Do the seasons affect how we think?

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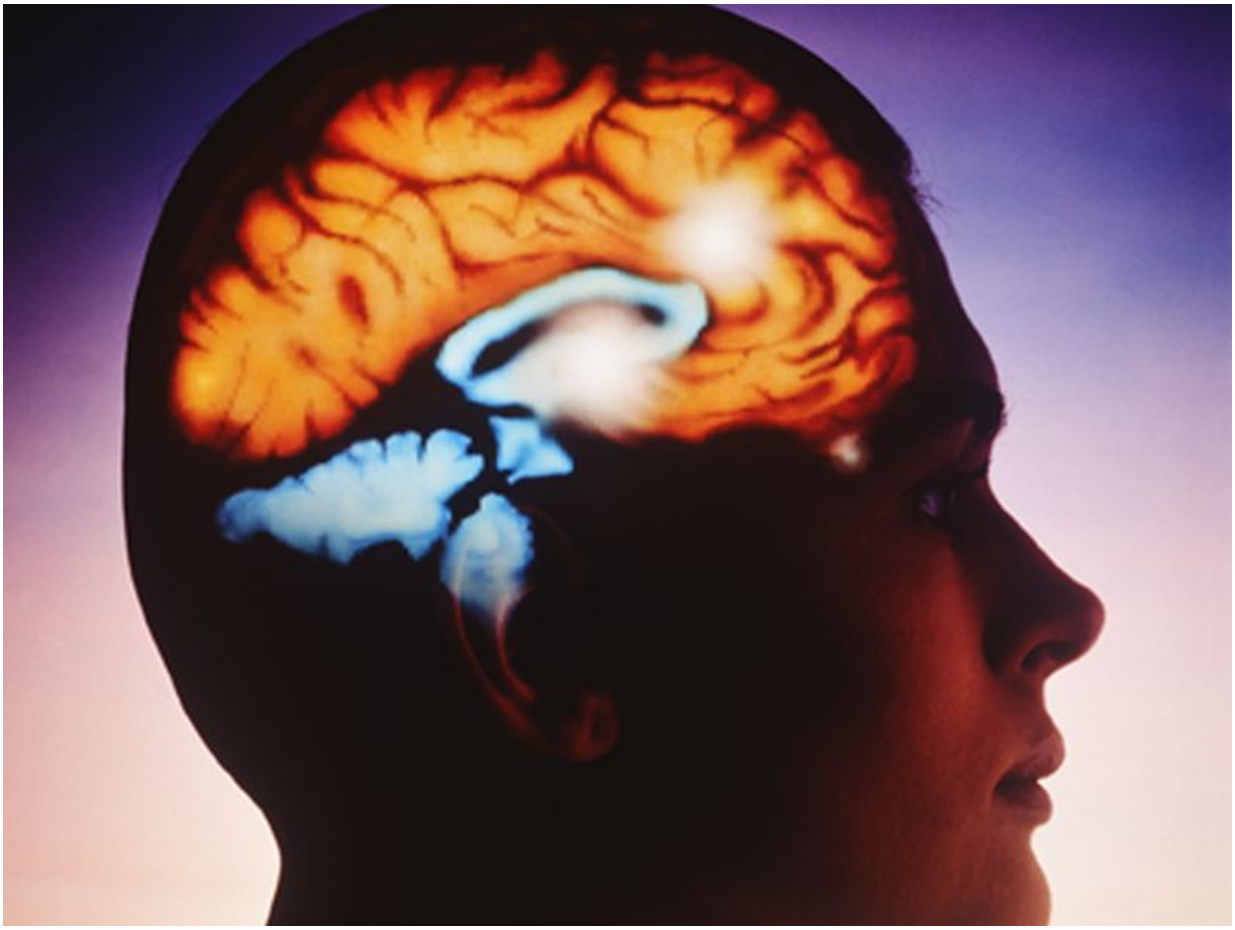

When do you think more clearly: winter or summer? What time of year is your short-term memory at its best?

A small new study suggests your brainpower may be stronger at certain times of year. The research isn't definitive, and the apparent differences don't seem to be noticeable beyond brain scans. But study co-author Gilles Vandewalle, a research associate with the University of Liege in Belgium, said the study of 28 young adults shows that "season matters."

And it may matter more to some people than others. In particular, Vandewalle said, people with seasonal affective disorder—depression during certain months—may be even more vulnerable to the effects of season on the brain.

It has long been known that seasons are crucial in other ways. "Seasons are important in animals in terms of reproduction and hibernation," Vandewalle said. And, in humans, "mood is well known to be impacted by seasons."

An estimated 5 percent of people in the United States suffer from seasonal affective disorder, which triggers depression-type symptoms, typically during the fall and winter. Light therapy is commonly used to treat it, a sign that the condition may be linked to the seasonal differences in sunlight.

Seasons also affect hormones, the immune system and neurotransmitters, which are chemicals in the brain, Vandewalle pointed out. Some research has suggested that seasons affect thinking abilities, but the findings haven't been conclusive, he said.

In the new research, Vandewalle and colleagues studied 14 men and 14 women, average age 21, at different times of year between May 2010 and October 2011. The participants spent 4.5 days in laboratories where they had no indication of the season outside, such as daylight, and no access to the outside world.

Researchers then used brain scans to study how participants handled tasks testing their abilities to pay attention and remember things on a short-term basis.

The scans suggested that participants' attention skills were best near the summer solstice in June and worst near the winter solstice in December. Their short-term memory was best in fall and worst in spring.

Vandewalle said the differences in brain function wouldn't be noticeable in day-to-day life, but the amount of brain activity did change.

"Season is most likely responsible," Vandewalle said.

The researchers don't know how seasons actually affect the brain. But, seasonal changes in humidity, temperature, the length of days and even social interaction between people may be involved, Vandewalle suggested. "It's probably multiple factors," he added.

It's not clear why the brain may have evolved this way, although humans in the past had to rely more on seasonal changes for such things as the supply of food, Vandewalle said. In addition, as humans, "we may be tuned to lower brain activity in winter, and that could cause changes in brain activity. But in modern society we are similarly active throughout the year," he pointed out.

Vandewalle said it's not clear how seasons—or the lack of them—may affect people outside Europe, where the study was performed.

Xenia Gonda is an assistant professor who studies the brain at Semmelweis University in Hungary. Gonda was not involved with the new research, but she said the study is important because it provides more understanding about the brain and how people adapt to their environment.

Gonda said the findings may especially be useful in developing better ways to diagnose and treat seasonal affective disorder. Now, "we mostly target mood symptoms but don't check whether cognitive symptoms—like forgetfulness and inability to pay attention—also improve," she said.

The study was published in the Feb. 8 edition of the *Proceedings of the National Academy of Sciences*.

More information: Seasonality in human cognitive brain responses, *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1518129113