CHAPTER 9: THOUGHT & INTELLIGENCE
TUESDAY NOVEMBER 20, 2007

NOTE: THE FIRST SECTION OF NOTES WAS INCLUDED WITH LAST WEEK'S NOTES BUT WAS NOT COVERED

●Reasoning and Problem-Solving

Deductive Reasoning

-Top down reasoning
-From general principles to a conclusion about a specific case
-If X, then Y
Formula mathematics & logic

Inductive Reasoning

-Bottom up reasoning
-From specific facts to a general principle
-Laws and theories are developed in this manner
Less certainty about conclusions

Defining Intelligence

-Intelligence is a set of abilities which allow us to:
→Acquire knowledge
→Think rationally
→Act purposefully
→Deal effectively with the environment (intelligence having adaptive or survival value)

-Intelligence can be thought of as a capacity rather than a thing

Theories of Intelligence

●**Key Issue:** Is intelligence a single capacity or multiple capacities?
●**Spearman:** a single unitary factor **(g).**
→observed that school grades in different subjects were positively correlated.
→So, attributed to general intelligence "g"
●**Factor Analysis**
-Reduces variables to related clusters
-Called Factors

●**PROBLEMS:** with a single unitary factor
→**Savant**-below average intelligence, but excel in one particular area.
→**Learning Disabilities**-usually effect only specific skills.
→**Problems with making causal statements based on correlations.**
→3rd Related Factors?

●Thurstone:
-7 Primary mental abilities
1) S-Space
2) V-Verbal
3) W-Word fluency
4) N-Number facility
5) P-Perceptual speed
6) M-Rote memory
7) R-Reasoning (more abstract reasoning)
→Performance on a task is more influenced by the specific abilities than a "general" intelligence.

●Guliford:
-More than 100 distinct measurable mental abilities.
→Containing operations, contents, and products

●Cattell:
●Crystallized Intelligence
-Ability to apply previously acquired information to a current problem
→Adequate LTM

●Fluid Intelligence
-Ability to deal with novel problems, reason abstractly, think logically, adequate ST working memory.

= Age Variations in the above 2 types of intelligence
→earlier ages rely more on fluid intelligence
→as we age, rely more on crystallized intelligence

●The Triarchic View of Intelligence
-Sternberg argues for 3 dimensions of intelligence:
-**Analytic:** Involves the kinds of academically oriented problem-solving skills assessed by traditional IQ test.
-***Practical:*** The ability to use experiences in dealing with everyday tasks
-***Creative*****:** The mental skills needed to deal with novel (new) problems.

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THE NOTES THAT FOLLOW WERE NOT INCLUDED IN THE PREVIOUSLY PROVIDED NOTES

ASSESSING INTELLIGENCE
ASSUMPTIONS
- **Valued capacity**
- **Individual differences**
- **Can be defined & measured.**

HISTORICAL PERSPECTIVE

SIR FRANCIS GALTON (Late 1800s)

- "inherited mental constitutions"
- evolutionary perspective
- measured head circumference and perceptual speed

ALFRED BINET (early 1900s)

- established "typical" mental functioning of children at various ages.

MENTAL AGE = highest level of functioning.

- Can predict "real life" success/failure?

HISTORICAL PERSPECTIVE

WILLIAM STERN (early 1900s)

INTELLIGENCE QUOTIENT (IQ)

I.Q. = Mental age / Chronological age

LIMITATIONS

- problem measuring intelligence in adults

INTELLIGENCE TESTS

Stanford-Binet (IQ)- reflect individual's performance relative to peers on mostly verbal items.

Wechlser Scales (WAIS-R, WISC)

- measures verbal and performance intelligence

*** Cultural Bias in Intelligence Tests**

Culture-fair tests: **Raven Progressive Matrices Test**

MEASUREMENT ISSUES

- A test is a standardized device used to assess some construct

Development of a test requires

- Definition of what the test is to measure (the construct)
- Create items that assess the construct
- Standardization of the test includes:

1. Well-controlled testing procedures.
2. Creation of norms for the test scores.

A good test must be reliable and valid

RELIABILITY refers to consistency of measurement

1. **Test-retest:** same group takes the test twice

2. **Split-half:** divide the test into halves and then compare consistency of scores on the halves

VALIDITY refers to whether the test measures what it was designed to measure

1. **Content validity:** do test items tap relevant ability?

2. **Predictive validity:** the ability of the test to predict future achievements

3. **Face validity:** do the items seem appropriate?

Criticisms of Intelligence Test Validity

1. There are no clear definitions of
2. intelligence, thus one cannot build the appropriate test
3. Intelligence tests reflect schooling rather than ability
4. Administration circumstances can alter test scores
5. Some people are "test wise"
6. Some people fear tests and do poorly

EXTREMES IN INTELLIGENCE

- **Cognitive Disability**
  - **Mild - I.Q. (50-70)**
  - **Moderate - I.Q. (35-50)**
  - **Severe - I.Q. (20-35)**
  - **Profound - I.Q. (35-50)**

CAUSES : Biological & Environmental

- **The "Gifted"**
  - **I.Q. > 120**

GENETIC/ENVIRONMENTAL INFLUENCES ON INTELLIGENCE

- **BIOLOGICAL DETERMINISM suggests that**
  - **genetics completely dictates our intelligence**

- **HERITABILITY** is the genetically determined proportion of the variance of a trait in a population

- BUT
    - Even heritable traits can be altered by environmental factors
    - E.g. Height is reduced during periods of famine
- The best evidence suggests equal contributions of genetics and environment to intelligence
    - **~ 50 % genetic contribution**
    - **~ 50% environmental influences**

Twin studies:
identical twins raised apart are similar in intelligence (genetics)
BUT are not identical in intelligence (environment)

FACTORS EFFECTING INTELLECTUAL FUNCTIONING

Biological
- **Genetic (sets limits)**
- **Neural efficiency *(neural speed/metabolic efficiency of brain)***

Psychological
- **Specific cognitive/perceptual abilities**
- **Beliefs, expectations, anxiety**
- **Motivation**

Environmental
- **Learning**
- **Culture**
- **Gender roles**

Flynn effect: *world-wide gains in IQ caused by urbanization, nutrition, educational opportunity*

Intelligence: Nature vs Nurture

- How do heredity and environment interact to affect intelligence?

- **INTERACTIONIST PERSPECTIVE**
- Reaction range: an individual inherits a range for potential intelligence that has upper and lower limits

- environmental effects determine where the person falls within these boundaries

- * Biopsychosocial