Test Bank
to accompany
Language in Mind: An Introduction to Psycholinguistics, Second Edition
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Chapter 3: Language and the Brain

Multiple Choice

1. A neurolinguist would most likely study
a. the physical organization of the cerebral cortex, including fissures, grooves and the vessels that transport blood and nutrients throughout this system.
b. how a lesion in Wernicke's area might affect language production.
c. the effects of dopamine on depression.
d. the effects of moving to a new school on children's self esteem.
Answer: b
Textbook Reference: Intro
Bloom's Level: 3. Applying

2. Which of the following sentences would you expect a patient with Broca's aphasia to have the most difficulty understanding?
a. The dog bit the man.
b. The sorbet that the lady is eating is sour.
c. The girl who the boy is pushing is big.
d. The mail carrier who the dog bit called the police.
Answer: c
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 5. Evaluating

3. The cerebral cortex is
a. smooth with little or no convolutions.
b. the outermost layer of neurons covering the brain.
c. only used 10% of the time.
d. only found in humans.
Answer: b
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 1. Remembering

4. Scientists in Phineas Gage's time
a. knew a great deal about how the brain is organized and which cerebral areas are responsible for which cognitive abilities.
b. were just beginning to decipher the relationship between the physical components of the brain and their relationship to human behavior.
c. used sophisticated methodologies and techniques to indentify how the physical brain relates to human behavior.
d. had little interest in understanding the relationship between neural components and behavior.

Answer: b
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 4. Analyzing

5. Studies such as those published by Nina Dronkers and her colleagues (2004) indicate that language functioning
a. is contained within specific, independent brain "organs."
b. is affected in similar ways regardless of where in the brain damage occurs.
c. is distributed across several different brain regions.
d. can be restored even in cases of severe brain injury.
Answer: c
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 1. Remembering

6. Voxel-based lesion-symptom mapping (VLSM) is most useful because it allows researchers to
a. precisely correlate diminished performance with damage to specific parts of the brain.
b. study the impact of brain lateralization.
c. identify and define Brodmann areas.
d. assess language comprehension in aphasic patients.
Answer: a
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 1. Remembering

7. Broca's aphasia is characterized by a patient's inability to
a. understand spoken language.
b. understand written text.
c. speak fluently.
d. understand the function of objects in their environment.
Answer: c
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 1. Remembering

8. Which would you expect to be especially difficult for a patient with Broca's aphasia?
a. Understanding a political candidate's speech
b. Delivering a speech without pauses or hesitations
c. Getting the gist of an audiobook
d. Following a movie that has a great deal of dialogue
Answer: b
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 2. Understanding

9. A person with Wernicke's aphasia will demonstrate
a. halting speech.
b. inability to produce speech.
c. nonsensical speech.
d. normal ability to comprehend speech.
Answer: c
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 2. Understanding

10. A physician asks four patients with aphasia to describe how to make a peanut butter sandwich. Which response most likely came from a patient with Wernicke's aphasia?
a. "Sure, no problem. Open the jar and, uh, uh, uh … peanut, oops, no, no knife …spread and, uh … bread … sprea-ding … jeeelly … wait …"
b. "I'd put a glob of peanut butter from the jar onto a knife, spread it onto one piece of bread, put some jelly on another slice of bread, spread that, and then put the two pieces of bread together."
c. "Me like peanuts. Me spread. Jelly on bread. Put together. Me eat."
d. "Obviously I'd think it's utzkin, though certainly I do want to go when it's vehubative. I would recommend placing a spoon in the bowl. I do wobble and frink."
Answer: d
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 2. Understanding

11. A surgeon conducting an autopsy on a patient who had suffered from Broca's aphasia would most likely find damage in the
a. corpus callosum.
b. right frontal lobe.
c. left occipital lobe.
d. left frontal lobe.
Answer: d
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 1. Remembering

12. Wilder Penfield's research on the localization of function in the brain demonstrated that when Broca's area is stimulated in a conscious person,
a. the effect is always the same; namely that the ability to understand language is disrupted.
b. the effect is always the same; namely that the ability to produce language is disrupted.
c. although the effect may be varied, depending on the individual being stimulated, it will likely be related to linguistic abilities.
d. although the effect may be varied, depending on the individual being stimulated, it will likely be related to non-linguistic abilities.
Answer: c
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 1. Remembering

13. You are examining a split-brain patient. After flashing a picture of a bird in the patient's left visual field, which response are you likely to get?
a. The patient says "bird" but is unable to chirp.
b. The patient says "bird" and points to a bird with the left hand.
c. The patient points to a bird with the right hand but is unable to say "bird."
d. The patient points to a bird with the left hand but is unable to say "bird."
Answer: d
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 4. Analyzing

14. A(n) _____ is evident if one patient exhibits a language impairment with normal mathematical abilities and another patient exhibits a mathematical impairment with normal language.
a. hemodynamic change

b. localization
c. double dissociation
d. action potential
Answer: c
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 1. Remembering

15. When designing an fMRI study, which would be the best strategy for isolating the neural activity associated with the vocal component of reading a word from other potential actions related to reading?
a. Compare fMRI scans of a subject silently reading a word and of reading the word aloud.
b. Compare fMRI scans of a subject looking at a picture that is related to a word and of reading the word aloud.
c. Compare a PET scan of a subject reading a word aloud to an fMRI scan of a subject reading the same word aloud.
d. Perform an fMRI scan of the participant as he is talking to a friend, noting the level of brain activity when he uses the target word.
Answer: a
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 5. Evaluating

16. In a 2004 fMRI study of word reading, Olaf Hauk and his colleagues demonstrated that language-specific brain regions
a. are the only regions responsible for interpreting and producing spoken language.
b. are not the only areas activated by certain categories of words related to physical acts, such as kicking, stepping, or walking.
c. are highly localized and respond primarily to written language.
d. rarely interact with regions responsible for action or movement.
Answer: b
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 1. Remembering

17. Wernicke believed that language processing was
a. highly compartmentalized in the brain, with specific modules communicating in pre-set patterns.
b. distributed throughout the brain in a highly coordinated network.
c. localized in one specific brain area.
d. strictly contained in the left hemisphere.
Answer: b
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 2. Understanding

18. While the dorsal stream is responsible for "_____" information, the ventral stream provides us with a path for knowledge about "_____" information.
a. where; how
b. how; what
c. who; what
d. what; how
Answer: b

Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 1. Remembering

19. During a visit to a coffee shop, a patient who has a lesion along the dorsal stream of information processing would have the most trouble
a. identifying liquid in a mug as coffee.
b. understanding the items on the menu.
c. reaching for his coffee without knocking it over.
d. remembering the name of the server.
Answer: c
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 3. Applying

20. Which of the following is an example of procedural memory?
a. Recalling the author of a favorite poem
b. Remembering the contents of a painting
c. Remembering how to ski
d. Recalling a zip code
Answer: c
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 2. Understanding

21. In terms of memory systems, declarative recall is to _____ as procedural recall is to _____.
a. remembering the date of your mother's birthday; flipping pancakes
b. flipping pancakes; remembering your zip code
c. remembering your zip code; remembering your phone number
d. riding a skateboard; flipping pancakes
Answer: a
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 3. Applying

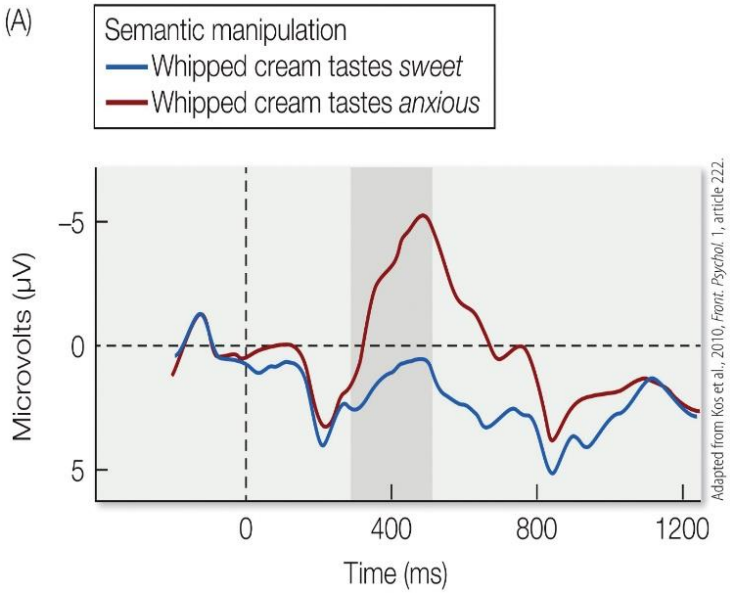
22. A deaf ASL signer suffering from Broca's aphasia would
a. have a difficult time mimicking and lip reading what a hearing person was trying to convey.
b. have a difficult time understanding what other signers are signing in ASL.
c. have difficulty interpreting pantomime signs produced by hearing individuals.
d. have a difficult time generating ASL signs they once knew well.
Answer: d
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 2. Understanding

23. A nineteenth century phrenologist would most likely be found
a. using psychoanalytic techniques to investigate a client's personality characteristics.
b. describing a client's psychological traits based on the physical attributes on a client's skull.
c. conducting neural surgery to help patients with physical brain trauma.
d. mapping brain regions using patients with brain trauma.
Answer: b
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 3. Applying

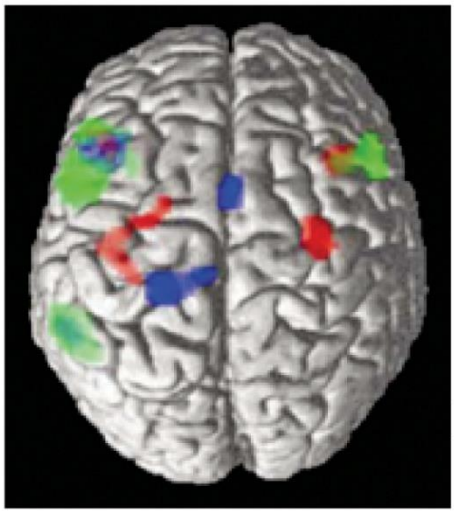
24. fMRI scans would find that English and Mandarin speakers
a. both process tone information in the right hemisphere.
b. both process tone information in the left hemispheres.
c. process tone information differentially, with Mandarin speakers showing activation in the language areas for tones and English speakers showing activation in non-linguistic, sound processing regions.
d. process tone information differentially, with English speakers showing activation in the language areas for tones and Mandarin speakers showing activation in non-linguistic, sound processing regions.
Answer: c
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 4. Analyzing

25. Information flows through a neuron from
a. synapse to cell body to dendrites to axon.
b. dendrites to cell body to axon to synapse.
c. cell body to dendrites to synapse to axon.
d. axon to cell body to synapse to dendrites.
Answer: b
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom's Level: 1. Remembering

26. Refer to figures A and B.



(B)



From Hauk et al., 2004, *Neuron* 41, 301.

Action words

Blue: Leg words
Red: Arm words
Green: Face words

What is the main benefit of using the technique represented in image B over the technique represented in image A?
a. fMRI scans can be conducted on live participants whereas ERPs are dangerous for live participant research.
b. ERPs provide a more precise position for activation of linguistic processing areas in the brain than do fMRI scans.
c. fMRI scans provide more precise representations of the latency of language activation than do ERP measures.
d. ERPs provide real-time information about the time course of language whereas fMRI data lag by a few seconds in demonstrating activity sequences.
Answer: d
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom's Level: 5. Evaluating

27. Imagine you are conducting an ERP study. You would expect to see an N400 waveform produced as a result of the italicized stimulus word in this sentence:
a. "I like to eat *toast."*
b. "Toast is what I like to *jump.*"
c. "I will *jumped* on the trampoline."
d. "Stephanie likes to eat ripe *umbrellas.*"
Answer: d
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom's Level: 3. Applying

28. Imagine you are conducting an ERP study. You would expect to see a P600 waveform as a result of the italicized stimulus word in this sentence:
a. "I will *jump* on the trampoline."

b. “Stephanie likes to eat *unripe* umbrellas.”
c. “Stephanie likes to eat ripe *umbrellas.*”
d. “I will *jumped* on the trampoline.”
Answer: d
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom’s Level: 3. Applying

29. You are a physician working with patients who have been diagnosed as being in a vegetative state. If you present these patients with various types of auditory stimuli, you would likely find that
a. none of the patients ever demonstrated any ERP activity due to their lack of consciousness.
b. some patients produce ERP activity in response to the auditory stimuli of their names.
c. some patients produce a variety of strong and distinct ERP activation when presented with action words.
d. it is impossible to determine if any of the patients retain any cognitive abilities.
Answer: b
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom’s Level: 2. Understanding

30. _____ is characterized by the inability to make sense of music while language comprehension remains unaffected.
a. Amusia
b. Insomnia
c. Aphasia
d. Arabia
Answer: a
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom’s Level: 1. Remembering

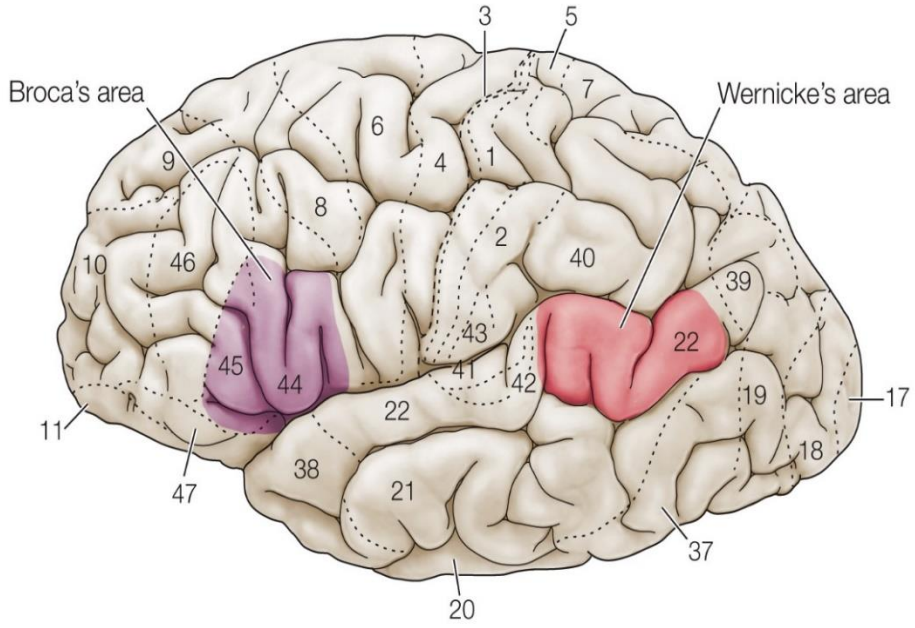
31. The symptoms exhibited by _____ and _____ illustrate a double dissociation.
a. split brain; amusia
b. Wernicke’s aphasia; auditory verbal agnosia
c. auditory verbal agnosia; amusia
d. amusia; Broca’s aphasia
Answer: c
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom’s Level: 3. Applying

Short Answer

1. Sanjay is a patient with distinct damage to Broca's area, but he doesn't seem to exhibit the constellation of language impairments that characterize Broca's aphasia. Judy is a patient with fairly widespread damage to the left hemisphere, not limited to Broca's area, and she has been diagnosed with Broca's aphasia but with only some of the traditional symptoms. Explain the implications of these findings.
Answer: It is difficult to localize multi-faceted syndromes to precise brain regions. A more promising approach to understanding the relationship between brain structure and function is to localize individual symptoms associated with a disorder using voxel-based lesion-symptom mapping (VLSM).
Textbook Reference: 3.1 Evidence from Damage to the Brain
Bloom's Level: 3. Applying

2. If MRIs were available in Phineas Gage's time, what kinds of conclusions could a researcher draw from the information available from an MRI scan his of brain after his accident? How might this information contribute to our study of the relationship between the brain and behavior?
Answer: An MRI would provide a detailed view of which areas of his brain were damaged or missing. By comparing his behavior and cognitive abilities with that of a normal individual, we would be able to describe the overall deficits suffered by Gage in comparison to someone without those specific brain injuries.
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 3. Applying

3. Refer to the figure.



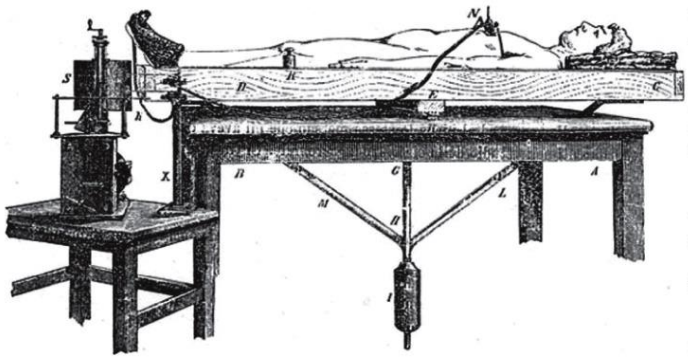
Identify Broca's and Wernicke's areas, and summarize the types of linguistic deficits that patients with lesions in each would typically experience. Provide an example of spoken language that would represent lesions in each of these two cortical regions.

Answer: Broca's area is in the left frontal lobe (Brodmann's area 44 and 45) and Wernicke's area is located in the left temporal lobe (Brodmann's area 22). While damage to Broca's area doesn't necessarily produce the full symptom-complex associated with Broca's aphasia, a lesion in this area can result in difficulty producing language including halted and broken speech. For example: *Soccer um…kick...uh...ball…stones...game...tomorrow.* A lesion in Wernicke's area would likely lead to the patient producing fluid speech which is largely meaningless. For example: *Mountain fillows also lant while lowering into the senacious bleem.*
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 3. Applying

4. If you were trying to identify the brain areas responsible for speech recognition, how useful would it be to compare fMRI scans of participants who heard spoken language with those who actively read aloud the same script from a monitor? Would a direct comparison of scans in these two conditions allow you to identify the areas responsible for speech recognition? Why or why not?
Answer: It would not be useful to compare MRI scans; a direct comparison of scans in these two conditions would not allow you to identify the areas responsible for speech recognition. In the tasks described above, although the specific linguistic content is the same across both tasks, there are far too many differences between these two conditions to draw any meaningful conclusions about what the activated brain regions might be responsible for. For example, brain activity in the reading aloud condition may reflect activity due to the processing of visual stimuli in general, the mapping of symbols to sounds, or activity related to speaking. Brain activity in the listening condition may reflect activity due to the processing of auditory stimuli in general rather than activity that is specific to the processing of speech. In reality, multiple carefully constructed experiments would be necessary to determine all the brain areas that are responsible for speech recognition.
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 5. Evaluating

5. Refer to the figure.

(A)



Reprinted from Sandrone et al., 2013, *Brain* 137, 621, modified and adapted from Mosso, 1884, Atti della Reale Accademia dei Lincei.

(B)

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How do each of the machines, depicted in A and B, attempt to provide evidence for mental activity? What theoretical assumption is shared by both machines? Compare the data each produces and argue which is more useful and why.
Answer: Both machines were designed to measure blood flow in the brain under the assumption that greater blood flow reflects more intense cognitive activity. Mosso's "machine to weigh the soul," depicted in panel A, attempted to determine whether certain mental tasks required enough cognitive activity—and hence, enough blood flow to the brain—to cause the platform on which the participant lay to tip in the direction of the participant's head. The fMRI, shown in panel B, uses hemodynamic changes and direction of blood flow to demonstrate higher and lower levels of activity in the brain as the participant is performing various cognitive tasks. Whereas the machine to weigh the soul can only see whether blood has flowed to any location in the upper half of the body, fMRI can measure blood flow in very precise locations within the brain.
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 5. Evaluating

6. Briefly summarize the outcome and conclusions of Hauk and colleagues' 2004 fMRI study investigating where and how action words are processed in the brain. What does this reveal about localization?
Answer: Participants in this study, when shown words related to activities occurring near particular body regions, showed brain activation in areas related to the physical control of those areas. For example, seeing the words *kick*, *step*, or *walk* produced increased blood flow to regions of the brain related to motor control of the feet or legs, in addition to language areas. Hauk et al. (2004) found that language is distributed not only across linguistically specific

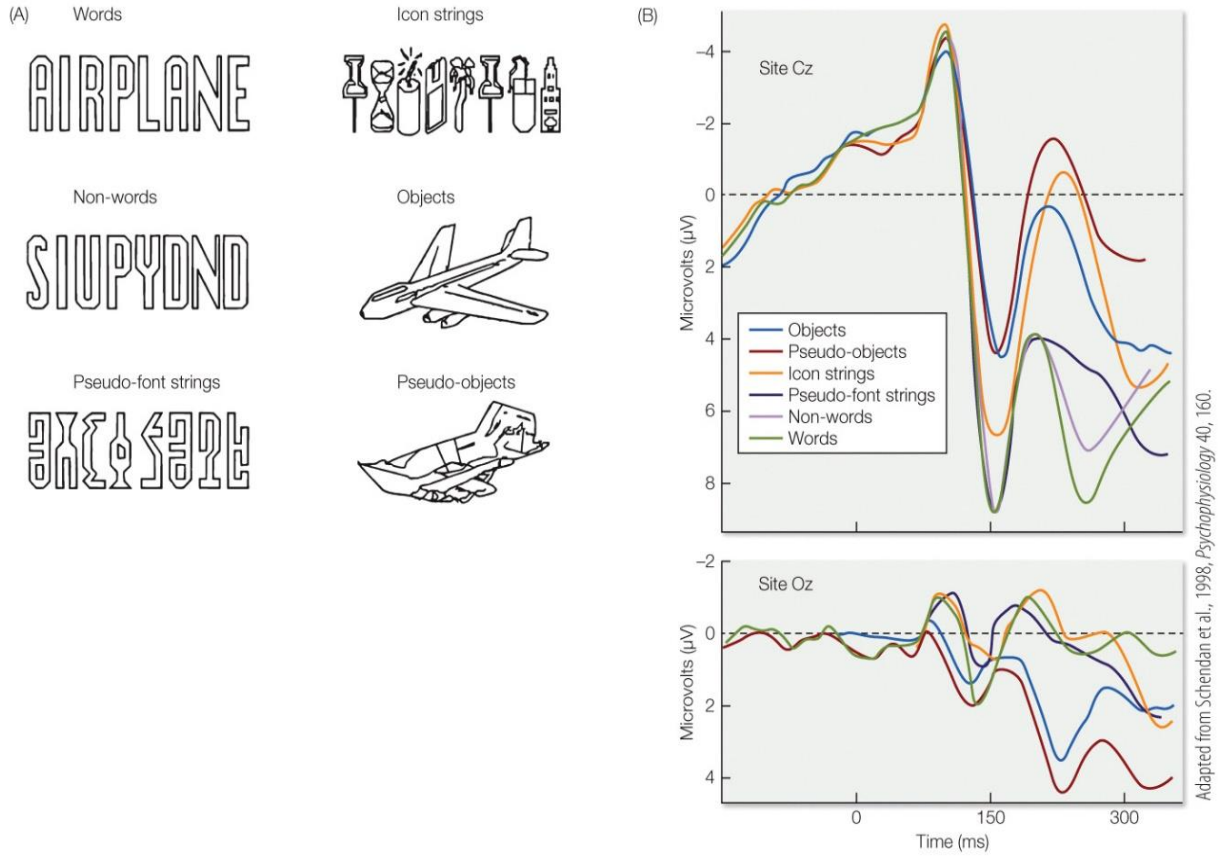
regions of the brain, but also non-linguistic areas, indicating that some tasks related to language processing reside in brain areas not previously connected to language tasks.
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 2. Understanding

7. Imagine that you are a psycholinguist working with a deaf ASL signer who is having trouble remembering and producing ASL signs that they once knew well but is able to carry out actions such as pouring coffee. Would you expect that any brain damage that you found would be in language-specific brain areas such as Broca's or motor-specific areas such as the primary motor cortex?
Answer: Imaging research shows that ASL signers use the same language-specific brain areas that hearing individuals use and when experiencing trauma-related signing difficulties, signers often exhibit lesions or damage in language-specific brain regions such as Broca's and Wernicke's areas. The patient above is more likely to have damage in a language-specific brain region than a motor region.
Textbook Reference: 3.2 Mapping the Healthy Human Brain
Bloom's Level: 3. Applying

8. Which ERP component, the N400 or the P600, you would expect to find in a waveform generated by a participant's brain exposed to the following sentence: *Priscilla give the toast to her sister*? Why?
Answer: The P600 would be observed in this example. The P600 is observed when the sentence contains a grammatical anomaly, in this case, *give* rather than *gave*. The N400 is created when a nonsensical or unexpected word is found in the sentence.
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom's Level: 2. Understanding

9. Discuss the benefits and limitations of fMRI scans and ERP measures on the representation of the time-course of language production.
Answer: An fMRI produces a visual representation of the areas of the brain that are active during a behavior related to language production, but does not provide a real-time view of the activities occurring in the brain as stimuli are being processed. Because blood flow takes time, the relevant responses are observed several seconds after a stimulus evokes the original brain activity. An ERP wave is created as a result of specific activity in the brain. Because it can be measured immediately, it can help scientists track the relationship between a stimulus and our response to that stimulus in real-time. On the other hand, fMRI scans show much more precise detail than ERP measures regarding the spatial location of active brain regions.
Textbook Reference: 3.3 The Brain in Real-Time Action
Bloom's Level: 2. Understanding

10. Refer to the figure.



What does the figure suggest about how the brain distinguishes between words and icons or objects?

Answer: Although we are not able to say that words are distinguished from non-words prior to 350 ms after stimulus onset based on the ERP data, we can say that visual stimuli begin to be differentiated fairly early on after initially viewing a stimulus. For instance, the separation of the orange and blue lines from all the others at 150 ms shows that we distinguish object-like stimuli from word-like stimuli very quickly. As more time passes, we observe additional distinctions in brain activity for the different types of stimuli.

Textbook Reference: 3.3 The Brain in Real-Time Action

Bloom's Level: 4. Analyzing