Unit VII

Cognition

Overview

Unit VII brings the topics of memory, thought, and language together under the umbrella of cognition. The first half of the unit discusses how memories are encoded, stored and retrieved, as well as theories of retrieval failure and forgetting. Elizabeth Loftus' work on the reliability of eyewitness testimony is presented in the section on memory construction, and tips to improve memory are provided. The unit continues with an overview of how thoughts are derived, how we process and make sense of concepts in our world, and how creativity results from myriad cognitive processes. The aids and detriments to problem solving are reviewed followed by a presentation of the mechanisms of decision making. Finally, the unit closes with a review of language formation and the relationship between language and thought.

Modules

31 Studying and Building Memories

32 Memory Storage and Retrieval

33 Forgetting, Memory Construction, and Memory Improvement

34 Thinking, Concepts, and Creativity

35 Solving Problems and Making Decisions

36 Thinking and Language

Tip #7
Form Study Groups

It is often said that we learn best by teaching others. And nowhere is that truer than in studying for your psychology exams! If you are looking to improve your understanding and retrieval of key psychological knowledge, form a small study group of like-minded students. Include a variety of people because sometimes a classmate may really understand a concept you struggle with and sometimes you are the one who can readily explain a tough concept. Arrange a place to meet and practice quizzing each other on the material. Remember to include applications of the terms and theories, not just definitions. Use the extremely helpful and practical suggestions from Modules 31 and 33 to help you remember key concepts. One group member can make a study outline, one can lead the review, one can develop quiz questions and roles can rotate at the next study session. And of course, don't forget the pizza!

Module 31

Studying and Building Memories

Before You Read

Module Summary

Module 31 offers a definition of memory and explains how psychologists describe the human memory system. The module distinguishes between explicit and implicit memories and explains how sensory, short-term, and working memory function. A section on the difference between effortful processing and automatic processing is presented and a description of the levels of processing and their effect on encoding closes the module.

Before beginning the module, take a moment to read each of the following terms and names you will encounter. You may wish to make vocabulary cards for each.

Key Terms

memory
encoding
storage
retrieval
parallel processing
sensory memory
short-term memory
long-term memory
working memory
explicit memory
effortful processing

automatic processing
implicit memory
iconic memory
echoic memory
chunking
mnemonics
spacing effect
testing effect
shallow processing
deep processing

Key Names

Richard Atkinson
Richard Shiffrin
George A. Miller

While You Read

Answer the following questions/prompts.

31-1

1. Compare the definition of memory to the definition of learning (from Unit VI).

2. How has research on memory's extremes helped us understand how memory works?

31-2

1. The analogy of a computer system is often used to illustrate the different parts of memory. The keyboard is where we *encode* new information, the CPU (or main hard drive) is where we *store* information, and the monitor is where we *retrieve* information.
   encoding: keyboard
   storage: CPU
   retrieval: monitor

   Now create your own analogy and explain why each part of the memory system corresponds with the analogy you have selected.

   encoding:

   storage:

   retrieval:

2. How could a file cabinet full of file folders fit the analogy above?
   encoding:

storage:

retrieval:

3. Define and give an example of parallel processing.

4. Define the Atkinson and Shiffrin model of memory and the information-processing model. Compare how Atkinson and Shiffrin's model of memory is similar to and dissimilar from the information-processing model. Which model do you most agree with and why?

5. Give an example of how you encoded, stored and retrieved a psychology term or concept from any previous unit.

6. Imagine you are trying to remember a math formula. Using Figure 31.2, show how each of the stages in the model would be applied to memorize the math formula.

7. Explain why "working memory" is a more useful term for the way we process memory.

8. Teachers are sometimes asked to put their classroom lecture notes online for students to view later. According to Sparrow et al., why might this result in decreased memory for the material?

31-3

1. Explain how explicit and implicit memories are produced and processed. Be sure to discuss how the two types of memory are different.

2. How do the terms *declarative* and *nondeclarative* apply to explicit and implicit memory? Provide your own example for each category.

31-4

1. In your own words, explain how we automatically process:
   Space:

   Time:

Frequency:

2. How can effortful processing become more automatic over time?

31-5

1. Define *sensory memory*.

2. Discuss how echoic and iconic memory operate in sensory memory. Provide examples of each in your own life.

31-6

1. Compare the capacity of short-term memory to that of working memory.

2. What have we learned about our ability to focus on more than one event at a time? Support your answer with an example from your own life.

31-7

1. List and give three examples of effortful processing strategies.

2. Explain how organizing new material into categories helps us recall it.

3. Explain why chunking and mnemonic devises are useful in aiding memory. Provide an example of how you have used each of these in your own experiences.

4. How does the spacing effect relate to distributed practice and recall?

5. Discuss why it is more advantageous to practice retrieval of information than to reread material.

6. Explain how you can put the principles of distributed practice, the spacing effect and the testing effect to use in studying for the test on this unit.

31-8

1. Explain, using examples and definitions, how shallow processing differs from deep processing.

2. How does *meaning* help aid retrieval or reduce the encoding time and effort?

3. Discuss how the self-reference effect aids recall.

After You Read

Module 31 Review

Complete the Matching Questions below to see if you have mastered the basics.

Terms

_____ 1. short-term memory
_____ 2. working memory
_____ 3. explicit memory
_____ 4. effortful processing
_____ 5. iconic memory
_____ 6. echoic memory
_____ 7. long-term memory
_____ 8. implicit memory
_____ 9. sensory memory
_____ 10. automatic processing

Definitions

A. activated memory that holds a few items briefly before the information is stored or forgotten

B. a momentary sensory memory of visual stimuli; a photographic or picture-image memory lasting no more than a few tenths of a second

C. the relatively permanent and limitless storehouse of the memory system

D. the immediate, very brief recording of sensory information in the memory system

E. a momentary sensory memory of auditory stimuli; if attention is elsewhere, sounds and words can still be recalled within 3 or 4 seconds

F. a newer understanding of short-term memory that focuses on conscious, active processing of incoming auditory and visual-spatial information, and of information retrieved from long-term memory

G. memory of facts and experiences that one can consciously know and "declare"

H. encoding that requires attention and conscious effort

I. retention independent of conscious recollection

J. unconscious encoding of incidental information such as time, space and frequency

11. Explain how chunking could be used to remember this long string of letters:

TSAFBICIAIRSNSADOJDOE

12. Devise a mnemonic device to remember the four lobes of the brain (learned in Unit II).

13. Janice, a classmate in your psychology class, wants to improve her memory for the material in the course. She has been staying up late, pulling all-night study sessions the night before tests, and getting up early to reread the chapter before quizzes. Use the concepts of the spacing effect, the testing effect, and deep processing to advise Janice of a better way to study.

14. Katrina is a talkative student in your class. The teacher is halfway through a detailed explanation of the causes of the Civil War when Katrina leans over to tell you about a joke she saw online. The teacher stops in the middle of her explanation and accuses Katrina of not listening. Katrina defensively retorts, "I was listening and I can prove it. You just said the most significant cause of the Civil War was the inequity in wealth between the slave-holding states and the non-slave-holding states." The teacher apologized because that was indeed what she had just said. Katrina smirked in victory, but as a psychology student, you understand that something else occurred. Explain why Katrina was able to repeat word-for-word what the teacher had been saying.

Module 32

Memory Storage and Retrieval

Before You Read

Module Summary

Module 32 describes the capacity of our long-term memories and the roles of various brain structures in memory processing. Also discussed are how emotions and changes at the synaptic level affect our memory processing. The module closes with a description of how external cues, internal emotions, and order of appearance influence memory retrieval.

Before beginning the module, take a moment to read each of the following terms and names you will encounter. You may wish to make vocabulary cards for each.

Key Terms

hippocampus
flashbulb memory
long-term potentiation (LTP)
recall
recognition

relearning
priming
mood-congruent memory
serial position effect

Key Names

Eric Kandel
Hermann Ebbinghaus

While You Read

Answer the following questions/prompts.

32-1

1. Discuss our current understanding of the limits of long-term memory.

2. How do we process and store memories?

32-2

1. Discuss the frontal lobe's role in processing particular types of memory.

2. Explain how the hippocampus functions in the encoding of explicit memories.

3. Describe the role that sleep plays in memory consolidation.

32-3

1. Apply your knowledge of classical conditioning to the situation in which a patient becomes afraid of a tack. Identify the unconditioned stimulus (US), unconditioned response (UR), neutral stimulus (NS), conditioned stimulus (CS) and the conditioned response (CR).

2. Discuss how the cerebellum plays a role in memory processing.

3. Explain the role of the basal ganglia in procedural memory.

4. Briefly explain infantile amnesia.

32-4

1. How does the amygdala play a role in memory processing?

2. Give an example from your own life of a flashbulb memory. Discuss the meaning of the term "flashbulb" in this context. Are flashbulb memories implicit or explicit? Explain.

3. Answer the Try This from page 332: Which do you think is more important—your experiences or your memories of them? Explain your thinking.

32-5

1. Summarize and discuss the importance of the work of Kandel and Schwartz with the sea slug *Aplysia* as it relates to memory processing.

2. Explain the meaning of and list the support for long-term potentiation as a physical basis for memory. Provide an example of how this process may be disrupted.

32-6

1. Discuss the difference between the three measures of retention. Give an example of each from your own life.

2. Use Figure 32.6 and information from the text to summarize and analyze the results of Ebbinghaus' work with memory.

32-7

1. Use Figure 32.7 and information from the text to provide a new example of priming.

2. In what ways can context aid memory recall?

3. Explain how state-dependent memory differs from context-dependent memory.

4. How does mood-congruent memory influence the retrieval and recall of other memories? How has this worked in your own experiences?

5. Use Figure 32.9 and information from the text to explain how the primacy and recency effects relate to the serial position phenomenon. Create a new example that illustrates your explanation.

After You Read

Module 32 Review

Answer the following questions to see if you have mastered the basics.

1. The brain structure shown to be essential in laying down new explicit memories of names, images and events is the
   a. amygdala.
   b. hippocampus.
   c. cerebellum.
   d. basal ganglia.
   e. hypothalamus.

2. The brain structure shown to be necessary in the development of implicit memories for skills, particularly classically conditioned reflexes, is the
   a. basal ganglia.
   b. hippocampus.
   c. amygdala.
   d. cerebellum.
   e. hypothalamus.

3. Implicit procedural memories for motor movement or skills like riding a bike seem to be a function of the
   a. amygdala.
   b. hippocampus.
   c. hypothalamus.
   d. frontal lobes.
   e. basal ganglia.

4. Which of the following is a typical example of a flashbulb memory?
   a. the scrambled eggs you had for breakfast this morning
   b. the daily homework assignment from your psychology teacher
   c. your first kiss
   d. the shirt you wore to school yesterday
   e. the chores your parent asked you to complete after school

5. Which of the following is NOT a measure of retention?
   a. recall
   b. recognition
   c. relearning
   d. retrieval
   e. long-term potentiation

6. Jim has just memorized the following list of words for his 3rd grade spelling test: host, most, coast, boast, ghost. When asked by a classmate, "What do you put in a toaster?" Jim replies "Toast!" "No, silly!" said his friend. "You put bread in a toaster!" What psychological process caused Jim to reply incorrectly?
   a. long-term potentiation
   b. priming
   c. serial position effect
   d. implicit memory
   e. recall

7. Leila is studying an alphabetical list of thirty African countries. She has a test tomorrow in her 4th grade history class and hopes to remember all thirty. According to the serial position effect, it is most likely that Leila will
   a. remember the countries at the beginning of the list, but not the end.
   b. recall the countries at the end of the list only.
   c. remember all thirty correctly.
   d. recall the countries at the beginning and end of the list, but not as many from the middle.
   e. remember the countries from the middle of the list, but not as many from the beginning or the end.

8. Danielle has just broken up with her long-time boyfriend and is feeling quite down. Her friends are trying to cheer her up, but are having a hard time. According to the research on memory, in her current emotional state, what memories is Danielle most likely to recall? Why?

9. John robbed three banks, stashed the money in a secret place in the woods, then jumped into the getaway car and raced off. Due to his erratic state, he got into a car accident and has suffered trauma to his brain. After leaving the hospital, John still remembered how to drive a car and find his way home. He did not have memory of the bank robbery or the hiding spot of the loot. Discuss which brain structures may have been damaged and which remained undamaged in John's accident and the reasons for your answer.

10. Jorge is preparing for a psychology test and tells you he really hopes the test is in essay format so he'll get a better grade. Based on your understanding of measures of retention, how would you respond to Jorge?

Module 33

Forgetting, Memory Construction, and Memory Improvement

Before You Read

Module Summary

Module 33 explains how we forget and how misinformation, imagination, and source amnesia distort our recollection and our ability to discern true memories from false. The module discusses Elizabeth Loftus' work on eyewitness testimony and discusses the controversies surrounding claims of repressed and recovered memories. The module concludes with tips on using memory research to improve your studies.

Before beginning the module, take a moment to read each of the following terms and names you will encounter. You may wish to make vocabulary cards for each.

Key Terms

anterograde amnesia

retrograde amnesia

proactive interference

retroactive interference

repression

misinformation effect

source amnesia

déjà vu

Key Names

Hermann Ebbinghaus

Elizabeth Loftus

While You Read

Answer the following questions/prompts.

33-1

1. Discuss how forgetting can actually be helpful and efficient.

2. Explain how anterograde amnesia differs from retrograde amnesia, and use personal examples to support your explanation.

3. Summarize the theories that address the reasons we forget:

   a. encoding failure:

   b. storage decay:

   c. retrieval failure:

   d. proactive interference:

   e. retroactive interference:

   f. motivated forgetting/repression:

4. Briefly summarize the work of Hermann Ebbinghaus on the retention and recall of nonsense syllables.

5. Using Figure 33.2 and information from the text, draw a basic cartoon illustrating Ebbinghaus' forgetting curve.

33-2

1. Summarize and discuss the importance of Elizabeth Loftus' work on the misinformation effect. How might the misinformation effect impact those testifying as eyewitnesses in crime? How might lawyers use the misinformation effect to their favor in a criminal case?

2. Provide an example of a time in your life when you have fallen victim to the misinformation effect.

3. Explain how source amnesia affects our formation of memory.

4. How does source amnesia help explain déjà vu?

5. What difficulties arise in trying to sort real memories from false memories? Why is it that false memories often seem to be so vivid and strong?

33-3

1. Summarize and discuss the implications of research on children's eyewitness descriptions.

2. In what circumstances have children been shown to be reliable eyewitnesses?

3. Discuss the controversy surrounding repressed or constructed memories of abuse.

4. How has the American Psychological Association (APA) helped to negotiate this controversy?

33-4

1. Show how the seven tips provided in the text can be applied to your study of psychology. Give specific examples, timeframes, and terminology that support your application.

a. rehearse repeatedly:

b. make the material meaningful:

c. activate retrieval cues:

d. use mnemonic devices:

e. minimize interference:

f. sleep more:

g. test your own knowledge:

After You Read

Module 33 Review

Answer the following questions to see if you have mastered the basics.

1. Rashad has recently been in a car accident and suffered damage to his brain, which has him hospitalized and involved in rehabilitative therapy. He can recall his childhood and other memories from his past, but is having difficulty learning the names of his nurses, doctors and aides and cannot recall from one day to the next what he did the day before. Most likely Rashad is suffering from
   a. the forgetting curve.
   b. anterograde amnesia.
   c. retrograde amnesia.
   d. storage decay.
   e. proactive interference.

2. Samantha cannot recall her childhood, her name, or most of the events that occurred prior to the trauma that caused her brain damage. She does, however, seem to be making good progress in her therapy and has learned the names of her doctors and nurses. Samantha's condition is likely
   a. retroactive interference.
   b. anterograde amnesia.
   c. misinformation effect.
   d. retrograde amnesia.
   e. motivated forgetting.

3. In Ebbinghaus' studies involving recall of nonsense syllables he found that
   a. memories stored in childhood are more easily retrieved.
   b. memory for new information fades fast and is completely lost.
   c. subjects still attempted to chunk the syllables into meaningful units.
   d. memory for new information fades fast then levels off over time.
   e. relearning was improved by working memory.

4. Troy just moved to a new school in the middle of his junior year. He is given a locker combination but keeps entering the combination from his old locker before he remembers his new combination. This occurrence is referred to as
   a. retroactive interference.
   b. encoding failure.
   c. anterograde amnesia.
   d. proactive interference.
   e. retrograde amnesia.

5. The sense that "I've been in this exact situation before" is referred to as
   a. reconstructive memory.
   b. déjà vu.
   c. source amnesia.
   d. proactive interference.
   e. mood-congruent memory.

6. Studies by Loftus and Palmer on the misinformation effect, in which people were quizzed about a film of an accident, indicate that
   a. when quizzed immediately, people can recall very little, due to the stress of witnessing an accident.
   b. when questioned as little as one day later, their memory was very inaccurate.
   c. most people had very accurate memories as long as 6 months later.
   d. people's recall may easily be affected by misleading information.
   e. people could recall the first and last events of the film, but not the middle.

7. Lindsey has a vivid memory of swimming with dolphins when she was a young girl, but her mother denies that this ever occurred. Her mother explained that Lindsey watched many movies about dolphins and visited them frequently at the aquarium as a toddler, but did not actually swim with them herself. The best explanation for Lindsey's constructed memory is
   a. retroactive interference.
   b. source amnesia.
   c. déja vu.
   d. proactive interference.
   e. retrieval failure.

8. When he was a young boy, Montel lied to people he respected. This caused him a great deal of distress but he felt he had no choice. Years later, when asked if he lied as a child, Montel reported being a pretty honest kid. A psychoanalytic psychologist would likely explain Montel's self-censoring of this painful and anxiety-provoking memory as
   a. source amnesia.
   b. proactive interference.
   c. anterograde amnesia.
   d. recall failure.
   e. repression.

9. Caitlin is learning French in college after spending her high school years studying Spanish. Initially, she has difficulty learning the new French words as the Spanish words keep getting in the way. However, over the course of the semester Caitlin becomes much more fluent in French and can no longer even recall the Spanish word for the same item. Which is the best explanation for Caitlin's experience in world languages?
   a. Initially, her recall of the Spanish terms was blocked through proactive interference and recall of the French words is blocked through retroactive interference.
   b. In the beginning, Caitlin was not encoding the terms effortfully and later in the semester she began encoding the terms automatically.
   c. Caitlin was impacted by the misinformation effect in the beginning of the semester but as that passed, she was able to learn the French words.
   d. Initially, Caitlin's recall of the French was blocked through proactive interference, and eventually, recall of the Spanish vocabulary is blocked through retroactive interference.
   e. Initially, Caitlin's recall of the French vocabulary was blocked by retroactive interference, but toward the end of the semester, the Spanish vocabulary was blocked by retroactive interference.

10. Bruck and Ceci's work on children's eyewitness descriptions and accuracy of recollection showed
   a. children's recollections can be easily skewed by suggestive interviewing techniques.
   b. older children tend to recall events more vividly than younger children.
   c. preschoolers are the least likely to produce false stories when asked.
   d. psychologist specializing in interviewing children have tools that help detect real from false memories.
   e. children were especially accurate when they talked about the incident with adults prior to the interview.

Module 34

Thinking, Concepts, and Creativity

Before You Read

Module Summary

Module 34 defines and reviews the functions of cognition and identifies the factors associated with creativity.

Before beginning the module, take a moment to read each of the following terms and name you will encounter. You may wish to make vocabulary cards for each.

Key Terms

cognition

concept

prototype

creativity

convergent thinking

divergent thinking

Key Name

Robert Sternberg

While You Read

Answer the following questions/prompts.

34-1

1. Discuss how concepts simplify cognition. Provide an example of a concept from the text and one of your own creation.

2. Explain how a prototype aids in the formation of concepts.

3. Discuss the problems that arise when an object, person, or event does not fit our prototype.

34-2

1. Explain how the processes of convergent and divergent thinking contribute to creativity.

2. Using Robert Sternberg's five components of creativity, consider whether you self-identify as creative. Support or refute each of the components with a specific example from your life.

3. How do intelligence and creativity co-mingle to impact one's success?

4. Briefly explain the components that make up creativity.

5. Explain, using the material in this module, how it may be possible to increase creativity.

After You Read

Module 34 Review

Complete the questions below to see if you have mastered the basics.

1. Place the words below in either the Concept or Prototype category of the chart. Then, add one concept and one prototype of your own. Two have been filled in for you.

couch	Red Delicious apple	robin	laugh
sing	Jay-Z	flower	4-door sedan

Concept	Prototype
laugh	Jay-Z

2. Devon is part of a consumer survey group and is being asked to think of as many ways as he can to improve gas mileage in a new line of vehicles. Devon's responses require _____ thinking.

3. In Geometry class, Chantal is asked for the answer to a problem on the board. Her response requires _____ thinking.

4. What are the five components of creativity, according to Robert Sternberg?

5. When forming a concept, people often develop a best example, or _____ , of a category.

Module 35

Solving Problems and Making Decisions

Before You Read

Module Summary

Module 35 describes the cognitive strategies that assist and hinder our problem-solving abilities. The module explains heruristics and algorithms as problem-solving strategies and discusses how overconfidence, belief perseverance, and framing influence our decisions and judgments. The module closes with a description of intuition and the ways in which smart thinkers utilize this ability.

Before beginning the module, take a moment to read each of the following terms and names you will encounter. You may wish to make vocabulary cards for each.

Key Terms

algorithm
heuristic
insight
confirmation bias
mental set
intuition

representative heuristic
availability heuristic
overconfidence
belief perseverance
framing

Key Names

Wolfgang Köhler
Amos Tversky
Daniel Kahneman

While You Read

Answer the following questions/prompts.

35-1

1. Discuss and give an example of how algorithms differ from heuristics as problem-solving strategies.

2. How have you personally used an algorithm and a heuristic as problem-solving strategies?

3. How does insight relate to problem solving?

4. Explain, using definitions and real-life examples, the ways in which confirmation bias and mental set can impede the ability to problem solve.

5. How might confirmation bias and mental set relate to one's political views?

35-2

1. Briefly summarize and give an example of the representativeness heuristic.

2. Use the data from Figure 35.4 to summarize and give an example of the availability heuristic.

3. How does the concept of overconfidence influence your decisions or judgments in both helpful and detrimental ways? Give an example of overconfidence impacting a decision in your life.

4. Define and give an example of belief perseverance. How is it different from confirmation bias? Provide your own example of belief perseverance.

5. Explain the power of framing in influencing our cognitions. Provide an example of how framing could be a powerful persuasion tool in negotiating with your parents for a later curfew.

35-3

1. How does intuition fit into the larger discussion of cognition? What does it mean that intuition is often implicit?

After You Read

Module 35 Review

Complete the questions below to see if you have mastered the basics.

Terms

_____ 1. algorithm

_____ 2. heuristic

_____ 3. insight

_____ 4. confirmation bias

_____ 5. mental set

_____ 6. representative heuristic

_____ 7. availability heuristic

_____ 8. overconfidence

_____ 9. belief perseverance

_____ 10. framing

Definitions

A. a tendency to search for information that supports our preconceptions and to ignore or distort contradictory evidence

B. a tendency to approach a problem in one particular way because the approach has been successful in the past.

C. the way an issue is posed; how an issue is phrased can significantly affect decisions and judgments

D. a sudden realization of a problem's solution

E. a simple thinking strategy that often allows us to make judgments and solve problems efficiently but may sometimes lead to the wrong conclusion

F. judging the likelihood of things in terms of how well they seem to represent, or match, particular prototypes

G. clinging to one's initial conceptions after the basis on which they were formed has been discredited

H. a methodical, logical rule or procedure that guarantees solving a particular problem

I. the tendency to be more confident than correct, to overestimate the accuracy of our beliefs and judgments

J. estimating the likelihood of events based on their availability in memory

11. Keisha is told that her new geometry instructor will be flexible, nurturing, and soft-spoken. When she arrives to class on the first day, Keisha is somewhat surprised to discover her instructor is a man. Most likely Keisha applied _____ in her vision of her new instructor.
    a. the representativeness heuristic
    b. belief perseverance
    c. confirmation bias
    d. mental set
    e. the framing effect

12. Barrett's parents are divorced and several of his friends' parents are divorced as well. In a class discussion about marriage and compatibility, Barrett shares his opinion that the divorce rate is on the rise and that most marriages will not remain intact over time. It is likely Barrett's opinion is influenced by
    a. overconfidence.
    b. a mental set.
    c. the representativeness heuristic.
    d. belief perseverance.
    e. the availability heuristic.

13. The tendency to minimize the arguments that contradict our opinions and accept information that supports them is known as
    a. framing.
    b. confirmation bias.
    c. mental set.
    d. representativeness heuristic.
    e. insight.

14. When Tim and Ali were dating, he learned that she liked to receive flowers after they had a fight. Years later, Tim dates another woman and after having a fight, he stops by the florist to order a bouquet of flowers. Tim is likely affected by which cognitive occurrence?
    a. confirmation bias
    b. mental set
    c. representativeness heuristic
    d. insight
    e. availability heuristic

15. Simran is running for class officer and has to present a compelling speech in front of the student body. She is adamant about the illiteracy problem in her 2000-student school and wants to drive home the statistics that demonstrate the pervasiveness of the problem. Having studied psychology last year, Simran adds the following points to her speech:
    "22% of our classmates failed the end-of-year reading exam last spring."
    "Schools like ours that have implemented literacy support programs have shown a 17% increase in student's reading ability"
    It is apparent from these inclusions, that Simran understands the power of
    a. confirmation bias.
    b. overconfidence.
    c. intuition.
    d. algorithms.
    e. framing.

Module 36

Thinking and Language

Module Summary

Module 36 concludes Unit VII by tying thought and cognition to language acquisition. The milestones and acquisition processes of language development are reviewed and the brain areas involved in language processing and speech are identified. The module concludes by describing the relationship between language and thinking and discussing the value of thinking in images.

Before beginning the module, take a moment to read each of the following terms and names you will encounter. You may wish to make vocabulary cards for each.

Key Terms		Key Names
language	two-word stage	Steven Pinker
phoneme	telegraphic speech	Noam Chomsky
morpheme	aphasia	Paul Broca
grammar	Broca's area	Carl Wernicke
babbling stage	Wernicke's area	Benjamin Lee Whorf
one-word stage	linguistic determinism	

While You Read

Answer the following questions/prompts.

36-1

1. Discuss the various forms of communication that could be considered language.

2. Explain how phonemes differ from morphemes.

3. Can you think of a phoneme that is also a morpheme?

4. Consider the word *incomprehensible*. List the phonemes and morphemes that make up this word.

5. Which sentence below is an example of poor syntax and which exhibits faulty semantics? Explain your answer.

   a. Sluggish calendars advise immediate butchers.

   b. Lunch disturbs eaten hastily digestion.

36-2

1. Explain how infants develop receptive language. How is this different from productive language?

2. List and describe the stages involved in productive language. In your description, include the characteristics and an example of what children can say in each respective stage.

36-3

1. Briefly address Noam Chomsky's view regarding how children acquire language.

2. What does current research reveal about the importance of the critical period in language development?

3. Based on the research presented in the text, what advice would you give a friend who is hoping to raise her new son to be multilingual?

4. How might the results differ for your friend's son above and her parents who have just immigrated and are trying to learn a new language?

36-4

1. Briefly explain aphasia.

2. Using examples, explain the roles of Broca's and Wernicke's areas on language and speech processing. How do the two effects differ?

3. Discuss how the brain divides its mental functions into subfunctions.

36-5

1. Explain Whorf's linguistic determinism and discuss why it may be too extreme of a hypothesis in explaining the relationship between language and thinking.

2. What evidence does the text provide that we may interpret the world differently because of our language?

3. In what situations might we tend to think in images? Discuss how thinking in images can be valuable and what the limitations might be.

After You Read

Module 36 Review

Circle the correct answers below to see if you have mastered the basics.

1. The concept of linguistic determinism is most closely associated with
   a. Steven Pinker.
   b. Carl Wernicke.
   c. Benjamin Whorf.
   d. Paul Broca.
   e. Noam Chomsky.

2. Consider the word *unbuttoned*. Which of the following is true of this word?
   a. It has 4 morphemes and 8 phonemes.
   b. It has 3 morphemes and 9 phonemes.
   c. It has one morpheme and 10 phonemes.
   d. It has 4 morphemes and 5 phonemes.
   e. It has 3 morphemes and 4 phonemes.

3. Carlos was born into a Spanish-speaking household and as an infant he made many babbling sounds that could be identified as Chinese or Swahili, in addition to those that sounded Spanish. Now, as an adult, Carlos cannot distinguish the sounds in any language but Spanish. The explanation for this occurrence is likely that
   a. he cannot retrieve the sounds due to retroactive interference.
   b. he wasn't exposed to any other languages but Spanish and lost his innate ability to hear and produce sounds and tones outside his native language.
   c. Carlos was exposed to too many other languages in school.
   d. he is missing a portion of his hippocampus, which is essential for memory of words.
   e. Chinese and Swahili words have too many morphemes and are hard to pronounce.

4. Two-year-old Claudia is finishing dinner in her high chair. She says, "Me, down" to her mother. Her mother understands that Claudia is finished and wants to be taken out of her chair and set down to play. Claudia is displaying
   a. telegraphic speech.
   b. receptive language.
   c. babbling.
   d. a morpheme.
   e. a phoneme.

5. Stephanie sustained left temporal lobe damage in an athletic injury and has just returned home from a long stay in the hospital. Her mother asks her to check on the dinner cooking in the oven and Stephanie responds, "The boy didn't jump as fast and the turtle should have known it". Stephanie's misunderstanding of her mother's request and her subsequent meaningless response is most likely caused by
   a. linguistic determinism.
   b. Broca's aphasia.
   c. a critical period for language.
   d. Wernicke's aphasia.
   e. universal grammar constraints.

✓ Check Yourself   Now that you have mastered the basics, work through the problems below to see if you can *synthesize*, *evaluate*, and *analyze* what you have learned.

> Carly is a social studies teacher at a new school and will be welcoming students into the classroom next week. She has just received her student roster for the course and finds the following students listed:
> Short-Term Memory Maria
> Hippocampus Damage Holly
> Retroactive Interference Inez
> Divergent Thinking Daniel
> Mental Set Monty
> Linguistic Determinism Diego

Using definitions and examples, discuss the specific obstacles and limitations each student will face in Carly's class.

Before You Move On

Use the checklist below to verify your understanding of the unit's main points.

☐ Do I understand the difference between different types of cognitive processes (for example, effortful versus automatic processing; deep versus shallow processing; focused versus divided attention)?

Can I describe the psychological and physiological systems of memory?
- ☐ short-term memory
- ☐ working memory
- ☐ long-term memory
- ☐ explicit memory
- ☐ implicit memory
- ☐ procedural memory
- ☐ semantic memory
- ☐ episodic memory

Can I describe the principles that support memory?
- ☐ encoding
- ☐ storage
- ☐ retrieval

☐ Do I understand how biopsychosocial factors facilitate language acquisition, development, and usage?

☐ Can I identify the aids and obstacles to problem solving?

☐ Can I list the characteristics of creative thought and thinkers?

Can I describe the research findings of:
- ☐ Noam Chomsky
- ☐ Benjamin Whorf
- ☐ Hermann Ebbinghaus
- ☐ Elizabeth Loftus
- ☐ George A. Miller
- ☐ Wolfgang Köhler