LANGUAGE AND THOUGHT

CHAPTER 9

LEARNING OBJECTIVES

Discuss how we communicate with others
  • Understand the structure of language
  • Describe the milestones in language development
Discuss how objects are classified and categorized
  • Understand the use of prototypes, exemplars and category organization
Discuss how problems are solved effectively
  • Compare algorithms and heuristics
Discuss how decisions are made
  • Understand framing and common biases
INTRODUCTION

Christopher

- By age 6, he learned French and Greek on his own
- As an adult, he could read, write and communicate in 16 languages
- When presented with artificial languages he could decipher the rules better than advanced language students
- He is a savant – very low IQ and cannot learn simple games like tic-tac-toe

http://www.youtube.com/watch?v=jFi7BXTGqJ8
INTRODUCTION

Cognition: What does it include?

Thought
- The cognitive processes operating in the private inner space of our brains that enable us to form mental worlds containing things both realistic and fantastic

Cognitive psychology is the scientific study of mental processes and mental structures
COGNITIVE PSYCHOLOGY

Studying the mind?

• What would the behaviorists have to say about that?
• How do you study that which you can not see?
• If you can explain behavior without reference to unseen processes, do we need to study them?

OUTLINE

• Introduction
• Language
  • Language Development
  • Language in Non-Humans
• Concepts
• Problem Solving
• Decision Making
LANGUAGE

J.R.R. Tolkien

- Loved languages, created 15 languages starting when he was 13 until he died
- Created the stories to give meaning and background to the languages.

What is a language?

- Grammar - rules
  - Phonology
  - Syntax
  - Semantics

LANGUAGE DEVELOPMENT

Phonemes – smallest significant unit of speech sound

Morpheme – smallest unit of language that carries meaning

- English languages contains 50,000 to 80,000
LANGUAGE DEVELOPMENT

Cooing to babbling
  • Even deaf children babble

Child speak
  • Overgeneralize the rules

Critical period
  • Before age of 7 – no accent if learn new language

What happened is that I saw a movement. I stopped. I was talking to an empty chair, but out of my peripheral vision I saw something move. I look at Ildefonso and he had just become rigid! He actually sat up in his chair and became rigid. His hands were flat on the table and his eyes were wide. His facial expression was different from any I’d seen. It was just wide with amazement!

And then he started—it was the most emotional moment with another human being, I think, in my life so that even now, after all these years, I’m choking up [pauses]—he started pointing to everything in the room, and this is amazing to me! I’ve thought about this for years. It’s not having language that separates us from other animals, it’s because we love it! All of a sudden, this twenty-seven-year-old man—who, of course, had seen a wall and a door and a window before—started pointing to everything. He pointed to the table. He wanted me to sign table. He wanted the symbol. He wanted the name for table. And he wanted the symbol, the sign, for window.

The amazing thing is that the look on his face was as if he had never seen a window before. The window became a different thing with a symbol attached to it. [emphasis added, GD] But it’s not just a symbol. It’s a shared symbol. He can say “window” to someone else tomorrow who he hasn’t even met yet! And they will know what a window is. There’s something magical that happens between humans and symbols and the sharing of symbols.

That was his first “Aha!” He just went crazy for a few seconds, pointing to everything in the room and signing whatever I signed. Then he collapsed and started crying, and I don’t mean just a few tears. He cradled his head in his arms on the table and the table was shaking loudly from his sobbing. Of course, I don’t know what was in his head, but I’m just guessing he saw what he had missed for twenty-seven years.
LANGUAGE DEVELOPMENT

B.F. Skinner: Behaviorist view
- Random sounds and shaping

Noam Chomsky: Not just reinforcement contingencies
- Develop large lexicon even after one-time learning
- Grammar – not perfect but is often accurate
- Parental involvement – Children of immigrants
- Cultural differences – Different languages but all learn in a very similar way

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LANGUAGE IN NON-HUMANS

Dogs
http://www.youtube.com/watch?v=y4Z0xn4pYSY&NR=1

Primates
• Early attempts to teach primates to speak (1976) were complete failure
• Washoe
  • Gardner’s treated her like a deaf child and she learned ASL using behavioral techniques
• Kanzi
  • Bonobo chimpanzee that used symbols on tablet

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KANZI THE CHIMP

http://www.youtube.com/watch?v=kwm4FEB9LC8&NR=1
What parts of language can they do and can’t they do?
HUMANS ALONE POSSESS LANGUAGE...

“… if, by the term [language], we mean verbal or signed expression of complex grammar.”

“If we mean, more simply, the ability to communicate through a meaningful sequence of symbols, apes are capable of ‘language’”

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CONCEPTS

For each category below, generate the first 3 members of each category that come to mind

- Furniture
- Sport
- Article of clothing

Compare your answers and see how many you have in common

Pick one category and develop a rule of membership (what features does it have to have to be in that category?)

CONCEPTS

Thinking involves forming new mental representations by manipulating available information

- Involves concepts, images, schemas and scripts

Concepts

- Categories we form that consist of mental representations of related items
- Natural concepts – everyday experience
- Artificial concepts – ideals and abstractions
CONCEPTS

Family resemblance theory
- Features of a category that all members might have but not all will have
- Bird – feathers, beak, eggs

Prototype theory
- Best, most typical member of a category
- Bird - Different geography, different prototype

CONCEPTS

Exemplar theory
- Make judgments by comparing to memories
- New bird is compared to memories of previous birds
- Better job because it has both general and specific
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REASONING

Deductive reasoning
  • Drawing conclusions intended to follow logically from a given set of assumptions
  • General to specific
  • Syllogism

Inductive reasoning
  • Based on existing data
  • Specific to General
  • Scientific method
PROBLEM SOLVING

Problem space

• Initial state
• Goal state
• Set of operations

Well-defined

• Initial, goal, and operations are well-defined
• Tower of Hanoi
• Number of moves $2^n - 1$, $n=$number of disks

PROBLEM SOLVING

Ill-defined

• One of the areas is unclear
• World peace

Functional fixedness

• Allowing preconceptions or existing rules to interfere with problem solution
HEURISTICS

Heuristics - Greek *heuriskēn* meaning “to find”
- Mental shortcuts/rules of thumb

DECISION HEURISTICS

Availability heuristic - What ever comes easiest to mind
- Faulty when it gives rise to biased sample of information or when memory is inaccurate
  - A person argues that cigarette smoking is not unhealthy because his grandfather smoked three packs of cigarettes a day and lived to be 100.

Representativeness heuristic - Past information to make decisions
- Faulty when ignore other types of information
- Gambler’s fallacy – flip a coin and get three heads in a row what will be the next coin flip?
- Subprime mortgage crisis
- Lane change in traffic
DECISION HEURISTICS

Anchoring heuristic - First experiences and last may be of greatest weight in decisions

- Faulty when information has no validity
- Initial prices set the stage for others comparisons

People hate making decisions that will give more to some and less to others

- People are able to anticipate regret
- People do not like to be accountable
- People do not like to make decisions for others

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DECISION MAKING

Dan Ariely – MIT Economist

• Saw an ad for the Economist
• Online subscription only - $59.00
• Print subscription only - $125.00
• Both online and print - $125.00

Which one would you choose?

DECISION MAKING

Decisions are always relative to the context

• People don’t know what they want until they see the context

Framing

• Framing is a cognitive heuristic in which people tend to reach conclusions based on the ‘framework’ within which a situation was presented.
• Knowing how a person frames the decision will help you understand how it is made
• Loss aversion – people are more affected psychologically by loss than by gains
• Endowment effect – People will pay more to retain something they own than to obtain something owned by someone else