International Society for Intelligence Research 2006

James McKeen Cattell

Program
Seventh Annual Conference
Hyatt, Fisherman's Wharf
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Acknowledgements

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Short Schedule for ISIR 2006
(#) = Page of Abstract

Time	Thursday, Dec. 14	Time	Friday, Dec. 15	Time	Saturday, Dec. 16
8:00-820	Gignac (28) Group Factors	8:00-8:20	te Nijenhuis (27) Empty Gains	8:00-820	Stough (61) MSCEIT Validity
8:20-840	Long (38) Sternberg and *g*	8:20-840	Beaujean (17) CNLSY79 and IRT	8:20-840	Downey (22) Smart or Persobable?
8:40-9:00	Visser 68) Gardner: *g* /Personality	8:40-9:00	Wicherts (70) Bright Future	8:40-9:00	Timoshanko (65) Brain Structure and EI
9:00-9:20	Miele (43) Media and Opinion	9:00-9:20	Lynn Discussant	9:00-9:20	Hansen (32) EI and Scholastic Apt.
9:20-9:40	Gottfredson (30) Dangerous Ideas	9:20-9:40	Rinderman (52) Intelligence and Politic	9:20-9:40	Ryan (55) Gifted and EI
9:40-10:00	Break	9:40-10:00	Break	9:40-10:00	Break
10:00-10:20	Irwing (34) Sex Diff. in WAIS-III	10:00-10:20	Hunt (33) Market Place for Intell.	10:00-10:20	Smieja (59) Cognitive Mech. & EI
10:20-10:40	Wicherts (57) Dutch WAIS-III	10:20-10:40	Condon (20) *g* -free Abilities	10:20-10:40	Zajenkowski (74) Personality and Intell.
10:40-11:00	Rushton (54) Sex Diff. in *g* from RT	10:40-11:00	Park (47) Creative Accomp.	10:40-11:00	Demetriou (21) Mind, Pers. & Emotion
11:00-11:20	Johnson (36) VPR Theory	11:00-11:20	Bates (14) Dance and IQ	11:00-11:20	Tucker-Drob (66) Contextual Analysis
11:20-11:40	Lynn (40) Evolution and Sex Diff.	11:20-11:40	Payne (48) Pitch and Work. Mem.	11:20-11:40	Pink (49) Working Memory
11:40-12:00	Discussion Wendy Johnson	11:40-12:00	Neubauer (45) g and Chess	11:40-12:00	Rabaglia (50) Written Language
12:00-1:30	Lunch	12:00-1:30	Lunch	12:00-1:30	Lunch
1:30-1:50	Arden (13) DNA Markers and *g*	1:30-1:50	Widaman (72) PKU and Prenatal Exp.	1:30-1:50	Bleske-Rechek (18) Advisor-Advisee Exp.
1:50-2:10	Reynolds (51) Sex Diff. in General . .	1:50-2:10	Rushton (53) *Microcephalin* and *g*	1:50-2:10	Webb (69) Work-Fanily Balance
2:10-2:30	Nyborg (46) NLSY and Sex Diff.	2:10-2:30	Haier (31) Gray Dist. And IQ	2:10-2:30	Martin (41) GAD and IQ
2:30-2:50	Keith (37) Sex Diff. and WJ III	2:30-2:50	Johnson (35) *g* -free Ability and Brain	2:30-2:50	Carlson (19) Dynamic Assessment
2:50-3:10	Ferriman (25) Math/Science Students	2:50-3:10	Wolf (60) Cranial Capacity Evol.	2:50-3:10	Fagan (24) SAT Too Long?
3:10-3:30	Break	3:10-3:30	Break	3:10-3:30	Break
3:30-4:30	Spec. Pres.-van der Maas (67) Mutualism	3:30-3:50	Beaujean (15) Math Based Chronom.	3:30-3:50	Firmin (26) Clinical Utility of RIAS
4:30-6:00	Dist. Contributor Inter. John Loehlin	3:50-4:10	McPherson (42) Game-Like Tests	3:50-4:10	Sefcek (56) IQ and Life History
6:00-7:30	Elsevier Reception	4:10-4:30	Luo (39) Lag in g	4:10-4:30	Gladden (29) Life History Psycho.
		4:30-4:50	Mouyi (44) Cognitive Process Web	4:30-4:50	Templer (64) Ruchton's K Theory
		5:00-6:00	Invited Speaker Dean Simonton (58)	4:50-5:10	Beaujean (15) Span, Race and IQ
				5:10-5:30	Templer (63) Skin Color & Continent

Symposia =Shaded

International Society for Intelligence Research (ISIR) Program
2006

(Numbers in parentheses refer to page of abstract)

All sessions will be in the C. J. Thayer Room with registration in the lobby.

Thursday, December 14, 2006

Papers (8:00-9:40): Misc.
Chair: Detterman

8:00-8:20　　Gignac (28)
　　　　　　Internal consistency reliability and higher-order modeling: Implications for
　　　　　　contentions that a lower-order group-factor is isomorphic with *g*.

8:20-8:40　　Long and Thompson (38)
　　　　　　The Sternberg Triarchic Abilities Test: Three separate types of intelligence or one
　　　　　　general factor.

8:40-9:00　　Visser, Ashton, and Vernon (68)
　　　　　　The general self-estimate factor: *g* or personality.

9:00-9:20　　Miele (43)
　　　　　　Surveying expert, media and public opinion on intelligence research.

9:20-9:40　　Gottfredson (30)
　　　　　　Dangerous ideas and safe zones.

9:40-10:00　　**Break**

Symposium (10:00-12:00): Sex Differences (57)
Chair: Wicherts and Irwing

10:00-10:20   Irwing (34)
Sex differences in *g*: An analysis of the US standardization sample of the WAIS-III.

10:20-10:40   Wicherts (57)
Modeling sex differences in the Dutch WAIS-III

10:40-11:00   Rushton (54)
Confirming sex differences in *g* from RTs.

11:00-11:20   Johnson and Bouchard (36)
Using VPR theory to link interests and abilities in males and females.

11:20-11:40   Lynn (40)
Evolutionary sex differences in intelligence.

11:40-12:00   Johnson
Discussant

12:00-1:30   **Lunch**

Papers (1:30-3:10): Sex Differences
Chair: Johnson

1:30-1:50   Arden, Harlaar, and Plomin (13)
A set of DNA markers is more strongly associated with g in boys than in girls.

1:50-2:10   Reynolds, Keith, Ridley, and Patel (51)
Sex differences in general and broad cognitive abilities for children and adolescents.

2:10-2:30   Nyborg, Albeck, and Hartmann (46)
Rasch probabilistic modeling of the NLSY97 study, using the computer adaptive form of the Armed Services Vocational Aptitude Battery (CAT-ASVAB97), confirms a significant male lead in general ability.

2:30-2:50   Keith and Reynolds (37)
Sex differences in latent general and broad cognitive abilities: Evidence from the WJ III.

2:50-3:10   Ferriman, Lubinski, and Benbow (25)
             Sex differences in personal views among the top math/science graduate students
             and the profoundly gifted.

3:10-3:30   **Break**

3:30-4:30   **Special Presentation**
             Introduced by Detterman
             van der Maas, Dolan, Grasman, Wicherts, Huizenga, Raijmakers (67)
             A dynamical model of general intelligence: The positive manifold of intelligence
             by mutualism.

5:00-6:00   **Distinguished Contributor Interview**
             John Loehlin
             Interviewed by David Lubinski

6:00-7:30   **Elsevier Reception**

Friday, December 15, 2006

Symposium (8:00-9:20): The Flynn Effect (27)
Chair: te Nijenhuis

8:00-8:20   te Nijenhuis and van der Flier (27)
             Gains in *g* and empty gains.

8:20-8:40   Beaujean (17)
             Using item response theory to assess the Lynn-Flynn effect: Results from the
             CNSLY79 sample.

8:40-9:00   Wicherts (70)
             The dark past, obscure present, and bright future of African IQ.

9:00-9:20   Lynn
             Discussant

Papers (9:20-11:00): Intelligence, Education, and Vocation
Chair: Bates

9:20-9:40   Rindermann (52)
             Relevance of education and intelligence at the national level for politics:
             Democracy, rule of law, and political liberty.

9:40-10:00   **Break**

10:00-10:20 Hunt and Madhyastha (33)
             The market place for intelligence.

10:20-10:40 Condon and Schroeder (20)
             Do g-free abilities correspond to vocational interests?

10:40-11:00 Park, Lubinski, and Benbow (47)
             Intellectual topography of creative accomplishements in the arts and sciences:
             Some antecedants to C. P. Snow's "two cultures".

Papers (11:00-12:00): Intelligence and Abilities
Chair: Hunt

11:00-11:20 Bates and Tully (14)
             Gardner, Spearman, and Darwin on the dance floor: IQ accounts for the
             association of fluctuating asymmetry with the dance ability.

11:20-11:40 Payne (48)
             Cognitive influences on pitch discrimination: Working memory capacity for
             active maintenance or active listening?

11:40-12:00 Neubauer, Grabner, and Stern (45)
             How much g is needed to play chess successfully? Psychometric and
             neurophysiological evidence.

12:00-1:30   **Lunch**

Papers (1:30-3:10): Intelligence and the Brain
Chair: Stough

1:30-1:50   Widaman (72)
             Timing of prenatal exposure to phenylalanine moderates effects of childhood
             intellectual outcomes.

1:50-2:10   Rushton, Vernon, and Bons (53)
              No evidence that the postulated brain regulator genes *Microcephalin* and *ASPM*
              are associated with general mental ability, head circumference, or altruism.

2:10-2:30   Haier, Jung, and Alkire (31)
              Mapping gray matter distibutions in high and average IQ groups.

2:30-2:50   Johnson, Jung, Colom, and Haier (35)
              Cognitive abilities independent of IQ correlate with regional brain structure.

2:50-3:10   Wolf and Figueredo (60)
              Hominid cranial capacity and global climate change over the past 205,000 years.

3:10-3:30   **Break**

Papers (3:30-4:50): Intelligence and Cognitive Processes
Chair: Brody

3:30-3:50   Beaujean, Firmin, Knoop, Frisby, Michonski, Berry, and Johsnon (15)
              Math based chronometric tasks: Factor structure and predictive efficacy.

3:50-4:10   McPherson and Burns (42)
              Computer-game-like tests of processing speed and visual working memory.

4:10-4:30   Luo (39)
              Developmental lags in processing speed and working memory in subaverage
              range of intelligence predominantly predict the lag in g.

4:30-4:50   Mouyi (44)
              Untangling the cognitive process web.

5:00 -5:30   **Invited Address**
              Introduced by Thomas Bouchard
              Dean Simonton (58)
              Historiometric assessments of intelligence.

Saturday, December 16, 2006

Symposium (8:00-9:40): Emotional Intelligence (23)
Chair: Stough

8:00-8:20   Stough, Erskine-Fowler, Timoshanko, Hansen, and Desfosses (61)
Examining the divergent and convergent validity of the Mayer Salovey Caruso
Emotional Intelligence Test (MSCEIT).

8:20-8:40   Downey, Lee, and Stough (22)
Predicting revenue: Is it a question of being smart, personable, or people smart?

8:40-9:00   Timoshanko, Desmond, Desfosses, Erskine-Fowler, and Stough (65)
The relationship between brain structure and emotional intelligence.

9:00-9:20   Hansen, Fraser, and Stough (32)
Examining the contribution of EI to scholastic aptitude in adolescents
independently of personality and cognitive ability.

9:20-9:40   Ryan, Stough, Downey, Care, and Griffin (55)
The influence of emotional intelligence on gifted and mainstream adolescents
academic achievement.

9:40-10:00   **Break**

Papers (10:00-11:00): Emotions, Personality, and Intelligence
Chair: Luo

10:00-10:20   Śmieja and Orzechowski (59)
Cognitive mechanisms of emotional intelligence.

10:20-10:40   Zajenkowski (74)
The influence of personality on intelligence.

10:40-11:00   Demetriou (21)
Mind, personality, and emotions: Deciphering their relations.

Symposium (11:00-12:00): Aging (12)
Chair: Tucker-Drob

11:00-11:20   Tucker-Drob, Rabaglia, Pink, and Salthouse (66)
"Contextual" analysis of cognitive abities.

11:20-11:40   Pink, Tucker-Drob, and Salthouse (49)
               An analysis of working memory in the context of reference cognitive abilities.

11:40-12:00   Rabaglia, Tucker-Drob, and Salthouse (50)
               A contextual analysis of written language.

12:00-1:30   **Lunch**

Papers (1:30-3:10): Misc.
Chair: Gottfredson

1:30-1:50   Bleske-Rechek, Webb, Lubinski, and Benbow (18)
               Career outcomes and perceptions of the graduate advisor-advisee experience: A
               10-year follow-up of the graduate students in the top-15 math-science programs.

1:50-2:10   Webb, Lubinski, Benbow, and Bleske-Rechek (69)
               Work-family balance among hihly talented STEM professionals and their
               spouses: A 10-year follow-up of graduate students in the top-15 math-science
               programs.

2:10-2:30   Martin, LeWinn, Kubzansky, and Buka (41)
               Cognitive performance in childhood and the risk of Generalized Anxiety
               Disorder.

2:30-2:50   Carlson (19)
               Dynamic assessment and the Raven Matrices: The testing-the-limits approach.

2:50-3:10   Fagan and Holland (24)
               Does the SAT have to be so time consuming?

3:10-3:30   **Break**

Papers (3:30-5:30): Misc.
Chair: Wicherts

3:30-3:50   Firmin (26)
               A clinical utility assessment of the Reynolds Intellectual Assessment Scales
               (RIAS).

3:50-4:10   Sefcek, Miller, and Figueredo (56)

General intelligence, life-history, and covitality: A test of evolutionary hypotheses.

4:10-4:30   Gladden, Burger, Figueredo, and Jacobs (29)
Life history, social deviance, personality, and intelligence: A psychometric study.

4:30-4:50   Templer and Arikawa (64)
Empirical support for Rushton's K differential theory.

4:50-5:10   Beaujean and Frisby (15)
Forward and backward spatial span interaction with race and IQ.

5:10-5:30   Templer and Arikawa (63)
Correlations of skin color and continent with IQ.

Abstracts

Aging Sympoium:
"Contextual" Analysis of Cognitive Abilities: Symposium Overview

Elliot M. Tucker-Drob, Cristina D. Rabaglia, Jeffrey E. Pink, and Timothy A. Salthouse
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This symposium consists of three presentations. The first (A Contextual Approach to Construct Validation), by Elliot Tucker-Drob, describes the concept of "reference" cognitive abilities that have been used in a number projects conducted at the Cognitive Aging Lab at the University of Virginia. It is proposed that employing an approach in which "new" cognitive variables are examined in the *context* of the reference abilities, allows for a comprehensive understanding of the new variables that is easily applied to and integrated with contemporary ability research. In the second presentation (An Analysis of Working Memory in the Context of Reference Cognitive Abilities), Jeffrey Pink applies this approach in an examination of the meaning of individual differences in working memory. In the third presentation (A Contextual Analysis of Written Language) the approach is applied by Cristina Rabaglia, who examines the relations of the reference abilities to individual differences in written language.

A Set of DNA Markers is More Strongly Associated with *g* in Boys than in Girls

Rosalind Arden, Nicole Harlaar, and Robert Plomin
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Phenotypic sex differences in intelligence are well studied. As DNA markers associated with intelligence are identified, the structure of sex differences, where they exist, will become amenable to genetic analysis. A composite set of five single-nucleotide polymorphisms (SNPs) which has a small association with g, has been previously identified and replicated. We used this SNP set to investigate whether the associations differ between boys and girls for general cognitive ability at ages 2,3,4,7, 9 and 10 years. In a longitudinal community sample of British twins aged 2-10 (*n* > 4000 individuals), we found that the SNP set is more strongly associated with intelligence in males than in females at ages 7, 9 and 10 and the difference is significant at 10. If this finding replicates in other studies, these results will constitute the first evidence of the same autosomal genes acting differently on intelligence in the two sexes.

Gardner, Spearman, and Darwin on the Dance Floor: IQ Accounts for the Association Of Fluctuating Asymmetry with Dance Ability.

Timothy C. Bates and Laura Tully
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Dance reveals symmetry (Brown et al. 2005, *Nature*. **438**:1148-1150) and Symmetry is associated with fitness and with IQ. We report a study replicating the Brown report, and extending this to include ability measures. The basic finding that Raven Advanced Progressive Matrices scores correlated around 0.4 with FA (fluctuating asymmetry – assessed in the fingers, elbow, ankle, and knee) was replicated. In addition the novel finding of Brown et al. that ratings of Dance reveal FA was replicated, with subject's "Dance-ability" being rated by judges viewing 1-minute of subjects dancing to the hip-hop track "Hey-Ya" by OutKast. We then examined the relationship of both Danceability and IQ as indicators of FA, with the data indicating that the Danceability-FA relationship is fully accounted for by IQ. The implications for fitness and sexual selection in human are discussed, as are the implications for non-traditional theories of ability such as proposed by Gardner.

Forward and Backward Spatial Span Interaction with Race and IQ.

A. Alexander Beaujean [a] and Craig L. Frisby [c],

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Previous research (Jensen, & Figueroa, 1975; Jensen & Osborne, 1979 cf. Jensen 1998) has shown that Spearman's (1927) hypothesis (i.e., that black/white differences in test scores vary as a function of the test's *g* loadings) holds for the digit span tasks on the Wechsler Intelligence Scales. Recently, Beaujean, Knoop, Frisby, Crouch and Holliday (2006) found that the pattern of *g* loadings on the Wechsler Memory Scale's (WMS) spatial span tasks are similar to those found on the Wechsler digit span tasks. Thus, this purpose of this study is to take the next step in testing Spearman's hypotheses for WMS's spatial span tasks.

Data was obtained from the norming sample for the Wechsler Adult Intelligence Scale-Third Edition and Wechsler Memory Scale-Third Edition. As the two instruments were co-normed, each of the over 900 participants had scores on both instruments. Then, using the steps outlined by Jensen (1998) and Dolan (2000; Lubke, Dolan, & Kelderman, 2001), the Spatial Span tasks were analyzed to test Spearman's hypothesis. Preliminary analysis indicated that Spearman's hypothesis was confirmed.

References

Beaujean, A. A., Knoop, A. J., Frisby, C. L., Crouch, C. & Holliday, G. (2006). Forward and backward digit and spatial span tasks. Manuscript under submission.

Dolan, C. V. (2000). Investigating Spearman's hypothesis by means of multi-group confirmatory factor analysis. *Multivariate Behavioral Research, 35,* 21-50.

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Lubke, G.H., Dolan, C. V & Kelderman, H. (2001). Investigating group differences on cognitive tests using Spearman's hypothesis: An evaluation of Jensen's method. *Multivariate Behavioral Research, 36,* 299-324.

Spearman, C. E. (1927). *The abilities of man: Their nature and measurement*. New York: Macmillan

Math Based Chronometric Tasks:
Factor Structure and Predictive Efficacy

A. Alexander Beaujean [a], Michael W. Firmin [b], Andrew J. Knoop [c], Craig L. Frisby [c], Jared D. Michonski [b], Theodore P. Berry [b] and Courtney Johsnon [b]

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This study sought to assess the factor structure and predictive capability of a new battery of math-based chronometric tasks. In the first analysis, approximately 200 college students were given a psychometric and chronometric battery of tasks. Initially the chronometric and psychometric tasks were factor analyzed, then, the chronometric tasks that loaded highest on a primary math factor were put into a multiple regression equation to determine the percentage of the variance in SAT Math scores they could predict. In the second analysis, the same tasks were given to both a group of college students with and without a mathematics disability to determine the tasks' sensitivity and specificity. The results from both studies provides evidence that these math-based chronometric tasks merit further investigation, both academically (i.e., their refinement) and clinically (i.e., their "real world" usage).

Flynn Effect Sympoium:
Using Item Response Theory to Assess the Lynn-Flynn Effect: Results from the CNSLY79 Sample

A. Alexander Beaujean
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Much work on the Lynn-Flynn Effect (LFE) has shown a rise in IQ scores across time. While there have been many postulated theories explaining the rise, the reason for such a rise has proved elusive due, in large part, to the odd nature of the LFE. For example, while general IQ scores are rising, there is a differentiated rate of increase with the more fluid types of a tasks (e.g., matrix reasoning) showing a larger increase than more crystallized types of tasks (e.g., vocabulary). In addition, while there is evidence that g might show some change, its rate of increase is not near the magnitude of IQ scores.

In 1952, when Sir Cyril Burt first wrote about the observed increase in IQ scores, he, too, was unsure of the reason for the rise, but ultimately dismissed it as due to a change in test properties and inadequate testing conditions. Later, Chris Brand took a similar stance; namely, that the LFE was the result of increased test sophistication, not necessarily increased intelligence. Up until recently though, the methods that have been used to unravel the LFE have been largely based on comparing mean scores across time, which assumes the tests are measuring the same constructs, the same way, across time. Using such methods, it is very difficult, if not impossible, to tease out any changes in a test's psychometric properties from changes in the examinees' measured ability.

One method that can disentangle a test's psychometric properties from the constructs the test is intended to measure is the use of Item Response Theory (IRT). Instead of determining item properties post-hoc, as does classical test theory, IRT models item properties and examinee ability concurrently, which allows for a host of features, such as item invariance and nonequivalent groups equating, that have no counterpart in classical test theory. Consequently, it appears that it would be advantageous to investigate the use of IRT in examining the LFE, which is the purpose of the current study.

Using data obtained from the National Longitudinal Study of Youth 79 Children and Young Adults (CNSLY79), this study examined raw scores, standardized scores, and individual item data from the Peabody Picture Vocabulary Test-Revised and the Peabody Individual Achievement Test-Math. It found that using raw and standardized scores, there was an increase over time across all ages of an average magnitude of about .4 points a year. Using the latent trait scores from IRT models, however, showed little to no increase (after correcting for items that showed parameter drift), and in some cases there was an actual decrease over time.

Career Outcomes and Perceptions of the Graduate Advisor-Advisee Experience: A 10-year Follow-up of Graduate Students in Top-15 Math-Science Programs

April Bleske-Rechek [1], Rose Mary Webb [2], David Lubinski [3], and Camilla P. Benbow [3]

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We explored two primary questions in a 10-year follow-up of 368 men and 346 women originally identified as graduate students enrolled in top U.S. mathematics, engineering, and physical science programs: First, after controlling for incoming aptitude, investigative interests, and hours devoted to research, are participants' perceptions of their advisor-advisee experience during graduate school associated with their career success and career satisfaction?; and second, do men's and women's perceptions of their primary advisor-advisee relationship differ?

To determine whether participants' perceptions of their advisor-advisee experience during graduate school are associated with their career outcomes, we asked participants to complete the Advisory Working Alliance Inventory (AWAI; Schlosser & Gelso, 2001) at the 10-year follow-up. Participants also reported on various aspects of their primary graduate advisor (e.g., advisor's work hours per week) and advisor-advisee relationship (e.g., overall satisfaction with their advisor during graduate school). Although incoming GRE composite scores (for women), investigative interests (for men and women), and hours devoted to research (for men and women) predicted attainment of PhD by the 10-year follow-up, positive perceptions of the advisor-advisee relationship predicted PhD attainment for both sexes after controlling for these personal attributes. Positive perceptions of the advisor-advisee relationship also were positively associated with men's perception of their career success, men's satisfaction with the current direction of their career, and men's number of refereed journal article publications.

At the 10-year follow-up, men and women were similarly likely to have had a male advisor, had primary advisors of similar age and workweek, reported a similar number of collaborations with their primary advisor, met with their advisors with similar frequency, and felt similarly mentored by their advisor. Men, however, held slightly more positive perceptions of their advisor, as assessed by the AWAI, and reported more overall satisfaction with their advisor. Men who had a male primary advisor differed from those with a female advisor in only one respect: Men with a male (rather than female) advisor perceived themselves as more successful in their career. Women who had a male (rather than female) primary advisor reported more collaborations with their advisor and were more likely to have earned a PhD. However, after controlling for incoming aptitude (women with female advisors had higher incoming GRE composite scores), the link between the sex of women's advisor and their likelihood of earning a PhD became non-significant. Overall, our findings suggest more similarities than disparities between men's and women's advising experiences in rigorous graduate training programs.

Dynamic Assessment and the Raven Matrices: The Testing-the-Limits Approach

Jerry Carlson

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A variety of alternatives to traditional cognitive assessment have been developed. These include Feuerstein's learning potential approach, Guthke's learning efficiency approach, and Campione and Brown's graduated prompts approach. In this presentation the efficacy of testing-the-limits approaches for assessing g (Raven matrices performance) will be demonstrated and implications for test validity issues drawn. The data presented show that children's performance on the Raven matrices can be substantially affected by "non-target" variables, i.e., variables ignored or considered irrelevant to test performance and independent of the "target", g, putatively assessed. by the Raven matrices.

Do *g*-Free Abilities Correspond to Vocational Interests?

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In this presentation we will examine the relationship between cognitive abilities and vocational interests. Our specific hypothesis is that when *g* is statistically controlled for, the first two factors that remain in a particular set of cognitive-ability tests will correspond to the two-dimensional hexagon of vocational interests advanced by Holland and others. We evaluated our hypothesis with data from the Johnson O'Connor Research Foundation's (JOCRF's) aptitude-testing program, in which individuals pay a fee to take a diverse battery of ability tests, usually for purposes of career planning. The examinees took a battery of cognitive-ability tests and Holland's Self-Directed Search (SDS). We partialled all test scores for age, and we analyzed males and females separately.

Initially, we examined the simple correlations between the abilities and scores for the six Holland themes, and generally found moderate-to-low correlations between individual abilities and interests in areas that use those abilities (e.g., spatial ability and interests in Holland's Realistic and Investigative areas).

When we factor-analyzed the interest and ability scores separately, the interest scores showed a general factor that we suspect may indicate examinees' response styles rather than substantive interest (that is, some examinees tend to answer affirmatively across themes, and other examinees answer negatively across themes). The second and third factors showed the familiar hexagon structure. For abilities, we found that an eight-test set showed, after a *g* factor, two factors that resemble the Holland hexagon, as we found in previous data (Schroeder, ISIR, 2000).

To see if these factors correspond to each other, we partialled the *g* factor from the cognitive abilities and the first factor from the interest scores and then factor-analyzed the abilities and interests simultaneously. The first two factors from that analysis showed the two ability and two interest factors aligned together. That is, the two-dimensional circle/hexagon formed by the SDS's R, I, A, S, E, and C scores was matched by a circle formed by *g*-free spatial ability, reasoning, ideational fluency, perceptual speed, and memory.

Mind, Personality, and Emotions: Deciphering their Relations

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This presentation deals with the relations between developing intelligence, personality, and emotional intelligence. It presents a series of empirical studies that involved participants from primary school to middle age. These participants were examined by (1) cognitive tasks addressing various cognitive functions, such as processing efficiency, working memory, and reasoning in various domains (e.g., mathematical, spatial, causal, and social reasoning), (2) various aspects of personality, such as the Big Five Factors, and (3) various aspects of emotional intelligence, such as understanding and regulating emotions. A series of structural equation models were built to capture the relations between the various dimensions. These models show clearly that, on the one hand, intelligence, personality, and emotional intelligence are distinct of each other throughout the age span studied. On the other hand, they are related in specifiable but intricate ways. For instance, of the Big Five factors of personality only openness to experience and conscientiousness are related to the intelligence. However, all Big Five Factors but neuroticism are highly related with cognitive self-concept, suggesting that self-awareness and self-representation are the liaison for the relations between intelligence and personality. Emotional intelligence is not reducible either to intelligence or personality. The cognitive aspects of emotions, although distinct from, are closely related to intelligence. The dynamic aspects of emotion, such as self-regulation of emotions and management of the emotion of other people, are more related to the emotional dimensions of personality (neuroticism) and their social aspects to the social dimensions of personality (agreeableness). The strength of these relations changes with development. For example, the intelligence-personality relations weaken with age. The presentation will advance a general overarching frame that explicates these relations with the aim to re-institute the whole person in psychological theory.

Emotional Intelligence Symposium:
Predicting Revenue: Is it a Question of Being Smart, Personable, or People Smart?

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Recently Emotional Intelligence (EI) has been touted as a principal component for effective workplace performance (Shutte et al, 2001) not accounted for by IQ or personality (McCrae, 2000). The current study examined the relationships between EI (measured by the Workplace SUEIT), Personality (NEO-FFI), General Intelligence (WASI - Matrix Reasoning and Vocabulary), and the financial revenue earned by consultants in an Australian professional recruitment company. Results indicated that EI accounted for 22.4% of the variance associated with revenue accrued in a financial year, with Personality and IQ accounting for 12.9% and 7.7% respectively. Implications for understanding the linkages between emotional competencies, IQ, personality and workplace performance are discussed.

Emotional Intelligence Symposium:
Assessing the Construct, Predictive and Biological Validity of Measures of Emotional Intelligence (EI)

Chair: Prof Con Stough

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The last decade has seen significant growth in both research and consulting in the construct of Emotional Intelligence (EI). To meet the popularity of this construct several measures of EI have been proposed. Several studies have demonstrated the high predictive validity of measures of emotional intelligence for important life and occupational criteria. However critics of the construct have argued that EI may not be separable from personality and cognitive ability. In this symposium we present five studies examining the construct, predictive and biological validity of different measures of emotional intelligence. In all studies the relative contribution of emotional intelligence to important criteria is assessed independent of personality and cognitive ability. In the first study the construct and predictive validity of the MSCEIT is assessed together with personality and cognitive ability. In the second study, the contribution of EI to workplace performance is assessed over and above personality and cognitive ability. In the third study, relationships between EI measured by the MSCEIT and Magnetic Imaging Resonance variables are assessed in order to understand the neurobiological basis of EI independent of human cognitive ability and personality and in the fourth study we present the results of the first wave of a longitudinal study assessing the contribution of EI to scholastic aptitude in adolescents independent of cognitive ability and personality. In the fifth study, compares the contribution of EI for mainstream and gifted students.

Does the SAT Have to Be So Time Consuming?

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The present study found that scores derived from a 24 item, 15-minute version of the type of questions typically asked on the SAT-V are as predictive of academic performance in college as are standard SAT-V scores. The purpose of the Scholastic Assessment Test (SAT) is to predict how well a student will do in college courses. Currently, questions have been raised in a series of articles in the *New York Times* as to the amount of time necessary to complete the SAT which is estimated at 3 hours and 45 minutes (longer for disabled students). Earlier reports in the *New York Times* also revealed a sizable error rate in the current scoring process for the SAT. In the present study we asked if a very brief, easily scored version of the SAT-V would be as predictive of college grades as the standard SAT. The sample included 502 students at three private universities attending introductory classes in Psychology. Questions of the sort traditionally tested on the SAT-V were taken from practice tests for the SAT-V to create a Brief Verbal Test which included 24 items, 8 of which tested knowledge of the meanings of words, 8 the knowledge of opposites, and 8 the knowledge of analogies. Measures of specific academic achievement (exam performance on objective tests) were obtained from the instructors of the Psychology courses. Cumulative grade point averages representing at least two semesters of attendance were also obtained from the registrar at each institution. Both the SAT-V and the Brief Verbal Test were successful in predicting academic performance. The predictions from each test to academic performance were virtually identical. No significant difference was found between the SAT-V prediction of class grade or the Brief Verbal Test's prediction of class grade. The same was true for the predictions of each measure of aptitude to cumulative GPA. The present results tell us that scores derived from a brief version of the type of questions typically asked on the SAT-V are as predictive of academic performance in college as are scores derived from the SAT-V. Of course the SAT consists of more than the verbal portion of the test. There is a mathematical section to the SAT, the SAT-M. Perhaps a brief version of the SAT-M would also prove to be as predictive of academic performance as the lengthy standard version. That remains a question for further study. What we do know now is that a predictive, less time consuming, and more easily scored version of the SAT-V is possible.

Sex Differences in Personal Views among Top Math/Science Graduate Students and the Profoundly Gifted

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Cross-sectional and 10- and 20-year longitudinal analyses of sex differences in the personal views, life values, and work preferences of profoundly gifted (265 males, 84 females) and top math/science graduate students (307 males, 293 females) were conducted. Graduate students enrolled in top-ranked U.S. mathematics, engineering, and physical science programs in 1992 (at approximately age 24, and tracked for 10 years) and talent-search participants scoring in the top 0.01% on cognitive ability measures in the early 1980s (by age 12, and tracked for 20 years) manifest similar patterns of sex differences and similarities in personal views and life values at age 33. In addition, sex differences in work preferences among the graduate students increase over time (between age 23 and age 33). Further scrutiny reveals that approximately half of the male and half of the female graduate students became parents in those ten years, and that parents show larger sex differences as a group at age 33 than non-parents do, both in values and work preferences. Although individual differences within groups are many times greater than differences between groups, overall, the pattern of differences between the sexes is salient: while males find independence, risk-taking, and dominance in their careers to be more personally fulfilling than females do, females more than males appear to favor a wide-angle perspective for life satisfaction, preferring work schedules with more flexibility and fewer hours than males do, and also valuing community more than males do. The extent to which these findings are consistent with theoretical expectations derived from evolutionary psychology has not escaped us. Observed sex differences in life views among these two extraordinarily talented samples have implications for occupational and creative achievement, particularly in fields of science, technology, engineering, and mathematics (STEM). In addition to informing a scientific understanding of sex differences in lifespan development, these findings inform contemporary discourse about male/female representation in high-level STEM careers.

A Clinical Utility Assessment of the
Reynolds Intellectual Assessment Scales (RIAS)

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Clinical utility, in the present context, refers to the usefulness of a psychological test in actual clinical practice. Obviously, a test requires strong theoretical and statistical validity & reliability as cornerstones of its value. But these traits, alone, are insufficient. A test also must possess human factor qualities, if you will, that allow the clinician using the test to apply its qualities efficiently and in apt manners.

The Reynolds Intellectual Assessment Scales (RIAS) is a relatively new test introduced by Psychological Assessment Resources (PAR) that has sold relatively well and is widely marketed to psychologists. However, apart from the information provided in the technical manual, relatively little is known about the instrument. For example, a recent search in PsychInfo produced only one citation in a peer-reviewed journal.

As a psychologist who was involved with the norming process of the RIAS instrument and present consumer of the test since its publication, I suggest five strengths of the test and eight weaknesses. Strengths include its theoretical and psychometric foundations, the relatively brief administration time required, the option of an abbreviated version of the test, clear protocols, one test can be used for children through adult ages, and the test is different enough from the Wechsler and Stanford-Binet instruments that clients do not feel as though they are re-taking these tests when multiple administrations of IQ testing is needed.

Weaknesses of the test include having a memory screener rather than two additional subtests loading into the client's overall IQ, unclear utility with MR populations, discontinue rules exist too soon on some subtests, lack of manipulatives (e.g., puzzles, bead stringing, paper folding, etc.), ambiguous scoring at points, clients explicitly are told some answers are wrong, unsophisticated subtest nomenclature, and standard scores are reported as "indexes" rather than full-scale IQs.

In sum, I believe the RIAS has significant potential as an intelligence test and predict psychologists will see it utilized in multiple editions. The most useful milieus for the RIAS, in my opinion, include forensic evaluations, situations where periodic retesting or updates are required, and IQ screenings in school settings.

The Flynn Effect Symposium:
New Directions

Organizer: Jan te Nijenhuis

Secular score gains in IQ test scores are one of the most most intriguing and controversial findings in the recent psychology research literature. This symposium includes some of the latest findings from studies on the Flynn effect.

Jan te Nijenhuis (in collaboration with Henk van der Flier asks the question to what extent secular gains are on the *g* factor and therefore reflect a functional increase of real-life problem solving ability. They employ several independent archival data sets and focus on an attention test, perceptual motor tests, Spearman's Law of Diminishing Returns, and the method of correlated vectors. They conclude that, taken together, the results are in line with the hypothesis of a small or moderate gain in general mental ability, *g*.

Alexander Beaujean focusses on the methods that have been used to unravel the Flynn effect. Using present methods, it is very difficult, if not impossible, to tease out any changes in a test's psychometric properties from changes in the examinees' measured ability. One method that can disentangle a test's psychometric properties from the constructs the test is intended to measure is the use of Item Response Theory. Data are used from the National Longitudinal Study of Youth 79 Children and Young Adults, examining the Peabody Picture Vocabulary Test-Revised and the Peabody Individual Achievement Test-Math.

Jelte Wicherts studies the average scores of African samples on Raven's Standard Progressive Matrices, Coloured Progressive Matrices, and several other IQ tests. Results show that average IQ in Africa lies somewhere around 80 when compared to US norms, and that SPM scores among African adults have shown a secular increase over the years.

Richard Lynn will serve as a discussant.

Internal Consistency Reliability and Higher-Order Modeling: Implications for Contentions that a Lower-Order Group-Factor is Isomorphic with *g*

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While it has been well-established that factor analysis ("exploratory" and "confirmatory") have direct corollaries to internal consistency reliability, the specific implications of the internal consistency of composites and the results derived from a higher-order model have yet to be elucidated. In this presentation, two previously published papers (based on four samples) which have suggested fluid intelligence (Gf) and working memory (WM) to be isomorphic with *g* are evaluated from the vantage point of internal consistency reliability and the substantial disattenuation effects observed when the underlying composite of a lower-order group-factor is associated with low levels of internal consistent reliability. To this effect, the higher-order factor loadings associated with the previously published higher-order model solutions are re-attenuated based on the obverse of the Classical Test Theory procedure first introduced by C. Spearman, i.e., the correction for attenuation due to imperfect levels of reliability. In all examined cases, the re-attenuated correlations were substantially less than 1.0, suggesting that previous reports of isomorphism with *g* were achieved non-negligibly by the grouping of poorly inter-related variables. The re-attenuation procedure is validated based on estimating the implied correlation between 'phantom' composite variables and the higher-order latent g factor. Finally, the direct hierarchical model, which specifies the association between lower-order group factors and *g* at zero, is argued to be plausible alternative to the conventional higher-order model.

Life History, Social Deviance, Personality, and Intelligence: A Psychometric Study

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Differential-K theory (Rushton, 1985) proposed that, as humans dispersed out of Africa, ancestral environments presented new adaptive problems that drove the evolution of both group and individual differences in human life history strategy. According to Rushton, a coordinated "slow" ("high-K") life history strategy is characterized by increased general intelligence, high parental investment, longevity, and behavioral restraint. The opposite, a "fast" ("low-K") life history strategy, is characterized by decreased general intelligence, lower parental investment, shorter life-span, and decreased behavioral restraint. Differential-K theory predicts that social deviance will be more common among "fast" life history strategies due to decreased behavioral restraint and higher impulsivity. Socially deviant behavior is thought to be related to low general intelligence and low conscientiousness. Eysenck's "Psychoticism" personality factor is primarily composed of a combination of the Conscientiousness and Agreeableness factors in the "big five" framework and is expected to be predictive of social deviance.

A sample of undergraduate students (N=92) took an 18-item short form of the Raven's Advanced Progressive Matrices (RAPM-18) and responded to a battery of questionnaires about their life history strategy, social deviance, and personality. Life History Strategy was measured by using the full K-Factor Battery, including measures of high-K cognitions, close and cooperative social relationships with parents, family, friends, and romantic partners, general altruism, and religiosity. Social Deviance was measured by a battery of convergent tests measuring deviant attitudes. These measures were included the Lilienfeld measure of Psychopathy, a short-form Machiavellianism scale, a risk-taking questionnaire, and the mating effort scale. Personality was measured using the NEO-FFI.

Openness to experience predicted higher General Intelligence. The K-Factor predicted higher Conscientiousness, Agreeableness, Extraversion, and Emotional Stability; Social Deviance predicted lower Conscientiousness, Agreeableness, and Openness to Experience. The K-Factor and Social Deviance were not significantly correlated with General Intelligence or with each other. This may imply that, at least in high-functioning groups, both life history strategy and social deviance might represent behavioral preferences rather than mental abilities.

Dangerous Ideas and Safe Zones

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Even the most rigorous scientific research on group differences in intelligence is still routinely depicted outside intelligence research circles as inept, ideological, or dangerous to the social order. Hostile and mistaken perceptions of intelligence research suffuse both public and academic life, generating much social pressure against collecting or giving credence to evidence that indicates group differences in g, even at the phenotypic level. Most intelligence researchers seem to take this adverse atmosphere as a given, much like construction workers know they will sometimes have to work in unpleasant weather. What is less widely understood are (1) the multiple, diffuse, and seemingly inconsequential ways in which this social pressure is exerted, both within and outside of academe, (2) how it skews questions asked, answers reported, and opinions voiced by scientists and non-scientists alike, and (3) how the new national codes against offensive speech adopted by many multi-ethnic democracies may increase and legally empower efforts to restrict inquiry on group differences. I describe how intelligence researchers might use this knowledge, individually and collectively, to mitigate such processes and limit the damage they do to both science and society.
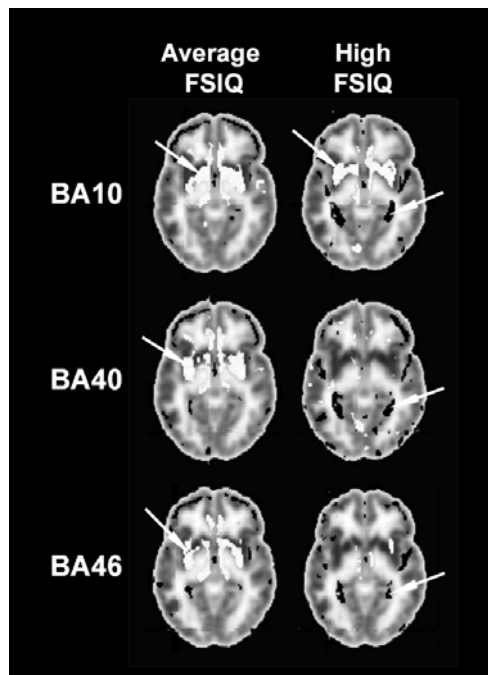
My suggestions are distilled from several decades of observing them in different disciplines, writing about the social implications of group differences, becoming caught up in controversy, teaching "sensitive" material to undergraduates, and dealing with journalists. Here are two among the suggestions I will discuss. First, the general public, journalists, students, and most social scientists are not uninformed, but *mis*informed about the science. We therefore do not enhance our credibility by merely restating our scientific conclusions or evidence, no matter how well-substantiated they may be. Instead, we must also pinpoint and neutralize the misconceptions that render those conclusions *seemingly* false or gratuitous when they are not. To aid this effort, I provide lists of common misconceptions, non-obvious confusions, and logical fallacies about intelligence that *appear*, to some people, to discredit the field in whole or part. Second, even a contractually guaranteed right to academic freedom provides scant protection for voicing unpopular ideas; in fact, institutions sometimes *punish* such speech in the name of protecting the right (for others). Merely invoking the principle therefore has little practical value, and its invocation usually signals that a serious violation has already occurred. Academic freedom works best by preventing, not reversing, such violations. It is only as strong as a community is vigorous in exercising and reinforcing it in day-to-day affairs. I describe the deceptively small but cumulatively crucial personal acts that sustain it.

Mapping Gray Matter Distributions in High and Average IQ Groups

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We report an analysis to map the inter-relationships among gray matter (GM) volumes in structures throughout the brain and the relationship of such maps to intelligence. The approach (McIntosh and Lobaugh 2004) uses partial least squares and bootstrapping to identify stable patterns of relationships to any specific voxel (i.e. the "seed") within an image. Using structural MRI, we identified three brain areas related to intelligence based on a recent review of 37 neuroimaging papers (Jung and Haier, accepted for publication): Brodmann areas (BA) 10 and 46 in left frontal lobe and BA 40 in the left parietal lobe. We set seeds in these areas and determined the correlations between GM at the seed and GM throughout the rest of the brain. We did this separately for high (FSIQ >116, mean =127; sd= 9; n=25) and average groups (FSIQ mean =104; sd=8; n=23) of adults. Results in the high IQ group included stronger associations between GM in all three area seeds and GM in the hippocampus (see figure; dark black shows positive correlations with the seed; bright white shows inverse correlations). Thus, the more GM in each of the three areas selected for relevance to intelligence, the more GM is in the hippocampus in the high IQ group, but not in the average IQ group. There were also inverse correlations between two of the seeds (BA 40, 46) with dopaminergic areas in the average group which were largely absent in the high group. These data help elucidate the neural basis of individual differences in intelligence.

Arrows pointing toward the left indicate positive correlations between GM in the seed and GM in the hippocampus (only in the high IQ group). Arrows pointing toward the right indicate inverse correlations between GM in the seed and GM in the basal ganglia (only unique in the average IQ group for BA 40 and 46).

Jung, R. E. and R. J. Haier (accepted for publication). "The Parieto-Frontal Integration Theory (P-FIT) of Intelligence: Converging Neuroimaging Evidence." Behavioral and Brain Sciences.

McIntosh, A. R. and N. J. Lobaugh (2004). "Partial least squares analysis of neuroimaging data: applications and advances." NeuroImage **23**(Supplement 1): S250-263.

Emotional Intelligence Symposium:
Examining the Contribution of EI to Scholastic Aptitude in Adolescents Independently of Personality and Cognitive Ability

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Previous research on the psychological predictors of academic achievement has primarily focused on cognitive predictors (Farsides & Woodfield, 2003; Neisser, et al., 1996). This body of research indicates that IQ is an important predictor of academic achievement, although the variance that IQ explains differs greatly across studies, from 4% to 25% (Neisser et al. 1996, Sternberg, 1996). To a lesser extent, personality as a predictor of academic achievement has also been explored and has been shown to account for approximately 10% of the variance (Furnham & Chamorro-Premuzic, 2003). Together, IQ and personality variables typically account for less than 35% of the variance in school success, indicating the potential utility in identifying other predictors of academic success. More recently, researchers have begun to explore whether EI may help explain variance in academic achievement (Schutte, et al., 1998; Lam & Kirby, 2002; Newsome, Day & Catano, 2002; O'Connor & Little, 2003; Barchard, 2003; Caruso, Van Buren, Mayer & Salovey, 1999; Petrides, Frederickson & Furnham, 2004; Parker et al, 2004). To date, the research in this area has shown inconclusive results (Parker et al, 2004). The current study represents the first wave of data collection in a longitudinal study examining the relative contributions of Ei, IQ and personality to scholastic variables including scholastic success. The presentation will report on the data from the first 100 Year 9 students who have completed measures of cognitive ability (Raven's SPM), Personality (NEO-3) and EI (Adolescent SUEIT).

The Market Place for Intelligence

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There have been literally thousands of analyses intended to reveal the distribution of cognitive skills in various populations. There have also been numerous, but not nearly as many, studies of the relationship between the possession of cognitive skills and the level of performance people display in the workplace. This suggests that the workplace provides a market for intelligence. But what is the extent of that market? This is the question that we wish to ask. We begin with what is perhaps the largest single analysis of requirements for cognitive skills, the Department of Labor's O*Net data base. In this data base hundreds of jobs have been rated for the extent to which they require more than thirty different skills. In addition, there are records of the number of job-holders currently in jobs. We present preliminary results on the distribution of skill requirements, compared to the distributions of skills themselves, as determined from surveys based on tests of cognitive skills, primarily in students about to leave high school. We also discuss certain methodological problems involved when we attempt to calibrate ratings of skill requirements to scores on tests of the skills possessed by individuals.

Sex Differences Symposium:
Sex differences in *g*: An Analysis of the US Standardization Sample of the WAIS-III.

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For almost as century, there have been studies of sex differences in intelligence and specific cognitive abilities such as verbal comprehension, reasoning, visualization, spatial and perceptual abilities, immediate memory and perceptual speed. The general consensus has been that males have higher averages on some abilities (notably spatial and mathematical) while females have higher averages on others (notably verbal), and that when these are averaged out there is no sex difference (or virtually no sex difference) in overall intelligence defined as the sum of a number of different cognitive abilities.

This consensus has been disputed by Lynn (1994, 1999) who has argued that while among children up to the age of 16 years the sex difference in overall intelligence (defined as the sum of a number of cognitive abilities) is negligible, a male advantage begins to appear at the age of 16 and increases into early adulthood, when it reaches an average of around 3 to 5 IQ points. Several subsequent studies have found that this thesis that among adults males have an IQ advantage is correct. For instance, a male advantage among adults of 3.6 IQ points has been reported on the Spanish standardization sample of the WAIS-111 (Colom, Garcia, Juan-Espinosa, & Abad, 2002), on a Dutch sample on the WAIS-111 (Van der Sluis, Posthuma, Dolan et al., 2006), and on the American SAT (Jackson and Rushton, (2006); of 3.3 IQ points on the Japanese standardization sample of the WAIS-R (Hattori and Lynn, 1997), of 5.8 IQ points on the Scottish standardization sample of the WAIS-R (Lynn, 1998); and of 5 IQ points on the Progressive Matrices (Lynn and Irwing, 2004).

However, it is conceivable that sex differences could reside in some combination of sub-factors of intelligence and not in *g*, but that this would still show up as a male advantage in full-scale IQ. A number of different approaches have been suggested in order to resolve the question as to the precise loci of sex differences in intelligence including three by Jensen (1998). Some studies have relied on the method of correlated vectors to support a conclusion of a null sex difference in *g* (e.g. Colom, Juan-Espinoza, Abad. & Garcia, 2000). We believe that these conclusions are vitiated by a number of problems in the method of correlated vectors which have been noted by several authors (e.g. Ashton & Lee, 2005; Lubke, Dolan & Kelderman, 2001). We agree with Dolan and colleagues who have argued that multiple-group confirmatory factor analysis with mean structures (MGCFA-MS) has many advantages for resolving the question as to the locus of sex differences in cognitive ability. In the current study we apply MGCFA-MS to the US standardization sample of the WAIS-III, which comprises 2,450 participants aged from 16 to 89 years. We analyze both hierarchical and Bifactor models, and because we consider that there are potential problems with both, we also estimate a MIMIC model. Each of the three analyses shows the existence of a sex difference favoring men in *g,* Information, and Arithmetic, and a sex difference favoring women in Processing Speed and Digit Symbol. The sex difference effect sizes vary somewhat in the different analyses. The hierarchical MGCFA-MS gives the weakest effects, the MIMIC model the strongest, and the Bifactor model produces intermediate size effects of .20 (*g*), -.55 (Processing Speed), .32 (Information), .27 (Arithmetic) and -.32 (Digit Symbol).

Cognitive Abilities Independent of IQ Correlate with Regional Brain Structure

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There is increasing evidence relating psychometric measures of general intelligence and reasoning to regional brain structure and function assessed with a variety of neuroimaging techniques. Cognitive dimensions independent of general intelligence can also be identified psychometrically and studied for any neuroanatomical correlates. Here we investigated two such dimensions, rotation-verbal and focus-diffusion. We used structural MRI and voxel-based morphometry (VBM) in two independent samples to identify gray and white matter correlates of both dimensions. Based on statistical conjunction of both samples, (N=45; $p<.001$), there were correlations with gray matter in BA's 20 and 9 involving the rotation-verbal dimension and in BA 18 involving the focus-diffusion dimension. There were white matter correlations involving the rotation-verbal dimension near BA 18, 40, 39, 10, 8, and 4 and involving the focus-diffusion dimension near BA 5 and the right sub-lobar amygdala. We discuss the implications of these correlations for understanding individual differences in the manifestation of intelligence.

Sex Differences Symposium:
Using VPR Theory to Link Interests and Abilities
in Males and Females

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The 42 mental ability tests administered to participants of the Minnesota Study of Twins Reared Apart (MISTRA) provide evidence for VPR Theory, which predicts that there are important dimensions of mental ability that function independently of g. Two of these dimensions, rotation-verbal and focus-diffusion, appear to involve trade-offs: greater residual rotation ability implies less residual verbal ability and vice-versa, and the focus-diffusion dimension functions similarly. These dimensions also show strong sex differences. Men tend to fall closer to the rotation pole of the rotation-verbal dimension, women to the verbal pole. Men tend to fall closer to the focus pole of the focus-diffusion dimension, women to the diffusion pole. The two dimensions are basically uncorrelated.

The few studies that have examined associations between interests and objectively measured abilities have suffered from small sample sizes, restricted ranges of ability, preconceived groupings of interests, and measures of ability that confound general intelligence with orientations toward specific abilities. In this study, we used latent class analysis with general intelligence and the rotation-verbal and focus-diffusion dimensions as covariates to articulate eight occupational interest groupings. These groups showed substantial mean differences in all covariates, and differences in ability profiles had substantial effects on probabilities of interest group membership. The sex differences in ability dimensions did not, however, completely explain the sex differences in interest group membership, suggesting that sex differences in occupational interests are polarized beyond sex differences in ability dimensions.

Sex Differences in Latent General and Broad Cognitive Abilities: Evidence from the WJ III

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Research on sex differences in cognitive abilities has been generally consistent in showing an advantage for males in visual-spatial ability, but other findings, such as differences in *g* or crystallized ability (Gc), are less consistent. Inconsistencies in findings may be due, in part, to developmental changes in cognitive abilities, or to the use of subtest and composite scores rather than latent factors. Here, multiple indicator—multiple cause (MIMIC) models were used to investigate sex differences in the latent abilities underlying the Woodcock Johnson III Tests of Cognitive Abilities (WJ III Cog). This approach allows the examination of sex differences in broad abilities while controlling for *g*, as well as sex differences in *g* with the broad abilities considered. We will report results for 12 age groups from age 6 through 59. Preliminary analyses for children and adolescents aged 6 to 15 (5 age groups) show a statistically significant advantage for girls on processing speed (Gs) at all age levels, and advantages for boys on quantitative reasoning (RQ) and Gc at most age levels. Preliminary analyses have shown no statistically significant differences on the latent, higher-order *g* factor or in visual-spatial ability. Results for all age levels will be presented at the conference.

The Sternberg Triarchic Abilities Test: Three Separate Types of Intelligence or One General Factor?

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There are two major theoretical camps in intelligence research. One camp argues that there is one unitary factor (g) that accounts for a large part of the variance between individuals. The other argues that intelligence is composed of various abilities, and the combination of these abilities is what constitutes intelligence. The Sternberg Triarchic Abilities Test (STAT) is an intelligence test that is designed to measure three distinct types of intelligence, analytical, practical, and creative. Both exploratory and confirmatory factor analyses were run to determine the factor structure of the STAT. Correlations and regressions using academic variables such as grade point average, ACT/SAT, and academic major were analyzed to determine the predictive validity of the STAT. These analyses were an attempt to establish whether or not the triarchic model is empirically supported, or if g theory is the best explanation of intelligent behavior. Results indicate that the STAT is mainly a measure of g. Regressions and correlations suggest that STAT scores are highly related to GPA and SAT/ACT score. Exploratory and confirmatory factor analyses indicated that a g model was the best explanation for the data.

Developmental Lags in Processing Speed and Working Memory in Subaverage Range of Intelligence Predominantly Predict the Lag in *g*

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The subaverage range of IQ (SRIQ) includes the subgroup of mental retardation (IQ scores less than the lower 70s) and the subgroup historically known as borderline mental retardation and currently classified as borderline intellectual functioning (IQ scores between the lower 70s and the mid 80s). The range represents a sizable group in the general population (about 15%) and the intellectual difficulties characteristic of this range are thus likely to give rise to pervasive educational and social disadvantages. A clarification of the cognitive deficits causing the intellectual difficulties of SRIQ will help disperse the confusion surrounding the source of the disadvantages related to SRIQ. In the present study, the hypothesis that the developmental lag in IQ observed from SRIQ during the growing years can be mostly ascribed to the comparable lags in the basic cognitive capacities (BCC) of processing speed and working memory was tested using the data from the Woodcock-Johnson III Cognitive Ability Tests (WJ-III) standardization sample. Twenty four IQ range (SRIQ and the normal range of IQ) by age (age-by-year between 7 and 18) subgroups in the total sample of over 2000 after the listwise deletion were formed and compared. A BCC composite based on the four WJ-III processing speed and working memory W-scores (scores prior to age standardization) was obtained from the multiple regression model treating the BCC scores as the predictors and the W-score of the general ability index as the criterion. The means of the BCC composite in the 24 subgroups had a Pearson correlation of 0.99 and a Spearman correlation of 0.97 with the means of the general index, suggesting a very high congruency between the BCC-based developmental lag and the *g*-based developmental lag. Moreover, the peak level of the BCC composite at 18 years of age in SRIQ was only comparable to the mean level of the 11-year-old subgroup in the normal range, signifying a rather serious developmental lag of SRIQ in BCC, and the magnitude of the lag in BCC matches quite closely the lag in *g*, which was manifested by an approximate equivalence between the age of 18 in SRIQ and the age of 10 in the normal range. A close inspection of individual scores revealed that nearly all (99%) in SRIQ in this age span fell below the BCC level of an average 13-year-old in the normal range. Because the developmental lags in BCC may very likely reflect an inefficacy of neurological functioning, these serious lags associated with SRIQ indicate that the social and educational difficulties encountered by the individuals in this range may to a considerable extent be neurologically rooted.

Sex Differences Symposium: Evolutionary Psychology of Sex Differences in Intelligence

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Evolutionary Psychology attempts to explain human behavior and mental processes in terms of selection for survival and reproductive success over the course of many thousands and millions of years. This paper explores the potential of Evolutionary Psychology for the explanation of sex differences in a number of cognitive abilities. The general framework of the approach is that during some 4 million years humans evolved as hunter-gatherers in which males specialized in hunting, while females specialized in gathering and child rearing. These different specialisms required different cognitive abilities, with the result that these were selected for in men and women. The theory is applied to sex differences in spatial and verbal abilities and in general intelligence.

Cognitive Performance in Childhood and the Risk of Generalized Anxiety Disorder

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Perception of control over one's environment, particularly when faced with an ambiguous situation, has been identified as a critical cognitive process involved in worry and GAD. Similarly, it is thought that individuals with a lower level of cognitive performance (IQ) feel less in control when faced with stressful life events, and do not cope as well as individuals with a high level of cognitive performance. Here, we summarize the results from two separate studies. The first tests the hypothesis that individuals with higher IQ scores are less likely to develop a lifetime diagnosis of GAD. The second examines whether higher cognitive performance moderates the association between stressful life events in childhood and the development of GAD.

Participants for both studies were individuals in their mid-30s, who had been followed since birth as part of the National Collaborative Perinatal Project in Providence, RI (669 participants in study 1, 629 in study 2). Survival analysis and multivariate regression models were used to evaluate the relationship between cognitive performance at age seven, and DSM-IV diagnosis of GAD. Multiple logistic regression models were used to evaluate the relationship between an index of stressful life events occurring between birth and age 7 and lifetime GAD. This model was then stratified by high/low cognitive performance.

A 15-point (1 SD) advantage in childhood cognitive performance is significantly associated with a 50% reduced risk of lifetime GAD and an 89% and 66% reduction in risk of GAD in childhood and adolescence, respectively. Individuals who experienced 2 or more stressful life events were also at increased risk of GAD. Among individuals with lower cognitive performance (FSIQ<100), those who experienced 2 or more events were significantly more likely to develop GAD OR=2.6 (95% CI 1.1-5.9) compared to individuals who experienced no events, while two or more stressful life events was not significantly related to GAD among individuals with higher cognitive performance (FSIQ>=100) compared to those who experienced no stressful events OR=1.9 (95% CI 0.5-7.1).

Childhood cognitive performance is associated with a diagnosis of GAD in childhood and adolescence even after accounting for key potential confounders. Furthermore, our results suggest that higher cognitive performance may help protect individuals from developing GAD in the presence of stressful life events in childhood.

Computer-Game-Like Tests of Processing Speed and Visual Working Memory

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Although researchers interested in cognitive processes have made use of computer game formats (e.g. Berger, Jones, Rothbart & Posner, 2000; Donchin, 1995; Graham et al., 1986; Porter, 1995; Ryan, 1994), there appears to have been little systematic research investigating the potential use of computer games in assessing individual differences in cognitive abilities. Across three studies we have attempted to develop and assess two computer-game-like (CGL) tests designed to measure separate abilities currently of considerable interest to many researchers; Processing Speed and Working Memory. In Study 1 (N=60) a computerized coding task that uses a mouse response method (McPherson & Burns, 2005) was the basis for a speeded CGL test designed to measure Processing Speed. In Study 2 (N=61) dynamic game-like elements were added to this test to create a more game-like version (Space Code). For Study 3 a CGL test designed to measure Visual Working Memory (Space Matrix) was created by combining Space Code with a memory task based on the Dot Matrix test. In each study, construct validity was assessed using marker tests selected from the WJ-III and WAIS-III batteries and the relevant research literature.

Surveying Expert, Media, and Public Opinion on Intelligence Research

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Few topics in psychology are as controversial as intelligence, especially the heritability of IQ and group differences. To date the only survey of expert opinion on intelligence research was conducted by Snyderman and Rothman in 1987. They found a consensus that there is a heritable trait of general intelligence, objectively measurable by standardized IQ tests, and that the Black-White difference in average IQ score is not solely cultural. Their survey has been very effective in correcting media misrepresentations. However, two decades have passed. New research has been published, new issues arisen, and new scientists entered the debates. With Rothman's approval, FHU is conducting a replication, revision, and extension of the original survey. It will include some new items (sex differences, the relevance of intelligence research for social policy), as well as poll the members of new organizations and compare their responses against the original and each other. FHU will disseminate the results of the survey, issue press releases on intelligence research through networks such as AAAS's EurekAlert!, notify scientists of media misrepresentations and assist them in coordinating demands for correction.

Untangling the Cognitive Processes Web

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This study examined the structural relations between the basic dimensions of processing efficiency, working memory, and reasoning. An array of electronically designed and administered tasks, tapping on these processes, was addressed to 410 participants aged 6-12. The cascade model that fit our data best, revealed that sheer speed of processing lies at the lower end of the hierarchy, constituting the basic component that is involved to variant degrees in all hierarchically higher processes, while reasoning ability is at the apex. Reasoning involves general processing efficiency as reflected by sheer speed of processing, executive control processes directing processing on the relevant components of information and protecting processing from the interference of irrelevant information, some orchestration processes needed to scan the mental models built for an argument, working memory for the representation of the information needed, and the inferential processes needed to produce the conclusion. Partialling out the effect of age resulted in the annihilation of the relations between speed of processing and all non speed related factors but it did not influence the effect of working memory on reasoning. Speed of processing proves to be a strong developmental factor which determines the effectiveness of the other laden factors. Variation in reasoning is attributed to processing efficiency as a developmental factor and to working memory as a factor of individual differences. This pattern holds in all symbolic domains of relations and in regard to both inductive and deductive reasoning. To specify the pattern of development of the various cognitive processes a series of multivariate analyses of variance were run. The effect of age was highly significant and strong on the four speeded performance factors, suggesting that performance improved systematically. Further, the analysis revealed that age affects working memory extensively, suggesting that performance improved systematically throughout the age span studied here. Differences between age groups suggest a spurt-like development of working memory. Thus, the developmental-hierarchical structure of the model and the strength of the processes' interrelations set the basis for "untangling the cognitive processes web".

How Much *g* is Needed to Play Chess Successfully? Psychometric and Neurophysiological Evidence

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Individual differences in cognitive performance can be described and explained in the framework of two mental ability concepts: 1. Intelligence, which refers to performance differences across domains which are viewed as a function of a general efficiency of the human information processing system, namely a more efficient brain activation in brighter individuals during cognitive performance. 2. Expertise, which focuses on domain-specific competences that are assumed to be mediated by mechanisms (e.g. an elaborate knowledge base) acquired during an extended period of practice. Some researchers claim that high levels of expertise can be achieved independently of intelligence, while others emphasize the interplay between intelligence and expertise. This investigation aims at providing insights into the nature and potential bases of expert performance in the domain of tournament chess in interaction with individual differences in intelligence. In Study I, we correlated intelligence components and personality with the attained expertise level in a sample of 90 tournament chess players and found a substantial relationship between playing strength and general as well as numerical intelligence. This suggests that expert chess play requires superior intellectual abilities. Together with expertise indicators (tournament experience) and motivation, intelligence could explain about 50% of the expertise variance. Study II investigated the interplay between intelligence and expertise at the neurophysiological level. During EEG recording, a sample of 47 tournament chess players worked on three types of experimental tasks (speed, memory, reasoning). Analyses of cortical activation patterns revealed largely independent effects of intelligence and expertise. In all tasks, brighter individuals displayed a lower amount of cortical activation predominantly over anteriofrontal cortices, underlining the relevance of prefrontal brain regions for intellectual performance and supporting the neural efficiency hypothesis. This result was supplemented by an independent effect of the participants' skill level: In tasks drawing on speed and reasoning, the more skilled players displayed a more focused (to parietal cortices) and, thus, presumably more efficient activation pattern, pointing to the availability and usage of more efficient strategies in task performance. In the memory task, in contrast, a higher skill level was associated by a generally higher activation over almost all cortical areas, which may reflect the strong involvement of the experts' elaborate knowledge base in task performance. The findings indicate that efficient cortical activation patterns are a function of both intelligence and domain-specific competences.

Rasch Probabilistic Modeling of the NLSY97 Study, Using the Computer Adaptive Form of the Armed Services Vocational Aptitude Battery (CAT-ASVAB97), Confirms a Significant Male Lead in General Ability

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Marked sex differences were observed among sub-tests in a previous study of non-Hispanic whites in the NLSY79 study using the Armed Services Vocational Aptitude Battery (ASVAB79: Jensen 1998), even if the factor structure per se was identical for adult males and females. However, when considered together with the outcome of four other large-scale representative studies using tests that also encompass the full range of abilities in the general population, Jensen (ibid. p. 540-41) concluded that "… the sex difference in g is either totally nonexistent or is of uncertain direction and of inconsequential magnitude." and further that "The generally observed sex difference in variability of test scores is attributable to factors other then g."

Recent evidence questions these conclusions (e.g. Nyborg, 2005), so we analyzed the NLSY97 Computer Adaptive form of the Armed Services Vocational Aptitude Battery (CAT-ASVAB97) data in terms of Raschian probabilistic modeling, and used Facet analysis (Linacre, 2006).

We found that all the CAT-ASVAB97 subscales fit neatly into a one-dimensional equal-interval Rasch scale. The person-related ability separation index was high (i.e. 4.13) as was the reliability index (0.94). The newly established Rasch ability scale correlated 0.992 (Spearman R) with general intelligence, g, as estimated by Principal Axis Factor analysis (t(N-2) = 662.62; $p <$ 0.000).

The Rasch ability dimension is scaled in equidistant logit units. Males (N = 3,529) obtained a mean of 0.126 logits (SD 1.03) whereas females (N = 3,451) scored a mean of 0.059 logits (SD 0.90). This predicted sex difference is statistically significant (t = -2.89; p = 0.004; also after control for age (F(1,6977) = 14.012; p = 0.000). As both means and SDs affect the size of the sex ratios at the low and high ends of the close-to-normal logits ability distribution, we estimated male-female ratios on the basis of observed means and SDs. We found, as expected, that males were overrepresented at the low as well as at the high ends of the ability distribution. At logit = +3 there were about 3.5 males for each female.

We concluded that the representative NLSY97 study, using the wide-ranging CAT-ASVAB97 subscales, yields a well-defined one-dimensional equal-interval ability scale with a significant sex difference in general ability in male favor.

Intellectual Topography of Creative Accomplishments in the Arts and Sciences:Some Antecedents to C. P. Snow's "Two Cultures"

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A sample of 2,400 intellectually talented adolescents (top 1%) were assessed on the SAT at age 13 and tracked longitudinally for over 25 years. Their creative accomplishments were examined with particular emphasis on literary achievement and scientific/technical innovation, as a function of *ability level* (viz., SAT-M plus SAT-V) and *pattern* (viz., SAT-M minus SAT-V). Distinct ability patterns, uncovered at age 13, portend rare and contrasting forms of creative expression by middle age (e.g., securing a patent, publishing a novel, or achieving tenure at a top U.S. university in the humanities versus engineering and the physical sciences). While ability level contributes significantly to creative accomplishments, ability pattern is critical for predicting the specific domain in which it occurs. These findings are linked to historical treatments (Boring, 1950; Cronbach, 1957; Kimble, 1984), which support a psychological reality for C. P. Snow's (1967) "two cultures."

Cognitive Influences on Pitch Discrimination: Working Memory Capacity for Active Maintenance or Active Listening

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The purpose of this research was to expand existing knowledge of a relationship between sensory tasks, such as pitch discrimination and performance on higher order intelligence tasks, such as Raven's test of figural reasoning. A plethora of research assessing working memory capacity (WMC) with complex span tasks that require processing information while alternately updating a list of items to remember, has shown a link between this construct and a wide array of tasks that require controlled attention, (Engle, 2002). My hypothesis is that individual differences in WMC/controlled attention also predict performance on sensory tasks, which could explain variability within and between individuals on pitch discrimination. A series of 4 experiments were designed with the goal of finding a consistent, significant relationship between working memory capacity and difference threshold for pitch. Additionally, stimulus manipulations in the threshold task were used to test more specific hypotheses about the nature of the relationship. Findings revealed that performance on the working memory capacity assessment consistently predicted difference threshold.   Variability explained by WMC could be attributed to isolable processing elements in the pitch tasks. Since the complex span task has a strong element of updating and maintaining information, perhaps the relationship between working memory and pitch discrimination can be explained by *active maintenance* of pitch information over the inter-stimulus interval (ITI), and thus would be sensitive to shorter or longer durations. Theoretically, active maintenance should only be necessary on threshold tasks with longer ITI's. Very short ITI's in the threshold task may extinguish the existing relationship found with longer delays, hence eliminating the active maintenance hypothesis as a shared mechanism between WMC and pitch discrimination. Results from these experiments revealed that the relationship between WMC and difference threshold was present for ITI's of 20ms to 500ms with equivocal effect size across those durations. These results are inconsistent with the active maintenance hypothesis. An alternative explanation for the relationship between WMC and difference threshold for pitch is that controlled attention could be critical for attenuating focus when one is encoding the tones, or *active listening*. Theoretical support for this hypothesis comes from research finding that WMC predicted focus on the dichotic listening task (Conway et al, 2000).

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Aging Symposium:
An Analysis of Working Memory in the Context of Reference Cognitive Abilities

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In recent years there has been much speculation concerning the relationship between fluid intelligence (gF) and working memory (WM). Few studies, however, have expanded this line of research to investigate the relationships between WM and a wider range of cognitive abilities, or the extent to which age-related influences on WM are shared with age-related influences on other cognitive abilities. A large (N > 750) age-stratified sample of adults was recruited from the community and asked to complete a number of tasks designed to assess WM and the reference abilities. Initial analyses indicate that there is considerable overlap of the age-related influences on the reference abilities and on WM, and that the relationship between WM and these constructs remains invariant across age groups (18-39, 40-59, and 60+).

Aging Symposium:
A Contextual Analysis of Written Language

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Results of recent research suggest potentially powerful relationships between aspects of the language people use and their cognitive abilities. One example is the Nun Study, which demonstrated relationships between certain types of written language usage and cognitive outcomes as many as 60 years later. The purpose of the current project was to expand on these relationships, with adults across a wide age range and a comprehensive battery of cognitive tests. Adults, ranging from 18 to over 90 years of age, performed the reference battery of cognitive tests and also wrote two short essays on specified topics. Different cognitive abilities were found to be related to different aspects of written language. For example, word frequency and idea density were both related to vocabulary knowledge, but usage of certain grammatical constructions was related to fluid intelligence.

Sex Differences in General and Broad Cognitive Abilities for Children and Adolescents

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Researchers have long been interested in potential sex differences in cognitive abilities. Research has generally been consistent in showing an advantage for males in visual-spatial ability, but other findings, such as differences in g, are less clear. Findings also suggest the possibility of greater variation in males' cognitive abilities. Inconsistencies in findings may be due, in part, to developmental changes in cognitive abilities, or to the use of subtest and composite scores versus latent factors. Here, multi-group higher-order analysis of mean and covariance structures (MG-MCAS) and multiple indicator—multiple cause (MIMIC) models were used to investigate sex differences in the latent abilities underlying the Kaufman Assessment Battery for Children—Second Edition (KABC-II). We analyzed data from different age groups (6-8, 9-11, 12-14, 15-16, & 17-18) to account for changes due to development. Results showed no statistically significant differences across the sexes in the variance in g or other broad abilities at every age group. Boys consistently demonstrated a significant mean advantage on the latent visual-spatial (Gv) factor. They showed a significant mean advantage on the latent verbal-crystallized factor (Gc) at all ages except for 17 and 18. Girls scored higher on the latent, hierarchical g factor, although this difference was statistically significant at only two age levels.

Relevance of Education and Intelligence at the National Level for Politics: Democracy, Rule of Law and Political Liberty

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Political theory has described a positive linkage between education, cognitive ability and democracy. The change in cognitive abilities and attitudes done by education furthers tolerance, lowers extreme positions and increases the ability for rational decisions in political elections. Education and thinking ability themselves are linked to a cultural context, e,g. the „grand old man" of political research, Seymour Martin Lipset (1960, p. 57), emphasized: "The higher one's education, the more likely one is to believe in democratic values and support democratic practices." A similar position is held by the OECD (2000, p. 81), which strengthens the influence of education on voting decisions: "People with more schooling are likely to make more informed choices when voting and to participate more actively in their communities." Simpson (1997, p. 157) stresses the relevance of cognitive abilities as the central mechanism: "Democracy depends on a public who can process complex information and actively participate in politics." Meisenberg (2004, p. 139) underlines the intelligence aspect too: „As people get brighter they develop a habit of critical thinking, questioning religious dogmas and other sources of traditional authority. Being able to understand the nature of politics, people in modern societies are not easily manipulated by the ruling elite."

Additionally, research on moral development of children has demonstrated the relevance of cognitive development for moral judgement. Ethical orientations are necessary for the function of democratic rules in society too.

Longitudinal surveys and comparisons of national levels of education, cognitive abilities and political conditions allow the analyses of causal relationships. Data show strong correlations between education, cognitive ability and positive valued political conditions (democracy, rule of law and political freedom) with in cross-lagged analysis stronger impact of education and intelligence on politics than gross national product on politics or vice versa. A positive evolution of society in its non-economic aspects depends at national level largely on education and cognitive ability.

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No Evidence that the Postulated Brain Regulator Genes *Microcephalin* and *ASPM* are Associated with General Mental Ability, Head Circumference, or Altruism

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We tested the hypothesis that the newly discovered genes *MCHP1* and *ASPM* underlie human brain size and its correlates. These candidate genes were reported to be positively accelerated throughout the simian lineage leading to *Homo sapiens*, to be under strong positive selection pressure in modern humans, and to be associated with autosomal recessive microcepahly. We measured general mental ability, head circumference, and social intelligence in 644 Canadian adults (496 Caucasians, 36 Orientals, 84 Mixed Race/Other, and 28 Blacks; 257 men, 387 women). The gene variants were assessed from buccal DNA, general mental ability by the Multidimensional Aptitude Battery and Wonderlic Personnel Test, head circumference by stretchless tape, and social intelligence by the Self-Report Altruism and Arizona Mini-*K* scales. Although the allele frequencies showed expected population group differences, and all the measures showed good construct validity, no relationship was found between either of the genes and any of the criteria in the Caucasian, other, or total samples. Among Caucasian 18- to 25-year-olds, for example, the two mental ability tests correlated with each other ($r = 0.78$, $N = 476$, $P < 0.001$) and with head circumference ($r = 0.16$, $N = 182$, $P < 0.05$), Altruism ($r = 0.16$, $N = 476$, $P < 0.001$), and Mini-*K* ($r = 0.23$, $N = 182$, $P < 0.001$). The two prosocial attitudes scales correlated with each other ($r = 0.25$, $N = 182$, $P < 0.001$), but not with head circumference.

Sex Differences Symposium:
Confirming Sex Differences in *g* from RTs

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The finding of a male IQ advantage of 3.6 points on g from the SAT by Jackson and Rushton (2006), as earlier of 4 to 8 points by Richard Lynn, Paul Irwing, and Helmuth Nyborg, is validated by reaction time (RT) measures. The effect size of 0.24 favoring males found by Jackson and Rushton is matched by simple and choice reaction time (SRT and CRT) effect sizes of from 0.17 to 0.40.

RT tasks are so easy that 9- to 12-year-old children can perform them in less than one second. Children with higher IQ scores perform faster than children with lower scores, because RT measures the efficiency of the brain's capacity to process information, which is the same ability measured by intelligence tests. SRT correlates with IQ about 0.20, while CRT correlates about 0.40 -- in aggregate, RTs can correlate 0.70 with IQ (Jensen, 2006).

In a meta-analysis of 72 effect sizes derived from 21 studies (N = 15,003) of SRT over a 73-year period, Silverman (2006) found both secular trends and an effect size favoring men of 0.17. Several small sample studies have also found that men average faster on CRT, such as the Bonn Longitudinal Study of Aging (Mathey, 1976; reviewed in Deary & Der, 2005).

The most definitive evidence comes from two recent population representative studies by Deary and Der, carried out to examine aging effects.

In the first, Deary and Der (2005) tested 500+ 16-, 36-, and 56-year-olds from the West of Scotland. Participants were retested eight years later, at which time they also took the g loaded Paced Auditory Serial Addition Test (PASAT). Individual differences on the RT measures were stable over the 8-year period (r ~ 0.50), correlated with the PASAT scores (mean r ~ 0.25), and declined with age (CRT from age 20; SRT from age 50). Importantly, men scored higher on PASAT (d ~ 0.20) and averaged faster on RT, especially on one of the CRT measures (d ~ 0.40).

In the second study, Der and Deary (2006) reanalyzed data for 7,130 adults in the UK's Health and Lifestyle Survey. Again, they found CRT declined from age 20, SRT from age 50, and men consistently averaged faster.

In conclusion, any uncertainty over whether males really do average higher in general mental ability, a finding that had been missed for nearly 100 years, must now be considerably reduced.

Emotional Intelligence Symposium:
The Influence of Emotional Intelligence on Gifted and Mainstream Adolescents Academic Achievement

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Intellectually gifted students (IQ121) who academically underachieve for their intellectual potential have posed a concern for educators, parents and psychologists for a number of decades (Alsop, 1992; Gross, 1993; Hollingworth, 1926; Neihart, 2006; Rimm, 1986). Given that intellectual development is strongly linked to academic achievement, and intellectually gifted students by their very definition, have high IQ's, it would seem the underlining causes for academic underachievement may be linked to other aspects of gifted students development. Gifted students asynchronous development (Columbus, 1991; Silverman, 1993) and qualitatively differentiated emotional development (Dabrowski, 1964; Piechowski, 1991) lead the researcher to question if emotional intelligence (Salovey & Mayer, 1990) was effecting gifted students' academic achievement and underachievement. Therefore, differences in emotional intelligence of gifted (IQ 121≥) and mainstream (IQ 70-120) adolescent students academic achieving and underachieving students were investigated (N=375). The gifted (n=116) and mainstream (n=259) student's academic achievement level was determined by students Equivalent National Tertiary Entrance Rank (ENTER) Score. The Raven's Standard Progressive Matrices (Lemos, 1995) was used to identify gifted and mainstream students and the level of emotional intelligence was measured by the Swinburne University Emotional Intelligence Test (SUEIT) Adolescent Version (Palmer, Stough, & Luebbers, 2003). The results indicated that the gifted (n=106) and mainstream (n=212) achieving students had significantly higher emotional intelligence than gifted (n=10) and mainstream (n=47) underachieving students. The findings positively support the assertion that emotional intelligence plays a vital role in academic achievement for both gifted and mainstream students. Limitations of the findings are discussed, and implications for education policy and practice are offered.

General Intelligence, Life-History, and Covitality: A Test of Evolutionary Hypotheses

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Recent adaptationist accounts of human mental and physical health have spurred-on the debate over the evolution of human intelligence. Two of the major competing accounts, Rushton's (1995) life-history model and Miller's (2000) fitness indicator model have each argued for different adaptive pressures as the impetus for the development of intelligence. Rushton's Differential-K theory (K) proposes that novel environments, such as the colder climates of Europe and Asia, drove the evolution of a variety of mechanisms in which to solve an ever-increasing array of new adaptive problems. These mechanisms working together are thought to develop a coherent life-history strategy that incorporates high parental investment, longevity, and physical and mental health within stable environments, while the opposite (low parental investment, short life-span, and lower-level health and cognitive functioning) is thought to develop in unstable environments. Miller's perspective describes intelligence as one of many sexual signals, or fitness displays, along with physical and mental health (denoted here as "Covitality"). Similar to a peacock's tail these signals have been described as indicators of underlying genetic quality.

In the tradition of strong inference, the current two studies utilizing undergraduate students from Southern Arizona were developed to determine which hypothesis better accounts for general intelligence, or 'g'. Study 1 ($N = 132$) used theoretically derived unit-weighted factors to examine the relationships among K, measured by the Arizona K-battery (see Figueredo et al., 2005); g (measured by the Ravens Standard Progressive Matrices, Mill-Hill vocabulary scale, and Shipley Institute of Living Scale); and a variety of general physical and mental health measures. Due to testing limitations identified in the first study, the second study ($N = 192$) developed an 18-item short form of the Ravens Advanced Progressive Matrices (RAPM-18). Reliability of this scale was moderately high $r = .73$, outperforming other short-version scales of the Ravens. Across all studies, no significant relationships were found between g and either K or Covitality (for all, $r \geq -.08$, $p \geq .25$), while K and Covitality were significantly related to each other ($r \geq .30$, $p \leq .001$). These results suggest that while physical and mental health may be indicators of life-history, intelligence is not accounted for by either K or Covitality.

Sex Difference Symposium:
Sex differences in human cognitive abilities

Organizers: Jelte Wicherts and Paul Irwing
Discussant: Wendy Johnson

The symposium begins with a paper by Paul Irwing providing an analysis of the US-standardization sample of the WAIS-III. Both multi-group confirmatory factor analyses with mean structures (MGCFA-MS) and a MIMIC model confirm sex differences in g, Information and Arithmetic favoring males and in Processing Speed and Digit Symbol favoring females. The paper addresses both methodological issues, and presents additional findings on the relation between working memory and g, and on the variability of cognitive abilities in males compared with females. Jelte Wicherts then presents a matching set of analyses on the Dutch standardization sample of the WAIS-III, and additionally examines age trends. The two papers will highlight key problems in applying MGCFA-MS to the study of sex differences, particularly with regard to the issue of measurement invariance. Philippe Rushton then examines the question of sex differences in g from an alternative perspective, by summarizing reaction time studies, in a short note. At this point the focus of the symposium broadens, when Wendy Johnson and Thomas Bouchard examine the relationship of interests to the rotation-verbal and focus-diffusion dimensions, and sex differences in these. The symposium closes with an examination by Richard Lynn of how the general pattern of observed sex differences can be accounted for in evolutionary terms.

Invited Address:
Historiometric Assessments of Intelligence

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Running parallel to mainstream research on the psychometric assessment of intelligence was another tradition of research on the historiometric assessment of intelligence. Historiometric assessment is based on four data sources: (a) personality sketches (e.g., Intellectual Brilliance), (b) developmental histories (IQ), (c) content analyses (integrative complexity), and (d) expert surveys (Openness to Experience). The first two represent major lines of intelligence research that involved key figures in the development of corresponding psychometric methods. The literature on US presidents is then used to integrate the results from the four historiometric approaches. Significantly, historiometric investigations on the relation between intelligence and adulthood achievement obtain about the same effect size as found in psychometric research (i.e., rs or âs = .25 ± .10).

Cognitive Mechanisms of Emotional Intelligence

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One of the most important questions and controversies concerning emotional intelligence is whether it has the right to be called "intelligence". The correlation between emotional and general intelligence has already been proved, however up to now not many have tried to explore the nature of that relationship. We assumed that the shared starting point for emotional and general intelligence was the efficiency of the cognitive system on the elementary level of information processing, and that both academic and emotional intelligences were based on similar cognitive processes. In the case of academic abilities, those elementary mechanisms are driven by neutral stimuli, in the case of emotional intelligence – by emotional ones. To test that supposition we designed a number of isomorphic tasks, identical in structure but fulfilled with different content, specific to each intelligence. Three elementary cognitive processes related to intelligence (inspection time, attention, and working memory) were explored in the series of experiments. Preliminary results suggest that sought shared starting point for both intelligences is the efficiency of more complex (even though still elementary) processes of attention and working memory. Although inspection time is strongly related to general intelligence, it has no link to emotional intelligence, even if the content of the task is of affective sort. Obtained data are still being analyzed.

Hominid Cranial Capacity and Global Climate Change Over the Past 205,000 Years

Pedro Sofio Abril Wolf and Aurelio José Figueredo

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The human paleontological record shows that a gradual increase in cranial capacity started during *Australopithecine* evolution and continued throughout the Pleistocene (DeMiguel & Henneburg, 2001). Many researchers have noted that this phenotypic change coincided with the onset of global climate change approximately three and a half million years ago and may have been one of the major selective pressures driving this change (e.g. Gribbin & Gribbin, 1990; Calvin, 2002; and Potts, 1998).

Two general climatic hypotheses were tested: (1) that the overall Pleistocene drop in temperature drove this evolutionary change, because colder environments were "harsher" and therefore selected against individuals with smaller brains; and (2) that Pleistocene climactic variability (repeated glacial and interglacial cycles) drove this evolutionary change, because the rapidly changing temperatures selected against individuals who could not adapt over ontogenetic time to the changing environment.

The climate data used were collected from ice cores drilled out of the Antarctic and Greenland ice sheets and the hominid cranial capacity data used were published by DeMiguel & Henneburg (2001). The climate data contained measures of the Deuterium content (‰D) trapped in stratigraphic sections of ice sheets in Antarctica (Petit, Jouzel, Raynaud, Barkov, Barnola, et.al. 1999) and measures of ‰^{18}O content trapped in stratigraphic sections of the Greenland ice sheet (Alley, Gow, Johnsen, Kipfstuhl, Meese, et.al., 1995). Both δ^{18}O and δD are variables for estimating global ice volume which is associated with global temperature (Petit et.al., 1999). The climate data were transformed by aggregating data from the 1000-year intervals preceding the age of each of the crania, estimated as the minimum amount of time necessary for human evolutionary change (Wilson, 1981). The means and standard deviations of each interval were calculated as indicators for the two alternative climatic hypotheses. The mean temperature factor (MT) was the average z-score of the means of δ^{18}O and δD (r=.74*) and the climatic variability factor (SDT) was the average z-score of the standard deviations of δ^{18}O and δD (r=.58*) for each interval. Years before present (YBP) was correlated with MT (r= -.20*) and with SDT (r= .43*).

A series of hierarchical general linear models were used to partition the variance among the alternative hypotheses tested, including the possible nonlinearity and nonadditivity of effects. The first of two inclusive models tested the effects of YBP, MT, and SDT, in that order, followed by their quadratic and then their cubic polynomial terms. The second model instead tested the main effects and all the possible linear interactions of the same ordered predictors. Both of these inclusive models were statistically significant: R^2=.31* for the polynomial model and R^2=.29* for the interaction model. None of the interactions, however, were significant. The only significant predictors were YBP, SDT, and YBP^2. These three predictors and MT were included in a final restricted model, specified in the following order: YBP, MT, ST, and YBP^2. The restricted model was also statistically significant (R^2=.30*). The fact that SDT remained significant after controlling for both YBP and MT (which was itself non-significant) was interpreted as supporting the climatic variability hypothesis.

Emotional Intelligence Symposium:
Examining the Divergent and Convergent Validity of the Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT)

Con Stough [1], Fiona Erskine-Fowler [1], Amy Timoshanko [1,2,3], Karen Hansen [1], and Melissa Desfosses [1]

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Over the last decade there has been growing interest in the construct of emotional intelligence. To operationalise the construct several tests and measures have been developed which use either a self-report or ability based format. The Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT) is the only ability based measure of the original Salovey and Mayer conceptualisation of Emotional Intelligence (EI). Although the MSCEIT has had several critics, particularly in relation to its scoring method, the MSCEIT appears to be a promising assessment tool for the construct. Mayer and Salovey have claimed that the MSCEIT shows good convergent validity (correlates moderately with cognitive abilities) and divergent validity (does not correlate with personality). However, few independent studies have examined the construct validity of the MSCEIT using well validated measures of cognitive ability and personality. In this study we tested 102 participants from the general community with a battery of psychometric measures that included the MSCEIT, the Wechsler Abbreviated Scale of Intelligence (WASI) and the NEO Five Factor Inventory (NEO-FFI).Results indicated that at the sub-branch level of the MSCEIT there was little evidence for either convergent or divergent validity. Lower than expected correlations were observed between WASI abilities and MSCEIT dimensions and higher than expected correlations were observed between MSEIT dimensions and the big 5 personality dimensions, particularly Agreeableness (A). Predictive validity was also assessed by examining correlations between life satisfaction and MSCEIT dimensions.

Flynn Effect Symposium:
Gains in *g* and Empty Gains

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Secular score gains in IQ test scores are one of the most most intriguing and controversial findings in the recent psychology research literature. The significant research question is to what extent these empirical gains are on the *g* factor and therefore reflect a functional increase of real-life problem solving ability rather than in familiarity with taking tests or some other less cognitive function.

After reviewing the existing literature, we employ several independent archival data sets to test: (1) How strong the secular increase is among cognitive tests that have not been previously analyzed before (the GATB, the ISI, and the GALO); (2) Whether the secular gains on elementary cognitive tasks demonstrated for young children also hold for a similar attention test for adults; (3) If there are secular gains on perceptual motor tests for adults comparable to the gains reported for infant motor development tests; (4) Whether comparing the correlation matrices for two age cohorts confirms Spearman's Law of Diminishing Returns; and (5) Whether the method of correlated vectors yields a positive correlation or a modest negative correlation between score gains and *g* loadings indicative of a true increase in general mental ability, *g*.

While we note the limitations in the various methods used in the study we conclude that, taken together, the results are in line with the hypothesis of a small or moderate gain in general mental ability, *g*. This implies that various other factors together have a strong influence on secular score gains. Further research is needed to determine the role played by various biological factors (such as improved nutrition and health care, an overall decrease in inbreeding) versus cultural factors (such as improved schooling and amelioration of severest adverse environmental conditions among the poorest segments of the population), and their interaction in producing this increase in mental ability

Correlations of Skin Color and Continent with IQ

Donald I. Templer [a] and Hiroko Arikawa [b]

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The present study determined (1) the correlations between skin color and IQ across the countries of three different continents; and (2) the correlations of both skin color and continent in the three pair combinations with the three continents. The product-moment correlations between IQ and skin color were -.86 across the 48 African countries, -.55 across the 48 Asian countries, and -.63 across the European countries. When the 96 countries of Africa and Asia were combined skin color correlated -.86 and continent correlated .75 with IQ. The respective correlations were -.97 and .89 across the 81 countries of Asia and Europe, and -.71 and .54 across the 81 countries of Europe and Asia. In multiple regression continent yielded minimal increment to skin color in predicting IQ. In an earlier study (Templer & Arikawa, 2006a) skin color correlated more highly with IQ than racial category, but racial category yielded greater increments in multiple regression than did continent in the present study. The present findings, combined with previous research relating skin color and IQ (Templer & Arikawa, 2006a; 2006b), indicate that skin color is a robust correlate of IQ in an international perspective.

Empirical Support for Rushton's K Differential Theory

Donald I. Templer [a] and Hiroko Arikawa [b]

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The purpose of the present study was to empirically substantiate Rushton's Differential K Theory that purports that groups of persons with K (in contrast to r) characteristics have a life history and reproductive strategy that includes higher intelligence, less reproduction, less sexual activity, better care of offspring, lower birth rates, greater life expectancy, better impulse control, and greater social organization. The present research intercorrelated national mean IQ, infant mortality, HIV/AIDS rates, birth rates, prevalence rates, and life expectancy in 129 countries in Africa, Asia and Europe. All of the correlations were substantial and in the expected direction. Also supportive of Rushton's theory is that there was only one factor which accounted for 75% of the variance and was labeled "K-r continuum." All five variables were correlated with an economic variable (per capita income) and a biological variable (skin color, which correlated highly with intelligence in previous. research). Skin color correlated more highly with all five variables than per capita income so as to support the contention of Rushton that this continuum is biologically based. Factor analysis with all seven variables yielded one factor that accounted for 73% of the variance.

Emotional Intelligence Symposium:
The Relationship between Brain Structure and Emotional Intellligence.

Amy Timoshanko [1,2,3] , Trish Desmond [1], Melissa Desfosses [2], Fiona Erskine-Fowler [2], Con Stough [2]

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The concept of emotional intelligence (EI) is a well validated theoretical construct, regardless of whether EI is a state or trait ability, an underlying biological profile is posited to exist. No previous research has examined the biological underpinnings of EI. This study builds on converging evidence drawn from various research disciplines such as intelligence and imaging studies, functional studies of emotional laden stimuli, and mood disorder research to examine the biological basis of emotional intelligence.

The present study will for the first time, correlate structural brain profiles of normal, healthy participants with emotional intelligence performance. Sixty participants (aged 20-39, mean = 26.35, 21 males and 39 females) have been assessed on emotional intelligence (MSCEIT), intelligence (WASI) and personality (NEO-PI). These results were correlated with structural Magnetic Resonance Images (MRI) and Magnetic Resonance Spectroscopy. Group analysis was conducted on volumetric images with Voxel-based Morphometry (VBM) to differentiate between high and low emotional intelligence (MSCEIT). In addition further analysis was conducted to examine the association between personality and intelligence with EI and individual differences in structural brain imaging.

Aging Sympoium:
"Contextual" Analysis of Cognitive Abilities

Elliot M. Tucker-Drob, Cristina D. Rabaglia, Jeffrey E. Pink, and Timothy A. Salthouse

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This presentation describes the concept of "reference" cognitive abilities that have been used in a number projects conducted at the Cognitive Aging Lab at the University of Virginia. These reference abilities are reasoning/spatial ability (fluid intelligence), processing speed, episodic memory, and vocabulary knowledge (crystallized intelligence). Each ability is measured with 3 to 6 separate tests, and is represented as a latent variable in the structural equation modeling framework. The relations of these reference abilities with one another and with age have been found to be consistent across independent samples of participants, and across age groups. It is proposed that the meaning of "new" cognitive ability variables can be determined by examining them in the *context* of the reference abilities. That is, the magnitudes of the standardized path coefficients predicting the new variable from each of the reference abilities are reflections of the extent to which that variable is uniquely related to each of the reference abilities. This type of analysis can also be used to determine whether unique age-related influences on the new variable exist, and the extent to which age-related influences on the new variable are shared with age-related influences on the reference abilities.

A Dynamical Model Of General Intelligence: The Positive Manifold Of Intelligence By Mutualism

Han L.J. van der Maas, Conor V. Dolan, Raoul P. P. P. Grasman, Jelte M. Wicherts, Hilde M. Huizenga, & Maartje E. J. Raijmakers

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Scores on cognitive tasks used in intelligence tests correlate positively with each other, i.e., they display a positive manifold of correlations. The positive manifold is often explained by positing a dominant latent variable, the g-factor, associated with a single quantitative cognitive or biological process or capacity. In a new paper (van der Maas, et al., Psychological Review, in press) we propose a new explanation of the positive manifold based on a dynamical model, in which reciprocal causation or mutualism plays a central role. It is shown that the positive manifold emerges purely by positive beneficial interactions between cognitive processes during development. A single underlying g-factor plays no role in the model. The model offers explanations of important findings in intelligence research, such as the hierarchical factor structure of intelligence, the low predictability of intelligence from early childhood performance, the integration/differentiation effect, the increase in heritability of g, the Jensen effect, and is consistent with current explanations of the Flynn effect.

The General Self-Estimate Factor: *g* or Personality?

Beth A. Visser [a], Michael C. Ashton [a], and Philip A. Vernon [b]
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The current study examined adults' measured and self-estimated abilities in Howard Gardner's eight "intelligence" domains. Two hundred participants estimated their own levels of eight abilities from Gardner's framework (Linguistic, Spatial, Logical/Mathematical, Interpersonal, Intrapersonal, Naturalistic, Bodily-Kinesthetic, and Musical). Each participant also completed two maximum performance tests of each ability and a test of general cognitive ability (Wonderlic). When scores on the ability tests were factor analyzed, a sizeable *g* factor emerged (23.4% of variance) that was substantially correlated with the Wonderlic ($r = .72$). A similar factor analysis was conducted on the eight self-estimates of Gardner's abilities, and produced a large self-estimate general factor (42.3% of variance) that was uncorrelated with either the measured ability *g* factor ($r = .08$) or the Wonderlic ($r = .06$). The self-estimate general factor was correlated significantly with four personality factors, showing its largest correlations with Conscientiousness ($r = .30$) and Openness to Experience ($r = .30$). The measured ability *g* factor, on the other hand, was largely uncorrelated with personality factors, having only one modest but significant correlation ($r = .16$ with Openness to Experience). These results suggest that self-estimated abilities are associated with personality to a greater extent than they are with measured abilities. These results provide little support for the use of self-estimates as proxies for ability tests.

Work-Family Balance among Highly Talented STEM Professionals and their Spouses: A 10-year Follow-up of Graduate Students in Top-15 Math-Science Programs

Rose Mary Webb [1], David Lubinski [2], Camilla P. Benbow [2], and April Bleske-Rechek [3]

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In a 10-year follow-up of 368 men and 346 women identified in 1992 as first- or second-year graduate students enrolled in highly-ranked (top 15) U.S. mathematics, engineering, and physical science programs, we examined the family and work choices made by them and their spouses. We devoted particular attention to the relative commitments of each group to work and family and their perceptions of those commitments.

On average, men reported spending more hours working per week than women did. When participants were asked about their time allocation at work, the sexes reported similar proportions of their work hours devoted to research, mentoring, and administrative responsibilities, but women reported spending a larger proportion of their work hours teaching than men did. Both sexes reported that their ideal allocations of work time would include more time for research and less time spent on administrative responsibilities (although no actual-ideal differences were apparent for teaching or consulting).

Overall, women reported spending more hours per week with their immediate families, caring for aging/ill relatives, and doing volunteer work than men did. Although men and women in committed relationships reported similar satisfaction with the division of labor within the home, women reported having a higher proportion of the household responsibilities, including childcare related and non-childcare related responsibilities. There were marked differences between the actual and ideal divisions of labor reported by both men and women.

Both sexes reported a decrease in the number of hours worked following the birth of their first child, but women reported a decrease of three times the number of hours as men. Although women more frequently than men reported that it was difficult to balance work and family, men reported feeling pressure to be more involved with family more than women did. Overall, women reported that they were more involved with their family than their spouses were, and that their spouses were more involved with work than they were. Men reported that they were more involved with their work than their spouses were, and that their spouses were more involved with family than they were. These differences suggest differential contributions by men and women to work and family and inform contemporary discourse on male-female differences in representation in high-level STEM careers.

Sex Differences Symposium:
Modeling Sex Differences on the Dutch WAIS-III

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In this study, sex differences on the Dutch WAIS-III were studied in a large sample of the adult Dutch-speaking population. Sex differences in intelligence test performance can be related to (1) item scores (i.e., item bias), (2) subtest specific abilities, (3) broad factors, and/or (4) a (higher order) factor representing g. Multi-group confirmatory factor analyses with mean and covariance structure were used to test measurement invariance across sex groups. Both bi-factor models and second order-models were fitted in three age-range groups, separately. Overall, sex differences were small, particularly in the young and middle-aged groups. Results indicate that mean sex differences in g alone cannot explain sex differences on the level of subtests. For instance, across different factor models, the Information subtest was negatively biased for women. Results are not independent of the choice of factor models. In addition, results show that it is difficult to disentangle mean differences at the level of broad factors from mean differences in the g factor, particularly in the bi-factor model.

Flynn Effect Symposium:
The Dark Past, Obscure Present, and Bright Future of African IQ

Jelte M. Wicherts
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On the basis of extensive reviews of the literature, Lynn concluded that average IQ of the Black population of sub-Saharan Africa lies below 70. In this paper, the author evaluates published empirical data on this issue. Focus is on average scores of African samples on Raven's Standard Progressive Matrices (SPM), Coloured Progressive Matrices, and several other IQ tests. Validity of IQ tests in African samples is evaluated critically. Because of a general lack of rigorous measurement invariance studies, it is uncertain to what degree IQ scores in Africa reflect levels of general intelligence. Results show that average IQ in Africa lies somewhere around 80 when compared to US norms, and that SPM scores among African adults have shown a secular increase over the years. Variables representing health, fertility, nutrition, educational attainment, modernization, and urbanization are shown to correlate highly with national IQ over the world. It is concluded that the Flynn Effect is in its infancy in Africa. Implications for genetic theories of race differences in intelligence are discussed.

Timing of Prenatal Exposure to Phenylalanine Moderates Effects on Childhood Intellectual Outcomes

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The potentially devastating effects of phenylketonuria (PKU) have been well known for over 50 years. Quite normal at birth, children with PKU showed a pronounced decline in mental ability during the first six years of life, a decline that proved permanent. In the early 1950's, a diet was developed that was low on foods that contain protein and included dietary supplements to ensure proper nutrition; if children remained on the diet, the negative effects on intelligence were eliminated. In 1963, a newborn screening test was developed to identify infants with PKU, and screening is currently practiced worldwide. With the screening test and diet, the disastrous effects of the genetic defects associated with PKU appeared eradicable.

Many female infants with PKU were treated with the proper diet and developed normal levels of intelligence. When these females entered young adulthood, they had offspring of their own. Surprisingly, many infants born to mothers with PKU exhibited symptoms of PKU, such as low intelligence, regardless of whether the infants themselves had PKU. To study this problem, the Maternal PKU Collaborative (MPKUC) Study was initiated in 1984 and is a comprehensive study of the progress of each pregnancy as well as a wide range of outcomes by the offspring.

In a previous presentation at ISIR (Widaman, 2004), I presented analyses showing that average level of prenatal exposure to phenylalanine (PHE) was strongly related to offspring intellectual outcomes during infancy and childhood. In this presentation, I extend this research to model the differential effects of high levels of exposure to PHE during five intervals of pregnancy, specifically the first month, second month, third month, second trimester, and third trimester. Results demonstrated that average PHE levels in the five intervals were highly correlated and that a pronounced drop in mean PHE levels occurred across intervals. More importantly, modeling relations among the mean PHE levels with a first-order autoregressive model explains well the relations among the PHE levels and average PHE level during the second trimester of pregnancy has the strongest influence on offspring IQ. Indeed, once PHE level during the second trimester was included as a predictor of offspring IQ, none of the remaining PHE level variables was related significantly to offspring IQ.

These results have important implications for understanding the timing of prenatal influences on intelligence. In the current context, prenatal exposure to PHE appears to influence IQ primarily, if not solely, based on exposure during the middle trimester of pregnancy. But, for other offspring outcomes, exposure at other points during pregnancy may be more important. Results are discussed in terms of a developmental model for teratogenic influences on development that considers the nature of the teratogenic agent, the timing of its application, and the body systems undergoing crucial or maximal development during application of the teratogen.

Hominid Cranial Capacity and Global Climate Change Over the Past 205,000 Years

Pedro Sofio Abril Wolf and Aurelio José Figueredo

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Two general climatic hypotheses were tested: (1) that the overall Pleistocene drop in temperature drove this evolutionary change, because colder environments were "harsher" and therefore selected against individuals with smaller brains; and (2) that Pleistocene climactic variability (repeated glacial and interglacial cycles) drove this evolutionary change, because the rapidly changing temperatures selected against individuals who could not adapt over ontogenetic time to the changing environment.

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A series of hierarchical general linear models were used to partition the variance among the alternative hypotheses tested, including the possible nonlinearity and nonadditivity of effects. The first of two inclusive models tested the effects of YBP, MT, and SDT, in that order, followed by their quadratic and then their cubic polynomial terms. The second model instead tested the main effects and all the possible linear interactions of the same ordered predictors. Both of these inclusive models were statistically significant: $R^2=.31*$ for the polynomial model and $R^2=.29*$ for the interaction model. None of the interactions, however, were significant. The only significant predictors were YBP, SDT, and YBP^2. These three predictors and MT were included in a final restricted model, specified in the following order: YBP, MT, ST, and YBP^2. The restricted model was also statistically significant ($R^2=.30*$). The fact that SDT remained significant after controlling for both YBP and MT (which was itself non-significant) was interpreted as supporting the climatic variability hypothesis.

The Influence of Personality on Intelligence

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The issue of relationships between intelligence and personality is of significant interest. Altough the nature of the interactions between the two constructs is still poorly understood. In my presentation I would like to consider possible conceptual framework for understanding the personality-intelligence interface. In doing so, I examine two different levels of intelligence: intellectual ability and cognitive task performance. I focus on the second level. The distinction comes from R. Cattell, who distigunished between fluid (Gf) and crystallised (Gc) intelligence. First one is responsible for current intelectual performance and second one is the sum of acquired knowlegde and experience. This theory was further developed by P. Ackerman, who proposed intelligence as process and intelligence as knowlegde.

The influence of personality on cognitive task performance is the main aim of my presentation. I focus on, so called formal theory of intelligence, originated with Polish researcher, E. Necka. He wanted to describe intelligent behavior from formal point of view. This account is tied up with considarations about artificial intelligence, especially with Simon and Newell work. Necka created a model of intelligence which consists of three aspects: short term memory, attention and arousal. The last one represents all non - ability factors. I present my own model of influence of personal factors, like extraversion and neuroticism, on process of intelligence. I believe that personality traits modify the arousal (which can be tense or energetic) and by that, influence on short term memory and attention.

In my own research neuroticism (NEU) and emotion oriented coping (EOC) correlates positively with tense arousal; extraversion (EXT) and task oriented coping (TOC) correlates positively with energetic arousal. Experiment also showed that subjects with high NEU and EOC had longer reaction time in both cognitive tasks than subjects with high EXT and TOC. I explain this phnenomenon according to Eysenck and Calvo theory, which suggests that high trait anxiety individuals employ more resources in completing a task in order to maintain the same level of accuracy as low trait anxiety individuals. This strategy incurs poorer performance and longer response times, as the utilization of more resources lowers working memory and attention capacity.

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