Cognition and Language, Creativity and Intelligence

Chapter 9
Cognition is the process of thinking, knowing, or processing information; mental manipulation or what we do inside our heads. (images, concepts, etc.)
3 Basic units of thought:

1. **Internal representation**: (Images)

   a mental representation that is like a picture. We use images to think and solve problems. People who have good images tend to be more creative.
2. **Concepts**: represent a class of objects or events. We classify information into meaningful categories.

    Concepts have types of meaning:

1. **Denotative** means it’s exact meaning
2. **Connotative** is the emotional or personal meaning.
3. **Language**: words and symbols, and rules for combining them, which are used for thinking and communication.
Problem Solving

**Mechanical**: which is trial and error.

**Understanding**: which is a higher level of thinking. You need more knowledge than just trial and error.

**Insightful**: You need information about the problem. You need to bring information together that might not have been together before. And you need the ability to compare new problems with old information.
Heuristics

- **Heuristics**: Strategy for identifying and evaluating problem solutions

- Random search strategy: All possibilities are tried, more or less randomly
Insightful Solutions

- **Insightful**: You need information about the problem. You need to bring information together that might not have been together before. And you need the ability to compare new problems with old information.
Creative Thinking:
Involves problem solving and more complex thinking and mental manipulation.
To be a creative thinker you need to have:

- **Fluency** means having a lot of suggestions and produce a lot of ideas. **Flexibility** in thinking is shifting from thought to thought.
- **Originality** is having novel suggestions.

This is divergent thinking or thinking that produces many ideas and thoughts.
The Development of Language

As we develop, the more we manipulate symbols and language the more we can learn.

Language starts around the first birthday. It starts with one-word utterances like DOG, SHOE, CAR, MILK.

This gives children a sense of power and they start to learn the function of language and what it can do.
First words are often over generalized:

A ball is everything round.

Then a two-word stage starts around 18 to 24 months.

Instead of saying “the car broke down,” they say, “car broken”

More examples:

“All gone”

“All gone”

“More juice”
Children then progress up quite unevenly.
“Go” to “Go car” to “go car home.” And they eventually develop a better understanding for language.

As they make mistakes and we laugh or correct them, they will continue to learn.

Language and thought moves on with development and as we get older we learn to problem solve and be creative.
Three friends went to a restaurant to have a leisurely drink and lunch. They finished their meal and paid their bill while lingering over coffee and conversation. The bill came to $30.00, so each paid $10.00 to the waiter, who went off to pay the bill. The bartender, who handled the cash register, noticed that the waiter had charged full price for the drinks, which were on a two-for-one special. The actual bill should have been $25.00, so he gave the waiter $5.00 and told him to return the money to the customers. On the way back to the table the waiter decided that since the diners did not know they had been overcharged, he would return one dollar to each and keep $2.00 for himself. That is exactly what he did. Now each of the diners had paid $9.00 for the food and drinks, and the waiter kept $2.00. Three times nine equals 27 plus 2 equals 29. Where is the other dollar?
MENTAL FLEXIBILITY TASK

This activity does not measure intelligence but provides some insight into your mental flexibility. Relax and take the challenge. Simply fill in the missing words.

1. 26 L____ of the A____
2. 7 W____ of the W____
3. 1001 A____ N____
4. 12 S____ of the Z____
5. 9 P____ in the S____ S____
6. 32 D____ F____ at which W____ F____
7. 88 P____ K____
8. 13 S____ on the A____ F____
9. 18 H____ in a G____ C____
10. 90 D____ in a R____ A____
11. 200 D____ for P____ G____ in M____
12. 8 S____ on a S____ S____
13. 3 B____ M____ (S____ H____ T____ R____)
14. 4 Q____ in a G____
15. 24 H____ in a D____
16. 1 W____ on a U____
17. 5 D____ in a Z____ C____
18. 29 D____ in F____ in a L____ Y____
19. 64 S____ on a C____ B____
20. 40 D____ and N____ of the G____ F____
Intelligence is the capacity to solve problems and to readily adapt to a changing environment.

Global capacity to act purposefully, think rationally, and deal effectively with the environment.
Definition of intelligence:

*Human Intelligence: Robert J. Sternberg*

Mental activity directed toward purposive adaptation to, and selection and shaping of, real world environments relevant to one’s life.
g-Factor

- General ability factor, or core of general intelligence that involves reasoning, problem-solving ability, knowledge, memory, and successful adaptation to one’s surroundings
Savant Music Skills

Length: 3:25

Source: "Musically Speaking", 60 Minutes (CBS News)
A savant is someone with a mental/cognitive disability who, at the same time, demonstrates special skills, intelligence, or aptitudes.

Despite many advances in recent years, medical science has not yet offered a comprehensive or convincing explanation for why savant abilities exist.
There are three important requirements that are important in testing.

1. Standardization which has two meanings:

   A. Each test must have established norms, it must be given to a large number of people to determine which scores are average scores, which scores are above average, and which are below average.

   B. It is not necessary to assure standardization of testing procedures. Everyone tested must be tested the same, instructions, answer forms, etc.
2. A test must have **RELIABILITY**, which is a measure of the stability of tests scores over time.

3. **VALIDITY** refers to whether a test actually measures what it is intended to measure.
Intelligence Tests

I.Q. stands for Intelligence Quotient. I.Q. is an index of intelligence.

The first and most famous I.Q. test is the Standford-Binet Intelligence Scale.

Test items are administered individually and consist of such tasks as:

1. Copying geometric designs
2. Identifying similarities
3. Repeating a sequence of numbers
Another I.Q. test is the **Wechsler Test**. One of the Wechsler’s tests is made for adults.

Wechsler’s test can be broken down further than **Stanford-Binet’s test** to access verbal strengths and weaknesses better.

There are also group I.Q. tests like the **A.C.T.** and **S.A.T.** These tests estimate intelligence as well as college success.
Results of the test are expressed in terms of mental age. A score of 100 is considered average intelligence.

\[
\text{Mental age} \times 100 = \text{I.Q.}
\]

Chronological age
4 Levels of Mental Retardation

Mild: IQ 50-55 to 70

Moderate: IQ 35-40 to 50-55

Severe: IQ 20-25 to 35-40

Profound: IQ below 20-25
Mental Retardation:

A person with mental abilities below an I.Q. score of 70 is usually considered mentally retarded. They have a significantly sub-average general intellectual functioning, with deficits or impairment in adaptive behavior.
About 50% of all causes of mental retardation are related to physical disorders or ORGANIC.

I.E. Birth injuries (lack of oxygen)
   Fetal damage
   Genetic abnormalities

Another 30 or 40% no known biological problem can be identified.
One form of mental retardation is called Down Syndrome; it used to be called Mongolism because of their appearance.

Characteristics of Down Syndrome

1. Almond shaped eyes
2. A slightly protruding tongue
3. Stubby hands
4. Stocky build

Down Syndrome is a genetic defect (an extra chromosome). The older the parents are, the better chance of a down child because the chromosomes are more prone to error in older people.
Gardner’s Theory of Intelligence: Some Concepts

- Multiple intelligences: Theory posed by Howard Gardner that states we have several specialized types of intellectual ability
Gardner’s Theory of Eight Multiple Intelligences

- Language: Used for thinking by lawyers, writers, comedians
- Logic and math: Used by scientists, accountants, programmers
- Visual and spatial thinking: Used by engineers, inventors, aviators
- Music: Used by composers, musicians, music critics
Gardner’s Theory of Eight Multiple Intelligences (cont)

- Bodily-kinesthetic skills: Used by dancers, athletes, surgeons
- Intrapersonal skills (self-knowledge): Used by poets, actors, ministers
- Interpersonal skills (social abilities): Used by psychologists, teachers, politicians
- Naturalistic skills (ability to understand natural environment): Used by biologists, organic farmers
A Different Type of Intelligence Test

- Culture-fair test: Test designed to minimize importance of skills and knowledge that may be more common in some cultures than in others
Heredity and Environment

Psychologists agree that both heredity and environment play a part in intelligence. The controversy is to what extent does heredity and the environment influence intelligence.
Adoption studies and twin studies are used to argue the heredity side of this issue.

Adoptive studies show that I.Q. is related closer to the biological parents rather than adoptive parents.

I.Q. correlations between identical twins (same egg) are exceptionally high when they are raised together and only slightly less when reared apart.
Heredity proponents point to this similarity as proof of the high influence of heredity on intelligence.

Environmental proponents argue that sample sizes in these studies are small and the method of the I.Q. test is in question.

In a study with orphan children it was found that the children who moved to a better environment did much better than those that stayed in the orphanage.
To summarize: psychologists tend to agree that genetic components predetermine the upper and lower limits of intellectual capacities, and environment has a large effect whether people reach their full potential.