

# Spatial navigation is easier at that time of the month: Menstrual cycle affects memory

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Credit: George Hodan/public domain

It's been suggested that women are better at giving directions than men. New Concordia research published in the journal *Psychoneuroendocrinology* shows that may be thanks to the hormones that trigger the menstrual cycle.

"Women have sometimes reported to doctors that their memory works

differently depending on which phase of the menstrual cycle they are in—even during and following pregnancy, or following menopause. This has led scientists to wonder whether estrogen and progesterone could affect memory and problem solving," says psychology professor Wayne Brake, who co-authored the study.

"Our research shows that, rather than impairing memory in general, estrogen and progesterone may instead cause the brain to favour one memory system or strategy over another."

## **Hormones influence problem-solving**

For the study, researchers tested 45 women who had regular menstrual cycles. First, participants responded to a "hormonal profile" questionnaire that gathered detailed information on their periods, past pregnancies, contraceptive and synthetic hormone intake history and general life habits.

The participants were then given a verbal memory task, such as remembering a list of words, as well as a virtual navigation task, such as finding their way through a maze in a video game, that could be solved in several ways.

At the end of the experiment, participants were debriefed on how they solved the tasks from beginning to end.

Results were clear: women who were ovulating performed better on the verbal memory task. On the other hand, women tested in their pre-menstrual phase were better at solving spatial navigation tasks.

That proves that women tend to use different strategies to solve tasks—such as navigating a maze or remembering a list of words—depending on where they are in their [menstrual cycle](#).

Essentially, the study shows that the hormonal changes women experience throughout their cycles have a broader impact than previously believed, and have significant effects on how women approach and solve problems.

"This is important scientifically. We and others [have previously shown](#) that the levels of estrogen and progesterone in rodents influence different brain regions, affecting various memory systems involved in task-solving," says Brake.

"For example, when estrogen levels are high, female rats will use one type of memory system or strategy versus another to solve a maze. This is the first study to show that this is also true for women, who solve tasks in different ways based on their hormones"

## **'Research is needed to deepen our understanding of the female brain'**

For recent PhD graduate Dema Hussain, the study's lead author, these results point to an ongoing bias in scientific research.

"Traditionally, researchers and scientists have relied on using male participants—and male rats—in studies to develop drugs and treatments for the general population. But we now know that [women](#) respond differently than men," she says.

"I hope that this study emphasizes that more research is needed to deepen our understanding of the female brain, and that efforts must be made to tailor future research to improve our understanding of the effects of female sex hormones on cognition and memory."

**More information:** Dema Hussain et al. Modulation of spatial and

response strategies by phase of the menstrual cycle in women tested in a virtual navigation task, *Psychoneuroendocrinology* (2016). DOI: [10.1016/j.psyneuen.2016.05.008](https://doi.org/10.1016/j.psyneuen.2016.05.008)

Matthew G. Quinlan et al. Use of cognitive strategies in rats: The role of estradiol and its interaction with dopamine, *Hormones and Behavior* (2008). DOI: [10.1016/j.yhbeh.2007.09.015](https://doi.org/10.1016/j.yhbeh.2007.09.015)

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