

Remote Brainwaves Predict Future Eureka Moment

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Real-world problems come in two broad flavors: those requiring sequential reasoning and those requiring transformative reasoning: a break from past thinking and restructuring followed by an insight (also known as Eureka or 'Aha!'), which is a process by which a problem solver abruptly, through a quantum leap of understanding with no conscious forewarning, moves from a state of not knowing how to solve a problem to a state of knowing how to solve it.

Despite its widespread reports, the brain mechanism underlying eureka is poorly understood. What happens in the brain during that particular moment? Is that moment purely sudden as often reported by the solver or is there any (neural) precursor to it? Can we predict whether and when, if at all, the solver will hit upon the final eureka moment?

In a new study led by Joydeep Bhattacharya at Goldsmiths, University of London, these questions were addressed by measuring brainwaves of human participants as they attempted to solve puzzles or brainteasers that call for intuitive strategies and novel insight. They detected an array of specific patterns in characteristic brainwaves which occurred several (up to 8) seconds before the participant was consciously aware of an insight. Right hemisphere was further found to be critically involved in transformative reasoning.

These results indicate that insight is a distinct spectral, spatial, and temporal pattern of unconscious neural activity corresponding to pre-solution cognitive processes, and not to one's self-assessment of their

insight or the emotional “Aha!” that accompanies problem solution. Further, this study also postulates that consciousness is like an emergent tip of an iceberg of neuronal information processing, and remote brainwave patterns could reveal the underlying structure leading to that emergence.

The study was done in collaboration with Bhavin Sheth at the University of Houston and with Simone Sandkühler from the Austrian Academy of Sciences.

Citation: Sheth BR, Sandkühler S, Bhattacharya J (2008) “Posterior beta and anterior gamma oscillations predict cognitive insight.” *Journal of Cognitive Neuroscience*.

Source: Goldsmiths, University of London

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