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Research News Reading Lab

## Error Prediction in the Human Brain

Emerging technology is making it possible to predict in advance when people will make a mistake. A computer science PhD candidate at the University of Arizona, Federico Cirett, has devised a way to predict human error with a high degree of accuracy.

The subject of the study is the math portion of the SAT exam. University students were hooked up to an electroencephalography scanner and instructed to take the test. Observers inspected the test-taker's EEG readout for specific brain wave activity indicating fatigue or tiredness. Different patterns can be classified in different ways; Cirett devised an algorithm that inspects the pattern and predicts whether the student is especially tired or fatigued. Certain brainwaves indicate a propensity to not concentrate very well, or a low cognitive workload – indicating a mistake is imminent. The algorithm is so successful that Cirett says it can detect which test-takers will make a mistake with 80% accuracy only 20 seconds after they have begun the problem.

The applications for such a technology are obviously immense. Even in everyday life, if it were possible to predict your foolish errors while, say, doing your taxes, or driving to work, it would be immensely helpful in nearly everyone's life. More importantly, receiving a warning when cognitive performance is dipping or concentration is waning would also prove invaluable for high-alert jobs such as air traffic controllers, who need to be on point and focused at all times as one simple mistake could cost hundreds of lives. The field of education would be revolutionized – teachers would finally be able to tell the exact moment when a student messes up or makes a mistake. Cirett says that the prediction process could prove most valuable for language learners and math students, as these fields are the most black and white when it comes to “right” and “wrong” answers. A new form of intelligent tutoring system could be developed from such a technology, teaching at the student's pace, catching errors before they even occur and rapidly increasing the pace of learning.

### Citations:

- Galan FC, Beal C. [EEG estimates of engagement and cognitive workload predict math problem solving outcomes.](#) *University of Arizona Dept of Computer Science*. 2012(indep.). No doi.