

ARMSTRONG LABORATORY



HUMAN RESOURCES DIRECTORATE

Occupational Performance and g

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Occupational Performance and g



Brand, 1987 List of *g* Correlates

- Abilities**
- Creativity / Artistic**
- Health & Fitness**
- Interests / Choices**
- Moral**
- Occupational**
- Perceptual**
- Personality**
- Practical**
- Other**



Occupational Performance and g



- Physiological Substrata of g**
 - Brain size**
 - Myelination**
 - Conductive Velocity**
 - Neuron Density**
 - Cortical Thickness**
 - Glucose Metabolism**

- The International Review of Industrial Organizational Psychology, 1998**



Occupational Performance and g



- General Cognitive Ability**
 - Galton**
 - Spearman**
- Three Problems in Ability Research**
 - Censored Samples**
 - Rotated Factors**
 - Unreliability**



Occupational Performance and g



- Estimating g in Aptitude Tests**
 - Confirmatory Factor Analysis**
 - ASVAB 64%**
 - AFOQT 41%**

- Estimating g from Aptitude Tests**
 - Principal Components**
 - Principal Factors**
 - Hierarchical Factor Analysis**
 - Estimates Correlated .93 to .99**



Occupational Performance and g



- Predicting Training Success**
- 89 Air Force Jobs *g* Most Potent Predictor**
 - $r = .76$, Incremental Difference = $.02$**
- 82 Air Force Jobs**
 - Linear Models Analyses**
 - Follows Work of Thorndike (1985, 1986)**
 - Incremental Difference of $.02$**



Occupational Performance and g

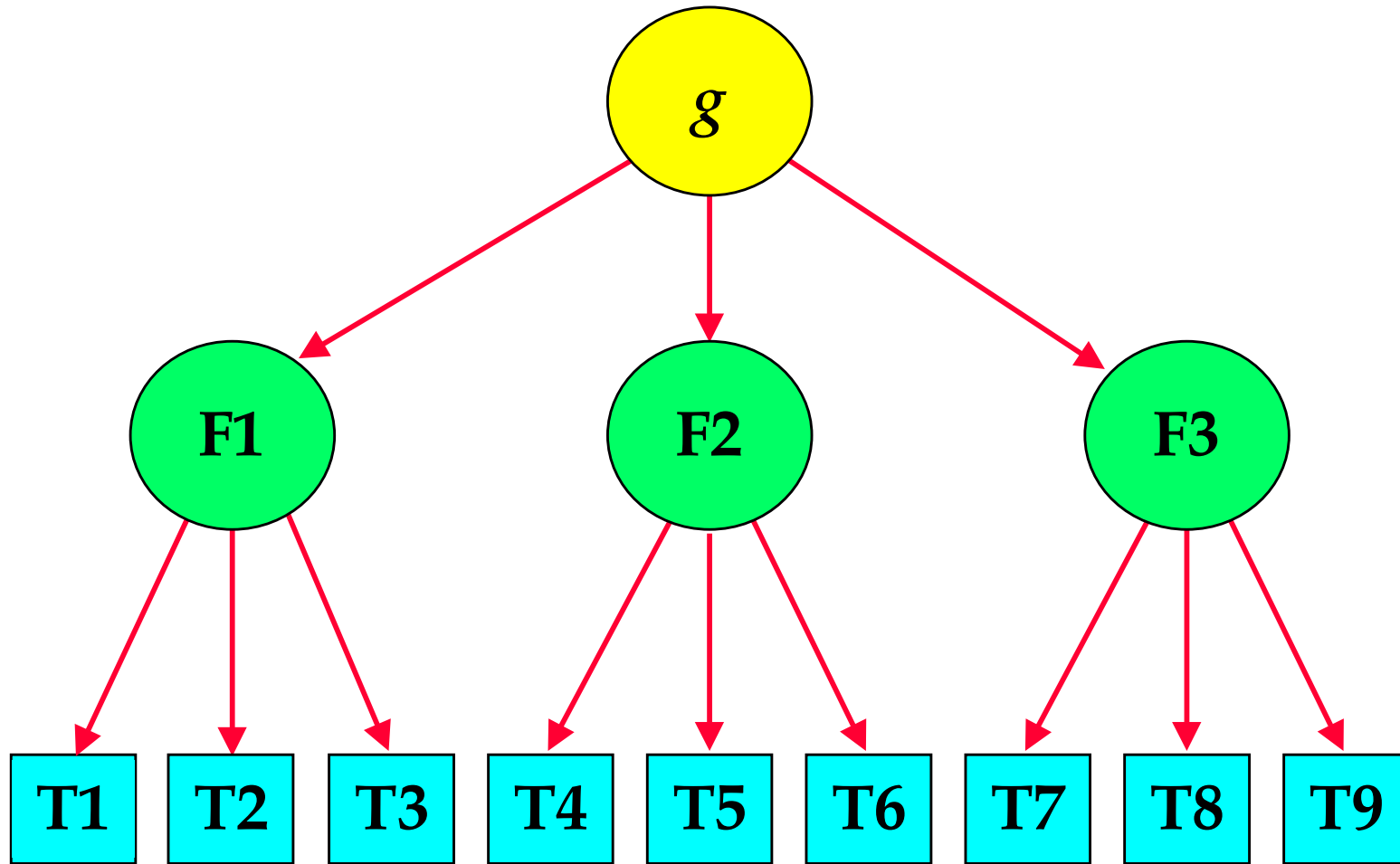


- Hierarchical Structure of Ability**
 - Vernon**
 - Gustafsson**

- Virtual Identity of Cognitive Abilities**
 - Sex**
 - Ethnicity**



Occupational Performance and g





Occupational Performance and g



- Predicting Training Success**
- Two USAF Jobs with Special Tests**
 - Incremental Differences**
 - Computer Programmer = .000**
 - Intelligence Operative = .016**
- Meta-Analyses**
 - General Ability Composite and All Subtests**
 - All variance accounted for**



Occupational Performance and g



Pilot and Navigator Study

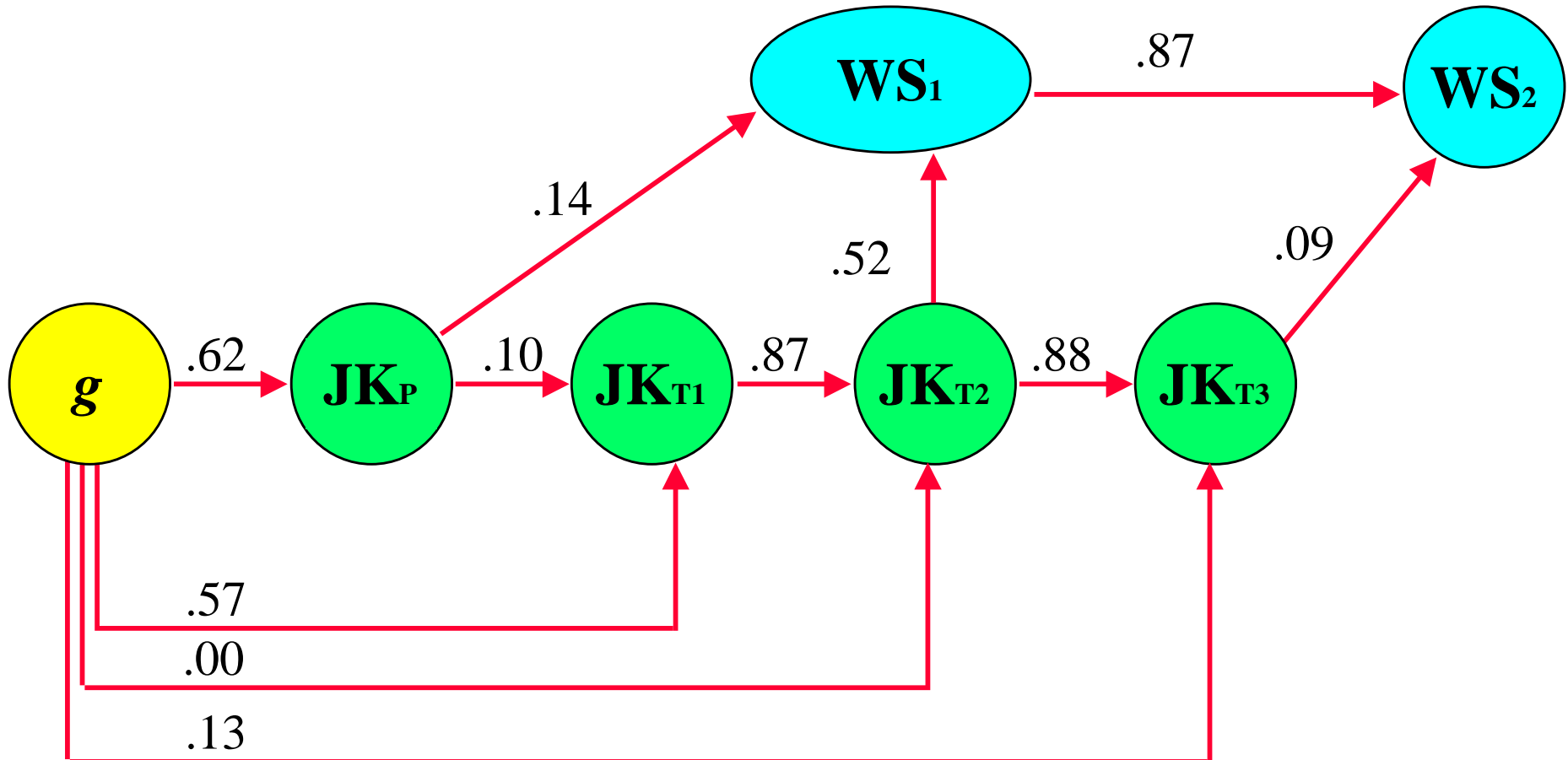
- N = 5,500; AFOQT**
- Six Pilot Criteria**
- Six Navigator Criteria**

Results

- Pilots $r = .314$ Navigators $r = .462$ (g only)**
- Pilots $R = .398$ Navigators $R = .482$ (g and s)**
- Incremental Differences**
 - .02 For Navigators, .08 For Pilots (Job Knowledge)**



Occupational Performance and g

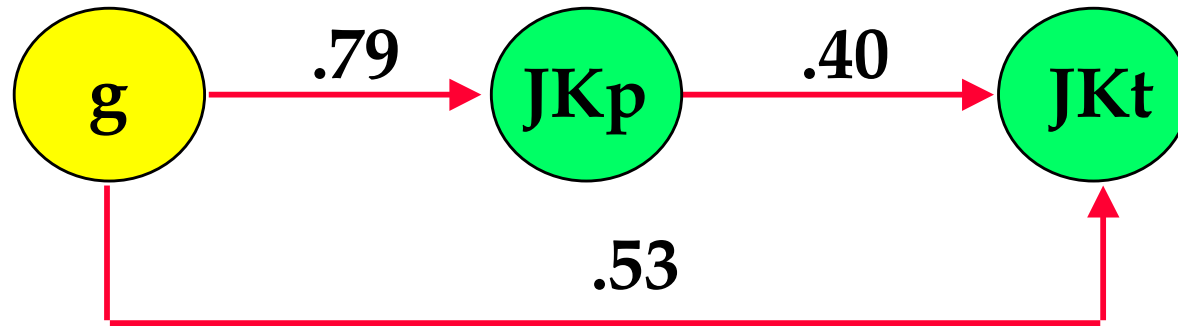




Occupational Performance and g



□ 83 Electronics and Mechanical Jobs



N = 51,429



Occupational Performance and g



Interviews For Pilot Selection

- Structured Interviews Based On SME Judgment**
- $n = 223$ Pilot Trainees**
- g from Multiple Aptitude Battery**

Results

- Interview Valid**
- No Incremental Validity beyond g**
- Interview g Loaded**



Occupational Performance and g



Job Performance

n = 1,500

Three Criteria

Work Sample

Technical Interview

Walk Through Performance Test

Results

r = .42 (*g* only)

R = .44 (*g* and *s*)

Consistent With Project A



Occupational Performance and g



- **Predictive Power of a test comes from g**
 - **Correlated Test g Loading with Test Validity**
 - **$r = .98$**
 - **r Within Job Family Groups Didn't Differ**
 - **g Predictive Across and Within Job Families**



Occupational Performance and g



- What Else Measures g ?**
- Hunter & Hunter, 1984**
 - Interviews**
 - Personal Integrity**
 - Psychomotor Tests**
- Psychomotor and g Nexus**
 - $n = 350$**
 - ASVAB And BAT**
 - CFA**
 - Psychomotor Tests Measure g**
 - General Psychomotor Factor**
 - Expanded Nexus in later study**



Occupational Performance and g



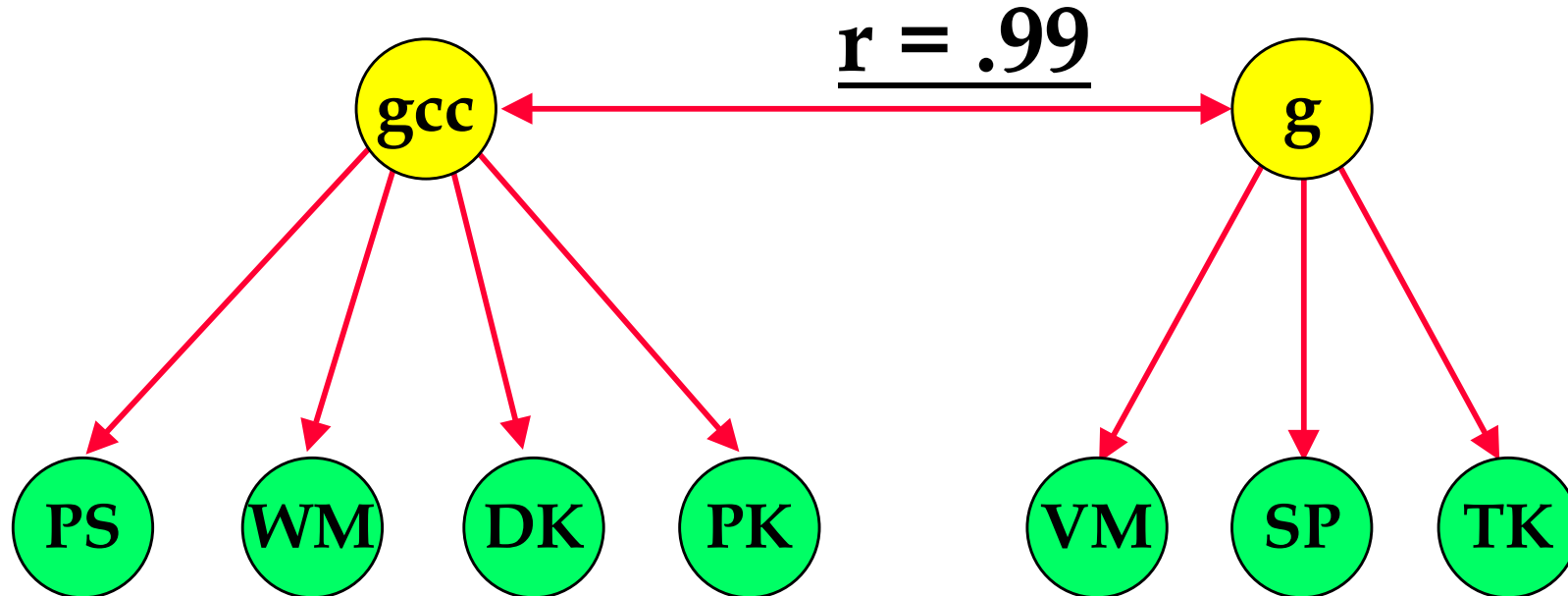
- What do Cognitive Components Tests Measure?**
 - N = 298**
 - 10 Traditional Paper and Pencil Tests**
 - 25 Cognitive Components Tests**
 - Processing Speed**
 - Working Memory**
 - Declarative Knowledge**
 - Procedural Knowledge**
 - Latent Variable Analysis**



Occupational Performance and g



□ Identity of Measurement of g





Occupational Performance and g



- What is Likely to be Incremental?**
 - Job Knowledge**
 - Personality**
 - Psychomotor**
 - Personal Integrity**
- Can They be Implemented?**



Occupational Performance and *g*



□ Predictive Validity for Overall Job Performance Using *g* And A Second Predictor.

Measure	Validity	R	Gain	Increase %
<i>g</i>	.51			
Work Sample	.54	.63	.12	24
Integrity Test	.41	.65	.14	27
Conscientiousness	.31	.60	.09	14
Interviews (Structured)	.51	.65	.14	27
Interviews (Unstructured)	.38	.58	.07	14
Job Knowledge Tests	.48	.58	.07	14
Job Tryout Procedure	.44	.58	.07	14
Peer Ratings	.49	.58	.07	14
T&E Behavioral Consistency	.45	.58	.07	14
Reference Checks	.26	.57	.06	12
Job Experience (Years)	.18	.54	.03	6
BioData	.35	.52	.01	2
Assessment Center	.36	.52	.01	2
T&E Point Method	.11	.52	.01	2
Ed Years	.10	.52	.01	2
Interests	.10	.52	.01	2
Graphology	.02	.51	.00	0
Age	-.01	.51	.00	0
Schmidt & Hunter (in press)				



Occupational Performance and g



- What Does the Future Hold for Measuring g ?**
 - Continued Controversy**
 - Computers in Testing**
 - Physiological Measurement**
 - Neural Conductive Velocity**
 - Low Content or Contentless Measures**



Occupational Performance and g



- Cognitive Components Validation**
 - 3 Jobs: (N = 3,600)**
 - Security Police**
 - Electronics Repair**
 - Aircraft Mechanics**
- WM, Induction, Fact & Skill Learning, RT**
- 4 Hours Testing Time on Computers**
- Incremental Validity of .04 (Uncorrected)**