Lecture Notes

# Chapter 10: Language

## Learning Objectives

* Define language
* Explain the structure of language, including phonology, syntax, semantics, and pragmatics
* Describe the perception of speech and its stages of processing as well as the processing of written language
* Debate the relationship between language and cognition
* Review the major findings in neurological language studies
* Discuss the effects that bilingualism has on cognition

## Outline

**I.** Setting the Stage

**A.** We often take our ability to produce and comprehend language for granted.

**1.** However, language use is not so straightforward.

**2.** It is extremely difficult to build computer systems that understand language as easily as a 4-year-old can.

**B.** Language use is intimately connected to cognition.

**C.** Some language processes are bottom-up, whereas others are top-down.

**D.** A natural **language** is *regular* (governed by a system of rules) and *productive* (infinite combinations of ideas can be expressed in it).

**1.** Human language is also *arbitrary* (the symbols of language do not necessarily resemble the things they refer to).

**2.** Human language is also *discrete* (the system can be subdivided into recognizable parts).

**II.** The Structure of Language

**A.** Language comprises a number of systems working together.

**1. Phonemes** are the sounds that make up a language; the study of the ways that these sounds can be combined is called *phonology.*

**2.** The smallest meaningful units of language are **morphemes,** which include words, prefixes, word endings, and tense markers.

**3. Syntax** refers to the structure of a sentence—how the morphemes are put together.

**4. Semantics** refers to the branch of linguistics devoted to the study of meaning.

**5. Pragmatics** refers to the give-and-take of language—the assumptions that speakers and listeners make in order to have a conversation.

**B.** Linguistic rules (such as phonological or syntax rules) make up the *grammar* of a language.

**1.** People may not be able to explicitly state the rules of their language, but they show implicit understanding of sentences that violate those rules.

**2.** Linguists also distinguish between **linguistic competence**(the underlying knowledge that lets us produce and comprehend sentences) and **linguistic performance**(the actual sentences we produce, which fully reflect our competence only under ideal conditions).

**C.** Part of what distinguishes one language from another is their idiosyncratic sounds.

**1. Phonetics** is the study of speech sounds and how they are produced.

**2. Phonology** is the study of the systematic ways in which speech sounds are combined and altered in language.

**a)** English has about 40 phonetic segments (sometimes called *phones*).

**b)** The term *phoneme* is used to describe the smallest unit of sound that makes a meaningful difference in a given language.

**(1)** English, for example, makes a meaningful distinction between the /l/ and /r/ sounds, so “lice” and “rice” are different words.

**(2)** This distinction is not used in other languages, such as the Cantonese dialect; speakers of Cantonese do not hear a difference between “lice” and “rice.”

**3.** Linguists and phoneticians distinguish between consonant and vowel sounds.

**a)** Vowels work without obstructing the airflow; they depend on the shape and position of the tongue and lips.

**b)** Consonants are more complicated, differing in place of articulation, manner of articulation, and *voicing.*

**4.** *Phonological rules* govern how phonemes can be combined in a particular language; different languages have different rules.

**D.** The term *syntax* refers to the arrangement of words into sentences.

**1.** *Tree diagrams* can show us which words “go together” in a sentence.

**2.** Tree diagrams can help us explain why certain kinds of changes can be made to a sentence and others cannot.

**3.** Various linguists have proposed a variety of syntactic rules.

**a)** Chomsky proposed a set of *phrase structure rules* (or *rewrite rules*) that generate the legal phrase structures of the English language.

**b)** Another type of rule, a *transformational rule,* turn structures into other structures—for example, through preposing a phrase from the end of a sentence to the beginning of a sentence.

**E. Semantics,** the study of meaning, also plays an important role in our language use.

**1.** Theories of meaning have to explain several things.

**a)** They must explain *anomaly* (why you can’t say something like “Coffee ice cream can take dictation”).

**b)** They must explain *self-contradiction* (why you can’t say something like “My dog is not an animal”).

**c)** They must explain *ambiguity* (why is it not clear to say “I need to go to the bank”).

**d)** They need to explain *synonymy* (why “The rabbit is too young” and “The rabbit is not old enough” mean the same thing).

**e)** They need to explain *entailment* (why “Pat is my aunt” means that Pat is female).

**2.** For a listener to figure out the meaning of a sentence, they need to pay attention to more than just the meanings of individual words.

**a)** Syntax gives clues to meaning, such as subject/object relationships.

**b)** Your general knowledge of how the world works is also necessary to determine meaning.

**3.** The study of semantics also involves the study of *truth conditions*—the circumstances that make something true.

**F.** Finally, *pragmatics*are the social rules of language that must be honored if you want to communicate successfully.

**1.** Different types of utterances demand different responses of us.

**a)** *Assertives* assert a belief, and require little response from the listener.

**b)** *Directives* are instructions from the speaker to the listener.

**c)** *Commissives* are utterances that commit the speaker to some later action.

**d)** *Expressives* describe the speaker’s psychological state.

**e)** *Declarations* are speech acts in which the utterance itself an action, such as “You’re fired.”

**2.** There are also subtle rules for the framing of requests, depending on the circumstances.

**III.** Language Comprehension and Production

**A.** Understanding speech is actually a remarkable ability.

**1.** Speech is continuous; there are rarely pauses between the sounds of speech.

**2.** A single phoneme sounds different depending on the context.

**3.** Visual information can affect how sound is perceived.

**4.** Speech perception is also subject to a number of other context affects, including *phonemic restoration,* in which the context of a sentence allows us to “fill in” a missing phoneme and not even realize that it was missing.

**B.** Speech errors can help us to understand how speech is produced.

**1.** Two types of speech errors rarely occur together.

**a)** Meaning errors substitute related words for each other (saying “finger” for “toe,” for example).

**b)** Form errors substitute words that sound alike (saying “mushroom” instead of “mustache”).

**2.** This suggests that the processing of meaning and form are separate and operate at different points in speech production.

**C.** Sentence comprehension is a complicated task that requires us to retrieve both word meanings and syntactic structures.

**1.** It appears that we hold clauses in memory only as long as is necessary to process the sentence.

**2.** When we finish processing a sentence, we “discard” the exact wording and store only the gist.

**3.** When ambiguities need to be resolved in order to process meaning, we rarely even notice the ambiguities.

**a) Lexical ambiguity** occurs when a word has two meanings.

**(1)** Priming studies suggest that, initially, both meanings of an ambiguous word are accessed in memory; this is probably an automatic, bottom-up process.

**(2)** But, once the context allows the correct meaning to be chosen, the other meaning is discarded; this happens very quickly under normal circumstances.

**D.** The comprehension of text passages (such as paragraphs or stories) is studied through the measurement of eye *fixations* as a reader scans a text.

**1.** The *immediacy assumption* holds that people try to interpret a new word as soon as they encounter it in text.

**2.** Interpretation of each word occurs during the time it is fixated, according to the *eye-mind hypothesis.*

**3.** Fixation duration is increased (and thus, reading speed is slowed) when readers encounter longer words, infrequent words, and syntactically or semantically anomalous words.

**4.** Kintsch and Keenan argue that the difficulty of processing a sentence depends on the **propositional complexity** of the sentence—the number of basic ideas conveyed.

**5.** The relationship among sentences is also important; the *given-new* strategy allows us to process “old” (given) information in a sentence before incorporating new information.

**6.** Context also plays a key role in how we process a story; without any context, or with context presented too late to be of use, a story can become incomprehensible even though the words and sentence structures are familiar.

**E.** Some cognitive psychologists have put the ideas of grammars and scripts together, forming the concept of a **story grammar** to describe the way people comprehend large pieces of text.

**1.** Story grammars are similar to scripts in that both have variables or slots that are filled in differently for different stories.

**2.** Story grammars are similar to syntactic grammars in that they help identify the units and the role each unit plays in a story: setting, theme, plot, resolution, and so forth.

**a)** Stories conforming better to the structure of a story grammar were better recalled than were stories that conformed less well.

**b)** People are more likely to “misremember” details such that they fit better with the story grammar—as with Bartlett’s “War of the Ghosts” story.

**F.** Conversations can be seen as examples of spoken connected text and are also subject to specific pragmatic rules according to **Gricean maxims of cooperative communication.**

**1.** Speakers should make their contributions as informative as is required—no more, no less—according to the *maxims of quantity.*

**2.** Speakers should make their contributions true, according to the *maxims of quality.*

**3.** Speakers should make their contributions relevant, according to the *maxim of relation.*

**4.** Speakers should be clear, brief and orderly, according to the *maxims of manner.*

**IV.** Language and Cognition

**A.** Our use of language raises an important question: What influences does language have over other cognitive processes?

**1.** One extreme position holds that language and other cognitive processes operate completely independently.

**2.** The opposite extreme holds that language and other cognitive processes are completely related, with one determining the other.

**B.** The **modularity hypothesis** implies that certain language processes are modular.

**1.** This implies that language is *domain-specific,* operating with certain kinds of input and not others.

**2.** It also implies that language is an **informationally encapsulated process,**operating independently of the beliefs and other information available to the processor.

**C.** Other investigators argue for a stronger relationship between language and other cognitive processes.

**1.** The **Whorfian hypothesis of linguistic relativity** argues that the language we grow up speaking determine the way we perceive the world.

**a)** Rosch’s studies of color perception, however, showed that speakers of very different languages still perceived colors in the same way.

**b)** Other researchers have also supported the idea that color terms and concepts are universal, regardless of language.

**2.** A weaker form of the Whorfian hypothesis has mixed support.

**a)** Bloom showed that speakers of languages like Chinese, with no *counterfactual* markers (*If* something *had been* true…), have difficulty drawing counterfactual inferences from text.

**b)** Later investigations by native Chinese speakers, however, showed that Bloom’s results were due to the Chinese versions of his story being awkwardly phrased.

**3.** Nonetheless, it is true that language at least reflects thought in many instances; for example, people with interest and expertise in a given area tend to develop more specialized vocabularies to describe subtle differences that novices do not see.

**V.** Neuropsychological Views and Evidence

**A.** Interest in localizing language function in the brain goes back at least to the 1800s.

**1.** Paul Broca reported a case study in 1861 of a mean suffering from a lesion in the left frontal lobe who experienced **expressive aphasia** (or **Broca’s aphasia**), leaving him unable to speak any words except “tan.”

**2.** About 13 years later, Carl Wernicke identified a brain area that, if damaged, was associated with **receptive aphasia** (or **Wernicke’s aphasia**), an extreme difficulty comprehending spoken language.

**3.** Aphasia studies also led to the recognition that usually, the area of damage was to the left hemisphere of the brain rather than the right, leading to the idea that the two cerebral hemispheres have different functions (*lateralization*).

**B.** Modern technologies such as CAT and PET scans have also been used to study language functioning.

**1.** PET scan studies show different areas of the brain are activated for different parts of word processing.

**a)** Simply viewing words led to activation of the left occipital lobes (specialized for visual information).

**b)** Listening to words led to activation of the temporal lobes (specialized for auditory processing).

**c)** Pronouncing words leads to activation of the motor cortex.

**d)** The task of generating related words in response to a presented word, however, activated many new areas of the brain, including Broca’s area.

**2.** However, other studies present a more complicated picture, suggesting that localization of specific language functions is not straightforward.

**VI.** Bilingualism

**A.** Bilingual people have fascinated cognitive psychologists in many ways.

**1.** Peal and Lambert noted that bilingual children outperformed monolingual children on both verbal and nonverbal intellectual tests.

**a)** The bilingual advantage may be due to executive functioning—the ability to switch attention, inhibit processing, and allocate working memory.

**b)** This advantage accrues not just for children; it can also protect aging adults from declines in executive function.

**2.** There are occasional costs to being bilingual, but they are minor in comparison with the benefits.

**a)** Receptive vocabulary (the number of words that a person understands) is slightly larger for monolinguals than for bilinguals.

**b)** Monolinguals also outperform bilinguals in tasks of verbal fluency (for example, generating as many words as you can in a specific amount of time).