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Intelligence and educational achievement

Volume 35, Issue 1, January 2007, Pages 13-21
Deary, I.J. | Strand, S. | Smith, P. | Fernandes, C.

This 5-year prospective longitudinal study of 70,000 + English children examined the association between psychometric intelligence at age 11 years and educational achievement in national examinations in 25 academic subjects at age 16. The correlation between a latent intelligence trait (Spearman's g from CAT2E) and a latent trait of educational achievement (GCSE scores) was 0.81. General intelligence contributed to success on all 25 subjects. Variance accounted for ranged from 58.6% in Mathematics and 48% in English to 18.1% in Art and Design. Girls showed no advantage in g , but performed significantly better on all subjects except Physics. This was not due to their better verbal ability. At age 16, obtaining five or more GCSEs at grades A*-C is an important criterion. 61% of girls and 50% of boys achieved this. For those at the mean level of g at age 11, 58% achieved this; a standard deviation increase or decrease in g altered the values to 91% and 16%, respectively. © 2006 Elsevier Inc. All rights reserved.

Spatial abilities at different scales: Individual differences in aptitude-test performance and spatial-layout learning

Volume 34, Issue 2, March 2006, Pages 151-176
Hegarty, M. | Montello, D.R. | Richardson, A.E. | Ishikawa, T. | Lovelace, K.

Most psychometric tests of spatial ability are paper-and-pencil tasks at the "figural" scale of space, in that they involve inspecting, imagining or mentally transforming small shapes or manipulable objects. Environmental spatial tasks, such as wayfinding or learning the layout of a building or city, are carried out in larger spaces that surround the body and involve integration of the sequence of views that change with one's movement in the environment. In a correlational study, 221 participants were tested on psychometric measures of spatial abilities, spatial updating, verbal abilities and working memory. They also learned the layout of large environments from direct experience walking through a real environment, and via two different media: a desktop virtual environment (VE) and a videotape of a walk through an environment. In an exploratory factor analysis, measures of environmental learning from direct experience defined a separate factor from measures of learning based on VE and video media. In structural-equation models, small-scale spatial abilities predicted performance on the environmental-learning tasks, but were more predictive of learning from media than from direct experience. The results indicate that spatial abilities at different scales of space are partially but not totally dissociated. They specify the degree of overlap between small-scale and large-scale spatial abilities, inform theories of sex differences in these abilities, and provide new insights about what these abilities have in common and how they differ. © 2005 Elsevier Inc. All rights reserved.

Executive functioning in children, and its relations with reasoning, reading, and arithmetic

Volume 35, Issue 5, September 2007, Pages 427-449
van der Sluis, S. | de Jong, P.F. | van der Leij, A.

The aims of this study were to investigate whether the executive functions, inhibition, shifting, and updating, are distinguishable as latent variables (common factors) in children aged 9 to 12, and to examine the relations between these executive functions and reading, arithmetic, and (non)verbal reasoning. Confirmatory factor analysis was used to decompose variance due to the executive and the non-executive processing demands of the executive tasks. A Shifting factor and an Updating factor, but not an Inhibition factor, were distinguishable after controlling for non-executive variance. Updating was related to reading, arithmetic, and (non)verbal reasoning. Shifting was mainly related to non-verbal reasoning and reading. However, in terms of variance explained, arithmetic and reading were primarily related to the non-executive processing demands of the executive measures. The results are discussed in light of the "task impurity problem". © 2006 Elsevier Inc. All rights reserved.

Predicting school achievement from general cognitive ability, self-perceived ability, and intrinsic value

Volume 34, Issue 4, July 2006, Pages 363-374
Spinath, B. | Spinath, F.M. | Harlaar, N. | Plomin, R.

The present study examined the extent to which motivation contributes to the prediction of school achievement among elementary school children beyond general mental ability (g). The sample consisted of $N = 1678$ nine-year-old UK elementary school children who took part in the Twins Early Development Study (TEDS). Teachers provided achievement assessments according to the UK National Curriculum criteria for Mathematics, English, and Science, and pupils reported their ability self-perceptions and intrinsic values for these subjects. For all three domains, g proved to be the strongest, and, in the case of Science, the only predictor of school achievement. However, in Mathematics and English, children's ability self-perceptions as well as intrinsic values each contributed incrementally to the prediction of achievement beyond g , with ability self-perceptions being a better predictor than intrinsic values. Finally, commonality analyses revealed a substantial portion of common variance in school achievement explained both by g and motivation. In the light of these results it is argued that the study of motivation offers valuable clues for the understanding and improvement of school achievement. © 2006 Elsevier Inc. All rights reserved.

Intelligence and socioeconomic success: A meta-analytic review of longitudinal research

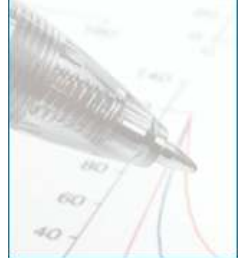
Volume 35, Issue 5, September 2007, Pages 401-426
Strenze, T.

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The relationship between intelligence and socioeconomic success has been the source of numerous controversies. The present paper conducted a meta-analysis of the longitudinal studies that have investigated intelligence as a predictor of success (as measured by education, occupation, and income). In order to better evaluate the predictive power of intelligence, the paper also includes meta-analyses of parental socioeconomic status (SES) and academic performance (school grades) as predictors of success. The results demonstrate that intelligence is a powerful predictor of success but, on the whole, not an overwhelmingly better predictor than parental SES or grades. Moderator analyses showed that the relationship between intelligence and success is dependent on the age of the sample but there is little evidence of any historical trend in the relationship. © 2006 Elsevier Inc. All rights reserved.

[CHC theory and the human cognitive abilities project: Standing on the shoulders of the giants of psychometric intelligence research](#)

Volume 37, Issue 1, January 2009, Pages 1-10
McGrew, K.S.

During the past decade the Cattell-Horn Gf-Gc and Carroll Three-Stratum models have emerged as the consensus psychometric-based models for understanding the structure of human intelligence. Although the two models differ in a number of ways, the strong correspondence between the two models has resulted in the increased use of a broad umbrella term for a synthesis of the two models (Cattell-Horn-Carroll theory of cognitive abilities-CHC theory). The purpose of this editorial is three-fold. First, I will describe the CHC framework and recommend that intelligence researchers begin using the CHC taxonomy as a common nomenclature for describing research findings and a theoretical framework from which to test hypotheses regarding various aspects of human cognitive abilities. Second, I argue that the emergence of the CHC framework should not be viewed as the capstone to the psychometric era of factor analytic research. Rather, I recommend the CHC framework serve as the stepping stone to reinvigorate the investigation of the structure of human intelligence. Finally, the Woodcock-Muñoz Foundation Human Cognitive Abilities (HCA) project, which is an evolving, free, on-line electronic archive of the majority of datasets analyzed in Carroll's (1993) seminal treatise on factor analysis of human cognitive abilities, is introduced and described. Intelligence scholars are urged to access the Carroll HCA datasets to test and evaluate structural models of human intelligence with contemporary methods (confirmatory factor analysis). In addition, suggestions are offered for linking the analysis of contemporary data sets with the seminal work of Carroll. The emergence of a consensus CHC taxonomy and access to the original datasets analyzed by Carroll provides an unprecedented opportunity to extend and refine our understanding of human intelligence. © 2008 Elsevier B.V. All rights reserved.

[Temperature, skin color, per capita income, and IQ: An international perspective](#)

Volume 34, Issue 2, March 2006, Pages 121-128
Templer, D.I. | Arikawa, H.

The impetus for our study was the contention of both Lynn and Rushton that persons in colder climates tend to have higher IQs than persons in warmer climates. We correlated mean IQ of 129 countries with per capita income, skin color, and winter and summer temperatures, conceptualizing skin color as a multigenerational reflection of climate. The highest correlations were -0.92 ($\rho=-0.91$) for skin color, -0.76 ($\rho=-0.76$) for mean high winter temperature, -0.66 ($\rho=-0.68$) for mean low winter temperature, and 0.63 ($\rho=0.74$) for real gross domestic product per capita. The correlations with population of country controlled for are almost identical. Our findings provide strong support for the observation of Lynn and of Rushton that persons in colder climates tend to have higher IQs. These findings could also be viewed as congruent with, although not providing unequivocal evidence for, the contention that higher intelligence evolves in colder climates. The finding of higher IQ in Eurasians than Africans could also be viewed as congruent with the position of Diamond (1997) that knowledge and resources are transmitted more readily on the Eurasian west-east axis. © 2005 Elsevier Inc. All rights reserved.

[The Rainbow Project: Enhancing the SAT through assessments of analytical, practical, and creative skills](#)

Volume 34, Issue 4, July 2006, Pages 321-350
Sternberg, R.J.

This article describes the formulation and execution of the Rainbow Project, Phase I, funded by the College Board. Past data suggest that the SAT is a good predictor of performance in college. But in terms of the amount of variance explained by the SAT, there is room for improvement, as there would be for virtually any single test battery. Phase I of the Rainbow Project, described here, uses Sternberg's triarchic theory of successful intelligence as a basis to provide a supplementary assessment of analytical skills, as well as tests of practical and creative skills, to augment the SAT in predicting college performance. This assessment is delivered through a modification of the Sternberg Triarchic Abilities Test (STAT) and the development of new assessment devices. Results from Phase I of the Rainbow Project support the construct validity of the theory of successful intelligence and suggest its potential for use in college admissions as an enhancement to the SAT. In particular, the results indicated that the triarchically based Rainbow measures enhanced predictive validity for college GPA relative to high school grade point average (GPA) and the SAT and also reduced ethnic group differences. The data suggest that measures such as these potentially could increase diversity and equity in the admissions process. © 2006 Elsevier Inc. All rights reserved.

[Sex differences in mental abilities: g masks the dimensions on which they lie](#)

Volume 35, Issue 1, January 2007, Pages 23-39
Johnson, W. | Bouchard Jr., T.J.

Empirical data suggest that there is at most a very small sex difference in general mental ability, but men clearly perform better on visuospatial tasks while women clearly perform better on tests of verbal usage and perceptual speed. In this study, we integrated these overall findings with predictions based on the Verbal-



Perceptual-Rotation (VPR) model ([Johnson, W., and Bouchard, T. J. (2005a). Constructive replication of the visual-perceptual-image rotation (VPR) model in Thurstone's (1941) battery of 60 tests of mental ability. *Intelligence*, 33, 417-430.; Johnson, W., and Bouchard, T. J. (2005b). The structure of human intelligence: It's verbal, perceptual, and image rotation (VPR), not fluid and crystallized. *Intelligence*, 33, 393-416.]) of the structure of mental abilities. We examined the structure of abilities after removing the effects of general intelligence, identifying three underlying dimensions termed rotation-verbal, focus-diffusion, and memory. Substantial sex differences appeared to lie along all three dimensions, with men more likely to be positioned towards the rotation and focus poles of those dimensions, and women displaying generally greater memory. At the level of specific ability tests, there were greater sex differences in residual than full test scores, providing evidence that general intelligence serves as an all-purpose problem solving ability that masks sex differences in more specialized abilities. The residual ability factors we identified showed strong genetic influences comparable to those for full abilities, indicating that the residual abilities have some basis in brain structure and function. © 2006 Elsevier Inc. All rights reserved.

[Still just 1 g: Consistent results from five test batteries](#)

Volume 36, Issue 1, January 2008, Pages 81-95
Johnson, W. | Nijenhuis, J.t. | Bouchard Jr., T.J.

In a recent paper, Johnson, Bouchard, Krueger, McGue, and Gottesman (2004) addressed a long-standing debate in psychology by demonstrating that the g factors derived from three test batteries administered to a single group of individuals were completely correlated. This finding provided evidence for the existence of a unitary higher-level general intelligence construct whose measurement is not dependent on the specific abilities assessed. In the current study we constructively replicated this finding utilizing five test batteries. The replication is important because there were substantial differences in both the sample and the batteries administered from those in the original study. The current sample consisted of 500 Dutch seamen of very similar age and somewhat truncated range of ability. The batteries they completed included many tests of perceptual ability and dexterity, and few verbally oriented tests. With the exception of the g correlations involving the Cattell Culture Fair Test, which consists of just four matrix reasoning tasks of very similar methodology, all of the g correlations were at least .95. The lowest g correlation was .77. We discuss the implications of this finding. © 2007 Elsevier Inc. All rights reserved.

[Working memory and intelligence are highly related constructs, but why?](#)

Volume 36, Issue 6, November 2008, Pages 584-606
Colom, R. | Abad, F.J. | Quiroga, M.Á. | Shih, P.C. | Flores-Mendoza, C.

Working memory and the general factor of intelligence (g) are highly related constructs. However, we still don't know why. Some models support the central role of simple short-term storage, whereas others appeal to executive functions like the control of attention. Nevertheless, the available empirical evidence does not suffice to get an answer, presumably because relevant measures are frequently considered in isolation. To overcome this problem, here we consider concurrently simple short-term storage, mental speed, updating, and the control of attention along with working memory and intelligence measures, across three separate studies. Several diverse measures are administered to a total of 661 participants. The findings are consistent with the view that simple short-term storage largely accounts for the relationship between working memory and intelligence. Mental speed, updating, and the control of attention are not consistently related to working memory, and they are not genuinely associated with intelligence once the short-term storage component is removed. © 2008 Elsevier Inc. All rights reserved.

[Predicting academic achievement with cognitive ability](#)

Volume 35, Issue 1, January 2007, Pages 83-92
Rohde, T.E. | Thompson, L.A.

The purpose of the present study is to explain variation in academic achievement with general cognitive ability and specific cognitive abilities. Grade point average, Wide Range Achievement Test III scores, and SAT scores represented academic achievement. The specific cognitive abilities of interest were: working memory, processing speed, and spatial ability. General cognitive ability was measured with the Raven's Advanced Progressive Matrices and the Mill Hill Vocabulary Scales. When controlling for working memory, processing speed, and spatial ability, in a sample of 71 young adults (29 males), measures of general cognitive ability continued to add to the prediction of academic achievement, but none of the specific cognitive abilities accounted for additional variance in academic achievement after controlling for general cognitive ability. However, processing speed and spatial ability continued to account for a significant amount of additional variance when predicting scores for the mathematical portion of the SAT while holding general cognitive ability constant. © 2006 Elsevier Inc. All rights reserved.

[Males have greater g: Sex differences in general mental ability from 100,000 17- to 18-year-olds on the Scholastic Assessment Test](#)

Volume 34, Issue 5, September 2006, Pages 479-486
Jackson, D.N. | Rushton, J.P.

In this study we found that 17- to 18-year old males averaged 3.63 IQ points higher than did their female counterparts on the 1991 Scholastic Assessment Test (SAT). We analysed 145 item responses from 46,509 males and 56,007 females (total N = 102,516) using a principal components procedure. We found (1) the g factor underlies both the SAT Verbal (SAT-V) and the SAT Mathematics (SAT-M) scales with the congruence between these components greater than 0.90; (2) the g components predict undergraduate grades better than do the traditionally used SAT-V and SAT-M scales; (3) the male and the female g factors are congruent in excess of .99; (4) male-female differences in g have a point-biserial effect size of 0.12 favoring males (equivalent to 3.63 IQ points); (5) male-female differences in g are present throughout the entire distribution of scores; (6) male-female differences in g are found at every socioeconomic level; and (7) male-female differences in g are found across several ethnic groups. We conclude that while the magnitude of the

male-female difference in g is not large, it is real and non-trivial. Finally, we discuss some remaining sex-difference/brain-size/IQ anomalies. © 2006 Elsevier Inc. All rights reserved.

National differences in intelligence and educational attainment

Volume 35, Issue 2, March 2007, Pages 115-121

Lynn, R. | Mikk, J.

We examine the correlations between the national IQs of Lynn and Vanhanen (Lynn, R. and Vanhanen, T. (2002). *IQ and the wealth of nations*. Westport, CT: Praeger. Westport, CT: Praeger, Lynn, R. and Vanhanen, T. (2006). *IQ and global inequality*. Athens, GA: Washington Summit Books.) and educational attainment scores in math and science for 10- and 14-year olds in 25 countries and 46 countries (respectively) given in the TIMSS 2003 reports. It was found that national IQs had (attenuation corrected) correlations of between 0.92 and 1.00 with scores in math and science. The results are interpreted as a validation of the national IQs. They suggest that national differences in educational attainment may be attributable to differences in IQ, or alternatively that national IQs and in educational attainment are both indicators of the mental ability of national populations. It is also shown that national IQs are positively associated with national per capita income ($r = .61$). It is proposed that these have a reciprocal positive feedback relationship such that each augments the other. © 2006 Elsevier Inc. All rights reserved.

Is there a validity increment for tests of emotional intelligence in explaining the variance of performance criteria?

Volume 34, Issue 5, September 2006, Pages 459-468

Amelang, M. | Steinmayr, R.

Emotional intelligence (EI) has often been criticized to measure nothing more than intelligence and personality. Recent studies have shown that EI has an incremental validity concerning life outcome criteria, but inconsistent results have been found for achievement criteria. Two studies were conducted to examine if EI could predict achievement above and beyond intelligence and conscientiousness. In the first study, a sample of students ($N = 227$, age range = 17-20 years, $M = 17.02$, $S.D. = 0.77$) were recruited and school performance served as an achievement criteria. In the second study, education, social status of profession, and average income were taken as vocational performance criteria and examined in a sample of employed adults ($N = 207$, age range = 27-43 years, $M = 33.82$, $S.D. = 3.96$) from the local community. By means of structural equation modelling, the data of both samples were separately tested for sex differences as well as for a validity increment of EI. In both samples, EI could not explain any variance in the criteria beyond psychometric intelligence and conscientiousness. The tests for sex differences only showed sex-specific convergent validity of EI in the student sample, providing useful information on the developmental aspect of EI. © 2006 Elsevier Inc. All rights reserved.

Revisiting the dedifferentiation hypothesis with longitudinal multi-cohort data

Volume 35, Issue 4, July 2007, Pages 381-392

de Frias, C.M. | Lövdén, M. | Lindenberger, U. | Nilsson, L.-G.

The present longitudinal multi-cohort study examines whether interindividual variability in cognitive performance and change increases in old age, and whether associations among developments of different cognitive functions increase with adult age. Multivariate multiple-group latent growth modeling was applied to data from narrow cohorts separated by five years of age. Tests assessing episodic recall, semantic knowledge, semantic fluency, and visuospatial ability were administered to 1000 non-demented adults (initially aged 35-80 years), participating in the Betula Project at three occasions over a 10-year period. Greater interindividual differences in change were noted in older age groups. Age-related increases in correlations among performance scores were noted for different cognitive measures beginning in old age, but not earlier. Our study supports a dynamic view of dedifferentiation of cognitive aging. © 2006 Elsevier B.V. All rights reserved.

Secular declines in cognitive test scores: A reversal of the Flynn Effect

Volume 36, Issue 2, March 2008, Pages 121-126

Teasdale, T.W. | Owen, D.R.

Scores on cognitive tests have been very widely reported to have increased through the decades of the last century, a generational phenomenon termed the 'Flynn Effect' since it was most comprehensively documented by James Flynn in the 1980's. There has, however, been very little evidence concerning any continuity of the effect specifically into the present century. We here report data from a population, namely young adult males in Denmark, showing that whereas there were modest increases between 1988 and 1998 in scores on a battery of four cognitive tests-these constituting a diminishing continuation of a trend documented back to the late 1950's-scores on all four tests declined between 1998 and 2003/2004. For two of the tests, levels fell to below those of 1988. Across all tests, the decrease in the 5/6 year period corresponds to approximately 1.5 IQ points, very close to the net gain between 1988 and 1998. The declines between 1998 and 2003/4 appeared amongst both men pursuing higher academic education and those not doing so. © 2007 Elsevier Inc. All rights reserved.

Working memory, short-term memory, and naming speed as predictors of children's mathematical performance

Volume 35, Issue 2, March 2007, Pages 151-168

Swanson, L. | Kim, K.

Working memory (WM) has been associated with the acquisition of arithmetic skills, however, the components of WM that underlie this acquisition have not been explored. This study explored the contribution of two WM systems (the phonological loop and the central executive) to mathematical performance in young children.

The results showed that a two-factor structure separating short-term memory (STM) and WM tasks predicted individual differences in mathematical performance. WM was independent of the contribution of STM and naming speed in predicting children's mathematical performance. However, these basic capacities correlated substantially with the math performance factor, and jointly accounted for over 74% of the Math Performance factor. The results were interpreted as support for the notion that both the central executive system (controlled attention) and storage system of WM predict children's math performance. © 2006 Elsevier Inc. All rights reserved.

[The quest for quantitative trait loci associated with intelligence](#)

Volume 34, Issue 6, November 2006, Pages 513-526
Plomin, R. | Kennedy, J.K.J. | Craig, I.W.

Progress towards identifying quantitative trait loci (QTLs) for complex traits like intelligence and common disorders like mental retardation has been slower than expected. An important factor is that most QTL effects may be much smaller than expected-not just 1% effect sizes but perhaps effects as small as .1%. If so, this would mean that studies have been seriously underpowered to detect and to replicate QTL effects. We have used microarrays to genotype DNA pooled for groups of low versus high intelligence in order to screen very large numbers of single nucleotide polymorphisms (SNPs) on very large samples in the quest for QTLs of very small effect size: We find no effect sizes greater than .5%. Microarrays with 500,000 SNPs are now available that facilitate genomewide scans which will make it possible to identify nearly all SNP associations that account for 1% of the variance of intelligence-if there are any QTL effect sizes as large as 1%. © 2006 Elsevier Inc. All rights reserved.

[Sex differences in mental rotation and spatial visualization ability: Can they be accounted for by differences in working memory capacity?](#)

Volume 35, Issue 3, May 2007, Pages 211-223
Kaufman, S.B.

Sex differences in spatial ability are well documented, but poorly understood. In order to see whether working memory is an important factor in these differences, 50 males and 50 females performed tests of three-dimensional mental rotation and spatial visualization, along with tests of spatial and verbal working memory. Substantial differences were found on all spatial ability and spatial working memory tests (that included both a spatial and verbal processing component). No significant differences were found in spatial short-term memory or verbal working memory. In addition, spatial working memory completely mediated the relationship between sex and spatial ability, but there was also a direct effect of sex on the unique variance in three-dimensional rotation ability, and this effect was not mediated by spatial working memory. Results are discussed in the context of research on working memory and intelligence in general, and sex differences in spatial ability more specifically. © 2006 Elsevier Inc. All rights reserved.

[The phenotypic and genotypic relation between working memory speed and capacity](#)

Volume 34, Issue 6, November 2006, Pages 549-560
Polderman, T.J.C. | Stins, J.F. | Posthuma, D. | Gosso, M.F. | Verhulst, F.C. | Boomsma, D.I.

This study examined the phenotypic and genotypic relationship between working memory speed (WMS) and working memory capacity (WMC) in 12-year-old twins and their siblings ($N = 409$). To assess WMS all children performed a reaction time task with three memory loads from which a basic mental speed measure and the derived slope were used. WMC was measured with two subtests of the WISC-R, namely Arithmetic and Digit Span. The phenotypic correlations among the WMS and WMC indices were around -0.30 . Heritabilities for all variables ranged from 43% to 56%. Structural equating modelling revealed that a model with two genetic factors, representing WMS and WMC, which were correlated (-0.54) fitted the data best, indicating that WMS and WMC are partly mediated by the same set of genes and partly by separate sets of genes. When general IQ was simultaneously analysed with the data the correlation between the genetic factors for WMS and WMC decreased (-0.25), but was still significant. This means that $\sim 50\%$ of the genetic correlation between WMS and WMC is explained by IQ. © 2006 Elsevier Inc. All rights reserved.

[Relevance of education and intelligence at the national level for the economic welfare of people](#)

Volume 36, Issue 2, March 2008, Pages 127-142
Rindermann, H.

Cognitive abilities are important for the economic and non-economic success of individuals and societies. For international analyses, the collection of IQ-measures from Lynn and Vanhanen was supplemented and meliorated by data from international student assessment studies (IEA-Reading, TIMSS, PISA, PIRLS). The cognitive level of a nation is highly correlated with its educational level ($r = .78$, $N = 173$). In international comparisons, it also shows a high correlation with gross domestic product (GDP, $r = .63$, $N = 185$). However, in cross-sectional studies, the causal relationship between intelligence and national wealth is difficult to determine. In longitudinal analyses with various samples of nations, education and cognitive abilities appear to be more important as developmental factors for GDP than economic freedom. Education and intelligence are also more relevant to economic welfare than vice versa, but at the national level the influence of economic wealth on cognitive development is still substantial. © 2007 Elsevier Inc. All rights reserved.

[Estimating state IQ: Measurement challenges and preliminary correlates](#)

Volume 34, Issue 6, November 2006, Pages 607-619
McDaniel, M.A.

The purpose of this study is threefold. First, an estimate of state IQ is derived and its strengths and limitations are considered. To that end, an indicator of downward bias in estimating state IQ is provided. Two preliminary causal models are offered that predict state IQ. These models were found to be highly predictive

of state IQ, yielding multiple R's of 0.83 and 0.89. Second, the extent to which state IQ predicts state outcome variables (e.g., gross state product, health, violent crime, and government effectiveness) is estimated. State IQ shows positive correlations with gross state product, health, and government effectiveness and negative correlations with violent crime. These results are consistent with the extent to which IQ predicts outcomes at the level of the individual. Third, a research agenda is provided for improving estimates of state IQ, identifying factors that cause differences in state IQ, and delineating the role of IQ in predicting important variables. © 2006 Elsevier Inc. All rights reserved.

[Historical increase in the number of factors measured by commercial tests of cognitive ability: Are we overfactoring?](#)

Volume 35, Issue 2, March 2007, Pages 169-182

Frazier, T.W. | Youngstrom, E.A.

A historical increase in the number of factors purportedly measured by commercial tests of cognitive ability may result from four distinct pressures including: increasingly complex models of intelligence, test publishers' desires to provide clinically useful assessment instruments with greater interpretive value, test publishers' desires to include minor factors that may be of interest to researchers (but are not clinically useful), and liberal statistical criteria for determining the factor structure of tests. The present study examined the number of factors measured by several historically relevant and currently employed commercial tests of cognitive abilities using statistical criteria derived from principal components analyses, and exploratory and confirmatory factor analyses. Two infrequently used statistical criteria, that have been shown to accurately recover the number of factors in a data set, Horn's parallel analysis (HPA) and Minimum Average Partial (MAP) analysis, served as gold-standard criteria. As expected, there were significant increases over time in the number of factors purportedly measured by cognitive ability tests ($r = .56$, $p = .030$). Results also indicated significant recent increases in the overfactoring of cognitive ability tests. Developers of future cognitive assessment batteries may wish to increase the lengths of the batteries in order to more adequately measure additional factors. Alternatively, clinicians interested in briefer assessment strategies may benefit from short batteries that reliably assess general intellectual ability. © 2006 Elsevier Inc. All rights reserved.

[Contextual analysis of fluid intelligence](#)

Volume 36, Issue 5, September 2008, Pages 464-486

Salthouse, T.A. | Pink, J.E. | Tucker-Drob, E.M.

The nature of fluid intelligence was investigated by identifying variables that were, and were not, significantly related to this construct. Relevant information was obtained from three sources: re-analyses of data from previous studies, a study in which 791 adults performed storage-plus-processing working memory tasks, and a study in which 236 adults performed a variety of working memory, updating, and cognitive control tasks. The results suggest that fluid intelligence represents a broad individual difference dimension contributing to diverse types of controlled or effortful processing. The analyses also revealed that very few of the age-related effects on the target variables were statistically independent of effects on established cognitive abilities, which suggests most of the age-related influences on a wide variety of cognitive control variables overlap with age-related influences on cognitive abilities such as fluid intelligence, episodic memory, and perceptual speed. © 2007 Elsevier Inc. All rights reserved.

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