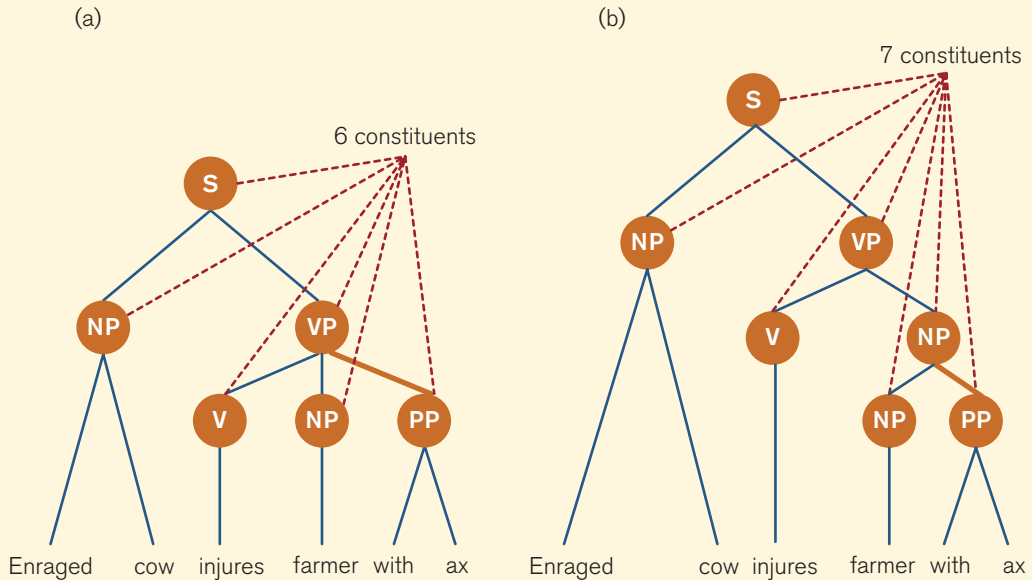
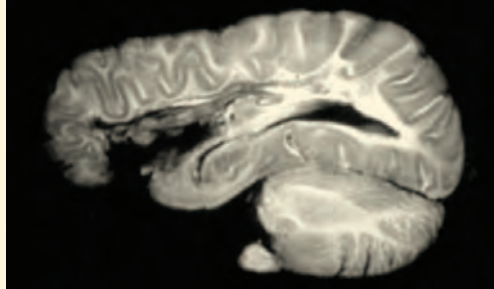


Figure 9.1 Different Syntactic Structures of a Newspaper Headline



Two sentences with identical surface structures can have two different interpretations depending on the underlying abstract syntactic structure. In (a) there are six constituent nodes, and the prepositional phrase (PP) modifies the verb phrase (VP), resulting in an interpretation of “the cow injures with the ax.” In (b) there are seven constituent nodes, and the prepositional phrase is attached to the noun phrase (NP), modifying *farmer* and resulting in an interpretation of “the farmer with the ax.”

Figure 9.2 Tan's (real name Louis Leborgne) Brain (*left*) and MRI of Tan's Brain (*right*)



SOURCE: Figure 2 and Figure 3, Dronkers, N., Plaisant, O., Iba-Zizen, M., & Cabanis, E. (n.d.). Paul Broca's Historic Cases: High Resolution MR Imaging of the Brains of Leborgne and Lelong. *Brain*, 1432–1441.

Figure 9.3 An Overview of Language Comprehension

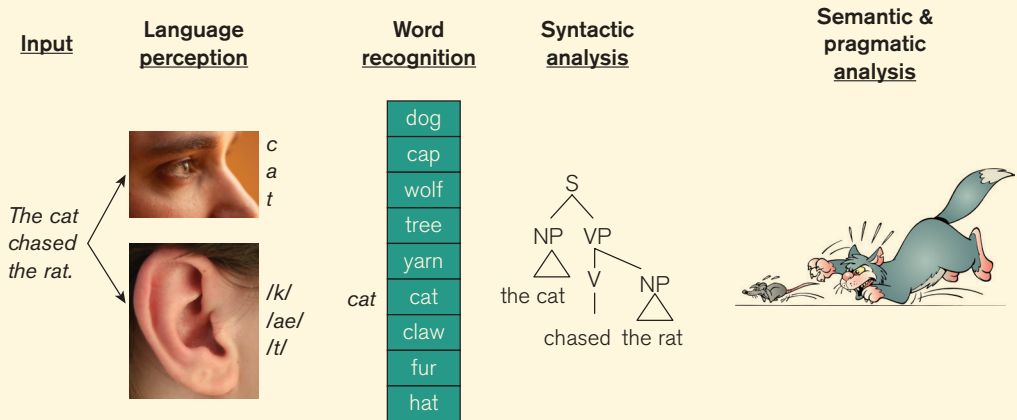


Figure 9.4 Sound Spectrograms of Speech



The top frame is a sound spectrogram of "The stuff he knows is dangerous," while the bottom is "The stuffy nose is annoying." Notice that the acoustic signal for the first part of the two sentences looks very similar. There is not much information in the signal to disambiguate the two different sentences. Notice also the lack of clear word boundaries. It is difficult to tell where one word ends and the next begins.

Figure 9.5 Top-Down Effects in Letter Recognition



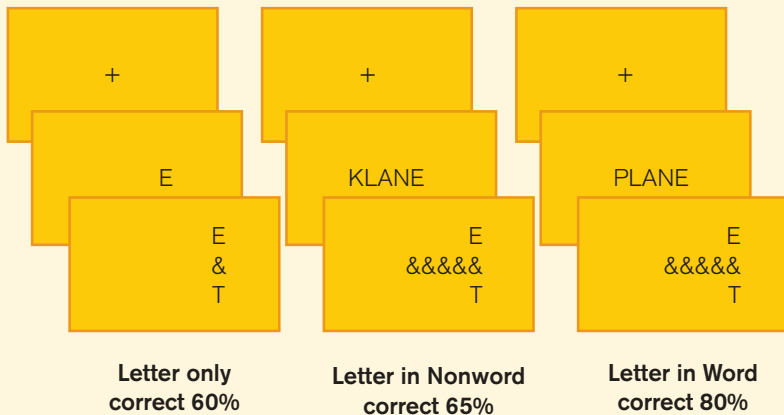
A single, vertically oriented letter figure. It consists of two vertical strokes and a horizontal crossbar. The top of the vertical strokes are slightly angled inward, and the bottom of the vertical strokes are slightly angled outward, which makes it ambiguous whether it is an 'A' or an 'H'.

THE

CAT

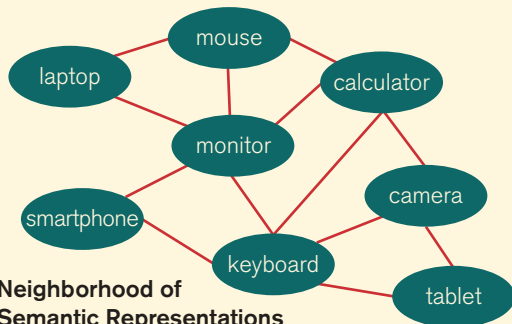
In the top frame is an ambiguous A/H figure. When presented in different contexts, people typically perceive it as either an *H* (as in *THE*) or an *A* (as in *CAT*).

Figure 9.6 The Word Superiority Effect



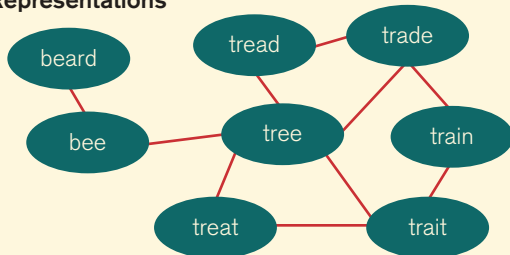
Following a fixation point to orient participants to the center of the screen, a letter or string of letters is briefly displayed, followed by a mask (the “&&&&&”). Above and below the mask in the position at which the target letter was presented are two options. The participant’s task is to identify the letter that had appeared briefly at that position before the mask was presented.

Figure 9.7 Mental Lexicon



**Neighborhood of
Semantic Representations**

**Neighborhood of Orthographic
Representations**



Lexical information may be stored as networks of representations at multiple levels. Here are examples of possible semantic and orthographic neighborhoods for *tree*.

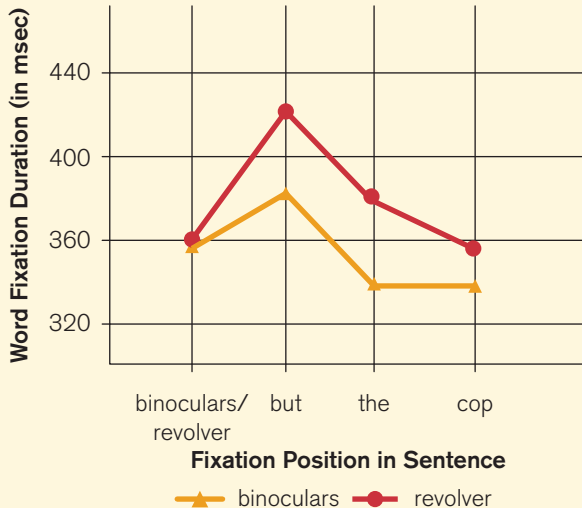
Figure 9.8 Word Priming Experiment

<u>Stimuli</u>	<u>Responses</u>				
Tasp	no				
Nurse	yes	Related	nurse	→	doctor
Doctor	yes				855 msec
Fract	no				Responded to faster
Slithest	no	Unrelated	shoes	→	doctor
Shoes	yes				940 msec
Doctor	yes				

“Priming effect” Evidence that associative relations influence lexical access

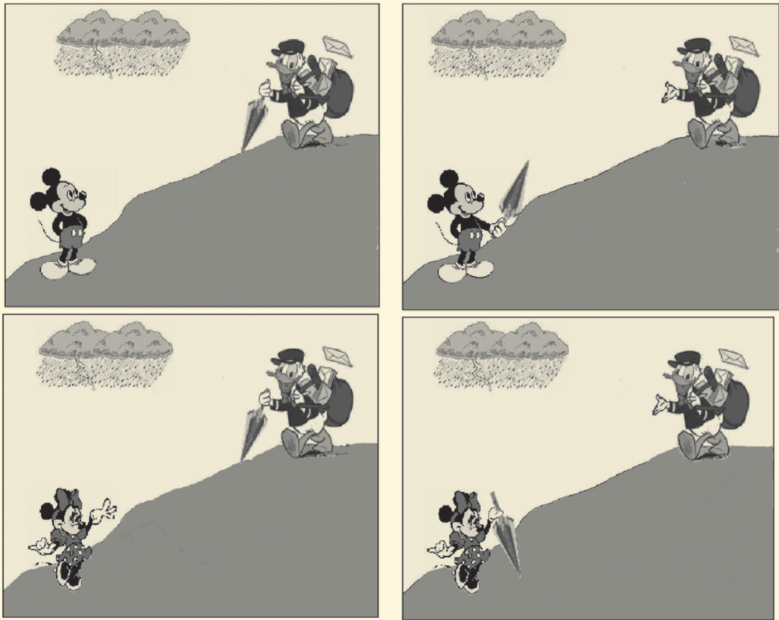
In this lexical decision task, participants see a list of strings of letters and respond with yes or no as to whether the string of letters is a word. The semantic priming effect is shown by comparing the response times to *doctor* following a related word and an unrelated word.

Figure 9.9 Rayner et al.'s (1983) Reading Time Results



Results for the critical region of the sentence "The spy saw the cop with the binoculars/revolver, but the cop didn't see him."

Figure 9.10 The Four Conditions Used in the Arnold et al. (2000) Study



SOURCE: Figure 1, Arnold, J. E., Eisenband, J. G., Brown-Schmidt, S., & Trueswell, J. C. (2000). The rapid use of gender information: Evidence of the time course of pronoun resolution from eye tracking. *Cognition*, 76, B13–B26.

Figure 9.11 Examples of the Kinds of Stimuli Used in the Zwaan et al. (2002) Study

Matched

"the egg fried in the pan"



"egg"

**Faster
Naming**

"the egg was in the carton"



"egg"

Mismatched

"the egg was in the carton"



"egg"

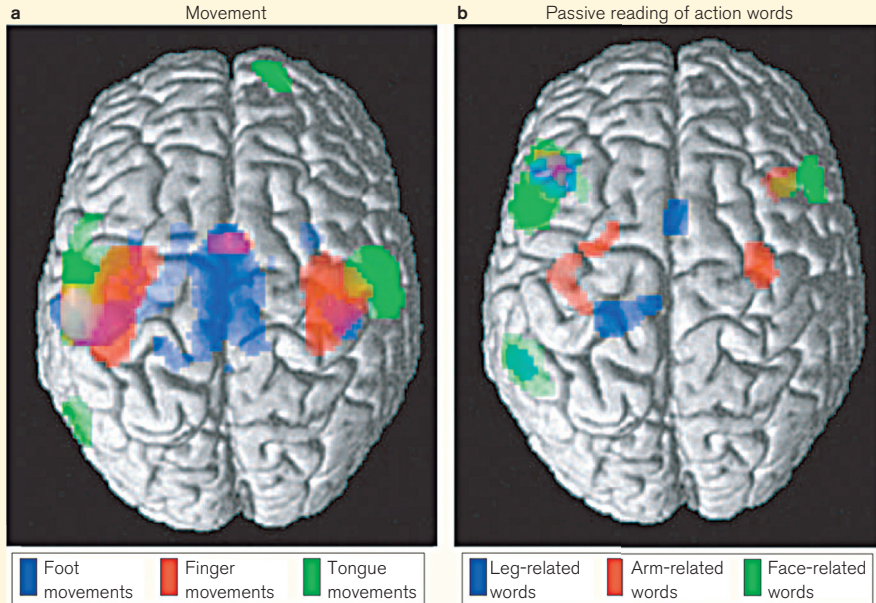
**Slower
Naming**

"the egg fried in the pan"



"egg"

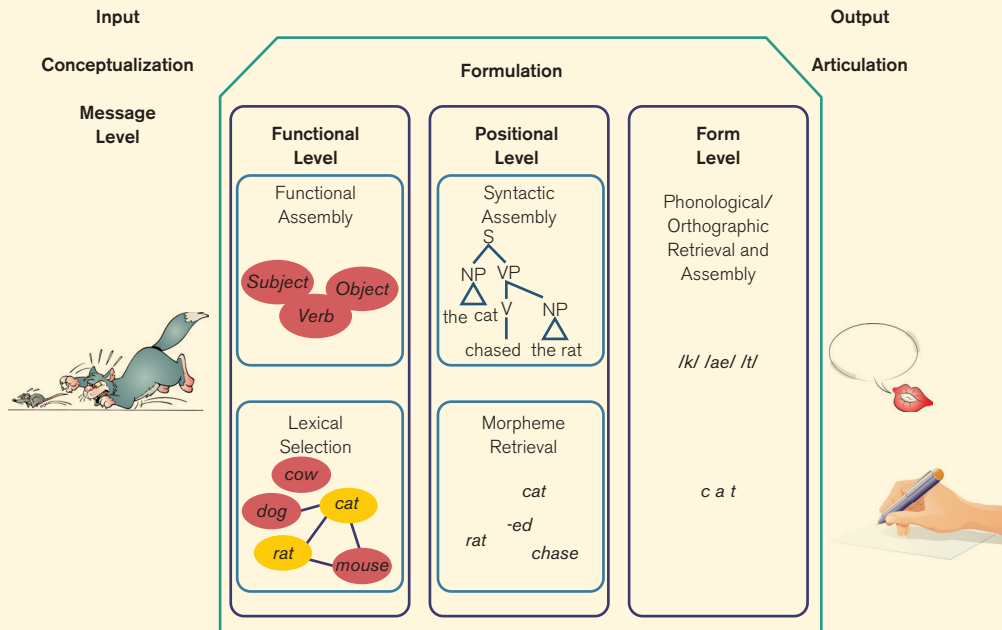
Figure 9.12 fMRI Images From the Hauk et al. Study



The frame on the left shows brain activation for three different movements. The frame on the right shows brain activation reading action-related words.

SOURCE: Hauk, O., Johnsrude, I., & Pulvermüller, F. (2004). Somatotopic representation of action words in human motor and pre-motor cortex. *Neuron*, 41, 301–307.

Figure 9.13 An Overview of Language Production



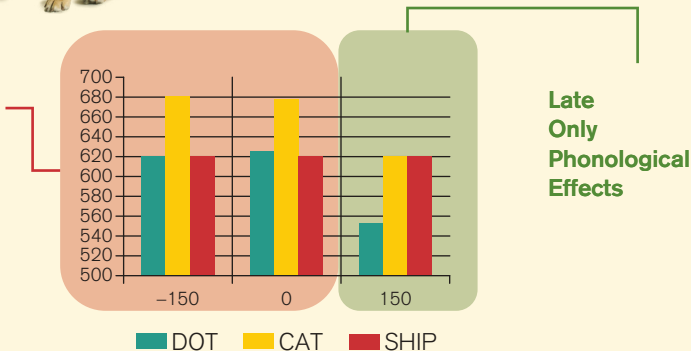
To produce a sentence like "The cat chased the rat" we must map the nonverbal concepts onto linguistic representations, order the representations, and finally articulate the language.

Figure 9.14 Results of Schriefers et al.'s (1990) Study



- **Schriefers, Mayer, and Levelt (1990)**
 - DOT phonologically related
 - CAT semantically related
 - SHIP unrelated word

Early
Only
Semantic
Effects

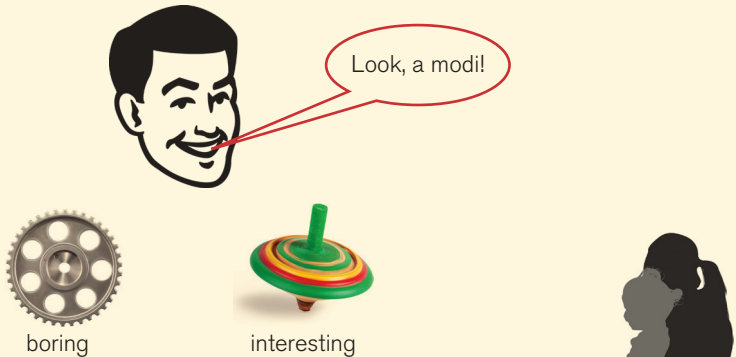


Late
Only
Phonological
Effects

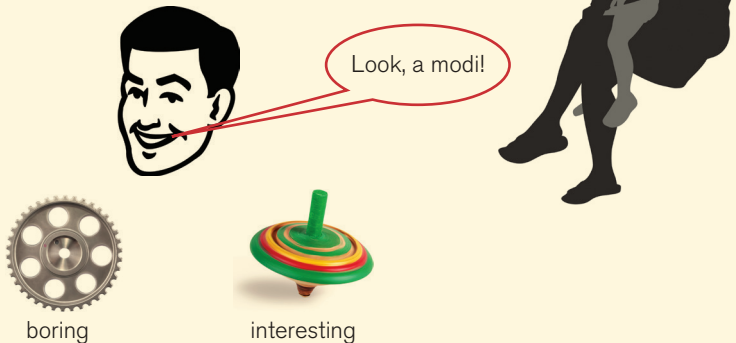
Speakers were presented named object pictures while ignoring a word they heard over headphones.

Figure 9.15 An Example of the Learning Phase Used in Hollich et al. (2000)

(a)

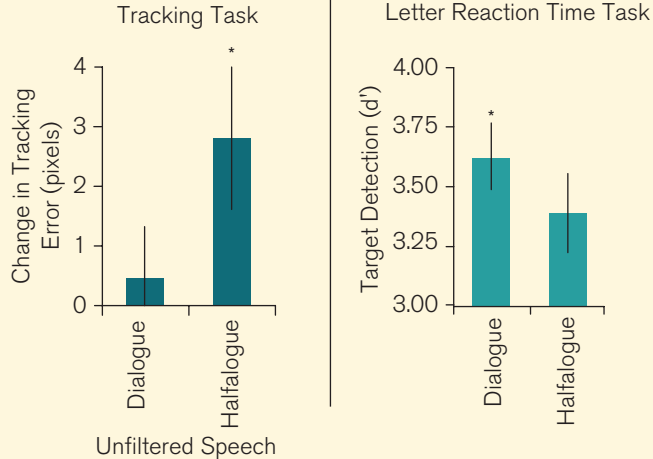


(b)



In (a), the attentional cue (colorful) and social cue (eye gaze) are consistent. In (b), the attentional cue and social cue are inconsistent.

Figure 9.16 Results of Emberson et al's (2010) Experiment 1



SOURCE: From Emberson, L. L., Lupyan, G., Goldstein, M. H., & Spivey, M. J. (2010). Overheard cell-phone conversations: When less speech is more distracting. *Psychological Science*, 21, 1383–1388.



Photo 9.1 Changing the name of the rose doesn't change the concept of what a rose is.



Photo 9.2 Paul Broca

Broca's aphasia: a deficit
in language production

Wernicke's aphasia: a deficit
in language comprehension



Photo 9.4 Language is a coordinated joint activity like dancing.



Photo 9.5 Children at these ages begin learning to use language.

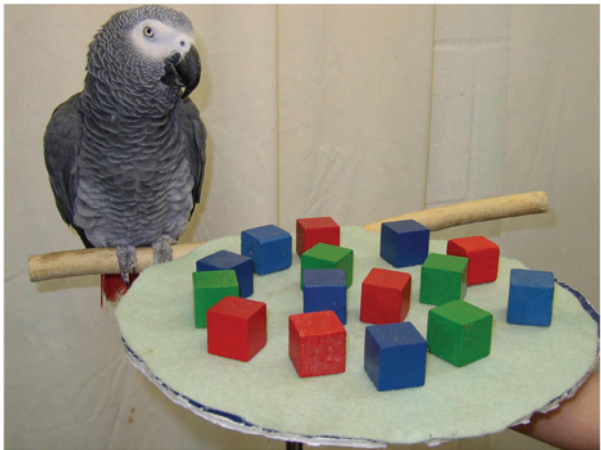


Photo 9.6 Alex, an African grey parrot trained by Irene Pepperberg.



Photo 9.7 Chimpanzees have been taught American Sign Language.

Table 9.1 Types of Speech Errors

TYPE	EXAMPLES: INTENDED → PRODUCED ERROR	UNIT INVOLVED
SOUND ERRORS		
Exchange	York library → “lork yibary”	Phoneme
Anticipation	Reading list → “leading list”	Phoneme
Perseveration	Beef noodle → “beef needle”	Phoneme
Addition	Blue bug → “blue blug”	Phoneme
Shift	Black boxes → “back bloxes”	Phoneme
Deletion	Same state → “same sate”	Phoneme
MORPHEME ERRORS		
Exchange	Thinly sliced → “slicely thinned”	Stem
Anticipation	My car towed → “my tow towed”	Stem
Perseveration	Explain ... rule insertion → “rule exsertion”	Prefix
Addition	Some weeks → “somes weeks”	Inflectional suffix
Shift	Gets it → get its	Inflectional suffix
WORD ERRORS		
Exchange	Writing a letter to my mother → “writing a mother to my letter”	Noun
Anticipation	Sun is in the sky → “sky is in the sky”	Noun
Perseveration	Class will be about discussing the test → “discussing the class”	Noun
Addition	These flowers are purple → “these purple flowers are purple”	Adjective
Shift	Something to tell you all → “something all to tell you”	Quantifier

SOURCE: Dell, G. S. (1986). A spreading-activation theory of retrieval in sentence production. *Psychological Review*, 93, 283–321.

Table 9.2 Hockett's Design Features of Language

FEATURE	DESCRIPTION	BEE DANCES	BIRD SONG	HUMAN LANGUAGE
Vocal-auditory channel	Using the sounds to communicate	✗	✓	✓
Broadcast transmission and directional reception	Sounds are broadcast widely but may be used to localize the speaker	✓	✓	✓
Rapid fading	The signal disappears quickly after production	?	✓	✓
Interchangeability	Users may be both producers and comprehenders	limited	✗	✓
Total feedback	Speakers have access to their own productions	?	✓	✓
Specialization	The speech organ has been adapted for the task			✓
Semanticity	The signals have meaning	✓	✓	✓
Arbitrariness	No direct connection between the sound and the meaning	✗	in part	✓
Discreteness	The signal is made of separate units	✗	✓ if semantic	✓
Displacement	Can communicate about things removed from time and space	✓	?	✓
Productivity	Can use unique combinations that have not occurred before	✓	?	✓
Traditional transmission	Can be taught and learned	✗	?	✓
Duality of patterning	Combinations of meaningless parts result in meaningful units	✗	?	✓

SOURCE: Demers, R. A. (1988). Linguistics and animal communication. In F. J. Newmeyer (Ed.), *Linguistics: The Cambridge Survey* (pp. 314–335). New York: Cambridge University Press.