

Psychometric Issues

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The Issues

- Separable cognitive factors
- Patient effort and test validity

I. Separable Cognitive Factors?: A Skeptics View

- An uncritically accepted assumption?
- A psychometric artifact?
- A failure to develop “clean” measures?

Psychometric Artifact: The Misuse of Factor Analysis

- 13 studies
 - 3 confirmatory factor analysis
 - 10 exploratory factor analysis

The Misuse

- Varimax rotation used in all EFAs
 - Imposed orthogonality: artificially uncorrelated factors
- Small samples: none exceeding 210 subjects
- Inadequate subject-to-variable ratios
 - 8 studies with < 10 subjects per variable
- Over-extraction of factors
 - Criterion: eigenvalues > 1
- Principal component analysis used
- Heterogeneity & the “appearance” of factors

Confirmatory Factor Analysis

- Latent constructs
- A more rigorous method to evaluate models
- You need to specify the model *a priori*
 - Specify the number of factors
 - Define the factors or latent constructs
 - Specify which variables load on which factors

Verbal Crystallized



Attention
Working Memory



Verbal Memory



Info Processing
Speed



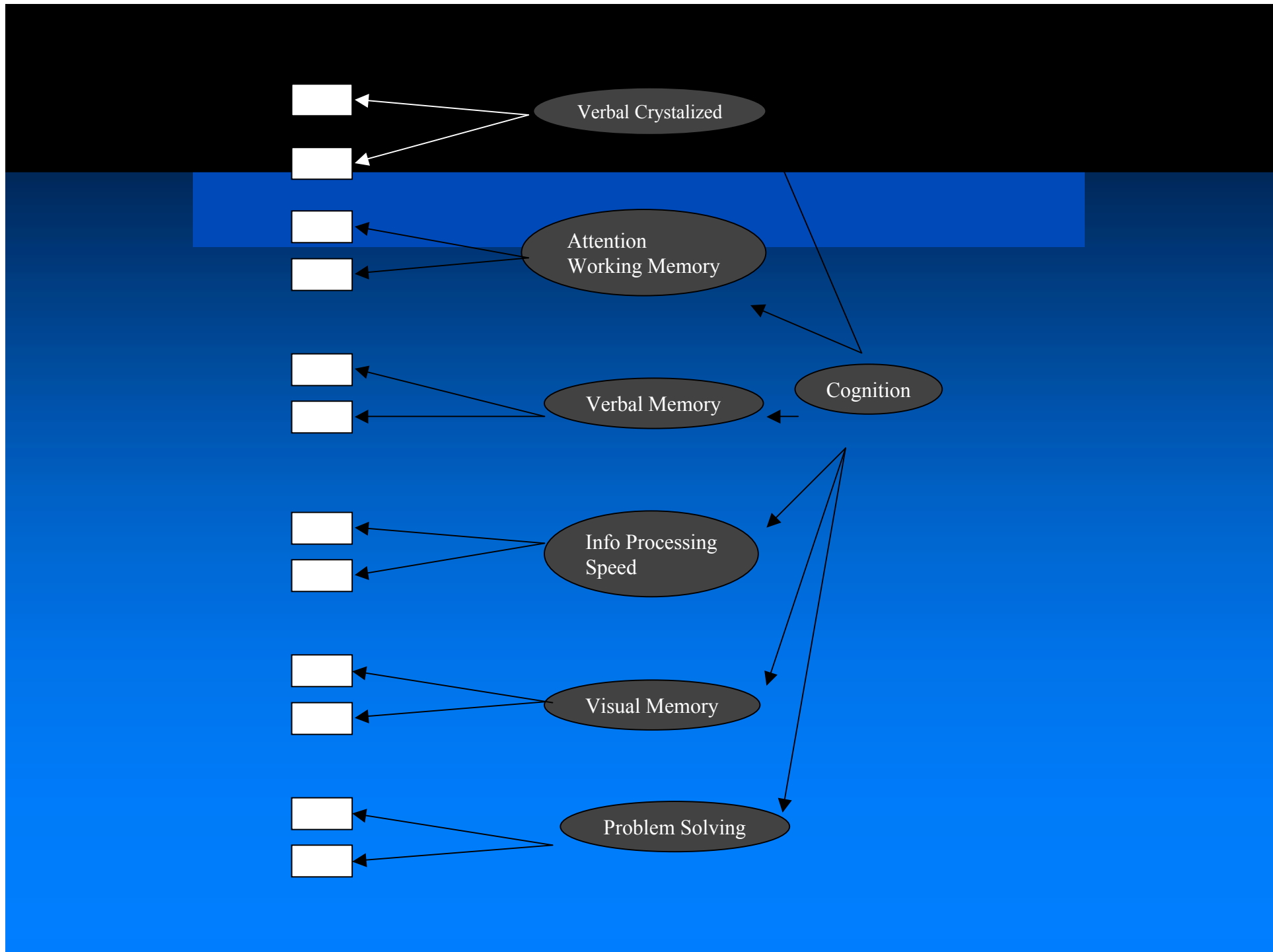
Visual Memory



Problem Solving

Confirmatory Factor Analysis

- Largest CFAs: Gladsjo et al., 2004
 - $N = 210$
- Correlations among the 6-factor model
 - Range: .45 to .86!
- Did not evaluate a second-order CFA model
 - GFI = .86 - .89 (prefer mid-.90)



A problem with “dirty” tests?

- Separable cognitive factors do exist but our tests lack precision or measure multiple factors?
- Although cognition may fractionate, most behavioral responses involve the integration of cognitive components?

Recommendations

- Combine data from past studies and re-analyze with confirmatory factor analysis
- Use of Rasch analysis to refine or improve existing tests, e.g., improving unidimensionality
- Use of composite or summary scores derived from test battery
- Don't take our constructs too seriously!

II. Patient Effort and Test Validity

- Cognitive tests require patient effort and cooperation
- Poor effort = Impaired test scores

Why wouldn't a person give best effort?

- Some cognitive tests can be tedious, difficult, boring, or frustrating, e.g., PASAT
- Need to “show” impairment

Mild Head Injury Studies

- Clinical samples in litigation
- Laboratory samples asked to “fake”
- Development of “effort” tests and indicators within existing tests
- Poor effort associated with exceedingly poor performance on recognition tasks

Recommendations

- Include validity indicators in test battery
 - Reliable digit span
 - Memory and Concentration Test (Green)
 - Forced-choice measures

Forced-Choice Test

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