated with the willingness to help others," says Joana Vieira, researcher affiliated with the Department of Clinical Neuroscience at Karolinska Institutet and the first author of the study.

The researchers observed that the intensity with which the amygdala and the insula region of the brain represented the threat to the person being studied—not the other's distress—could predict whether the person would help. Other parts of the brain that are known to be linked to cognitive functions were not found to be associated with helping behavior when the threat was imminent.

"Now we are trying to understand how these helping behaviors are affected when other people are present and how the bystanders learn from the situation. We are interested in understanding how fears and the perception of behaviors as moral or immoral are conveyed between people through learning processes," says Andreas Olsson.

More information: Joana B Vieira et al, Neural defensive circuits underlie helping under threat in humans, *eLife* (2022). DOI: 10.7554/eLife.78162

Provided by Karolinska Institutet