FAST BREAKING PAPERS - 2009

August 2009

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Rex E. Jung & Richard J. Haier talk with *ScienceWatch.com* and answer a few questions about this month's Fast Breaking Paper in the field of Neuroscience & Behavior. The authors have also sent along an image of their work.

Article Title: The Parieto-Frontal Integration Theory (P-FIT) of intelligence: Converging neuroimaging evidence
Authors: Jung, RE;Haier, RJ
Journal: BEHAV BRAIN SCI
Volume: 30
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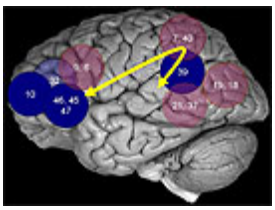
SW: Why do you think your paper is highly cited?

For many years, research on the nature of intelligence was mostly limited to psychometric methods. We published the first neuro-imaging study of intelligence in 1988, and it showed intelligence test scores were correlated to regional brain function. This demonstrated that intelligence tests were tapping brain properties at a time when many researchers thought intelligence tests did not measure anything real or important.

There is now widespread and rapidly growing interest in using imaging technology to understand how brain structure and function are related to intelligence. Our *BBS* paper reviewed the state-of-the-art based on 37 studies and proposed a specific neuro-anatomical model of intelligence with testable predictions. Many groups now engaged in neuro-intelligence research cite it as a rationale for hypotheses.

[+] enlarge



Brain regions by Brodmann area (BA) associated with better performance on measures of intelligence and

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The brain imaging studies of intelligence we reviewed used various structural and functional imaging techniques and a variety of intelligence measures. We synthesized the common results across these disparate studies and found more consistency than we thought

we would.

SW: Would you summarize the significance of your paper in layman's terms?

Intelligence is one of the most profound aspects of the human brain. Understanding how intelligence comes from brain properties potentially can lead to treatments for mental retardation, optimal education strategies for children, and even methods for enhancing cognition and intelligence. Our paper sets out a model for such research.

reasoning that define the P-FIT model. Numbers ¼ BAs; dark circles ¼ predominant left hemisphere associations; light circles ¼ predominant bilateral associations; white arrow ¼ arcuate fasciculus.

View/download the accompanying published paper.

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SW: How did you become involved in this research, and were there any problems along the way?

We both are interested in individual differences and why some people learn faster, remember more, and reason better than others. Intelligence is a key factor underlying such differences. Brain imaging is a powerful tool for linking such differences to brain properties. The major challenge was the negative view many people held of intelligence tests, but this has changed dramatically as more imaging research shows that the test scores are related to the brain.

SW: Where do you see your research leading in the future?

Once we understand more about the neural basis of intelligence, we can develop ways to intervene in key processes whether during brain development in childhood or later in life when aging and disease disrupt brain processes. The more effective these interventions become, the more discussion will be needed about issues concerning access, cost, and appropriateness, especially if interventions benefit people without brain injury, disease, or disability.

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KEYWORDS: DIFFUSION TENSOR IMAGING (DTI); FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI); G; GENOMICS; INTELLIGENCE; IQ; MAGNETIC RESONANCE SPECTROSCOPY (MRS); POSITRON EMISSION TOMOGRAPHY (PET); REASONING; STRUCTURAL MAGNETIC RESONANCE IMAGING (SMRI); VOXEL-BASED MORPHOMETRY (VBM).

PDF

back to top

2009 : August 2009 - Fast Breaking Papers : Rex E. Jung & Richard J. Haier

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