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Well-established views on heritable intelligence brought down: Genes and environment play dynamic role together

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The well-established view that intelligence is largely genetically fixed and hardly malleable has been discarded. A team of Dutch research methodologists at VU University Amsterdam, the University of Amsterdam and Tilburg University propose that the high heritability of intelligence stems from a dynamic interplay between genes and environment that takes place throughout the course of development. The interplay results in individual differences in knowledge and skills, and in this way differences in intelligence arise. The role of education, culture, and society is crucial in this process; they enable genetic effects to arise. The larger the environmental influences, the larger the genetic effects. Their paper will be published in the upcoming edition of *Psychological Science*.

Empirical results contradict mainstream intelligence theories

Research methodologists Kees-Jan Kan, Jelte Wicherts, Conor Dolan en Han van der Maas investigated how well intelligence theories actually predict empirical results. To this end, they listed the predictions from mainstream intelligence theories and collected relevant results that have been published in the scientific literature over the last decades, and which pertained to intelligence test scores from thousands of subjects across the world.

The team showed that on essential aspects empirical results were opposite of the predictions from mainstream theories of intelligence. Surprisingly, it also turned out that the larger the genetic influences on completing intelligence tests are, the larger is also the dependency on education and culture. Heritability estimates of clearly culture-depended knowledge and skills, such as vocabulary, spelling, and general knowledge, are the highest among all abilities that are measured by intelligence test batteries, hence higher than heritability estimates of less culture-depended abilities such as working memory, spatial ability, reasoning, and processing speed. This pattern did not follow from mainstream theories of intelligence, in which intelligence is interpreted as a biological trait.

The old idea: nature versus nurture

Scientists know that both genes (nature) and environmental influences (nurture) affect intelligence. Yet the role of genes is considered more important. The latter is based on the finding that in adulthood individual differences in intelligence are about 80% heritable and the thought that 'therefore' the remaining 20% must be due to environmental influences. In part because of this high heritability, mainstream theories interpret intelligence as a biological trait that is largely genetically fixed and hardly malleable by environment and education. Noteworthy, it is unknown what this biological trait should be.

'Findings ask for a different interpretation'

"Current theories of intelligence do not explain our findings", says Kees-Jan Kan, biological psychologist at VU University's Department of Psychology and Education. "We need to get rid of the reasoning that because intelligence is highly heritable, it is therefore hardly malleable by environmental factors. This invalid reasoning has been pointed out

before, but our research clearly indicates that empirical findings ask for a different interpretation of intelligence. Differences in vocabulary are the most heritable, but that does not imply that vocabulary is hardly malleable by environment. Simply educate people in a different language or raise them in a different culture and their vocabulary develops radically different ."

Heritability estimates have been based on a model in which genetic and environmental influences are independent from another. There lies a problem, because those influences do go together. The team concludes that relations between genetic and environmental influences on intelligence deserve more attention from the scientific community.

More information: The paper 'On the Nature and Nurture of Intelligence and Specific Cognitive Abilities: The More Heritable, the More Culture-Dependent' will be published in the upcoming edition of *Psychological Science*. pss.sagepub.com/content/early/ … 97613493292.abstract

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