

Cognitive Ability Tilt & Job Performance

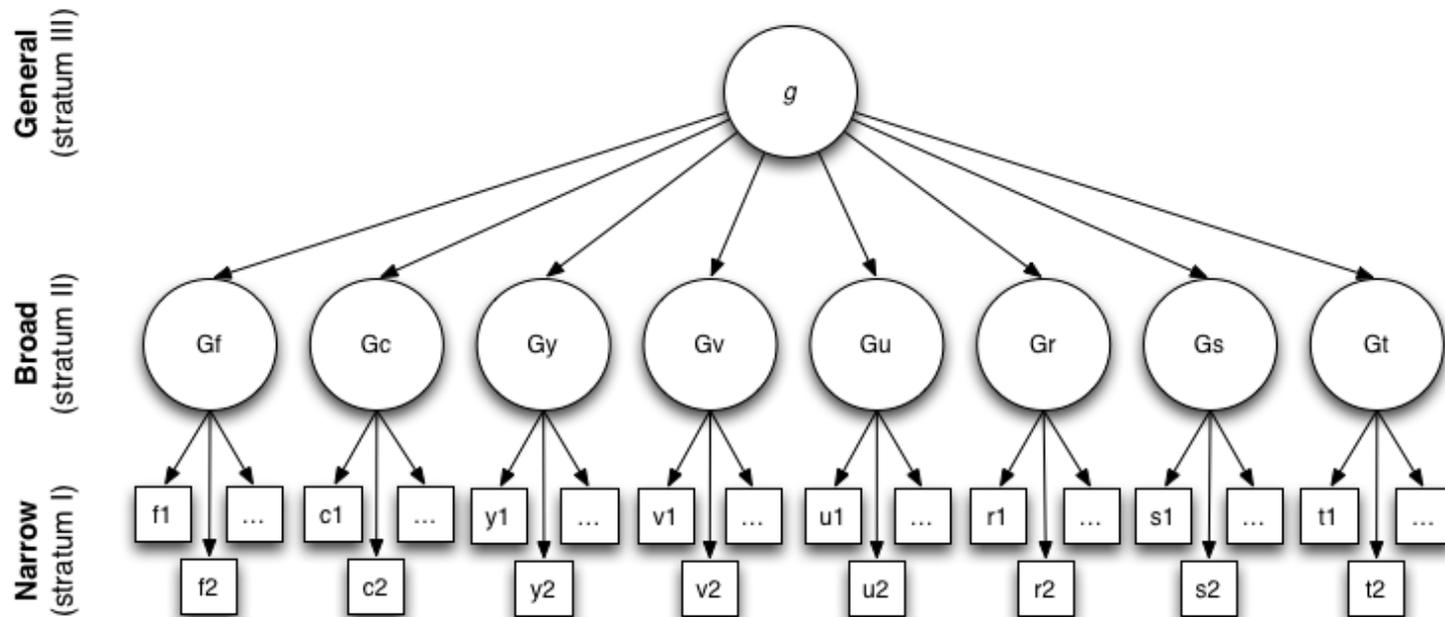
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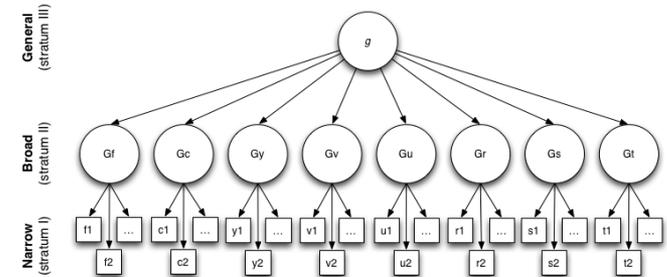
What Is Cognitive Ability?

- The capacity to “reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience” (Gottfredson, 1997)



Cognitive Ability & Job Performance

- Most research on the relationship between cognitive ability and job performance has emphasized g



- Recent resurgence of interest in specific cognitive abilities and empirical support for their validity
(e.g., Kell & Lang, 2018; Lang et al., 2010; Nye et al., 2018; Wee et al., 2014; Wee, 2018)
- The renewed interest has created opportunities for new research streams

Ability Tilt

- Within-person asymmetry between two specific abilities (e.g., quantitative > verbal)
- Typically explained in terms of investment and differentiation theories (e.g., Cattell, 1987)
- Predicts domain-specific outcomes, including occupational preferences & accomplishments (e.g., Lubinski, 2009; Park et al., 2008; Coyle et al., 2014; Coyle, 2016)



Study Overview

- Examined relations between ability tilt and job performance in a large sample of jobs
- Theory and empirical research suggest that fit between employee abilities and job requirements is positively related to performance (Connell et al., 2003; Edwards, 1991; Kristof-Brown et al., 2005)
- Predictions
 - Ability tilt will differentially relate to job performance based on a match vs. mismatch with job requirements
 - Ability tilt will provide incremental validity over g and specific abilities when the tilt matches job requirements



Method

- GATB dataset
 - N = 23,994
 - 80 jobs in 14 job families
- Variables
 - GATB scores (V, N, S, P, Q)
 - g scores
 - Ability tilt scores
 - Job performance ratings
 - Job tilt scores
 - Computed using O*NET ratings of ability importance & ability level
 - $\text{Job tilt} = (\text{Importance}_1 + \text{Level}_1) - (\text{Importance}_2 + \text{Level}_2)$



Method

- Job groups
 - **Matched job groups:** Jobs with job tilt scores at least 1 SD higher than sample mean for each type of tilt
 - **Mismatched job groups:** All jobs with negative job tilt scores for each type of tilt
- Analytical strategy
 - Correlation coefficients controlling for g
 - Relative weights analyses (Johnson, 2000)



Results

- Matched job requirements
 - Positive correlations for 14 of 18 types of ability tilt, though only 10 reached statistical significance
 - Mean effect size of .07
- Mismatched job requirements
 - Negative correlations for 13 of 18 types of ability tilt, though only 11 reached statistical significance
 - Mean effect size of $-.05$
- “Reverse” tilt effects mostly quantitative tilts



Results

- Relative weights for ability tilt ranged from 2.8% to 17.7%; mean of 7.1%
- Incremental validities
 - ΔR^2 over g ranged from .000 to .017 ; mean of .007
 - Comparable to incremental validity of biodata (Schmidt & Hunter, 1998)
 - ΔR^2 over g + specific abilities ranged from .000 to .008; mean of .003
- Supplementary analyses: Is tilt detrimental to performance in “generalist” jobs?
 - Tilt was unrelated to performance in these jobs



Discussion

- Relationship between ability tilt and job performance depends on the requirements of the job
- Ability tilt can be a *relatively* important predictor of job performance and can provide incremental validity over indicators of ability level – plus, it requires no additional measures
- Ability tilt is neither beneficial nor detrimental for “generalist” jobs – other factors may be involved



Future Research

- Examine more complex patterns/profiles of cognitive ability
- Further break down the criterion domain
- Expand to higher complexity jobs, including management jobs
- Test whether the counterintuitive quantitative tilt effects generalize



References

- Cattell, R. B. (1987). *Intelligence: Its structure, growth and action*. Amsterdam: North-Holland. (Reprinted and revised from *Abilities: Their structure, growth and action*, by R. B. Cattell, 1971, Boston: Houghton Mifflin).
- Connell, M. W., Sheridan, K., & Gardner, H. (2003). On abilities and domains. In R. J. Sternberg & E. L. Grigorenko (Eds.), *The psychology of abilities, competencies, and expertise* (pp. 126-155). New York, NY: Cambridge University Press.
- Coyle, T. R., Purcell, J. M., Snyder, A. C., & Richmond, M. C. (2014). Ability tilt on the SAT and ACT predicts specific abilities and college majors. *Intelligence*, 46, 18–24.
- Coyle, T. R. (2016). Ability tilt for whites and blacks: Support for differentiation and investment theories. *Intelligence*, 56, 28–34.
- Edwards, J. R. (1991). Person-job fit: A conceptual integration, literature review, and methodological critique. In C. L. Cooper & I. T. Robertson (Eds.), *International review of industrial and organizational psychology* (Vol. 6, pp. 283-357). Oxford: John Wiley & Sons.
- Gottfredson, L. S. (1997). Mainstream science on intelligence: An editorial with 52 signatories, history, and bibliography. *Intelligence*, 24, 13–23.
- Johnson, J. W. (2000). A Heuristic method for estimating the relative weight of predictor variables in multiple regression. *Multivariate Behavioral Research*, 35, 1–19.
- Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of individuals' fit at work: A meta-analysis of person-job, person-organization, person-group, and person-supervisor fit. *Personnel Psychology*, 58, 281-342.
- Lubinski, D. (2009). Exceptional cognitive ability: The phenotype. *Behavior Genetics*, 39, 350–358.
- Park, G., Lubinski, D., & Benbow, C. P. (2008). Ability differences among people who have commensurate degrees matter for scientific creativity. *Psychological Science*, 19, 957–961.
- Schmidt, F. L., & Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin*, 124, 262–274.

