Cognitive abilities

Recap
- Knowledge, Skills, Abilities
  - Knowledge organization, activation
  - Physical, social/emotional skills

Goals
- Background
- Definitions
- Models
- Utility of CA tests
- Issues with CA testing
Early work

- Sir Francis Galton (1884)
  - Firm believer that mental ability (and other factors) were hereditary
  - Created early research program designed to measure intelligence (using questionable measures)
    - Skull size
    - Reaction time
  - Helped popularize idea of intelligence, develop key statistical tools

Early work

- Alfred Binet (1904)
  - Many types of abilities
  - No unitary construct
  - Environment important
  - Quantitative measures not enough

Early work

- Army Alpha/Beta tests (1917)
  - First group intelligence test
  - Designed to select people for service in WWI
Definitions of intelligence

- Guilford: "The term ‘intelligence’ is useful... but it should be used in a semi-popular, technological sense. It is convenient to have such a term, even though it is one of the many rather shiftily concepts we have in applied psychology."
- Sternberg: "The integrated set of abilities needed to attain success in life, however an individual defines it, within his or her sociocultural context."
- APA: “Ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought.”
- Unknown: “Whatever intelligence tests measure.”

Models of cognitive ability

- Number of dimensions/factors?
  - Charles Spearman and ‘positive manifold’
  - Factor analysis

Correlational evidence for ‘g’

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<th>Comprehension</th>
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Correlational evidence for ‘g’

- Factor analysis
  - Try to reduce large number of observed variables to smaller number of latent underlying “factors”

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Models of cognitive ability

- Major models
  - Spearman’s general factor model
  - Thurstone’s multiple factor model
  - Cattell’s Gf-Gc model
  - Sternberg’s triarchic theory of intelligence
  - Cattell-Horn- Carroll (CHC) model
  - Gardner’s multiple intelligences
Predictors – Cognitive ability

- Spearman's general factor model

![Diagram showing Spearman's g and g factors]

Predictors – Cognitive ability

- Thurstone's multiple factor model

![Diagram showing P1, P2, and P3]

Predictors – Cognitive ability

- Cattel's Gf-Gc model (fluid and crystallized intelligence)

![Diagram showing Gf, Gc, and P1, P2, P3]

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Predictors – Cognitive ability

- Sternberg’s triarchic model
  - Applied intelligence
  - Analytical intelligence
  - Creative intelligence

Predictors – Cognitive ability

- Cattell-Horn-Carroll model

Predictors – Cognitive ability

- Gardner’s multiple intelligences model
  - Linguistic intelligence
  - Logical/mathematical intelligence
  - Musical intelligence
  - Kinesthetic intelligence
  - Spatial intelligence
  - Interpersonal intelligence
  - Intrapersonal intelligence
Questions

- Which model is correct?
  - … depends!
- Why do we care?
  - Major individual difference in applied research
  - Different tests, measures represent different models – not all equivalent

Utility of intelligence tests

- Predicts job training performance \((r = 0.6\) to 0.5\)
- Predicts job performance \((r = 0.40\) to 0.60\) across many jobs
- Predicts job knowledge
- Predicts occupational level
- Other relationships of note
  - leadership perceptions and performance
  - Impulse control/impatience

OB issues with CA tests

- Is \(g\) (an overall factor) all we need?
  - What is purpose of measuring CA?
    - Selection
    - Placement
    - Training
  - What information do you have?
    - Job analysis – Link jobs, tasks, abilities
OB issues with CA tests

- Adverse impact
  - CA testing sometimes produces subgroup differences in scores
  - Sources of adverse impact
    - ‘Cultural loading’; test bias
    - Differences in motivation, expectations
      - ‘Stereotype threat’
    - Method
      - Video vs. paper & pencil tests

Cognitive abilities