

# Investigating the constant performance monitoring that takes place in our brains

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Credit: Rice University

Psychologist Myrthe Jansen conducted research into the performance monitoring that constantly takes place in our heads. People with obsessive-compulsive symptoms are more afraid to make a mistake that harms others than when they make a mistake that only harms themselves. Jansen received her Ph.D. on 16 November.

When driving a car, you unconsciously pay attention to staying neatly on your side of the road and you adjust the steering when things threaten to go wrong. When you talk to someone, you constantly pay attention to whether your conversation partner is misinterpreting your words, or whether you are not saying anything wrong.

Unless there is something wrong with the performance monitoring in your brain, explains Myrthe Jansen (Clinical Psychology). "People with [borderline personality disorder](#), for example, have less performance monitoring or they respond less to it. In people with depression or an anxiety or obsessive-compulsive disorder, on the contrary, performance monitoring is tightly tuned, which we see reflected in increased [brain activity](#) after making mistakes." The latter is also true in people without disorders, but who are more rigid or cautious.

## **Obsessive-compulsive symptoms**

Jansen conducted behavioral experiments in healthy people with more or fewer obsessive-compulsive symptoms. "We had them do computer tasks where it was inevitable that you would make mistakes, because you have to react very quickly." They could earn a money bonus, with each [mistake](#) made reducing the money bonus. Sometimes a mistake did not cost the subject but another participant money. While they were performing the task, an EEG (electroencephalogram) was taken that reflected brain activity.

"What was striking about our findings was that the EEGs of people who

were more rigid and had more constraint symptoms showed increased [error](#)-related activity in their brains when the consequences of the error were for another person. These individuals also said themselves that they are more afraid of an error that harms another person, a social error, than of an error that harms themselves."

Jansen can explain this from practical experience, though. "People with an obsessive-compulsive disorder drive three laps around a roundabout, for example, to ward off the thought of something happening to a loved one. Many people with obsessive-compulsive disorder are characterized by heightened feelings of responsibility and are afraid of making mistakes that could harm others.

"Our healthy participants with more obsessive-compulsive symptoms also mentioned these feelings; they could possibly explain the increased error-related brain activity, which you can observe on EEG when someone catches themselves making a mistake, after social errors.

"We are looking for biomarkers, things you can measure in the body that are a clear indication of [obsessive-compulsive disorder](#)," says Jansen. With that, you can help diagnose such disorders. But the results also guide further research into possible treatments for these. "We identify situations that enhance or reduce error-related activity in the brain. These could possibly be used for [exposure therapy](#): therapy in which you expose people to situations they find difficult, in order to learn to deal with them better."

Jansen now works as a researcher at Statistics Netherlands (CBS). Her Ph.D. research consists of a whole series of experiments on performance monitoring. She also looked at the effects of hormonal fluctuations in women. "I compared the error-related activity between women who are or are not on the [oral contraceptive pill](#). I also compared that activity at two phases in the menstrual cycle."

No results came out of this to help explain why menstruating women really need a lot of chocolate. "Follow-up research is definitely needed; this was only an exploration with a small research group. But we did find tentative indications that hormones affect error processing in the [brain](#)." That follow-up research will come from Jansen's supervisor Ellen de Bruijn.

Provided by Leiden University

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