Intelligence

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Overview
- What is intelligence?
- Different theories of intelligence
  - Alfred Binet
  - Factor Analysis
    - "g"
    - Hierarchical models
    - Componential Analysis
- Measuring Intelligence & IQ
- Utility of IQ
- Nature, Nurture, Ethnicity, SES, & IQ
- Early Intervention & IQ
- LD & Giftedness

Intelligence: What is it?

Class Exercise
- List up to 5 important traits of intelligence among...
  - 6-month olds
  - 2-year olds
  - 10-year olds
  - adults

Intelligence: What is it?

- Difficult to find consensus
- "Intelligent" behaviors change with age
- Most people suggest
  - Verbal ability
  - Practical problem-solving
  - Social competence

Alfred Binet: A holistic Approach

- Response to universal public education (ID students)
- Binet developed 1st test
  - Along with Theodore Simon
- General ability → verbal & nonverbal
  - Single, holistic approach
- Difficulty increased with age
- Stanford-Binet

Factor Analysis: Multifaceted approach

A Primer
- Identifies sets of test items that cluster together
- People who do well on one item do well on the others in cluster, or factor
- What’s a correlation?
- Example:
  - Apple, Pencil, Pear, Paper, Chalkboard, Banana
Waddup “g”???

Early work with FA
- Charles Spearman: “g”
  - All items correlated together...
  - Test items vary in extent to which “g” contributes to them
  - Sets of items measure specific intelligence
- Louis Thurstone...is “g” all that?
  - Argued for supremacy of *primary mental abilities* (unrelated factors)

Hierarchical Models: Cattell

**Crystallized**
- Skills that depend on:
  - Accumulated knowledge
  - Experience
  - Good judgment
  - Mastery of social conventions
  - Valued by person’s culture

**Fluid**
- Depends on basic information processing skills:
  - Detecting relationships among stimuli
  - Analytical speed
  - Working memory

Hierarchical Models: Carroll

Recent Conceptualizations

**Componential Analysis**
- Examines relationships between information-processing and performance on intelligence tests
- What cognitive skills contribute to high intelligence?

Gardner’s Multiple Intelligences
- Linguistic
- Logico-mathematical
- Musical
- Spatial
- Bodily-kinesthetic
- Naturalist
- Interpersonal
- Intrapersonal
Measuring Intelligence

Why?
- Modest to good predictors of functioning in...
  - Academics
  - Vocations
  - Etc...

We haven’t yet said “IQ”

- What’s IQ???

\[ IQ = 100 \times \frac{\text{mental age}}{\text{chronological age}} \]

Measuring Intelligence

How: Spatial Abilities

How?
- Group administrations
- Individual administrations

Most Popular:
- WISC-IV (Preschool: WPPSI-III; Adults: WAIS-III)
- Stanford-Binet (5th Edition)
- Infants: more physical development (Bayley)

Measuring Intelligence: Scores

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentile Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>2</td>
</tr>
<tr>
<td>85</td>
<td>16</td>
</tr>
<tr>
<td>100 (average IQ)</td>
<td>50</td>
</tr>
<tr>
<td>115</td>
<td>84</td>
</tr>
<tr>
<td>130</td>
<td>98</td>
</tr>
</tbody>
</table>

(Child Does Better Than ...) (Percent of Same-Age Children)
Stability of IQ Scores

**Correlational Stability**
- Compares how children score relative to age-mates, from one time to the next
- Better correlations
  - When older at first testing
  - When tests are close together

**Absolute Scores**
- Examines same child’s profile of scores over repeated testings
- Most children fluctuate
- Some either increase or decrease with age
- >15 (1 SD)

## IQ correlates

**Academic Achievement**
- Correlated with achievement test scores, grades, staying in school

**Occupational Attainment**
- IQ predicts adult attainment well, but not perfectly
- Personality, practical intelligence also important
- Moderately correlated

**Psychological Adjustment**
- Low IQ related to school failure, aggression, delinquency
- NOT

## Cons of IQ

- Human abilities > test measurements
- Misunderstandings
  - Sole focus on IQ (instead of other relevant factors)
- Largely unconcerned about underlying processes
- Cultural bias

## Genetics and IQ

- May account for about half of differences
- Disagreements about interaction with environment
  - Adoption studies show influence of both
  - Ethnic differences may be more cultural than genetic

## Nature/Nurture

- Adoption & IQ
  - Biological Mother’s IQ
  - Adopted Child
  - Biological Child Living Together
  - Parent, Biological Child Living Apart
  - Parent, Unrelated Siblings Living Apart
  - Parent and Adopted Child
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- Moderate Twin Rearing Together
- Identical Twins Rearing Apart
- Fraternal Twins Rearing Together
- Fraternal Twins Rearing Apart
- Nontwin Siblings Rearing Together
- Nontwin Siblings Rearing Apart
- Parent, Biological Child Living Together
- Parent, Biological Child Living Apart
- Parent and Adopted Child

## Average Correlation
Thursday

- Wrap-up Intelligence:
  - Ethnicity, SES, & IQ
  - Early Intervention & IQ
  - LD & Giftedness
- Language Development
  - Only text (no additional reading)
- Next Thursday: Discussion Day!!!
The logic of some...

- See if you can follow this logic...
  - Heredity is largely responsible for IQ & SES (contribution of heredity to individual and SES differences in IQ is substantial)
  - IQ differs by ethnicity (black-white IQ gap) & SES
  - Therefore, heredity plays a major role in the black-white IQ gap
  - What does this say about variations in IQ???

Same logic...more detailed look

**Jensen**
- Associative versus conceptual intelligence
- African-American children perform worst on least culturally loaded (most Fluid) items (Conceptual Intelligence)
- Therefore, IQ diffs are NOT caused by cultural bias in the tests

**CONCLUSION???

Evaluating these claims

- Mixed research

Explaining the differences

- 3 major lines of research (over past 3 decades)
  1- Heredity
  2- Test Bias (esp. with low-SES and minority children)
  3- Influence of home environments on mental test performance

Explaining the differences

**Heredity** (a little more than last class)
- Heritability estimates (last class)
- Longitudinal twin studies (gene-environ corrns)
  - Identical twins → correlations increase modestly
  - Fraternal twins → corrns decrease with age
- Back to heritability estimates
  - If not 100%, then environ is involved!
  - Limitations to heritability estimates...remember???
- Related to ethnic & SES diffs???
  - What's in these genes anyway?? (within group differences!!!...but within group similarities for culture/environ)
- Book also discusses Adoption studies (and so have we previously)

Explaining the differences

**Biased Testing**
- Two Views:
  - Tests not biased; represent success in the common culture
  - Cultural factors can hurt test performance
  - Culture-specific content
  - Communication styles
  - Stereotypes
Communication Styles

Higher SES, whites
- Knowledge-training questions
- Topic-focused story style
- Hierarchical task style

Lower SES, minorities
- Real questions
- Topic-associating style
- Collaborative task style

Effects of Stereotype Threat on Performance

Reducing Cultural Bias in Testing

- Combine tests with assessment of adaptive behavior
- Dynamic Assessment
  - Focus on learning processes
  - Feedback provided
  - Adult-child learning relationship cultivated

Explaining the differences...

Home Environments

Shared
- Affect all siblings similarly

Nonshared
- Make siblings different from one another

Shared Environmental Influences

- Home environment qualities
  - HOME checklist
- Family beliefs about intellectual success

Nonshared Environmental Influences

- Birth order
- Spacing
- Sibling relationships
- Parental favorites
- Assigned roles
- Different impact of family events
- Influences away from home
Explaining the differences

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  1. Heredity
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Environmental
Cumulative Deficit Hypothesis

- Negative effects of underprivilege increase the longer it lasts
  - Early cognitive deficits lead to more deficits
    - Harder and harder to overcome

No Child Left Behind

What is it???

Let’s apply what we have learned about testing procedures and related processes...

Flynn Effect

Questions???

I never learn anything talking. I only learn things when I ask questions.

~Lou Holtz~