

# Independent of IQ, 'decision acuity' predicts broad range of decision-making abilities

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A common factor called "decision acuity" underpins diverse decision-making abilities in adolescents and young adults, suggests a study appearing May 20th in the journal *Neuron*. A large set of behavioral and

neuroimaging data revealed that decision acuity is stable over time, distinct from IQ, and reduced in individuals with low general social functioning.

"We describe a new cognitive construct that captures global [decision](#)-making ability across multiple domains," says senior study author Raymond Dolan of University College London. "This construct may be important for understanding mental health, particularly regarding poor social function and aberrant thought patterns."

Decision-making is a [cognitive process](#) that plays a central role in a range of daily life activities. But relatively little is known about the neural underpinnings of decision-making ability in adolescence and early adulthood—a crucial period for brain maturation and the emergence of many psychiatric disorders. "There is an increasing urgency in understanding the neural basis of cognitive development in young people, including its relationship with brain connectivity," says co-first author Michael Moutoussis of University College London.

To address this need, the researchers administered seven decision-making tasks to 830 individuals, who ranged in age from 14 to 24 years old. These tasks were able to measure sensitivity to gains and losses, the propensity to take risks and exhibit impulsivity, and the ability to make beneficial social judgements. The researchers extracted 32 decision-making measures from these tasks and identified a common underlying dimension named "decision acuity."

High decision acuity reflected factors such as fast learning, considering outcomes in the distant future, reward sensitivity, trust in others, and low propensity for retaliation. Independent of IQ, decision acuity predicted performance in the decision-making tasks, was higher in older subjects, and increased with parental education. In addition, decision acuity remained stable over time among 571 of the original participants who

were re-tested on the same behavioral tasks 18 months later.

The researchers also evaluated the subjects' self-reported psychological dispositions and mental-health symptoms. High decision acuity was most strongly linked to better social functioning. Although decision acuity was associated with aberrant thinking, this relationship wasn't statistically significant when sociality was taken into account.

Using [functional magnetic resonance](#) imaging, the researchers next explored the neural basis of decision acuity for 295 participants who had no history or signs of psychiatric disorders. Their brain activity was measured while they were resting and performing no explicit task. Independent of IQ, decision acuity predicted patterns of correlated activity among opercular cortex, [posterior cingulate cortex](#), and somatosensory and motor areas—brain regions previously linked to decision-making. This result remained stable among the 223 subjects who were re-tested 18 months later.

The study limitations include low retention rate and the potential of self-selection biases introduced by the reliance on volunteers. In addition, the self-reported symptoms do not reflect diagnosable clinical disorders.

"Further research is needed to trace the pathways between decision acuity, adaptive social function, and psychiatric symptoms, especially as poor social functioning may confer a greater functional impact to psychiatric symptoms," Dolan says. "Crucially, studies informed by the associations found here can be extended to clinical populations to assess the generality of the findings, as well as determine if decision acuity might inform diagnosis and treatment plans for individual psychiatric patients."

**More information:** *Neuron*, Moutoussis et al.: "Decision making ability, psychopathology, and brain connectivity"

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