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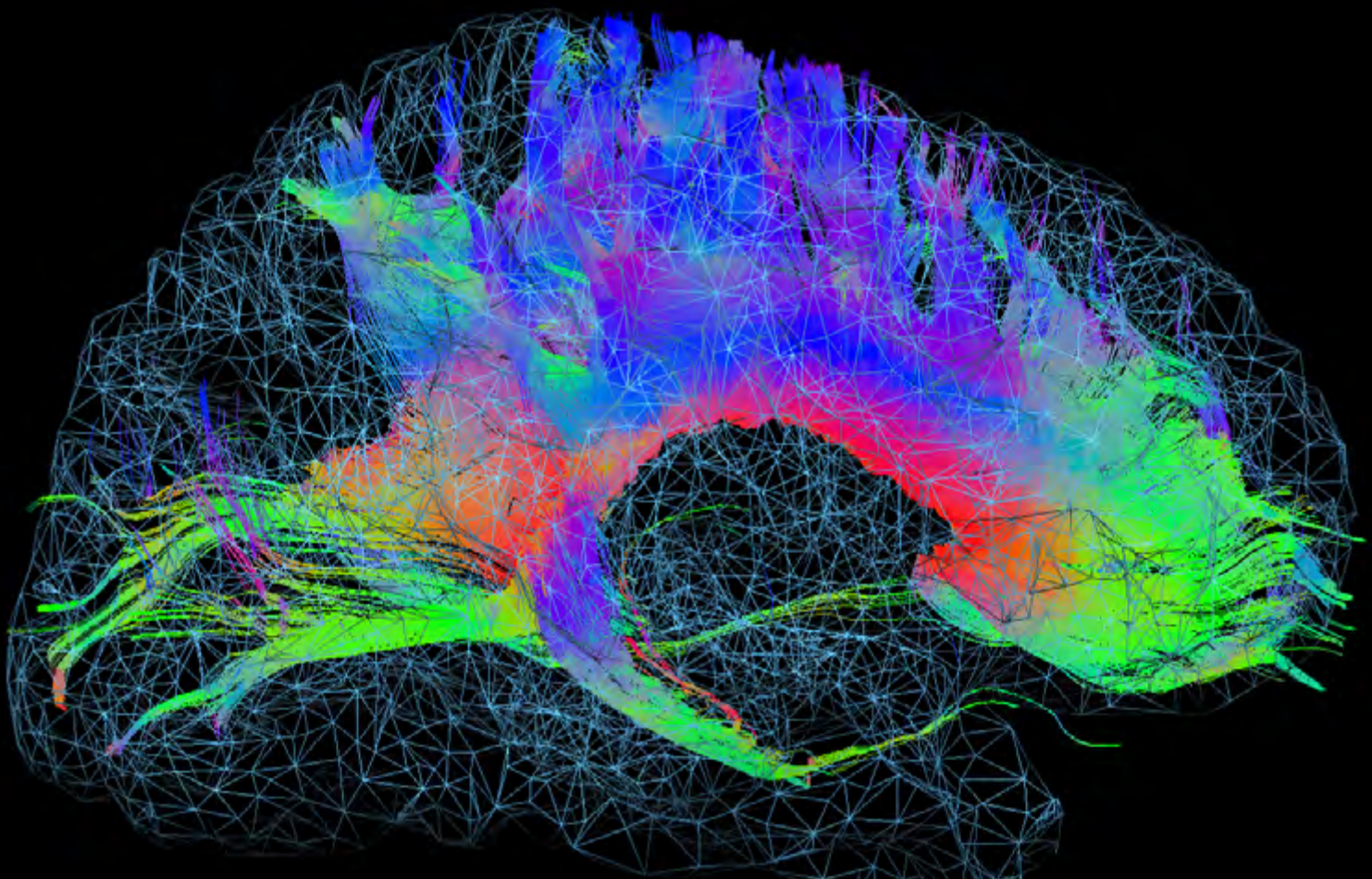

EXTINCTION LEARNING

What happens in the brain during learning

Why the context of an experience is crucial in this process

And how research into extinction learning helps patients overcome pain and anxiety

#35

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Extinction Learning

Psychotherapy

LOOKING FEAR IN THE EYE

Phobias arise through learning processes, so it is also possible to unlearn them. Bochum psychologists are using various interventions to help those affected conquer their fears.

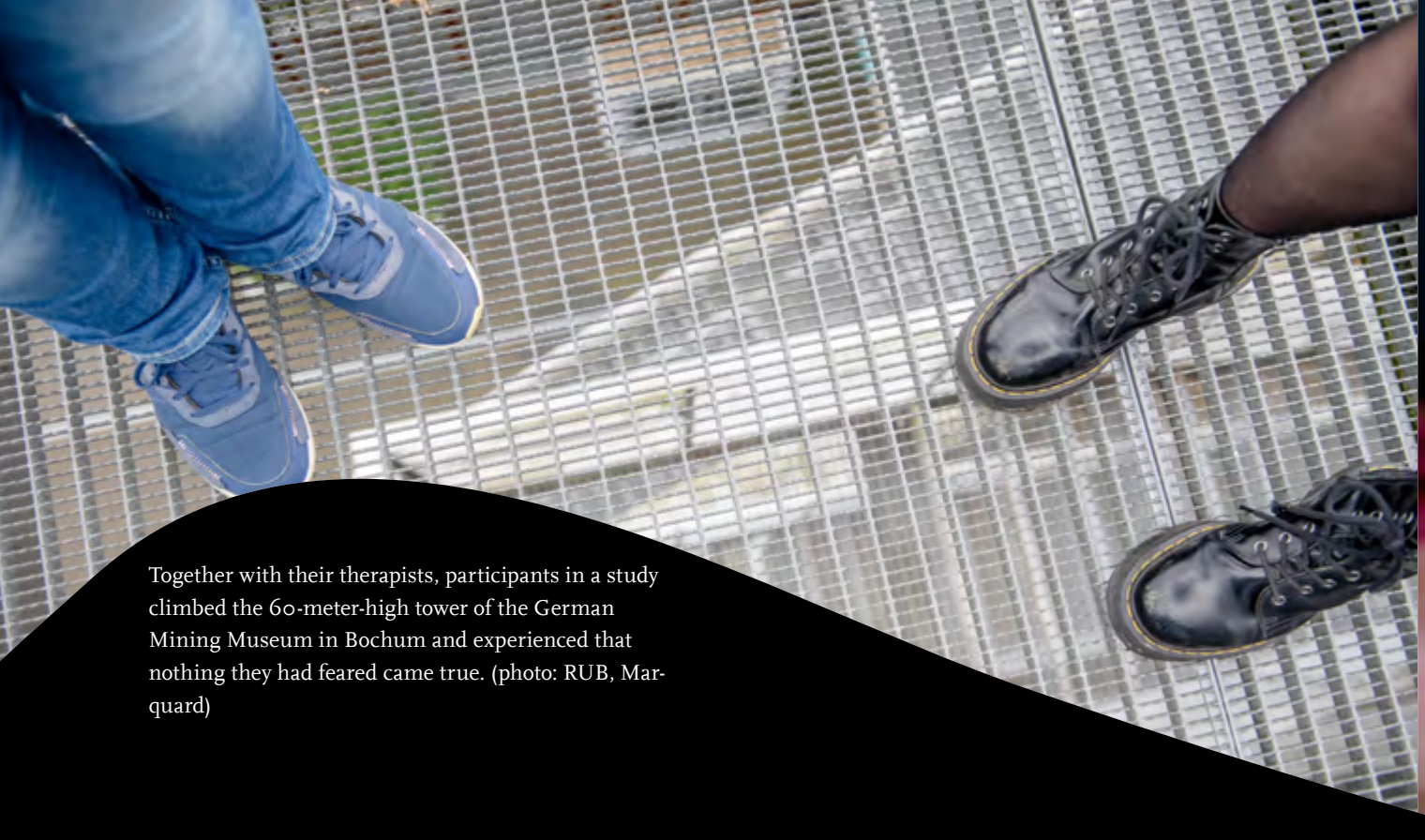
Professor Armin Zlomuzica doesn't have it. Instead, his Department of Behavioral and Clinical Neuroscience at the Mental Health Research and Treatment Center at Ruhr University Bochum is home to some impressive spider specimens, including tarantulas, which are lovingly cared for by his team. They perform an important job in treating patients with arachnophobia. "The proven most successful therapy for anxiety disorders and phobias such as a fear of spiders or heights is exposure therapy," says the psychologist. "This means you are exposed to the anxiety-inducing stimulus in the company of a therapist and learn that the catastrophe you are expecting doesn't actually happen, i.e., the spider doesn't bite you or jump on you and crawl inside somewhere." Those affected may only bring themselves to look at the box with the tarantula from a distance at the beginning of the therapy. However, they eventually manage to get closer to it and even touch the container. This strategy helps the majority of patients.

"There is, however, still room for improvement," says Zlomuzica. There are some patients who, for unknown reasons, do not benefit from exposure therapy. Others conquer their fear during therapy, but are still afraid when they encounter a spider in their own basement. Or the fear appears to have been overcome, but returns at some point.

"We therefore want to better understand which learning mechanisms underlie these anxiety disorders and find out whether there are additional strategies that support the effect and sustainability of the therapy," explains Zlomuzica. Learning and memory are aspects that interest the researchers be- ▸

Armin Zlomuzica keeps extra spiders in his premises for the therapy of people with arachnophobia. (photo: FBZ)

One of the tarantulas that patiently help with exposure therapy in the laboratory. (photo: rs)



Together with their therapists, participants in a study climbed the 60-meter-high tower of the German Mining Museum in Bochum and experienced that nothing they had feared came true. (photo: RUB, Marquard)

cause, in anxiety disorders, what has been learned appears to be difficult to unlearn: An originally neutral stimulus – the spider or even the height – is linked to something negative that never happens. However, this learned link is not extinguished by the experience that the spider didn't bite or that you didn't pass out when you climbed a high tower. "Relearning appears to be deficient in anxiety patients," reports Armin Zlomuzica from his studies. "This seems to be a general, characteristic feature of anxiety disorders."

To make therapy more successful and sustainable, the researchers are investigating the effects of various accompanying measures in the Extinction Learning Collaborative Research Center. One starting point for this is self-efficacy. "It feels good when we realize we have mastered a task independently," explains Zlomuzica. "We can use this feeling to make the interventions in exposure therapy more effective."

The effect of boosting self-efficacy

The trick: When anxiety patients realize during therapy that they survived their confrontation with the spider or the height without anything bad happening, their expectation is violated and they learn that they can master the situation. After all, they had seen the catastrophe approaching. When the therapy team reinforces this unexpected experience of self-efficacy, and promotes and activates the good feeling of having mastered the situation on one's own, patients do better in their next confrontation with the anxiety-inducing stimulus than they do without this self-efficacy activation.

"We have also been able to demonstrate the effect of boosting self-efficacy in related experiments," reports Armin Zlomuzica. The researchers increased self-efficacy in a group of participants by giving them a false positive feedback during a task. "For example, during a standardized task, we gave this group feedback that they are among the five per cent most stress-resistant people," explains the researcher. In a subsequent extinction learning experiment, which involved unlearning something that had already been learned, this group did better than the comparison group, which did not receive the feedback. As self-efficacy can be promoted via various sources – be it via an experience or via verbal confirmation – the research team believes this strategy offers great potential for therapy.

Other strategies are also based on influencing cognitive processes to improve the unlearning of fear. Professor Marcella Woud, who moved from Ruhr University Bochum to the University of Göttingen in fall 2023 as the Head of the Department of Clinical Psychology and Experimental Psychopathology, conducted a study with 80 patients suffering from fear of heights. All patients received exposure therapy, again with the goal to disconfirm their fear beliefs, i.e., the experience that the patients' threat does actually not occur once they reach a great height. During the exposure therapy, patients climbed the 60-meter-high tower of the German Mining Museum in Bochum, together with their therapists, and experienced (i.e., learned) that their feared outcome such as passing out or falling down did not occur.

To consolidate this experience, half of the participants received a cognitive bias modification interpretation training. During this computer-aided training, participants complete ambiguous, height-relevant sentences positively, and by doing so resolve the height-related ambiguity in a functional and adaptive manner. A typical training sentence could be as follows: "You are standing at the railing on the 4th floor of a shopping mall. As you look down, you realize that the railing only reaches up to your hip. You know that falling down is ... unlikely." Or: "You are dining on the roof terrace of a restaurant. To get to your table, you have to get very close to the edge of the roof. You approach the edge and feel ... relaxed." As a comparison, the other half of the participants were given a placebo training on the computer.

The researchers also work with virtual reality as part of the Collaborative Research Center. “The effects are similar, no matter whether you are exposed to a frightening situation in reality or in virtual reality,” says Armin Zlomuzica. (photo: RUB, Marquard)

Marcella Woud would like to use computer-based training to help consolidate the experience gained during therapy. (photo: Heike Engelberg)

Work on the cognitive tunnel vision

Immediately after the experiment and one month later, the researchers recorded how well the therapeutic interventions, i.e., the exposure in combination with the interpretation training, had worked, via various questionnaires and tests. “Immediately after the exposure therapy, all participants reported lower levels of fear of heights than before the therapy. It was also found that immediately after the training, the group that had taken part in the active training interpreted ambiguous, height-related sentences as less threatening compared to participants from the placebo,” reports Marcella Woud. Specifically, participants agreed less with typical statements such as “heights are dangerous” or “the bridge will collapse” or “my fear is uncontrollable” than the participants from the placebo group. The data from the test one month after the therapeutic interventions are currently being evaluated, and follow-up studies on this topic are planned.

“We want to find out, for instance, when the ideal timepoint is to offer this kind of training – before a confrontation with the frightening situation or afterwards? Put differently, when is the most beneficial time to try to work on the cognitive tunnel vision and to foster the cognitive change that is initiated via the exposure treatment?” explains Marcella Woud. The researchers think that it is also likely that a cognitive training of this kind could also help to encourage patients to actually confront themselves with the anxiety-provoking situation in the first place. After all, surveys from the USA and Germany have shown that only a small number of therapists actually offer exposure therapy. This has many reasons, e.g., because many patients withdraw from the exposure session at the last moment or because therapists consider this intervention too stressful for their patients.

“The cognitive component has a great influence on learning processes, and we want to learn to understand and use it better,” says Armin Zlomuzica. The researchers are laying the foundations for this in the Collaborative Research Center. “Translation, i.e., the optimal transfer into therapeutic practice, however, must be researched separately”, Zlomuzica and Woud are convinced. If this is successful, it could benefit not only people with a fear of spiders or heights, but also those with more complex symptoms such as panic disorder or disorder in the context of trauma.

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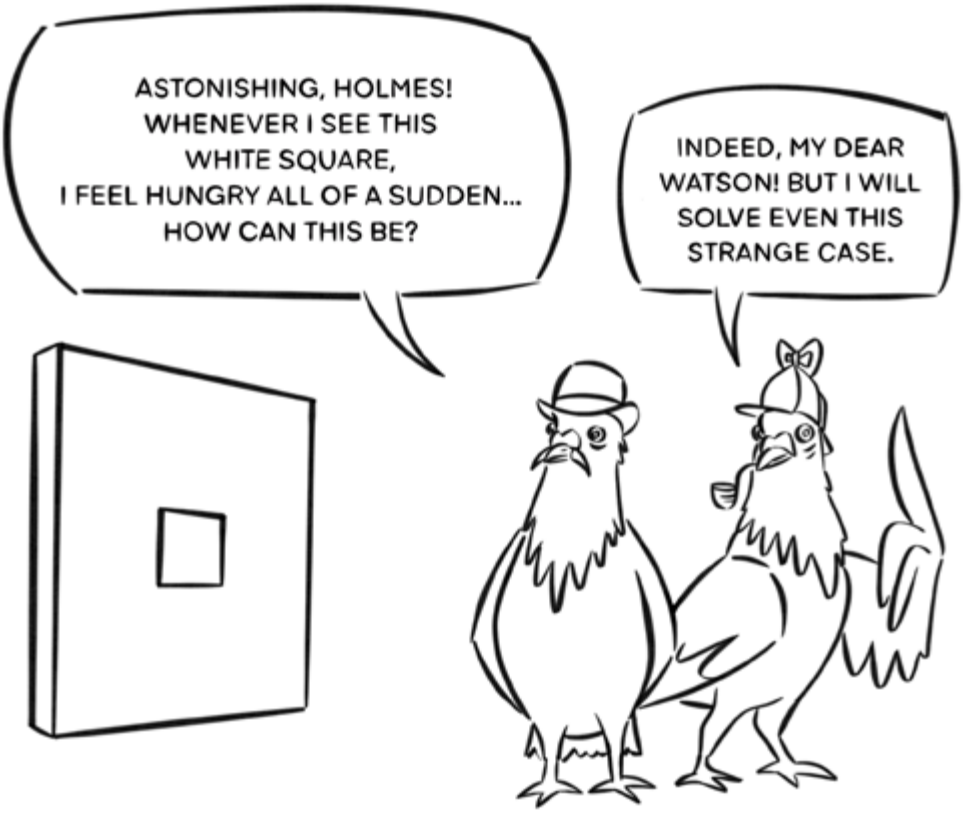
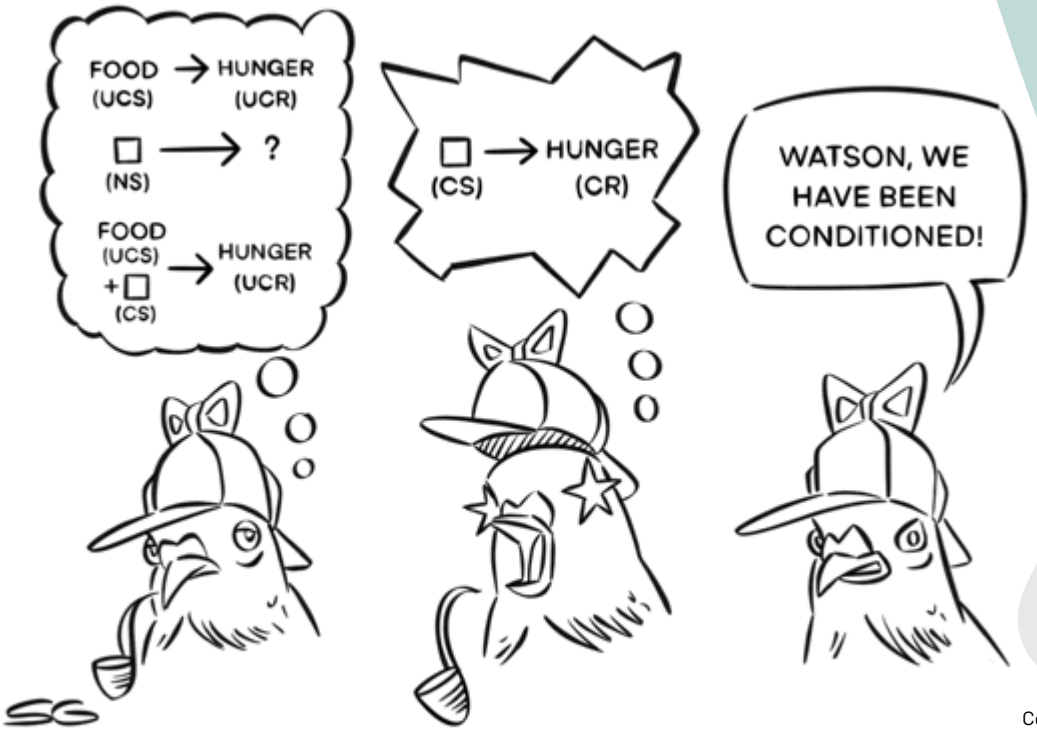
EDITOR'S DEADLINE





Comic: Simon Gies

UCS: unconditioned stimulus
NS: neutral stimulus
CS: conditioned stimulus
CR: conditioned response
UCR: unconditioned response

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