Chapter 9
Language and Thought

OUTLINE OF RESOURCES

I. LANGUAGE AND COMMUNICATION: FROM RULES TO MEANING

Lecture Suggestion 9.1: Language Vanishing Act (p. 9-6)

Lecture Suggestion 9.2: From Baby Einstein to Baby Mushmouth (p. 9-7)

Multimedia Suggestions

Feature Films:

*Children of a Lesser God* (1986, 119 min, rated PG) (p. 9-8)

*The Miracle Worker* (1962, 102 min, not rated) (p. 9-8)

Interactive Presentation Slides for Introductory Psychology: 10 Language

Worth Video Series:

Video Anthology for Introductory Psychology: Thinking and Language – Chomsky’s View of Language Development

Video Anthology for Introductory Psychology: Thinking and Language – Gleason’s Wug Test

Video Anthology for Introductory Psychology: Thinking and Language – Learning Language: Language Development in Infants and Toddlers

II. LANGUAGE DEVELOPMENT AND THE BRAIN

Lecture Suggestion 9.3: Washoe Dead; Alex Dead; Humans Sad (p. 9-9)

Multimedia Suggestions

Feature Films:

*Koko, a Talking Gorilla* (1978, 80 min, documentary, unrated) (p. 9-10)

*Project Nim* (2011, 99 min, rated PG-13) (p. 9-10)

Interactive Presentation Slides for Introductory Psychology: 10 Language
III. LANGUAGE AND THOUGHT: HOW ARE THEY RELATED?

Classroom Exercise 9.1: Using Nonsexist Language (p. 9-11)

Multimedia Suggestions

Interactive Presentation Slides for Introductory Psychology: 10 Language

Worth Video Series:

Video Anthology for Introductory Psychology: Thinking and Language – Gleason’s Wug Test

Video Anthology for Introductory Psychology: Thinking and Language – Learning Language: Language Development in Infants and Toddlers

IV. CONCEPTS AND CATEGORIES: HOW WE THINK

Lecture Suggestion 9.4: Monkeying Around with Cognition (p. 9-13)

Lecture Suggestion 9.5: Why We Need Concepts (p. 9-15)

Classroom Exercise 9.2: Prototype Grab Bag (p. 9-16)

Multimedia Suggestions

Feature Film: Weird Science (1985, 94 min, rated PG-13) (p. 9-17)

Interactive Presentation Slides for Introductory Psychology: 9 Thinking

PsychSim 5 Tutorials: My Head Is Spinning

Worth Video Series:

Video Anthology for Introductory Psychology: Thinking and Language – Can
Chimpanzees Plan Ahead?

V. DECISION MAKING: RATIONAL AND OTHERWISE

Lecture Suggestion 9.6: “. . . Though It May Seem Cheesy, It Actually Works” (p. 9-18)


Classroom Exercise 9.3: Active Participation in Judgment and Decision-Making Research (p. 9-20)

Classroom Exercise 9.4: Personalizing Heuristics (p. 9-21)

Classroom Exercise 9.5: A Quick Demonstration of Representativeness (p. 9-24)

Classroom Exercise 9.6: The Availability Heuristic (p. 9-25)

Classroom Exercise 9.7: Quick Demonstrations of Framing Effects (p. 9-25)

Multimedia Suggestions

Feature Film: She’s Gotta Have It (1986, 84 min, rated R) (p. 9-26)

Interactive Presentation Slides for Introductory Psychology: 9 Thinking

PsychInvestigator: Decision Making

VI. PROBLEM SOLVING: WORKING IT OUT

Lecture Suggestion 9.8: Know and Tell (p. 9-26)

Classroom Exercise 9.8: Gaining Insight (p. 9-27)

Classroom Exercise 9.9: Fun and Games (p. 9-28)

Classroom Exercise 9.10: What If You Asked a Question and No One Answered? (p. 9-29)

Classroom Exercise 9.11: Examining Creativity and Insight (p. 9-30)

Multimedia Suggestions

Feature Film: House of Games (1987, 102 min, rated R) (p. 9-30)

Interactive Presentation Slides for Introductory Psychology: 9 Thinking
Chapter Objectives

After studying this chapter, students should be able to:

1. Define language and grammar, and discuss three major differences between human language and signaling systems used by other species.

2. Describe how phonemes, phonological rules, morphemes, and grammatical rules interact with one another to form a system of human language, and distinguish between the deep structure and surface structure of language.

3. Discuss language development with respect to the following: distinguishing speech sounds, language milestones, and grammatical rules; describe how features of language development can be disentangled from cognitive development.
4. Compare the behaviorist, nativist, and interactionist explanations of language development.

5. Discuss the neurological specializations that allow language to develop, including recent research on the role of the right hemisphere and on bilingual language development and the brain.

6. Describe the successes and limitations of attempts to teach nonhuman animals, particularly apes, human language.

7. Describe several studies that provide support for the linguistic relativity hypothesis.

8. Define concept and discuss the following theories of concept formation: necessity and sufficiency, family resemblance theory, prototype theory, and exemplar theory.


10. Compare rational choice theory with how most real-world decisions actually get made.

11. Describe the availability bias, provide an example, and distinguish between a heuristic and an algorithm.

12. Describe the conjunction fallacy, and provide an example.

13. Discuss how the use of the representative heuristic often results in ignoring important information about base rates.

14. Discuss framing effects, especially the sunk-cost fallacy.

15. Describe the basic tenets of prospect theory.

16. Compare the accuracy at which people judge frequency and probability, state the frequency format hypothesis, and provide an evolutionary account of this phenomenon.

17. Discuss the relationship between prefrontal cortex activity and risky decision making.

18. Describe the basic principles of means–ends analysis, noting how analogical problem solving is a component of the overall system.

19. Discuss findings regarding insight and how it develops, including how brain activity differs between insight and analytic problem solving.

21. Define and compare *practical reasoning*, *theoretical reasoning*, and *syllogistic reasoning*; describe how different types of reasoning tasks activate different regions of the brain.

I. Language and Communication: From Rules to Meaning

(Chapter Objectives 1–4)

Human language is characterized by a complex organization, from phonemes, the smallest units of sound recognizable as speech, to morphemes, to phrases, and finally to sentences. Each level of human language is constructed and understood according to grammatical rules, none of which are taught explicitly. There are different theories about how children acquire language and learn the rules of grammar and syntax. Behaviorists, such as B. F. Skinner, believed the processes of operant conditioning explained language acquisition. According to Noam Chomsky’s *nativist theory*, children appear to be biologically predisposed to process language in ways that allow them to extract grammatical rules from the language that they hear. This *language acquisition device* (LAD) emerges as a child matures. The biological predisposition is represented by neurological specialization. Interactionist theorists have argued that while there is an innate ability to acquire language, it is only through the process of social interactions that children actually learn language.

Lecture Suggestion 9.1

Language Vanishing Act

Yawuru, Magati Ke, Siletz Dee-ni. If these words don’t make much sense to you, you’re not alone. Soon it’s possible they won’t make any sense to anyone, ever again.

Yawuru is a language spoken by three people living in Western Australia. It’s not something they made up for fun; they’re all that’s left of a cultural-linguistic group that spoke that language. Magati Ke is also spoken by three people living in the Northern Territory of Australia, and only one person remains who knows Siletz Dee-ni, one of many languages once spoken on reservations in Oregon. (Amurdag, a language in the Northern Territory of Australia, is also spoken by one person, as far as researchers can tell.) There are more than 7,000 human languages spoken on Earth, yet by some estimates more than half of them will disappear by the year 2100. Their disappearance brings with it a much greater loss. Many of these languages exist only in oral form—no written vocabularies or grammatical rules exist—so insights into the history of the speakers, their culture, the environments they described, and, to a large extent, the workings of their brains will be lost as well.

Language loss is nothing new. English speakers rarely speak Middle English anymore, just as there are few folks conversing in daily Latin. Sometimes languages die along with the death of the people who speak them; such would seem to be the impending case with Siletz Dee-ni and the others mentioned above. Sometimes languages die (or at least get really, really sick) because they get incorporated into other, dominant languages. Other times bilingual speakers drop a language due to social pressures, convenience, or
inaccessibility of other speakers. Whatever the cause, languages (like other living things) come and go.

According to research funded by the National Geographic Society, some languages are in more imminent danger of disappearing than others. For example, “hot spots” for language loss include northern Australia, central and eastern Siberia, and the northwest Pacific plateau of the United States; areas such as Oklahoma or southern Africa have endangered languages that are still alive but weakening.

Your primarily English-speaking students may not have given much thought to the mortality of languages. Discuss with them the importance of documenting linguistic ways of thinking about, describing, and understanding the world as a means of understanding human thought and behavior.

Sources:


http://travel.nationalgeographic.com/travel/enduring-voices/

Lecture Suggestion 9.2

From Baby Einstein to Baby Mushmouth

If you’ve been paying attention to marketing campaigns aimed at new parents, you’ve realized it’s possible to mold your child into any historical figure you’d like: Baby Einstein, Baby Mozart, Baby Newton, Baby Shakespeare, Baby Van Gogh, Baby Galileo . . . . Popular DVD series, such as those produced by Brainy Baby or the Baby Einstein conglomerate, purport to enhance your young child’s mind through appropriate stimulation.

Frederick Zimmerman, of the Department of Health Services at the University of Washington, begs to differ. Recent research suggests that exposure to such “baby genius” products may actually impede language development in children around the age of one. One thousand families were surveyed regarding their viewing habits. For children aged 8 to 16 months, every hour spent watching the so-called stimulating DVDs was associated with understanding 6 to 8 fewer words from a set of 90, compared with children who didn’t watch such videos. By comparison, watching educational shows (such as Sesame Street) or noneducational ones (such as SpongeBob Squarepants) had no demonstrable effect, and daily reading or telling of stories to infants increased their vocabularies by only two or three words. This suggests that the losses produced by the DVDs outweigh any gains that might be accrued by daily verbal interaction. The Three Bears are getting pummeled by Baby Shakespeare!

The American Academy of Pediatrics does not recommend any television viewing for children under the age of 2; were these guidelines to be followed, the problem would be
rendered moot. In fact, it’s not clear what the problem is, exactly. It could be that parents are simply using the DVDs as an electronic babysitter, rather than as a platform for enhanced interaction with their children. It’s also clear that young children are quite resilient; it’s doubtful that Baby Newton will incur permanent damage on a child’s language development. Nonetheless, a little more time with Baby Patty Cake and a little less time with Baby Paddy Chayefsky might be in order.

Sources:


http://www.babyeinstein.com/

http://www.thekiddlycompany.com

http://www2.aap.org/advocacy/releases/oct07studies.htm

**Multimedia Suggestions**

*Feature Film: Children of a Lesser God (1986, 119 min, rated PG)* William Hurt and Marlee Matlin star in this film that examines the relationship between a dedicated teacher at a school for the deaf and the beautiful but bitter woman who captivates him. Matlin won an Oscar for her performance. The subject matter goes beyond the treatment of language in the textbook, but students should enjoy seeing relevant selections from this film.

*Feature Film: The Miracle Worker (1962, 102 min, not rated)* This is the classic version of the story of Helen Keller and Annie Sullivan. Patty Duke and Anne Bancroft deliver tour de force performances chronicling the triumphs and tragedies associated with teaching a blind and deaf girl to communicate.

See the Preface for product information on the following items:

*Interactive Presentation Slides for Introductory Psychology:* 10 Language
**Worth Video Series**

Video Anthology for Introductory Psychology: Thinking and Language – Chomsky’s View of Language Development

Video Anthology for Introductory Psychology: Thinking and Language – Gleason’s Wug Test

Video Anthology for Introductory Psychology: Thinking and Language – Learning Language: Language Development in Infants and Toddlers

II. Language Development And The Brain

(Chapter Objectives 5–6)

Studies with individuals suffering from **aphasias** have highlighted the fact that our abilities to produce and comprehend language depend on distinct regions of the brain, with Broca’s area critical for language production and Wernicke’s area critical for comprehension. While language is predominantly a left hemisphere task, research has found that the right hemisphere contributes to language comprehension as well. Learning a second language results in changes in brain structure that can have lasting benefits across the lifespan. Nonhuman primates can learn new vocabulary and construct simple sentences, but compared with humans they are limited in terms of vocabulary and grammatical complexity.

**Lecture Suggestion 9.3**

Washoe Dead; Alex Dead; Humans Sad

The year 2007 was a bad one for pioneers of human–animal communication. Not so much for the human researchers; they’re generally doing fine. It’s the pioneering animals that had a rough time.

Washoe, often regarded as the first nonhuman to acquire human language, died on October 30, 2007, following a brief illness, at the ripe old age of 42. She lived at the Chimpanzee and Human Communication Institute (CHCI) at Central Washington University, having moved there in 1980 with her caretakers, researchers Roger and Deborah Fouts. Washoe is said to have learned at least 160 words using American Sign Language and had the ability to form simple telegraphic sentences. She also taught sign language to three younger chimpanzees at CHCI: Tatu, Loulis, and Dar.

On September 6, 2007, Alex the African Grey parrot died suddenly of unspecified causes (most likely related to arteriosclerosis). Alex (short for Avian Learning Experiment) was purchased in a pet shop by researcher Irene Pepperberg in 1976, when he was believed to be about 1 year old. Pepperberg runs the Alex Foundation, and has adjunct appointments at Brandeis and Harvard universities. Alex is claimed to have grasped the concepts of “bigger,” “smaller,” “same,” and “different,” and to have acquired a vocabulary of 150 words. Pepperberg also states that Alex could identify 50
different objects, distinguish 7 colors, recognize quantities up to 6, and understand the concept of zero.

Understandably, the research surrounding both Washoe and Alex had its share of critics—scientists who doubted that genuine language acquisition was at work. But no one doubts that these notable animals will be missed by the humans who knew them.

Sources:
http://www.friendofwashoe.org/
http://www.alexfoundation.org/


Multimedia Suggestions

**Feature Film: Koko, a Talking Gorilla (1978, 80 min, documentary, unrated)**
Acclaimed director Barbet Schroeder (*More, Reversal of Fortune, Barfly, Single White Female*) directed this documentary of Dr. Francine “Penny” Patterson and her protégé, Koko, who was taught to communicate with humans using sign language.

**Feature Film: Project Nim (2011, 99 min, rated PG-13)** This documentary explores the life of Nim, a chimpanzee who in the 1970s was the subject of a groundbreaking study that attempted to show that a chimp could learn language if the animal was raised and nurtured like a human child. Through interviews and archival footage we follow Nim’s path through human society, and the lasting effects he has had on the individuals who worked with him over the years. The film raises profound questions about what becomes of a research subject after the research is over. Raised as a human, Nim couldn’t live with humans or chimpanzees after he “retired.” The movie is a dispassionate and unwavering look at the life of an animal we tried to turn into a human. Note that Herbert Terrace, the researcher who led this project, had sexual relationships with two of the research assistants involved in this study and this behavior is discussed in the film as if it is not any sort of profound ethical issue.

See the Preface for product information on the following items:

**Interactive Presentation Slides for Introductory Psychology:** 10 Language

**Worth Video Series**

Video Anthology for Introductory Psychology: Biology, Behavior, and Mind – Language and Brain Plasticity

Video Anthology for Introductory Psychology: Thinking and Language – Teaching Language to Chimpanzees
III. Language And Thought: How Are They Related?

(Chapter Objective 7)

The linguistic relativity hypothesis suggests that language influences the way in which we think. Recent cross-cultural studies on color processing and time judgments point to just such an influence of language on thought. However, it is also clear that language and thought are separate to some extent.

Classroom Exercise 9.1

Using Nonsexist Language

The textbook notes the intimate interplay between thought and language: Each influences the other as we try to make sense of and describe the world around us. This mutual influence can be troublesome, however. For example, when people describe the world using masculine generics (i.e., using a male form of speech to describe people of both sexes) most listeners form a mental image of . . . well, a man. In fact, virtually 100% of the research evidence to date points to this conclusion. When someone speaks of a fireman, for example, indicating a person who fights fires, most listeners think of a man, just as they do when they hear about a chairman, a mailman, or “he who is without sin.” It’s arguable that the speakers of such phrases implicitly assume a male-dominated world as well.

■ Help your students break what unfortunately has become an acceptable habit of the English language.

■ Handout 9.1 contains several masculine- or feminine-oriented terms and phrases.

■ Challenge your students to generate gender neutral alternatives for each one, such as those listed below.

■ Point out that this is far from an exercise in political correctness. The language we use helps shape the thoughts we have, and for many people, language choices lead to mentally excluding half of the population.

Some suggested gender-neutral alternatives:

1. business person, professional, executive, manager, suit

2. professional, worker, employee, career person
3. cave dwellers, cave people
4. chair, head, president, leader, moderator, coordinator
5. first year students
6. representatives, members of Congress, Congresspeople
7. craftsperson, artisan, craft worker
8. delivery clerk, courier, deliverer
9. ancestors, forebears, progenitors
10. supervisor, boss, leader, foreperson, head juror
11. laypeople, laity, laypersons
12. mail carrier, postal worker
13. the human species, humans, humanity, humankind, human beings, people
14. handmade, hand-built, human-made, synthetic, manufactured, constructed
15. personnel, staff, human resources, labor, people power
16. meter reader, meter attendant, traffic officer, parking enforcement
17. police officer, constable, peace officer, law enforcement agent
18. repairer, repair person, technician
19. salesclerk, salesperson, sales rep (or representative)
20. trash collector, sanitation engineer, refuse collector

Sources:


Multimedia Suggestions

See the Preface for product information on the following items:

*Interactive Presentation Slides for Introductory Psychology:* 10 Language

*Worth Video Series*

Video Anthology for Introductory Psychology: Thinking and Language – Gleason’s Wug Test

Video Anthology for Introductory Psychology: Thinking and Language – Learning Language: Language Development in Infants and Toddlers

**IV. Concepts and Categories: How We Think**

(Chapter Objectives 8–9)

We store our knowledge in three main ways—our experiences in terms of individual memories, generalizations that take the form of *prototypes*, and factual information that is codified in terms of rules. The brain organizes *concepts* into distinct categories, such as living things and human-made things. We acquire concepts differently according to three theories: *family resemblance theory*, which states that items in the same category share certain features, if not all; *prototype theory*, which uses the most “typical” member of a category to assess new items; and *exemplar theory*, which states that we compare new items with stored memories of other members of the category. We use concepts and categories to solve problems, make inferences, and guide judgments.

**Lecture Suggestion 9.4**

Monkeying Around with Cognition

What can vervet monkeys and baboons teach us about cognitive psychology? Quite a bit, as it turns out.

Dorothy Cheney and Robert Seyfarth are a husband and wife team working at the University of Pennsylvania. In 1990 they published an influential book, *How Monkeys See the World*, which summarized many of their field studies with vervet monkeys. Using a paradigm of recording vocalizations, then playing them back at an opportune time, the researchers discovered that the monkeys had sophisticated processes of inference and a good deal of social cognition. For example, three vervet mothers sitting together would be exposed to a recording of a baby vervet’s call. The mother looks to the source of the sound, whereas the other two look to the mother, suggesting they realize whose baby is whose.

Similarly, baboon minds seem to be specialized for understanding social interaction, which takes place within a complex social structure. Baboon troops revolve around mother–daughter lines of descent. The rankings and hierarchies within these lines can
remain stable for multiple generations. What’s more, ranking among female baboons is hereditary, with daughters assuming their mothers’ ranks at the appropriate time. Male baboons, on the other hand, are in a constantly shifting hierarchy: No one’s really in charge much at any given point! When upheavals in the male social order occur, however, females know to be wary; infanticide is often the result. This happens so that an alpha male (wait; which one’s in charge now?) can force a mother out of weaning an infant and back into a reproductive cycle, and thereby sire his offspring.

But males have been shown to capitalize on cuckoldry. In one experiment, a male baboon heard the distinctive cry a female always makes after mating. However, he then heard another male’s signature grunt coming from another direction. Recognizing that the male was associated with the female . . . but that the two were in separate locations . . . but that the female was mating . . . but not with her partner(!) led the male baboon to go romping off in the direction of the female, in search of some quick illicit sex. Imagine his surprise when all he found was a loudspeaker playing back the female’s grunts! In any event, this pattern suggests a keen understanding of even transient social bonds, and the ability to reason from point A to point B to point C.

All very complicated, to be sure. Yet when Cheney and Seyfarth tested baboons’ knowledge of the social order in their recording/playback experiments, they found that baboons recognize what’s right—and wrong—about the social scene. For example, in most normal interactions, a dominant male lets out a threat grunt, which usually elicits a scream by an inferior male. Most baboons are immune to this common occurrence, rarely batting an eye when it happens. By manipulating the vocalizations—an inferior male is heard to let out a grunt, followed by a dominant male’s scream—the researchers found that members of the troop take notice and show evidence of surprise. All this suggests that baboons can form an “A dominates B” mental sequence and distinguish it from a “B dominates A” pattern, pulling out the relevant vocalizations that provide evidence for that concept. This process is similar to the way humans deconstruct speech sounds and form concepts based on language patterns. Baboons lack language, but they may engage in language-like processes when they perceive sounds and derive meaning from them.

Baboons also lack a theory of mind, which is found among humans. We can infer what another member of a species does or does not know, and communicate with that person based on that information. Knowing something that someone else doesn’t (but needs to) might have spurred language development in the evolutionary sequence. Among baboons, however, there is little evidence that a strong theory of mind exists. For example, baboons are always wary of crocodiles. Moving from one island to another, the adults typically go first, leaving the juveniles on the shore whimpering and wailing. No matter how many pleas and cries they hear, mothers never go back for their offspring, suggesting they are unable to understand the juvenile’s predicament.

All of this suggests that, even in absence of language and a theory of mind, baboons nonetheless can operate at a cognitively sophisticated level in a complex social environment. Understanding how they do that can shed light on the evolutionary origins of human cognition.
Why We Need Concepts

Humans, by nature, are driven to make sense of their world and to categorize the objects they encounter within that world. By grouping individuals and objects into categories, it makes it easier for us to think and communicate about our world. It’s not that we can’t handle complexity, it is just that acknowledging the uniqueness of every object and individual slows down our ability to communicate and think. These categories are known as concepts. We can think of a concept as a label that represents a class or group of objects, people, or events that share common characteristics or attributes.

Imagine that you are walking down the street with a friend and you see, approaching rapidly in the distance, a red motorized vehicle, with four wheels, two doors, headlights, and a chrome grill. You quickly say to your friend “Watch out, a car is coming.” Because we have concepts we do not need a different name to identify every different object, animal, or situation we encounter. Car is a concept that stands for a variety of vehicles that share many similar characteristics, even though they differ in significant ways. Concepts can encapsulate narrow categories like Priuses or broader categories like Toyotas or automobiles. We also have concepts for abstractions, as well as tangible objects and organisms: Love, Beauty, and Art are abstract concepts.

Why are concepts important? Without concepts, each object or event in our world would be unique to us and any kind of generalization would be impossible. Concepts allow us to relate experiences and objects. The Chicago Cubs, Milwaukee Brewers, and New York Yankees are professional baseball teams. Without the concept of the baseball team, we would be unable to compare these teams and argue that one is better than the other.
Classroom Exercise 9.2

Prototype Grab Bag

To help your students understand how prototypes contribute to concept formation, consider using a simple game that can be played in class.

- You’ll need a paper bag (a fancy box will also work), and several small slips of paper.
- On each slip of paper, write the name of a fairly large category that includes many group members. A “prototypical” example would be “bird” (but don’t use that; it’s been used too much). You might write “furniture,” “automobile,” “computing device,” “book,” “information source,” “animal,” “pet,” “dog,” “family member,” or any other category that comes to mind.
- Fold the slips of paper in half, jumble them up in the bag, then explain the following rules of the game.

Rules:

You can vary the game depending on your class size. For example, if you have a small enough class, you might ask each student to randomly select a slip of paper from the back, read it, and then generate a prototypical example of that category. A student pulling out “furniture,” for instance, would probably think of “chair” or “table” as an example of a prototype, just as a student selecting “automobile” would probably answer “sedan.”

You can time students, with faster times winning the prize of your choice.

Alternatively:

- Assemble teams of three students each.
- Ask each team to select a slip of paper.
- Have one member generate a prototype of that category, while the other members generate decidedly nonprototypical examples. In the case of “computing device,” “desktop computer” might be the prototype, whereas “personal digital assistant” or “iPhone” might be less prototypical. “Novel” certainly seems like a prototypical book, whereas “pamphlet” or “screed” would be less so.
- The teams can compete for speed, originality, or any dimension you’d like. (“The Internet” is probably the prototypical information source for most of your students, whereas “an encyclopedia” might seem like an unusual answer.)

As another variation:

- You might toss in harder or easier categories to have a little fun with your students. Adding “vegetable” or “distance driven in a day on a long journey” or “rock group member” might be interesting.
Discussion:

There’s really not much to be won or lost in this kind of game, other than to get a discussion going. Ask students why they think the prototypes they chose are in fact prototypical. What properties do they have that make them the best examples of a category? What kind of family resemblance do they bear to other members of that category? Are there any disagreements that arise in prototypes; if so, what are they based on? For example, it’s arguable that an iPhone is fast becoming a prototypical computing device, as clunky old desktop computers fade into the past. Why is the guitar player a better prototype of “rock group members” than the keyboardist? As students promote the prototypicality and nonprototypicality of category members, you can guide the discussion along a path that includes exemplar theory, family resemblance, and the way that concepts are used in cognitive processes.

Multimedia Suggestions

Feature Film: Weird Science (1985, 94 min, rated PG-13) John Hughes directed this comedy, starring Anthony Michael Hall and Kelly LeBrock, in which two teenage nerds decide to create what they consider to be the perfect (i.e., “prototypical”) woman. Lisa, their computer-generated creation, turns out to be more than they bargained for, and silliness ensues.

Interactive Presentation Slides for Introductory Psychology: 9 Thinking

PsychSim 5 Tutorials My Head Is Spinning

Worth Video Series

Video Anthology for Introductory Psychology: Thinking and Language – Can Chimpanzees Plan Ahead?

V. DECISION MAKING: RATIONAL AND OTHERWISE

(Chapter Objectives 10–17)

Human decision making often departs from a completely rational process. The values we place on outcomes weigh so heavily in our judgments that they sometimes overshadow objective evidence. We excel at estimating frequencies, defining categories, and making similarity judgments, but we do not make probability judgments very well. The frequency format hypothesis suggests that evolution might have played a role in our superior frequency estimates. Human decision-making performance varies dramatically depending on whether or not the task is presented in a format that fits our mental algorithms. Errors in decision making often take the form of biases and heuristic reasoning. Because we feel that avoiding losses is more important than achieving gains, framing effects can affect our choices. Prospect theory was developed in part to
account for these tendencies. Emotional information also strongly influences our decision making, even when we are not aware of it.

**Lecture Suggestion 9.6**

“... Though It May Seem Cheesy, It Actually Works”

What is your home worth right now? Wait! Don’t answer! First, think about what other homes are worth in your neighborhood, and how yours compares with them. Also think about what you paid for your home initially, and how much you’ve invested in it through upgrades, improvements, and maintenance. Be sure to factor in the current economic climate; is it a buyer’s market or a seller’s market right now? And how much would you be willing to pay for another home? Can you justify the difference in what you’d get selling by what you’d need to sink into buying?

Confusing, huh? Perhaps. Some people seek the thrill of a good deal, and relish the thought of weighing these and many other options simultaneously. Others would rather not be bothered with all that cognitive clutter, preferring to shun the myriad judgments, values, and decisions packed into such considerations. Psychologists plainly know a great deal about the decision-making process, and know that it isn’t always rational. But unless they also hold a real estate license, most psychologists aren’t in a position to capitalize on that knowledge. Conversely, many a realtor knows how to broker a good deal, even though they may never have taken a class remotely related to psychology.

Realtors recognize that most home buyers have “break points,” or some dollar threshold they’re willing to entertain when searching for a home or plunking down actual cash. In today’s market, these break points typically come at $250,000, $500,000, $1 million, and so on, although smaller break points (perhaps in increments of $25,000, $50,000, or $100,000) also loiter in the buyer’s mind. Knowing that, a realtor might advise that a property appraised at $515,000 be listed at $500,000, to sneak in under a potential buyer’s mental radar, so to speak.

At the same time, buyers also justify spending more than they’d like in a semi-rational way. A firm break point of $250,000 for a decent house might be entirely sensible, based on assets, income, market forces, and so on. Yet the emotional impact of actually touring a “dream house” priced at $300,000 can bedevil that firm rationality. Psychologists know that cognition and emotion both influence decision making, and not always in an equal mix! Buyers might therefore reason that a $50,000 increase is within one break point and will translate to only $50 more per month on a mortgage. That’s all well and good... until now $300,000 becomes a new baseline, and other attractive ups and overages boost the price even higher! In short order, what started as a firm $250,000 break point becomes a mushy “$385,000 isn’t so bad for this house!”

Break points can be massaged downward as well. For example, pricing a $500,000 property at $499,000 doesn’t produce much of a tangible difference; by the time fees, loans, and lawyers are paid, what’s $1,000 here or there? But “psychologically the first number has an impact,” according to Frederick W. Peters, the president of Warburg
Realty. “Even though it may seem cheesy, it actually works.” When a Manhattan apartment valued at $6 million is priced at $5.995 million, a realtor can afford an awful lot of Camembert.

Consider the ambiguity associated with various asking prices. A house listed at $397,556 might suggest at least two things: (1) the owner really, really figured out the exact worth of the property based on a careful analysis of all the relevant details; or (2) the owner really, really will be a pain in the neck to negotiate with! An odd price tag such as that can carry with it a connotation of precision; buyers might conclude that they’re getting a fair price, especially if their own calculations come close to that number. Conversely, the more typical practice of valuing a property in round numbers—$390,000, for instance—often signals to buyers that it’s just a “suggestion,” a platform from which to begin the negotiations. The hapless seller might really want to realize $390,000 from the sale, but many buyers would see that figure as a point to work down from (or, if the property is “hot,” perhaps bid up from).

With all this in mind, it may seem difficult to know what any property is “really” worth. By the time bidding up, bidding down, matching to break points, rounding to whole numbers, and adding a “99” to the end of the price takes place, the easiest solution may present itself: just rent!

Source:

Lecture Suggestion 9.7
Time Keeps On Slippin’, Slippin’, Slippin’, into the Future

Despite having the only cortex around that can imagine the future, humans aren’t very good at doing so. Sure, we can think about what we’d like for dinner later tonight, and guesstimate how much more we’ll be earning in five years than we currently are, but there are plenty of mindbugs associated with forecasting the future. For example, extensive research on affective forecasting indicates that people aren’t very good at predicting the intensity or duration of their future emotional states following an anticipated positive or negative event. It turns out that people get kind of stumped when making other kinds of decisions about the future as well.

Imagine if you were asked whether you’d like to receive $15 right now or $15 in a month. Most people would probably opt for the “right now” option, muttering something about birds in hands and the mouths of gift horses. Now imagine if you were asked whether you’d like to receive $15 now or $100 in a month. Chances are good you’d wait for the larger payoff; right now you have nothing, so waiting a few weeks for serious green sounds like a decent proposition. But imagine that you were asked whether you’d like $15 in a month, or $18.50 in a month and five days. The decision is a little more complicated—is the extra $3.50 worth the extra wait?—but presumably most people could figure out what they wanted.
Indeed, most people in experiments such as this, conducted by Jonathan Cohen of Princeton’s Center for the Study of Brain, Mind, and Behavior, do figure out what they want. Sometimes the choices seem sensible; other times they don’t. But what’s revealing is what happens while the choice is being made. Princeton University students made similar kinds of decisions about monetary outcomes while encased in an fMRI machine. Regardless of their choice, the students’ prefrontal cortices were humming away during the decision process. Yet when they opted for the immediate payoffs, the students’ limbic systems lit up like a pinball machine in a darkened arcade. Specifically, parts of the midbrain dopamine system were active when the “immediate” option was selected, suggesting that the evolutionarily older, “get it while you can before it goes away” pleasure system was influencing the decision process. Rationality, in the form of the prefrontal cortex, was uniformly present, but that region was particularly active when the students chose longer-term options.

A parallel to this research suggests itself. When people are asked to save for the future, through 401(k) plans, investments, or simply “paying oneself first,” they often falter. Many people know it’s a good idea to sock away a little something for a rainy day, but at the same time they see the current forecast—pleasant and sunny—as much more compelling. After all, who wants to see $200,000 on a slip of paper, inaccessible until we’re old and gray, when we could be looking at a new Mercedes parked in the garage? The marriage of neuroscience and economics may spur the development of better ways to make investing in the future more palatable, before the future slips away into the past.

Sources:


**Classroom Exercise 9.3**

Active Participation in Judgment and Decision-Making Research

Your students will no doubt find the many aspects of cognitive psychology quite interesting. After all, who doesn’t like learning about reasoning, logic, problem solving, decision making, and the many mindbugs that go along with them?

You can encourage your students to do more than just learn about these phenomena; point out that they can actively contribute to the knowledge gained in these areas.
Your university may have several experiments relevant to cognitive psychology going on, and chances are good that your students may be asked to participate in a subject pool as part of your course.

Beyond that, however, it’s a relatively simple matter to find many online studies related to cognitive psychology. Two sources that link to a variety of projects can be found at http://www.socialpsychology.org/expts.htm#sjudgment and http://psych.hanover.edu/research/exponnet.html (scroll down to “cognition” section).

Students are curious about psychology. Psychologists need data. Why not make everybody happy with some quick participation in the scientific process?

**Classroom Exercise 9.4**

Personalizing Heuristics

Heuristics—such as representativeness, availability, anchoring and adjustment, or simulation—can sometimes seem like dry logic games. You can make your discussion of heuristics more engaging for your students by tinkering with a demonstration to add a personal touch.

Alan Swinkels, at St. Edward’s University, suggests illustrating heuristics with a brief exercise.

- Prepare two versions of a handout. It’s better to conduct the exercise one class meeting and discuss heuristics the next. That way you’ll have time to tabulate some results to share with your students.

- Alternatively, if your classroom is equipped with a Classroom Response System (CRS: “classroom clickers”) such as the iClicker Radio Frequency system available from Worth Publishers, you might consider structuring the exercise to capitalize on that technology.

The exercise consists of four questions that demonstrate different “cognitive shortcuts.” Here is the first:

1. [YOUR NAME—“NAME’S”] cousin, Rudy, is a bit on the peculiar side. He has unusual tastes in movies and art, he is married to a performer, and he has tattoos on various parts of his body. In his spare time Rudy takes yoga classes and likes to collect 78 rpm records. An outgoing and rather boisterous person, he has been known to act on a dare on more than one occasion. What do you think Rudy’s occupation most likely is?

   A. Farmer

   B. Librarian

   C. Trapeze Artist
Students are likely to think that Rudy is a trapeze artist, given the particulars of the description. However, they are falling prey to the representativeness heuristic. Because Rudy sounds like a good example of the category “unusual people” students are led to believe it is very likely that he is a representative of that category. However, the base rate for surgeons, lawyers, and even farmers and librarians is much higher than that for circus performers; simply put, there are probably 1,000 times as many lawyers in this world as there are trapeze artists. Hence, it is much more likely that Rudy belongs to that category (“lawyers”) rather than the one that just happens to fit with quirks of his personality. By adding your name to the demonstration you can make it seem more realistic, plausible, and personal.

- For this question, as for the remaining items, collect the responses ahead of time to allow you to share with your students at a subsequent class meeting the percent of respondents who chose each option.

- Students should clearly see the action of the heuristics at work.

- For comparison, Handout 9.2 gives a table of response rates for all the questions in this exercise over a period of seven years, collected in introductory, social, and cognitive psychology courses taught by Swinkels.

- If you’re working with a clicker system, present the question in class and collect the responses via radio frequencies to give more immediate feedback.

Here is Item 2:

2. In one chapter of a best-selling novel, would you expect to find more words that (circle one)

   a. end in ing (——-ing) OR b. have n as the second to last letter (——-n-)?

Despite the obvious prompt given in the format of the item, students are likely to believe that “ing” endings are more common. That’s because, when thinking about this question, most students are likely to generate examples of each class of items. As they mentally recite gerunds (“running,” “jumping,” “skipping,” “flying,” “working,” “eating”) they should find that it is much easier to generate those examples than it is examples of words that have “n” as the second-to-last letter (“friend,” “end,” “mend” . . . um . . . . ). The correct answer, of course, is that all words that end in “ing” also have “n” as the second-to-last letter. At best, the two sets would be equal: There are only gerunds in the novel and no other words that have a letter on either side of the “n” that’s not an “i” or “g.” However, assuming that there is even a single “send” printed in the chapter, the “n as the second-to-last letter” category will be larger. The shortcoming here is the availability heuristic: “ing” endings were more accessible in memory than “n” endings, and were therefore judged to be more likely.
Here is Item 3:

3. Two college roommates, Vito and Mario, are registering for courses for the spring semester. They leave their dorm room together, stop and eat breakfast together, chat with a mutual friend, and arrive at the registrar’s office at the same time. They both line up to enroll in their art history sections.

Vito is told the section he wanted was filled to capacity at the end of the previous day.

Mario is told the section he wanted was filled to capacity 10 minutes before he arrived.

Who is more upset, Vito or Mario? _________________

Students judge Mario to be more upset, because they rely on the simulation heuristic. They can generate dozens of ways that Mario could have made up a 10-minute difference (e.g., leaving earlier, not chatting so long, walking faster, not holding the door for another student) but are hard-pressed to simulate ways that Vito could have made up a whole day’s difference. Because some scenarios are easier to simulate than others, students judge them to be more likely. In actuality, both Vito and Mario are in exactly the same boat: Neither has the class they want, both have to rearrange their schedules, both have to start over, and it really doesn’t matter if one person missed “by a mile” and the other missed “by an inch.” This item can be personalized by adding elements related to your university, department, course listings, and so on.

Finally, a last item requires two different versions of the handout. One version, received by half of the students in the class, says this:

4. How many students are enrolled in St. Edward’s University’s New College? (circle one)

   a. fewer than 200

   b. more than 200

What is your exact guess? Write a number on this blank line: _______________

The other version, received by the other half of students, says this:

4. How many students are enrolled in St. Edward’s University’s New College? (circle one)

   a. fewer than 80

   b. more than 80

What is your exact guess? Write a number on this blank line: _______________

The New College program at St. Edward’s University offers flexible meeting times, online courses, and abbreviated semesters for working adult students seeking an
undergraduate degree. Most traditional-age undergraduates aren’t very familiar with the program; hence, this is a decision made under uncertainty. To reduce the uncertainty, students will focus on an available anchor point and adjust their decision from there. One handy anchor is either “200” or “80,” depending on the version of the handout. As research on the anchoring and adjustment heuristic shows, the adjustments made around an anchor point are usually insufficient, resulting in guesses that cluster closely around 200 or 80 as the case might be.

- You can easily modify this question by substituting some little-known program at your university; the honors program, for example, or enrollment in an obscure major, or the total number of faculty at your school, etc.

- Be sure to choose plausible anchors that are fairly distant from one another, and you should find results similar to those in Handout 9.2.

After completing the exercise, focus on discussing how heuristics work, why they are often fairly accurate, but how they can sometimes lead us astray. Heuristics often allow us to be “accurate enough” in sizing up the world, although they fall short of a criterion of 100% logical reasoning. When supplied with the more rational answers, your students should begin to understand both the heuristics themselves and how they functioned in each case.

Source:

**Classroom Exercise 9.5**

A Quick Demonstration of Representativeness

Here’s a very quick demonstration of the representativeness heuristic. In fact, it pays to act fast in this demonstration so that students rely on a mental shortcut to provide an answer, rather than thinking things through too thoroughly.

- Show the students in the front row of your classroom that you have a fair quarter (i.e., heads on one side, tails on the other).

- Then ask all of your students to judge which of the two outcomes that you’ll write on the blackboard seems most likely after 6 coin flips:

  H H H T T T H T H T T H

Summary: You shouldn’t be surprised to find that your students judge the second sequence to be more likely. The reason is because the sequence H T H T T H seems more representative of the random pattern that should result from six coin flips, rather than the “orderly” pattern shown in the first case. Of course the probability of the two sequences is the same; in fact, the probability of any particular sequence is 1/64. Relying on
representativeness as a basis for the decision led to an incorrect judgment in this case.

Source:


**Classroom Exercise 9.6**

The Availability Heuristic

When asked how common something is, or how often something happens, we generally start by trying to think of examples. Here are some more questions that you can ask your students in order to demonstrate this heuristic. (These questions work well with a CRS like iClicker.)

1. Do you consider yourself a better-than-average driver, an average driver, or a worse-than-average driver?

2. In the English language, are there more words that start with k, like kite, kitten, and kitchen, or are there more words that have a k as their third letter, like irk, ink, and ask? While the majority of students will say that more words start with the letter k, there are in fact, five times as many words that have k as the third letter.

3. Ask your students how many were told that they shouldn’t talk to strangers when they were little. Chances are this will be most if not all of your class. Next, ask them how many were told to make sure they always put on their seatbelts. This will likely be a smaller percentage. The reason, of course, is that parents worry more about their child being abducted by a stranger than about their child wearing their seatbelt because of the availability heuristic. There are only 200–300 nonfamily member abductions per year, but these occurrences get prominent coverage in the local and national press. Considerably less coverage is devoted to deaths from auto accidents and so parents are more worried about abduction. In truth, there is a 1/230,000 chance that a child will be abducted by a non-family member versus 1/14,000 chance of that child dying in an auto accident.

**Classroom Exercise 9.7**

Quick Demonstrations of Framing Effects

As the textbook notes, framing effects are one of the factors that contribute to rational human beings making judgments that are not always well reasoned. Here are a couple of quick questions that you can pose to your students to demonstrate the phenomenon.

1. You are at the market buying hamburger meat. Do you buy the package of ground beef that is labeled 80% lean or do you buy the package marked 20% fat?
2. Which will be more effective in preventing the virus that causes HIV and AIDS: a condom with a 95% success rate or a condom that has a 5% failure rate?

Multimedia Suggestions

**Feature Film: She's Gotta Have It (1986, 84 min, rated R)** Spike Lee’s first feature film is the story of Nola, a young woman faced with a choice: Suitor A, Suitor B, or Suitor C? All have strengths and weaknesses, but Nola decides that she doesn’t really want to decide. Despite a substantial amount of pleading—“Please baby, please baby, please baby please”—Nola’s judgments remain murky.

See the Preface for product information on the following items:

**Interactive Presentation Slides for Introductory Psychology** 9 Thinking

**PsychInvestigator** Decision Making

**VI. Problem Solving: Working It Out**

(Chapter Objectives 18–20)

Problem solving is a process in which new information is interpreted in terms of old knowledge. Problems may be ill defined or well defined, leading to more or less obvious solutions. The solutions that we generate often depend on the organization of our knowledge, as well as the characteristics of the problems. **Means–end analysis** and **analogical problem solving** offer pathways to effective solutions, although we often frame things in terms of what we already know and understand. Sometimes, as is the case of **functional fixedness**, that knowledge can restrict our problem-solving processes, making it difficult to find solutions that should be easy to find.

**Lecture Suggestion 9.8**

Know and Tell

Who doesn’t find the advice to “know thyself” to be a noble pursuit? Popular sayings such as “I know my own mind” or “I’m the best judge of what I do” echo this admirable quest. However, classic studies by Richard Nisbett and Timothy Wilson suggest that it may be difficult or even impossible to fulfill this command—people have very little access to their own higher-order cognitive processes; in short, introspection is a rather hollow process. Instead, most people rely on plausible, a priori causal theories about the link between certain stimuli and subsequent behavior. To the extent these theories can account for the behavior in question, people’s reports on their mental processes may indeed be accurate. However, actors do not explain their own behavior any more accurately than do observers.

Nisbett and Wilson were able to establish circumstances in which a known, highly salient cause for behavior (i.e., the word-associate task) was available to participants, yet demonstrate that participants would opt for more seemingly plausible, a priori reasons
for their behavior. They generated support for these conclusions by reviewing a number of studies (such as the Maier string problem) and performing several experiments. In one experiment participants learned a series of word pairs, such as “floor-table,” “tree-cloud,” and so on. Some of the participants learned the pairing “ocean-moon.” When all participants were later asked to name their favorite brand of detergent, those participants who had been primed by the meaningful “ocean-moon” associate responded, as expected, with “Tide.” Although nearly all the participants could recall nearly all the word pairs, virtually no participants offered the word cue as a reason for their response. Rather, participants offered plausible (though incorrect) reasons for their choices, such as “It’s the brand I always use,” “Tide’s the best-selling brand,” or “I like the box.”

As another example, Nisbett and Wilson asked mall shoppers to perform a product comparison. Nylon stockings were arranged in a row in front of passing shoppers, whose task was to choose the stocking of the best quality and describe the reasons for their choice. By almost 4 to 1, the rightmost stocking was chosen overwhelmingly by the participants. This position effect is well known to psychologists; for a variety of reasons, we often prefer to reserve judgment or “shop around,” thereby choosing the last object in a series. Apparently it is not well known to laypeople. None of the shoppers volunteered the position effect as a reason for their behavior, and when asked directly if it could have affected their choice, virtually all the shoppers gave the researchers a sneer, smirk, or snort. But perhaps they were correct. Maybe, through a fluke, the better-quality stockings did end up in the rightmost position a significant amount of the time. It is a possibility, but one negated by the fact that all of the stockings used were identical.

Wundt and his colleagues built experimental psychology on the process of introspection. A little less than 100 years later, Nisbett and Wilson demonstrated that introspection is not all it’s cracked up to be and their article remains somewhat controversial, having sparked considerable debate in the literature. It does appear, however, that when called upon to “know our own minds” we may be faced with the task of telling more than we can know.

Source:

**Classroom Exercise 9.8**

Gaining Insight

Insight feels like the sudden understanding of a problem, although it’s more likely due to incremental nonconscious processes. In any event, you can demonstrate the “aha” feeling that insight inspires by presenting students with the problems in **Handout 9.3**, which are taken from the popular game *MindTrap*. Students are likely to whoop with glee each time they experience the insight necessary to solve a particular problem.
Answers to handout:

1. The letters should be arranged as follows: one word.

2. A desert is, by definition, a region so arid that it supports little or no vegetation. This includes frozen deserts of the far north, where Abdullah made his crossing. Thus, he survived by eating ice and snow.

3. It is the shortest sentence in the English language that includes every letter of the alphabet.

4. The “pack on her back” was a pack of wild wolves.

5. The two of you must stand back to back.

6. There aren’t any penguins in the Arctic (they are native to the southern hemisphere).

More examples of these brain teasers can be found here: http://www.mindtrapgames.com/Framesets/HistoryFS.html

Classroom Exercise 9.9

Fun and Games

Chances are good that if you ask your students, by a show of hands, how many have ever played Sudoku, there’ll be a lot of them reaching for the sky. After all, who can resist the grip of a mathematical puzzle with so much marketing behind it?

There are plenty of mathematical and verbal games that people enjoy, such as Sudoku, Boggle (www.wordsplay.net/), or the Daily Jumble (www.jumble.com). Heck, even that old standby, the crossword puzzle, attracts a regular crowd of newspaper readers. Many people who work such puzzles on a regular basis have tips and tricks that they employ, but chances are most of them have never thought explicitly about what they do to “solve a problem.” After all, a Sudoku, Jumble, or crossword puzzle presents a problem in need of a solution, and in most cases there’s a single right answer.

Ask your students to reflect on the problem-solving strategies underlying popular games.

You can make this a brief written exercise if you’d like (i.e., a one-page paper with a few key points), or an in-class activity.

There are plenty of sources (both print and electronic) of many popular games.

Discussion:

Consider sharing sources of popular games with your students, and encourage them to think critically about the process behind the problem as they work in pairs or small groups. For example, does means–ends analysis capture the problem-solving process of a
Sudoku puzzle? How about simple trial-and-error? (For some of your students, this may be the answer to every problem!) What role does insight play in solving a crossword puzzle? Can analogical problem solving be applied to any of these popular games? How do different puzzles call for different strategies? Are there any common elements at work?

Your students should come to recognize that what they thought was an idiosyncratic approach to entertaining themselves with the newspaper over a bowl of cereal actually has a basis in cognitive psychology. Problem solving—whether it is the construction of a skyscraper in a crowded city block or the generation of a solution to a play on words—follows rules for successful completion.

Sources:

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Classroom Exercise 9.10

What If You Asked a Question and No One Answered?

A fun way to strengthen creativity is to play the “what-if” game. The goal is to generate many possible outcomes to a situation by loosening one’s grip on realistic thinking and embracing unbridled speculation.

- Your students can form pairs or small groups to play.

- To begin, one person says, “What if . . .” and then lets her or his imagination fill in the rest. For example, if one person says, “What if you had eyes in the back of your head?” others could respond by naming potential effects that this anatomical change would have: hats would have to be redesigned; one pair of eyes could rest while the other worked; you wouldn’t need rearview mirrors in cars; you could tell if the person behind you was enjoying the movie; teachers could keep an eye on their students while writing on the board, and so on.
You and your students should have no problem generating what-if propositions. Some interesting starting points include: Can blind people see their dreams? Why doesn’t Tarzan have a beard? Where does the white part go when snow melts? Can you cry under water? Why does an alarm clock “go off” when it starts ringing? Would a fly without wings be called a walk? Get wild in finding ways to demonstrate creativity!

Sources:


Classroom Exercise 9.11

Examining Creativity and Insight

The textbook gives examples of Bower’s research on insightful solutions. Handout 9.4 lists a series of examples containing items similar to those found on Mednick & Mednick’s (1967) Remote Associates Test which Bowers et al. (1990) used in their research.

Answers: Ball, Bottle, Star, Paper, Hot, Beer, Horn, Table, Bar, Man, Pine, Card, Board, Short, Cold

Sources:


Multimedia Suggestions

Feature Film: House of Games (1987, 102 min, rated R) David Mamet’s directorial debut is a taut psychological suspense film. Lindsay Crouse plays a psychiatrist who agrees to help Mike (played by Joe Mantegna), a patient who is in trouble with gamblers. The twists and turns of the plot keep the audience thinking—testing this hypothesis, then that; weighing this evidence and judging that likelihood—in fine problem-solving fashion.

See the Preface for product information on the following items:

Interactive Presentation Slides for Introductory Psychology: 9 Thinking

PsychSim 5 Tutorials My Head Is Spinning

Worth Video Series

Video Anthology for Introductory Psychology: Thinking and Language – Learning
Through Visualization: A Gymnast Acquires New Skills

Video Anthology for Introductory Psychology: Thinking and Language – Problem Solving in Genus *Corvus* (Crows, Ravens, and Magpies)

V. Transforming Information: How We Reach Conclusions

(Chapter Objective 21)

The success of human reasoning depends on the content of the argument or scenario under consideration. People tend to excel at **practical reasoning** while stumbling when **theoretical reasoning** requires evaluation of the truth of a set of arguments. **Belief bias** describes a mindbug that distorts judgments about conclusions of arguments, causing people to focus on the believability of the conclusions rather than on the logical connections between the premises. Some of the same strategies that helped us to understand perception, memory, and learning are equally helpful in understanding thought and language.

Lecture Suggestion 9.9

Information Comes Easy, Experience Comes Hard

Here’s an observation. “SPSS” used to mean something. When it was first introduced in 1968 it stood for Statistical Package for the Social Sciences, and it was just that; a very useful but fairly esoteric tool used by researchers in the social sciences to perform statistical analyses. Currently, “SPSS” is just SPSS, in much the way KFC doesn’t stand for Kentucky Fried Chicken anymore; it’s just a set of letters. What’s more, spss.com lists the benefits of its software in the following order: Business intelligence, data mining, predictive analytics, and finally statistics, at least in the Top 4.

This observation parallels a corporate phenomenon: Data mining is big business. Data mining purports to be a marriage of the art and science of extracting relevant information from huge datasets. Data from supermarket price scanners are routinely inspected to enable advertisers to target specific shoppers with specific buying habits. Businesses routinely examine patterns of buying and selling to strategically position themselves in a competitive marketplace. Many federal agencies report relying on data mining to identify suspected terrorists, thwart nefarious plans, or otherwise keep America safe for its citizens. This is more than just eyeballing a spreadsheet. Modern data mining uses sophisticated algorithms and complex programming to discover patterns, trends, and phases that might escape traditional methods of data analysis.

But is the massive crunching of massive amounts of data the best way to make decisions? Ian Ayres, a law professor and econometrician at Yale University, argues that combing, mining, dredging, or otherwise sifting through data is leaving traditional decision-making skills, such as intuition, expertise, and experience-based reasoning, in the dust. We formerly admired the captain of industry who could somehow sense the way the economic wind was blowing and swoop in with a decisive acquisition or timely merger based on little more than hunch and know-how. These days, an army of data
wonks is more likely to predict the hour and day when an important business decision ought to be made.

This is not necessarily a bad thing. Data-based decisions are often preferable to those based on intuition; just ask your colleagues how they feel about the way many political decisions tend to be made. In fact, online businesses such as Amazon or Netflix rely heavily on their ability to tell their customers what they like before they know they like it (“if you bought this, you might also like . . . .”). Bank officers rarely do more than inspect the results of a financial analysis to determine a person’s suitability for a loan; “sizing a person up” and “taking a chance” on a business proposition seem like quaint notions. Baseball managers and football coaches are likely to look at the numbers at least as much as a prospect’s “heart,” and physicians are likely to look at a patient’s heart only after a diagnostic rubric tells them to.

As discretionary judgment fades into the background, a technocracy of sorts is taking its place. The folks who collect and control the gigantic databases needed to make numbers-based decisions increasingly have an edge—in politics, economics, business, finance, and other areas of daily life. The quality of the decisions based on data are only as good as the data themselves. But lately the data are looking pretty good.

Sources:


Lecture Suggestion 9.10

Don’t Believe Everything You Read . . . Except This

Forming and clinging to misbegotten beliefs such as flat Earths, cheese moons, or a person’s own invulnerability may be a consequence of some fundamental cognitive processes, such as how information gets encoded in memory or what happens to a disrupted attentional system.

Daniel Gilbert, well known for his current research on affective forecasting, or people’s ability to anticipate the extent and duration of their emotional states, has explored for many years now the problem of “believing what isn’t so,” invoking the thinking of René Descartes and Baruch Spinoza, both of whom wrote quite a bit about how information is perceived and stored in a mental system.

Here is a little background:

Descartes argued that information is first comprehended, and then in a subsequent step, a truth value is assigned to it: We decide to accept or reject the information as being true. This would suggest, of course, that we can easily entertain ideas (indefinitely, perhaps . . . putting them up in a mental guest room, so to speak) without
necessarily putting stock in them. If comprehension (understanding) of information and endorsement (acceptance or rejection) are two distinct steps, humans should be able to hold an idea without believing it. Spinoza adopted a different position on the nature of belief, arguing that comprehension and acceptance of information are accomplished in a single initial step, only later to be followed by certification or rejection of the information. This view holds that the very act of receiving information entails assigning a belief to it [“this information is true” (or false, as the case might be)], which only later can be substantiated or “unbelieved,” as might be called for. Quite unlike Descartes, then, Spinoza argued that ideas could not be entertained, “beliefless,” in a cognitive system, but rather are believed upon first being received into the cognitive system.

Notice that both of these competing predictions, if allowed to run their course, would lead to the same outcome: The acceptance or rejection of information as being true. The difference lies in when the belief is assigned, either in a Spinozan first step or in a Cartesian second step. Gilbert reasoned, then, that disrupting a belief system in action would be the only way to tell which system (Spinozan or Cartesian) was at work. (1) If Descartes was correct, disrupting the system between steps should have no effect on cognition: We would be left holding a collection of ideas that had not yet been assigned truth values. (2) If Spinoza was correct, however, disruption should produce a very pronounced tendency: We should be left believing information to be true (since it was automatically tagged with a truth valued upon entering the cognitive system) when in some cases it is not.

Gilbert and his colleagues tested these ideas by asking research participants in one of several experiments to learn some (fictitious) Hopi language terms. Participants saw a Hopi/English word-pairing flash on a computer screen (such as “A monishna is a star,” “A rirg is a valley,” or “A neseti is a bee”), which was followed by a brief pause, and then followed by one of three outcomes: The word “True” (signaling that the preceding pairing was accurate), the word “False” (indicating that the preceding pairing was incorrect), or a blank screen. Note that Descartes and Spinoza are still neck-and-neck at this point. Either account of belief would argue that participants could take in the information (untouched, as Descartes would have it, or believed as true, as Spinoza would have it) and then correct it based on the true/false cue later given (which would mean assigning a belief in the Cartesian system, or revising/substantiating an existing belief in the Spinozan system). However, the researchers asked participants to do one additional task. On some trials participants were asked to press a button if they heard a particular tone. This additional task served to tax their available cognitive resources, making it more difficult to perform the correction step of integrating the true/false cues with the prior information. These participants, however, provided an answer to the riddle of belief. When later polled they showed a particular pattern of errors; namely, they were left believing propositions that should have been revised (i.e., those tagged as “False”) as being true. Given the controls of the experiment, the only way to account for this outcome is that the information must have been encoded as true upon first being read (just as Spinoza argued). Because these resource-depleted participants were disrupted from performing Spinoza’s second task (certifying or, in these cases, rejecting the previously-believed information), they were left believing what they ought not to.
Summary:

The implications of this research are startling. For example, as Daniel Wegner and his colleagues have shown, it may help explain the workings of innuendo. When presented with information that may or may not be correct, our Spinozan belief system compels us to endorse that information upon comprehension. If our cognitive resources are later disrupted we may be unable to correct our initial comprehension. Similarly, this research may help explain why belief perseverance takes place. If the stage of correcting initial information is subject to disruption, we may be left clinging to beliefs even in the face of clearly disconfirming evidence. Finally, these results fly in the face of what your mother always told you. Far from “not believing everything you read,” it seems that we can’t escape that fate.

Sources:


**Classroom Exercise 9.12**

Silly Syllogisms

Syllogistic reasoning has an air of pomp and formality to it. This is probably justifiable, given that it’s a foundation of basic logical thinking. You can add a lighthearted touch to syllogisms, however, by sharing with your students a Web site that generates silly syllogisms. Through a random process, syllogisms such as “All brunettes are bugs, some birds are brunettes, therefore . . .” are created. Sometimes the results are weird, sometimes they’re sensible; but they’re usually entertaining. More important, they all help illustrate syllogistic reasoning and provide practice in this form of argumentation.

**Multimedia Suggestions**

See the Preface for product information on the following items:
**Interactive Presentation Slides for Introductory Psychology:** 9 Thinking

**Other Film Sources**

*The Ape: So Human!* (1998, 41 min, FHS). Allen and Beatrix Gardner, Sue Savage-Rumbaugh, and other primatologists discuss the similarities and differences between apes and humans, with a focus on language and cognition.

*Birth and Death: The Life Cycle of Language* (2007, 48 min, FHS). Languages come, languages go. Experts from Noam Chomsky to field researchers to proponents of Esperanto discuss why this is and what to do about it. Part of the *Speaking in Tongues: The History of Language* series.

*Building On What We Know: Cognitive Processing* (2003, 30 min, IM). Thinking and reasoning can be influenced by many things: prior experience, expectations, and context are just a few examples. This video looks at the effects of such influences on cognitive processing.

*Cognition and Language* (2001, 30 min, IM). Bread and butter. Toast and jam. Peanut butter and chocolate. Cognition and language. Some things are good by themselves, but better when paired with a partner. This video explores some of the nonedible pairings mentioned here.


*Correcting Your Thinking Errors: Using Rational Thinking for Emotional Stability* (2005, 30 min, IM). The hot passions of the soul can inflame the most reasonable arguments into invective and shrill *ad hominen* attacks. Let’s try to avoid all that, please. This video will help.

*Emotion vs. Logic* (2002, 26 min, IM). Emotion and logic are often pitted against one another as mutually exclusive ways of arguing a point. Maybe, maybe not. In the context of constructing arguments for moral reasoning, this video explores this and other issues.

*The First Signs of Washoe* (1974, 58 min, WGBH). Washoe, Lana, and their chimpanzee friends have cameos in this exploration of attempts to teach communication skills to primates.

*Human Speech: Articulation* (2003, 30 min, IM). Even the simplest of utterances—"duh," for example—enlists a complex interplay of mouth, teeth, tongue, and throat. The mechanics of speech are the focus here.

*The Joy of Logic* (2005, 60 min, IM). Sex, cooking, tech, painting . . . there’s been a lot to be joyful about over the years. Logic joins the rest of that pack, as this video demonstrates.
Language and Consciousness (2006, 60 min, IM). The links between language, consciousness, and cognition are examined. There’s a fairly tight weave among those processes, as this video explores.

Let There Be Words: The Origin of Human Language (2007, 48 min, FHS). Where did language come from? Did it evolve? Is our capacity for language innate? For some, these are questions of minor importance; for others, the answers may reveal much more about what it means to be human. Part of the Speaking in Tongues: The History of Language series.

Logic: The Structure of Reason (2004, 43 min, FHS). This video is heavy on philosophy, but nonetheless offers a solid introduction to basic forms of reasoning.

Mother Tongues: Languages Around the World (2007, 48 min, FHS). Twenty-five percent of languages worldwide are spoken by .1% of the population. How? Why? Which? This video, part of the Speaking in Tongues: The History of Language series, examines these questions.

Nature: Parrots: Look Who’s Talking (1995, 60 min, PBS). The talking ability of parrots, some of whom appear to have contextually appropriate, human-like speech, is highlighted in this video. Alex, the African Grey parrot who recently died, has a cameo.

Phonemes and Phonics (2002, 28 min, IM). This introduction to phonemes looks at their primary role in speech, language, and communication.

Signs of the Apes, Songs of the Whales (1983, 57 min, WGBH). Washoe is revisited 10 years after his first starring role (see The First Signs of Washoe). An older, wiser chimp, he shares the spotlight with dolphins, gorillas, and sea lions.

Talking (1999, 55 min, FHS). Babies babble, and they dabble, in thinking, rhyme, and reason. This portrayal, rarely stale, will surely be a-pleasin’. Part of the Aspects of Child Development series.

Think Like an Animal: Cognition Studies (1996, 51 min, FHS). There’s insight to be gained by thinking as animals think. Researchers from the Ohio State University Primate Cognition Project show us how.

Thinking About Thinking: Metacognition (2003, 30 min, IM). There are benefits to be had from thinking about what you’re doing as you’re doing it. Thinking about thinking can help in educational achievement.

Thinking and Language (2006, 30 min, IM). Daniel Kahneman, Nobel laureate and noted decision scientist, talks about his work in cognitive psychology. Noam Chomsky, linguist and political pundit, talks about language and communication. Susan Curtiss, noted for her work with Genie, talks about the importance of the environment in cognitive development.
Using Logic and Reasoning (1999, 24 min, IM). Deduction, induction, and analogical reasoning all appear in this how-to video—a little training in how to evaluate information.

Washoe: Monkeys and Sign Language (1996, 52 min, FHS). The celebrated chimp is featured in this look at communication abilities among primates.

Due to loss of formatting, Handouts are only available in PDF format.