Modern Tests of Mental Abilities

- Wechsler Adult Intelligence Scale (WAIS) consists of 11 subtests and cues us in to strengths by using.....
  
  Factor Analysis

- Later - Wechsler Intelligence Scale for Children (WISC), an intelligence test for preschoolers.
<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Verbal scale</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>Taps general range of information</td>
<td>On what continent is France?</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Tests understanding of social conventions and ability to evaluate past experience</td>
<td>Why are children required to go to school?</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>Tests arithmetic reasoning through verbal problems</td>
<td>How many hours will it take to drive 150 miles at 50 miles per hour?</td>
</tr>
<tr>
<td>Similarities</td>
<td>Asks in what way certain objects or concepts are similar; measures abstract thinking</td>
<td>How are a calculator and a typewriter alike?</td>
</tr>
<tr>
<td>Digit span</td>
<td>Tests attention and rote memory by orally presenting series of digits to be repeated forward or backward</td>
<td>Repeat the following numbers backward: 2 4 3 5 1 8 6</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Tests ability to define increasingly difficult words</td>
<td>What does audacity mean?</td>
</tr>
<tr>
<td><strong>Performance scale</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digit symbol</td>
<td>Tests speed of learning through timed coding tasks in which numbers must be associated with marks of various shapes</td>
<td>Shown: 1 2 3 4 5</td>
</tr>
<tr>
<td>Picture completion</td>
<td>Tests visual alertness and visual memory through presentation of an incompletely drawn figure; the missing part must be discovered and named</td>
<td>Tell me what is missing: Windmill</td>
</tr>
<tr>
<td>Block design</td>
<td>Tests ability to perceive and analyze patterns by presenting designs that must be copied with blocks</td>
<td>Assemble blocks to match this design:</td>
</tr>
<tr>
<td>Picture arrangement</td>
<td>Tests understanding of social situations through a series of comic-strip-type pictures that must be arranged in the right sequence to tell a story</td>
<td>Put the pictures in the right order:</td>
</tr>
<tr>
<td>Object assembly</td>
<td>Tests ability to deal with part/whole relationships by presenting puzzle pieces that must be assembled to form a complete object</td>
<td>Assemble the pieces into a complete object:</td>
</tr>
</tbody>
</table>
Assessing Intelligence: Sample Subscores from the WAIS

<table>
<thead>
<tr>
<th>VERBAL</th>
<th>PERFORMANCE</th>
</tr>
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<tbody>
<tr>
<td>General Information</td>
<td>Picture Completion</td>
</tr>
<tr>
<td>Similarities</td>
<td>Picture Arrangement</td>
</tr>
<tr>
<td>Arithmetic Reasoning</td>
<td>Block Design</td>
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<tr>
<td>Vocabulary</td>
<td>Object Assembly</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Digit-Symbol Substitution</td>
</tr>
<tr>
<td>Digit Span</td>
<td></td>
</tr>
</tbody>
</table>

From Thorndike and Hagen, 1977
As you watch: Note the advantages and disadvantages of intelligence testing.
Aptitude v. Achievement Tests

Aptitude

- A test designed to predict a person’s future performance.
- The ability for that person to learn.

Achievement

- A test designed to assess what a person has learned.
Q: What is the correlation between SAT scores and IQ scores?

Aptitude and Achievement Tests
What are the 3 most important considerations when testing?
How do we construct Intelligence tests?

Tests must be:

• Valid
• Reliable
• Standardized
Validity
The extent to which a test measures what it is supposed to measure.

- **Content Validity**: does the test sample a behavior of interest?
- **Predictive Validity**: does the test predict future behavior?
Reliability

- The extent which a test yields consistent results over time.
- *Spilt halves* - Correlate two halves such as odd versus even items.

Or....
Reliability  The extent which a test yields consistent results over time.

Test-Retest Reliability

- Administering the same test to the same set of examinees on two separate occasions.

Questionnaire (Completed 9/20)

4. I feel I do not have much proud of.
3. On the whole, I am satisfied with myself
2. I certainly feel useless at times
1. At times I think I am no good at all
4. I have a number of good qualities
3. I am able to do things as well as others

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Standardization

- The test must be administered to a large, representative sample of people to establish “norms.”
- Forms a normal distribution or bell curve
Flynn Effect

- Intelligence test performance has been rising
The Flynn Effect

- Performance on IQ scores has steadily increased over generations
  - Environmental factors?
    - Reduction in malnutrition
    - Access to schooling
    - Technological advances
Does Intelligence Change Over Time?

- By age 3, a child’s IQ can predict adolescent IQ scores.
- Depends on the type of intelligence, crystallized or fluid.
What is fluid intelligence?

- Our ability to learn new things, like technology.

Our ability to reason quickly and abstractly, such as when solving logic problems.
What is crystallized intelligence?

• Old people intelligence, ability to relate information to past experiences.

One’s accumulated knowledge, including vocabulary, that has built up over a lifetime.
Extremes of Intelligence

• Low test score AND difficulty adapting to normal demands of independent living
• 1% of the population meets this criteria
• Males outnumber females by 50%

▪ **Down Syndrome**
  ▪ retardation and associated physical disorders caused by an extra chromosome in one’s genetic makeup
Extremes of Intelligence

• Mental Retardation
  - Refers to sub-average general mental ability (IQ<70-75) accompanied by deficits in adaptive skills, originating before 18.
  - Retardation may be mild, moderate, severe, or profound. (85% are mild)
  - Many organic conditions can cause retardation, but a specific organic cause can be identified in only about 25% of cases
  - Cases of unknown origin tend to involve mild retardation and are believed to be mainly caused by unfavorable environmental factors.
<table>
<thead>
<tr>
<th>Level</th>
<th>Approximate Intelligence Scores</th>
<th>Percentage of Persons with Retardation</th>
<th>Adaptation to Demands of Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>50–70</td>
<td>85%</td>
<td>May learn academic skills up to sixth-grade level. Adults may, with assistance, achieve self-supporting social and vocational skills.</td>
</tr>
<tr>
<td>Moderate</td>
<td>35–50</td>
<td>10%</td>
<td>May progress to second-grade level academically. Adults may contribute to their own support by laboring in sheltered workshops.</td>
</tr>
<tr>
<td>Severe</td>
<td>20–35</td>
<td>3–4%</td>
<td>May learn to talk and to perform simple work tasks under close supervision but are generally unable to profit from vocational training.</td>
</tr>
<tr>
<td>Profound</td>
<td>Below 20</td>
<td>1–2%</td>
<td>Require constant aid and supervision.</td>
</tr>
</tbody>
</table>

Extremes of Intelligence

Sho Yano was playing Mozart by 4, aced the SAT at 8, and graduated summa cum laude from Loyola University at age 12. He then began PhD-MD studies at the University of Chicago.
Extremes of Intelligence

• Giftedness
  - In practice, efforts to identify gifted children focus almost exclusively on IQ scores, with a score of 130 as the typical minimum.
  - For the most part, gifted children tend to be above average in social and emotional maturity.
  - Although gifted children tend to be successful in life, very few go on to make genius-level contributions.
  - Gifted programs have created controversy
Gender Differences

Three people were hiking through a forest when they came upon a large, raging violent river.

Needing to get on the other side, the first man prayed, "God, please give me the strength to cross the river."

Poof! God gave him big arms and strong legs and he was able to swim across in about 2 hours, having almost drowned twice.

After witnessing that, the second man prayed, "God, please give me strength and the tools to cross the river."

Poof! God gave him a rowboat and strong arms and strong legs and he was able to row across in about an hour after almost capsizing once.

Seeing what happened to the first two men, the third man prayed, "God, please give me the strength, the tools and the intelligence to cross river."

Poof! He was turned into a woman. She checked the map, hiked one hundred yards up stream and walked across the bridge.
Group Differences

- Gender Similarities & Differences
- Girls are better spellers
- Boys outnumber girls at the low extremes.
- Boys tend to talk later and stutter more often.
- In remedial reading classes, boys outnumber girls 3 to 1.
- In high school, underachieving boys outnumber girls 2 to 1.
- Women are better at detecting emotions than men.
- Who is better at math?

Which two circles contain a configuration of blocks identical to the one in the circle at the left?
Racial Difference in IQ

- Racial difference in average IQ among different racial groups can be measured

- More variation in IQ scores within a particular group than between groups
Claude Steele - Stereotype Threat

- A self-confirming concern that one will be evaluated based on a negative stereotype
Test Bias?

• Most experts would agree that intelligence tests are "biased" in the sense that test performance is influenced by cultural experiences.
• But some argue that their sole purpose is to discriminate.
• We have to look at the type of discrimination.
• More variation in IQ scores within a particular group than between groups.
Gender bias

Gender bias exists

- when males or females are depicted in a stereotypical manner.
- When males and females with the same skills and knowledge obtain different scores on a test.
Cultural Bias

• A test is culturally biased when it makes assumptions about what is “common knowledge.”

• Examples: cultural norms and conventions, literary knowledge, conventions of language etc.
Regional Bias

- A test has regional bias when people are penalized because of the use of regional names or dialects.
- Examples: sundrop, pop, bubbler, pies for pizzas (pizza pie) in NY, etc.
Ethnic and Racial Biases

Ethnic Bias or Racial Bias occurs

- When members of a group are portrayed in a stereotypical manner.
- When members of such groups obtain different scores than members of another group - with the same skills and knowledge\(^1\).
Socio-Economic Bias

- Socio-economic bias occurs in tests when students are penalized based on their Socio-economic status:
  - the isolated, rural environment, the restrictive poverty of many families, and cultural ties with a tribe or other group deny many students important knowledge of the outside world.
Language Bias

Language bias in tests occurs when second language learners are penalized because of their lack of knowledge of the English Language. For example, by their inability to read the questions accurately, or to give appropriate verbal responses.
Special Needs Bias

According to Popham, a test is biased if it unfairly penalizes a group of students so that their performance is less than that of another group of students with the same achievement level with respect to the knowledge or skill being tested.