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Damage to the frontal cortex of the brain affects ability to react quickly to a stimulus

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Researchers of the University of Granada have demonstrated that patients who have damage to the right prefrontal cortex of the brain -the part involved in anticipation and quick reaction to stimuli- present a deficit in intentional anticipation (for example, when we put the vehicle in gear before the light turns green). However, these patients keep unintentional anticipation functions intact, which could help develop new therapies.

This study was published in the last issue of the prestigious journal *Brain*, and was led by Mónica Triviño (Department of Neuropsychology, University Hospital San Rafael, in Granada) and Ángel Correa, Marisa Arnedo and Juan Lupiáñez (Department of Experimental Psychology and Behavioural Physiology, University of Granada).

What is important about the study is that the researchers of the [University of Granada](#) have studied for the first time the neural basis in temporal preparation in patients and its connection to other two effects: the reaction-stimulus interval effect, and sequential effects. To this purpose, patients who had prefrontal damage, patients with injuries to basal ganglia circuits and healthy individuals underwent an experimental test.

Methodology

Patients were shown a sign that anticipated a stimulus to which a reaction was expected. The sign did not always anticipate correctly the stimulus, since it sometimes was shown too early or too late. Consequently, there were valid tests (the stimulus appeared just after the sign) and invalid tests (the

sign and the stimulus were not synchronized, since the sign was shown too early or too late).

The results showed clear evidence that patients with right prefrontal damage presented deficient temporal preparation, while the other patients (those with damage to the left frontal cortex and to the basal ganglia) obtained the same results as healthy individuals.

As regards the response-stimulus interval, the researchers found that patients with prefrontal damage presented deficient preparation effects, while patients with damaged basal ganglia circuits showed normal effects. Finally, none of the groups -not even frontal-damage related patients- showed any altered sequential reaction.

At present, the authors of this study are analysing the relation between deficit in intentional preparation during reaction time foreperiods exhibited by prefrontal damage-related patients and their precipitation when it comes to react to a stimulus. Within their therapeutical application, researchers are analysing in what measure patients provided with rhythms (that is, basing on unintentional responses) this type of patients can improve their temporal preparation.

Provided by University of Granada

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