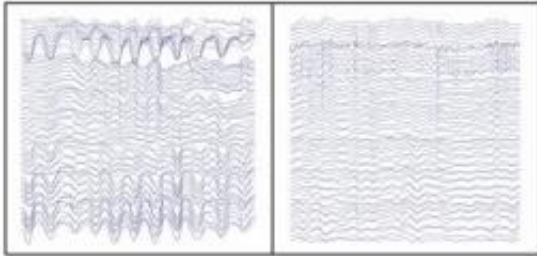


Brain waves reveal video game aptitude

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Those whose brain waves oscillated most powerfully in the alpha spectrum (about 10 times per second) when measured at the front of the head (left EEG readout) tended to learn at a faster rate than those whose brain waves oscillated with less power (readout on the right), the researchers found. Credit: Kyle Mathewson

Scientists report that they can predict who will improve most on an unfamiliar video game by looking at their brain waves.

They describe their findings in a paper in the journal *Psychophysiology*.

The researchers used electroencephalography (EEG) to peek at [electrical activity](#) in the brains of 39 study subjects before they trained on Space Fortress, a video game developed for cognitive research. The subjects whose brain waves oscillated most powerfully in the alpha spectrum (about 10 times per second, or 10 hertz) when measured at the front of the head tended to learn at a faster rate than those whose brain waves oscillated with less power, the researchers found. None of the subjects

were daily video game players.

The [EEG signal](#) was a robust predictor of improvement on the game, said University of Illinois [postdoctoral researcher](#) and Beckman Fellow Kyle Mathewson, who led the research with psychology professors and Beckman Institute faculty members Monica Fabiani and Gabriele Gratton.

"By measuring your brain waves the very first time you play the game, we can predict how fast you'll learn over the next month," Mathewson said. The EEG results predicted about half of the difference in learning speeds between study subjects, he said.

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"These oscillations are the language of the brain, and different [oscillations](#) represent different brain functions," he said.

The researchers also found that learning to play the game improved subjects' reaction time and working memory (the ability to hold a piece of information in mind just until it is needed), skills that translate to everyday life.

"We found that the people who had more [alpha waves](#) in response to

certain aspects of the game ended up having the best improvement in [reaction time](#) and the best improvement in working memory," Mathewson said.

This project is a part of a larger collaborative effort to determine whether measures of brain activity or brain structure can predict one's ability to learn a new [video game](#). One analysis, led by Beckman Institute director Art Kramer (an author on this study as well), found that the volume of specific structures in the brain could predict how well people would perform on Space Fortress. That study used magnetic resonance imaging (MRI) to measure the relative sizes of different brain structures.

But MRI is expensive and requires that subjects lie immobile inside a giant magnet, Mathewson said. With EEG, researchers can track brain activity fairly inexpensively while subjects are engaged in a task in a less constricted, less artificial environment, he said.

The new findings offer tantalizing clues to the mental states that appear to enhance one's ability to perform complex tasks, Mathewson said. Alpha waves are associated with relaxation, but they also are believed to arise when one is actively inhibiting certain cognitive functions in favor of others, he said. It is possible that everyone could benefit from interventions to increase the strength of their alpha waves in the front of the brain, a region associated with decision-making, attention and self-control.

"You can get people to increase their alpha [brain waves](#) by giving them some positive feedback," Mathewson said. "And so you could possibly boost this kind of activity before putting them in the game."

More information: *Psychophysiology* [DOI: 10.1111/j.1469-8986.2012.01474.x](#)

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