Beginning Concepts

-Psycholinguistics is an interdisciplinary field of study in which the goals are to understand how people acquire language, how people use language to speak and understand one another, and how language is represented and processed in the brain.

The Creativity of Human Language

A good place to begin is by thinking about some of the unique features of human language. Language is a system that allows people immense **creativity**. This is not the same creativity of people who write essays, fiction, or poetry. Instead, this is the linguistic creativity that is commonplace to every person who knows a language. The creativity of human language is different from the communication system of any other animal in a number of respects. For one, speakers of a language can create and understand novel sentences for an entire lifetime.

A second important kind of creativity humans possess is that we can use language to communicate anything we can think of. No other animal communication system affords its users such an unlimited range of topics. Many mammals have complex sets of calls and cries, but they can communicate only certain kinds of information, such as whether danger is coming from the ground or the air, who is ready to mate, where food is located, and so forth.

Language as Distinct from Speech, Thought, and Communication

Language is the primary communication system for the human species. In ordinary circumstances it is used to convey thoughts through speech. It is a special system, however, that functions independently of speech, thought, and communication.

Speech ought not to be confused with language, though speech is indeed the most frequent mode for transmitting linguistic information. Other modes for transmission include the gestures used in sign language and the graphic representations used in writing.

It is tempting to confuse **thought** and language, because we verbalize our thoughts using language. The distinction between language and thought (or general intelligence) becomes clear when one considers the many kinds of individuals who can think but cannot communicate through language. Among these kinds of individuals are infants and people who suffer from neurological pathologies that have

impaired their language ability. Moreover, many animals can think but cannot communicate using language. In the language pathologies, we observe pronounced mismatches between level of intellectual development and linguistic ability. Specific language impairment (SLI) is not a rare disorder in children without any neurological or motor pathology. In children with SLI, language development lags far behind that of their peers. While there are numerous cognitive deficits associated with children with SLI, their non-verbal intelligence is within normal range and their cognitive deficits are not sufficient to account for their language disorder (Leonard 1998). The flip side of SLI is Williams Syndrome, a genetically based disorder causing severe retardation. Children with Williams Syndrome are deficient in many other aspects of cognition. While some aspects of their language are impaired (Jacobson and Cairns 2009), these children have surprisingly good language skills, in both vocabulary and in the ability to form grammatical sentences (Lenhoff et al. 1997). Pathologies such as SLI and Williams Syndrome, that demonstrate a dissociation of language and general intelligence, are of interest because they demonstrate the independence of language and thought.

Language is the primary communication system for human beings, but it is not the only way to communicate, so language can be distinguished from **communication** in general. Many forms of communication are not linguistic; these include non-verbal, mathematical, and aesthetic communication through music or the visual arts. Frequently, language is not used to communicate or transfer information; language can be used aesthetically (consider poetry or song lyrics) or as a means to negotiate social interactions (consider how *Yo, whassup!* might be the preferred greeting in some contexts but quite inappropriate in others).

Some Characteristics of the Linguistic System

Language is a formal system for pairing signals with meanings (see Figure 1.1). This pairing can go either way. When people produce a sentence, they use language to encode the meaning that they wish to convey into a sequence of speech sounds.

The set of rules that creates sentences in a language is a language's **grammar**, and the words of a language are its **lexicon**.

Knowing a language involves knowing its grammar and lexicon.

This special kind of knowledge is called *tacit* (or *implicit*) *knowledge*, to distinguish it from explicit knowledge, such as your knowledge of a friend's telephone number. Tacit knowledge is represented in the brain and is put to use, in this case, in the

production and comprehension of sentences, but is not consciously available to the individual who possesses it.

The Distinction between Descriptive and Prescriptive Grammar

The term *grammar* means something different to linguists than what it means to language teachers. People who teach language are interested in teaching a standardized use of language, the form of a language that is accepted in academic and business circles. We can refer to this type of language as conforming to **prescriptive grammar**. Knowing how to adapt to the standard (*prescribed*) way of speaking or writing is very useful for people conducting a job interview or producing a formal piece of writing. People who study language, in contrast, are interested in what is called **descriptive grammar**, that is, the language system that underlies ordinary use.

Many people who speak English – especially young people or people talking in informal contexts – will say sentences like the following:

. (1) Me and Mary went to the movies.

. (2) Mary and me went to the movies.

How Language Pairs Sound and Meaning

Three kinds of rule systems make up a grammar. **Phonological rules** describe the sound patterns of the language; they are used to create individual words and are responsible for the rhythm and intonation of speech. **Morphological rules** and **syntactic rules** are involved in creating the structural organization of words and sentences, that is, the relationships between words and phrases in sentences.

Linguistic Competence and Linguistic

Performance

A grammar and a lexicon are those components of language that allow sounds and meanings to be paired. When people know a language, they know its grammar and its lexicon. This knowledge is called **linguistic competence**. It simply refers to the knowledge of language that is in a person's brain (or mind), knowledge that provides a system for pairing sound and meaning. **Linguistic performance**, in contrast, is the use of such knowledge in the actual processing of sentences, by which we mean their production and comprehension.

Chapter2- The Biological Basis of Language

What evidence do we have that language is biological?

1- Language Is Species Specific

If we define *communication* loosely as a way to convey messages between individuals, we can generalize that every species has a communication system of some sort. If the system is **species specific** – that is, if it is unique to that species – the system is likely to be part of the genetic makeup of members of the species.

No other species has a communication system like the language used by humans. There are two ways to approach this claim, and thus meet Lenneberg's first criterion. One is rather obvious: no other animals talk, nor do any other animals have a gestural system with the organizational structure of human language. The other way to address this issue is to ask whether other animals can be taught a human communication system.

2- Language Is Universal in Humans

Lenneberg's second criterion – that a biological system must be **universal** to all members of the species – is met by language in two ways. First, all human babies are born with a brain that is genetically prepared to organize linguistic information;

Secondly, all human languages have universal properties.

There are close to 7,000 languages spoken in the world today and, on the surface, they differ greatly. However, there are profound similarities among the languages of the world – so many similarities, in fact, that *human language* can be thought of as a single entity.

3- Language Need Not Be Taught, Nor Can It Be Suppressed

Lenneberg's third criterion is about how biological systems consist of processes that are differentiated (develop) spontaneously as the individual matures. This has two correlates in language acquisition:

language does not need to be taught, and acquisition cannot be suppressed. Language acquisition in the child is a naturally unfolding process, much like other biologically based behaviors such as walking.

4- Children Everywhere Acquire Language on a Similar Developmental Schedule

There is a remarkable commonality to the milestones of language acquisition, no matter where in the world children acquire language.

there seems to be a **critical period** in the acquisition of their first language.

most researchers agree that the optimal period for first language acquisition is before the early teen years, after which a fully complex linguistic system will not develop. The evidence for this comes from reports of so-called "wild children," particularly from the case of Genie, a California girl who was locked in a closet by an abusive father for the first 13 years of her life (Curtiss et al. 1974; Curtiss 1977, 1988). During that time, Genie was deprived of any linguistic input of any kind. After she was rescued, in November 1970, researchers from the University of California at Los Angeles worked for years with her to help her acquire English, but to no avail. She acquired words and the ability to communicate verbally, but she never acquired the full morphological and syntactic system of English. Examples of her utterances in (2) illustrate the level of her language ability:

2

Genie full stomach.
Applesauce buy store.
Want Curtiss play piano.
Genie have mama have baby grow up.

Anatomical and Physiological Correlates for Language

The most fundamental biological fact about language is that it is stored in the brain, and, more importantly, that language function is localized in particular areas of the brain.

Aphasia is a language impairment linked to a brain lesion.

Neurolinguistics is the study of the representation of language in the brain, and the discovery of aphasias led to the birth of this interdisciplinary field.

Broca's aphasia, also known as *non-fluent aphasia*, is characterized by halting, effortful speech; it is associated with damage involving Broca's area in the frontal lobe of the left hemisphere. **Wernicke's aphasia**, also called *fluent aphasia*, is characterized by fluent meaningless strings; it is caused by damage involving Wernicke's area in the temporal lobe of the left hemisphere.

The speech associated with Broca's aphasia has been characterized as **agrammatic**; it consists of primarily content words, lacking syntactic and morphological structure. In contrast, the speech of people with Wernicke's aphasia has stretches of grammatically organized clauses and phrases, but it tends to be incoherent and meaningless. In conversation, it appears that people with Broca's aphasia

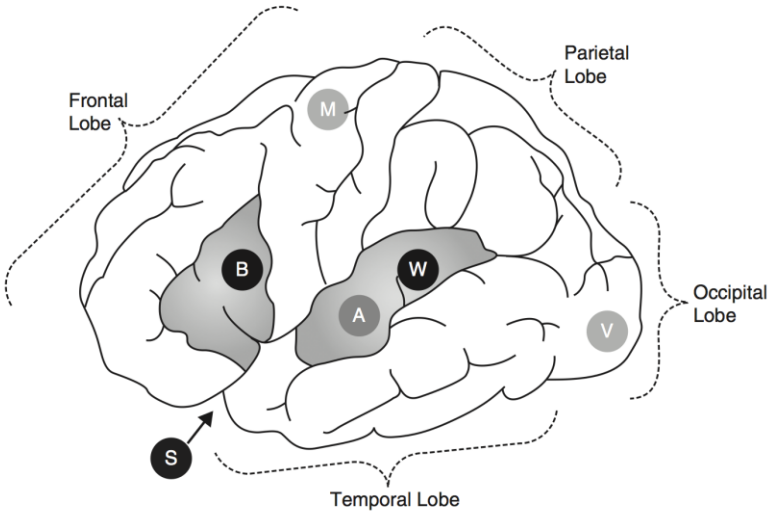


Figure 3.1 Diagram of the left hemisphere of the human cerebral cortex (side view). The diagram indicates the location of the primary language areas (Broca's and Wernicke's areas, 'B' and 'W', and the Sylvian fissure 'S'), as well as the approximate areas recruited for motor (M), auditory (A), and visual (V) processing.

comprehend what is said to them, while people with Wernicke's aphasia do not.

Language lateralization

To say that language is lateralized means that the language function is located in one of the two hemispheres of the cerebral cortex. For the vast majority of people, language is lateralized in the left hemisphere.

The hemisphere of localization is related to handedness, left-handed people being more likely than right-handed people to have language lateralized in the right hemisphere.

control of the body is **contra- lateral**: the right side of the body is controlled by the left motor and sensory areas, while the left side of the body is controlled by the right motor and sensory areas. Thus, left-handed people have right- dominant motor areas, while right-handed people have left-dominant motor areas.

Further evidence of the dominance of the left hemisphere for language comes from studies of **dichotic listening**. In this kind of experiment, participants are presented auditory stimuli over headphones, with different inputs to each ear. For instance, the syllable *ba* might be played into the right ear, while at the same exact time *da* is played to the left ear. The participant's task is to report what was heard. On average, stimuli presented to the right ear are reported with greater accuracy than the stimuli presented to the left ear. This is known as the **right-ear advantage for language**. It occurs because a linguistic signal presented to the right ear arrives in the left hemisphere for decoding by a more direct route than does a signal presented to the left ear. From the left ear, the signal must travel first to the right hemisphere, then across the corpus callosum to the left hemisphere (Kimura 1961, 1973). Thus, information presented to the right ear is decoded by the left hemisphere earlier than the information presented to the left ear.

Chapter3: The Acquisition of Language

Language acquisition could not be possible without two crucial ingredients, which we discuss in the first two sections of this chapter:

1- A biologically based predisposition to acquire language, and

2- Experience with language in the environment.

A Biological Predisposition for Language

If human language is a genetically based characteristic of humans, represented and processed in the human brain, then it follows that a human infant will acquire that system as its brain develops. This is called the **nativist model of language acquisition**.

The nativist claim is that the developing brain provides the infant with a **predisposition to acquire language**; but language acquisition will not happen in a vacuum. The child must be exposed to external input to construct a grammar and a lexicon with all the properties associated with human language.

Chomsky (the linguist) proposed the Language Acquisition device) LAD:

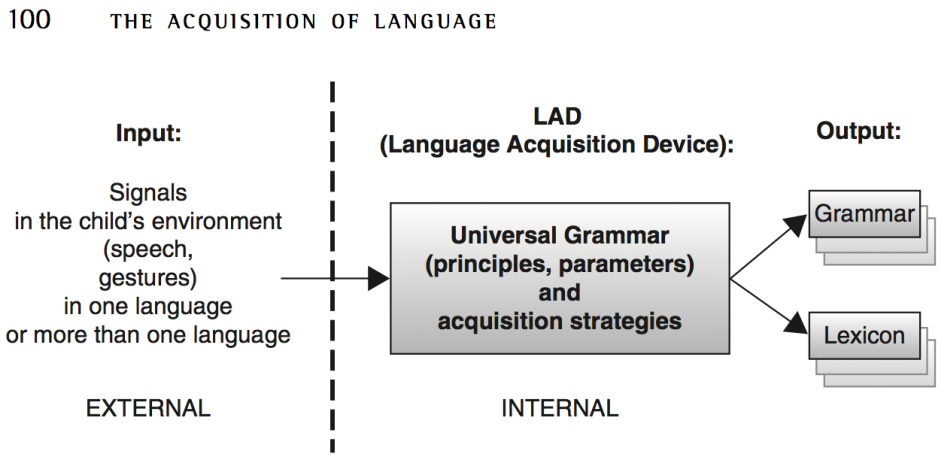


Figure 4.1 Schematic diagram of the relationship between external stimuli and internal knowledge in language acquisition. Input from the environment activates internal processes that lead to the acquisition of a grammar and a lexicon, which are the output of the process of acquisition. If the input provides experience in more than one language, a grammar and lexicon will develop for each language.

Another part of the child's biological endowment is a set of **acquisition strategies** that enable the child to take the input from the environment and construct a grammar that conforms to the organizational principles of UG. These strategies, or *operating principles* (Slobin 1973, 1985), determine what will be the most salient and easily acquired aspects of language. For instance, children are highly sensitive to the regularities of language (e.g. past tense -ed or plural -s).

Characteristics of the Language in the Environment

The primary purpose of a child's linguistic environment is to provide information about the language the child is acquiring. Psycholinguists call this type of information **positive evidence**.

Obviously, the main providers of input are the people who interact with the child: parents, caretakers, siblings, and any other children or adults engaging in routine linguistic interactions with the child. In this section we consider the general characteristics of care- taker speech. We stress that children need to be talked to: experiencing input provides children with positive evidence about how the language works.

It is clearly not the case that parents or other caretakers need to "teach" language to their children. Research over the years has revealed what kind of language experience caregivers need to provide for children and what kind they do not. Caregivers *do* need to provide linguistic input to their children, and opportunities for interaction with the input enhance acquisition

the information must be conveyed in an interactive setting. But children do not need to be rewarded, or encouraged to imitate the language around them, or corrected when they produce an error, and caregivers do not need to alter the way they speak (or sign) to guarantee successful language acquisition.

negative evidence is ungrammatical language that the child hears.

Developmental Stages

1- From before birth to 12 months

In fact, sensitivity to language seems to be present even before birth, since the earliest exposure to linguistic input is *in utero*. Hearing begins to develop during the second trimester, at around 18 weeks of gestation,

full-term fetuses (38 weeks of gestation) have a preference for their own mother's voice over that of a stranger, as indicated by increased fetal heart rate and body movements.

* **In the first half of the first year** of life infants interact in a variety of ways with their caretakers, but their vocalizations are primarily **soft coos and gurgles** that are not at all like actual language. **In the second half of the first year, true babbling begins.** Babbling consists of single syllables at first, always consisting of a consonant and a vowel. Usually the consonant is a stop consonant and the vowel is /a/. At first the babbles will be strings of similar syllables, like *baba baba*. Later, the babbles will become more varied, e.g., *baga bada*.

2- From 12 to 24 months

* it is not until between 12 and 18 months that children produce their first word. The first word is often indistinguishable phonologically from babble, but it is identifiable as a word because it has a consistent referent. The child will spend a few months in the **one-word stage** of language, also called the **holophrastic** period,

because each word conveys as much meaning as an entire phrase. The word *milk*, for instance, will not only be used to refer to milk, but it will also be used to request milk, to observe that the cat is drinking milk, that milk has been spilled, and so forth.

During this early one-word period, the twin phenomena of **underextension** and **overextension** are features of word use. Underextension is a case in which the child will acquire a word for a particular thing and fail to extend it to other objects in the same category. For example, if a child learned the word *flower* in connection with a rose and did not extend its meaning to other kinds of flowers, this would be an example of underextension.

Overextension is more common, or perhaps it's just more noticeable. Overextension is when the child will extend a word incorrectly to other similar things. For example, a child might call all four-legged animals *dog*, or everything that is bright *light*.

* When the child's vocabulary approaches about 50 words, two interesting things happen. 1- The child starts putting words together to form rudimentary sentences. 2- Words are learned more rapidly than before, so much so that most children are said to go through a **vocabulary spurt**, and the rate of acquisition of vocabulary increases dramatically.

3-The preschool years

As the child leaves the one-word stage, vocabulary development speeds up and children begin to combine words to form small sentences.

As sentences gradually lengthen, a useful index of language development is **mean length of utterance** (**MLU**). The MLU for a child is computed by adding the bound and free morphemes in a language sample (e.g., 100 intelligible utterances) and dividing by the number of utterances.

an example of sentences produced by a 23 month old girl (no morphemes or subjects sometimes):

(3) No Hannah mess.
No Daddy mess.
Where go, Mom?
Mom, talk phone.
Mommy like it.
Want juice.
More cracker.
Daddy push in swing.
Go subby [subway].

Children sometimes **overgeneralize** the past tense -ed in situations like (he eated or he goed).

Around the age of 3 (with much individual variation), the child will begin to produce complex sentences. This is a very important linguistic development, because it means the child has developed the last capacity of the syntax – to create complex sentences out of simple ones. A complex sentence is one with two verbs.

Children begin producing relative clauses spontaneously around the age of 3 or 4

There is a considerable period between the time a child first uses a past tense marker and consistent use of past tense. (First, the child uses a morpheme, then will not use it sometimes then after time will always use it correctly)

4-Later Language Development

children of 7, 8, and 9 years of age could correctly produce words with derivational morphemes that do not alter the pronunciation of the stem to which they are attached (such as *–ness*, *–ful*, and *–ment*)

discourse ability and metalinguistic awareness develop as children grow older.

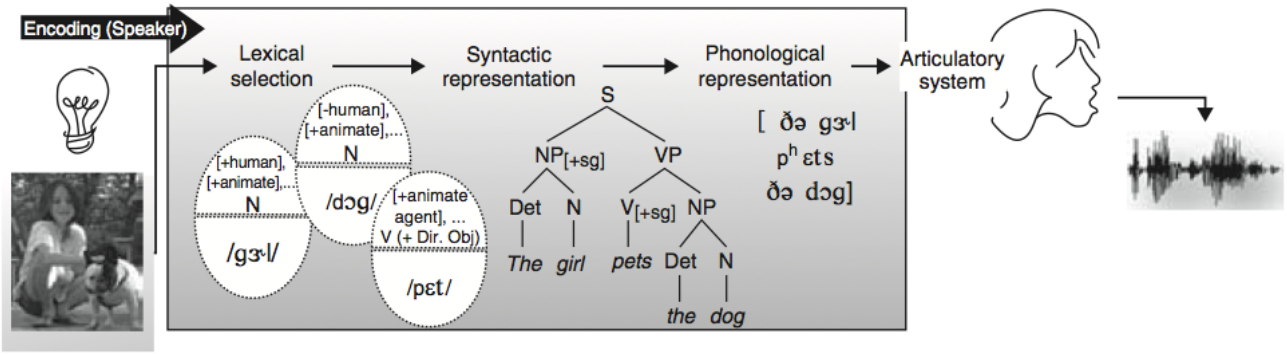
Chapter 4:The Speaker: Producing Speech

A Model for Language Production

The production of a sentence begins with the speaker's intention to communicate an idea or some item of information. This has been referred to by Levelt (1989) as a **preverbal message**, because at this point the idea has not yet been cast into a linguistic form.

Figure 5.1 summarizes, from left to right, the processing operations performed by the speaker.

The girl pets the dog



speech errors are called **slips of the tongue**.

Production in bilinguals and second language learners

When a bilingual is speaking in a **unilingual mode** (only one language), only one of the grammars is consulted to build structural representations, and the active language's lexical entries are activated. When in a **bilingual mode** (when the bilingual's two languages are being used in the same con versation), access to both grammars and lexical items from both languages must be possible (

knowledge of two languages has at least two important consequences for language production: it permits intentional switching from one language to the other, and it triggers occasional unintentional slips into a language not active in the conversation.

One type of alternation between languages in bilingual speech is **code-switching**. Code-switching is switching between two *codes* (two languages, or two distinct dialects of the same language) within the same discourse.

A third category, *tag-switching*, involves the insertion of frequently used discourse markers, like *so*, *you know*, *I mean*, etc.

Steps of speech production

Planning Speech Before It Is Produced

Producing a sentence involves a series of distinct operations and representations: lexical, syntactic, morphological, and phonological. **There are five stages (study them)**

1- Accessing the lexicon

2- **Building simple sentence structure**

3- Creating agreement relations

4- Building complex structure

5- Preparing a phonological representation

Here's the explanation

1- Accessing the lexicon

lexical retrieval. Remember that the lexicon is a dictionary of all the words a speaker knows. A lexical entry carries information about the meaning of the word, its grammatical class, the syntactic structures into which it can enter, and the sounds it contains (its phonemic representation). **A word can be retrieved using two different kinds of information: meaning or sound.**

more common words (frequent words) are retrieved more rapidly: for example, it is easier and faster to retrieve the word *knife* than the word *dagger*.

The following errors give evidence that words are organised by their meaning

(3) a. I just feel like whipped cream and mushrooms.
{I just feel like whipped cream and strawberries.}
b. All I want is something for my elbows.
{All I want is something for my shoulders.}
c. Put the oven on at a very low speed.
{Put the oven on at a very low temperature.}
d. I hate … I mean, I *love* dancing with you!

The following errors show us that words are organised by their sounds:

(4) a. If you can find a gargle around the house …
{If you can find a garlic around the house …}
b. We need a few laughs to break up the mahogany.
{We need a few laughs to break up the monotony.}
c. Passengers needing special assistance, please remain comfortably seated until all passengers have complained … uh, deplaned.

A phenomenon in lexical retrieval that has fascinated psycholinguists for decades is the **tip-of-the-tongue phenomenon** (Brown and McNeill 1966; Aitchison 2003). A tip-of-the-tongue state occurs when the speaker knows the word needed but cannot quite retrieve it.

2- Building simple sentence structure

These errors give evidence that there is a simple sentence structure stage

(5) a. I left the briefcase in my cigar.
{I left the cigar in my briefcase.}
b. … rubber pipe and lead hose …
{… rubber hose and lead pipe …}

3- Creating agreement relations

a. The bridge closes at seven.

b. The bridges close at seven.

4- ■ Building complex structure

5- Preparing a phonological representation

look at the following errors in phonology

(15) a. hass or grash
{hash or grass}
b. I can't cook worth a cam.
{I can't cook worth a damn.}
c. taddle tennis
{paddle tennis}

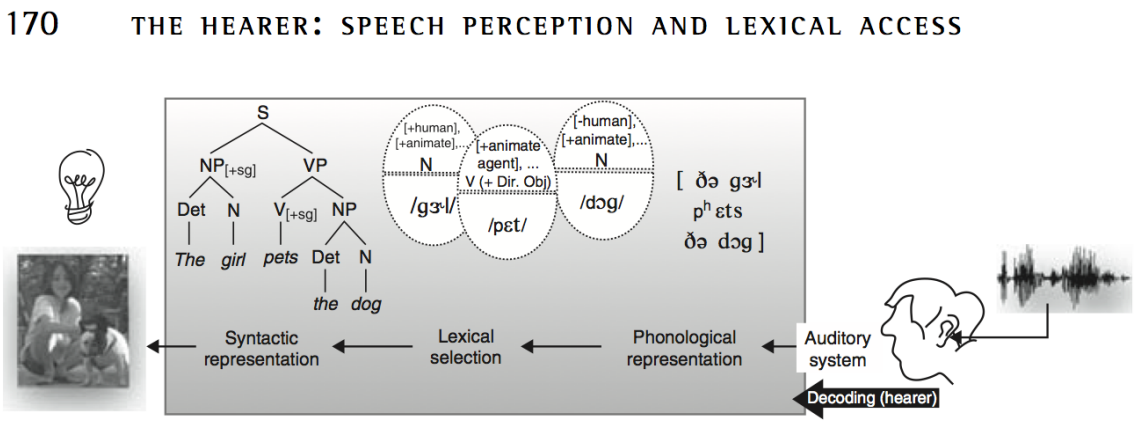
* The example in (15a) is an example of a **segment exchange error**, in which the exchange is between two phonological elements: the final consonants in the two words. In (15b), we have an example of a **perseveration error**, in which a segment (in this case the /k/ of *can't*) perseveres and intrudes in a later word (so the speaker utters *cam* rather than *damn*). In (15c), the example is of an **anticipation error**, in

which a speech sound that has not yet been produced (the /t/ of *tennis*) intrudes in an earlier word.

Chapter5: The Hearer: Speech Perception and Lexical Access

The hearer's task is almost the mirror image of the speaker's task. First, using information from the acoustic signal, the hearer reconstructs a phonological representation. The hearer enters the lexicon using that phonological representation to retrieve the lexical items that match. This permits the hearer to recover the semantic and syntactic details of the words in the message.

From right to left.



Perceiving Speech

There are three features of the speech signal that the speech perception system must deal with: the signal is continuous, it transmits information in parallel, and it is highly variable.

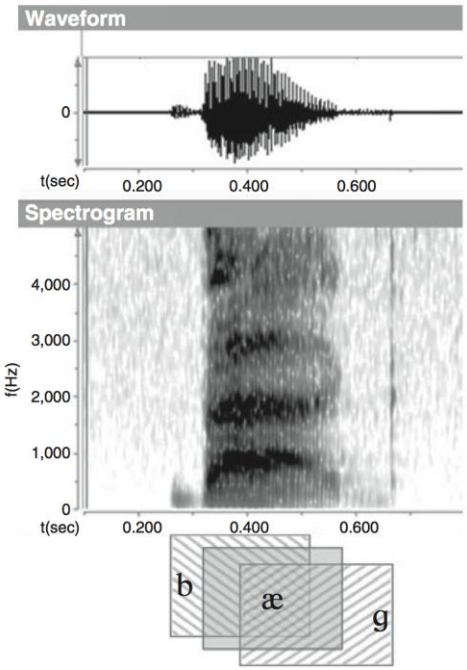


Figure 6.2 Illustration of parallel transmission of phonetic information. The figure is an adaptation of Figure 5 in Liberman (1970: 309).

*** Constructive speech perception and phonological illusions**

Another important property of the speech perception system is that it is **constructive**. **This means that the speech perception system takes information anywhere it can find it to construct a linguistic percept of the acoustic signal.**

McGurk effect (McGurk and MacDonald 1978) – illustrates how visual and auditory information together affect the construction of a phonological percept. If you watch a video of a person mouthing [ga ga ga ...], together with the audio track of a person saying [ba ba ba ...], you will hear neither [ba] nor [ga] – but [da].

Another kind of illusion that illustrates the constructive nature of speech perception, **phoneme restoration**, was discovered by Warren (1970). Warren took a recording of the sentence *The state governors met with their respective legislatures convening in the capital city*, removed the [s] from the word *legislatures*, and replaced it with a recording of a cough of exactly the same duration as the excised [s]. Listening to this sentence, people reported that the [s] was present in the signal, and that the cough was in the background.

The phenomenon of phoneme restoration demonstrates the perceptual system's ability to "fill in" missing information, while actively trying to recover meaning from an acoustic signal: what we hear is sometimes not what we perceive.

*__Slips of the ear__ are similar to phoneme restoration effects. Consider the person who "heard" *She had on a French suit*, from a signal produced by a speaker who intended to say *She had on a trench suit*. Slips of the ear are also called *mondegreens*,

*An important difference between slips of the ear and phoneme restoration effects is that the former are often the result of inattentiveness to the signal, while the latter can be truly illusory.

*** ■ Bottom-up and top-down information**

we use information processing in two ways (top-down OR bottom up). Information is everything we see, hear, or experience.

Bottom up: If you use the acoustic signal (i.e. speech of the speaker) to understand what the person said, then this is bottom up. For example, someone says 'I will see you after the class' and you think he just wants to see you after the class.

top-down: if you use context or prior knowledge in trying to understand what the other person said. For example, someone told you Ali heared what you said about him and he is very angry right now. you meet Ali and then he says 'I will see you after the class' but this time you understand something different (that he will start a fight for example). This is understanding aided by context so it is top-down processing.

■ The Role of Orthography

The **orthography** of a language is its writing system, including the characters (graphemes)

Stages of language perception (not production)

1- Accessing the Lexicon

* Lexical access is affected by phonotactics, word frequency, and lexical ambiguity.

any evidence ?

*A technique widely used to investigate lexical access is the **lexical decision task**. Participants are briefly shown a string of letters and asked to push one button if the letters constitute a word in their language, and a different button if they do not. Responses in a lexical decision task tend to be very quick, ranging between 400 and

600 milliseconds. The computer calculates how long it took each person to respond (yes or no) to each word or non-word.

In a lexical decision experiment, participants will see equal amounts of words and non-words, and within the many words they will see throughout the experiment, a subset of those is of interest to the investigator: those words contain a contrast being investigated in the experiment.

Table 6.1 Word list for simulated lexical decision task. For each string, write Y if it is a word of English, N if it is not.

CLOCK ☐	DOCTOR ☐	ZNER ☐	FLOOP ☐
SKERN ☐	NURSE ☐	TABLE ☐	FABLE ☐
BANK ☐	TLAT ☐	URN ☐	MROCK ☐
MOTHER ☐	PLIM ☐	HUT ☐	BAT ☐

- Quicker responses to Tlat, Zner, and Mrock.
- Slower responses to Skern, Plim, and Floop.
- All of them are non-words BUT the first three violate English phonotactics. (**impossible non-words**) .. The other words are **possible non-words** … That is non-words that don't violate English phonotactics (phonological rules).
- For correct words, faster responses are found to words like Clock and Bank than Hut or Urn. (**the first are frequent words**)
- Bank (money - river bank- snow bank)
- Homonyms & lexical retrieval

- Left (past tense of leave) & left (opposite of right)
- Polysemous words (the mouth of a river - the mouth of a person).
- Research from LDT found that polysemous words (e.g. eye) are retrieved faster than homonymous words (e.g. punch)

Priming: A stimulus you just experienced will affect how you respond to a later stimulus- and this associative response is true not just with linguistic stimuli, but with stimuli of any type (pictures, smells, non-linguistic sounds, etc).

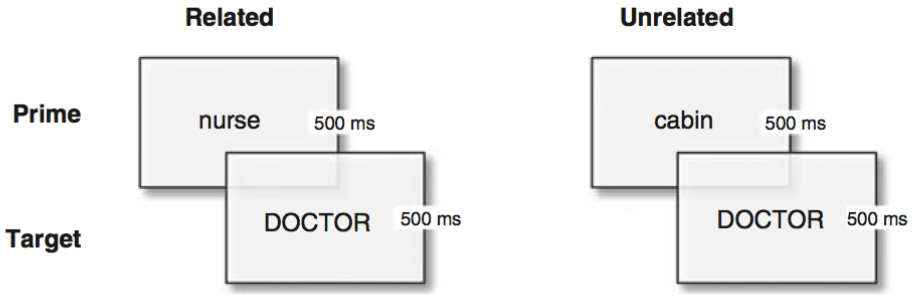


Figure 6.6 Example of two prime–target pairs in a lexical decision experiment. The primes are in small letters, the targets in capital letters. The figure simulates the display sequence: the prime appears by itself and remains on the screen for a few hundred milliseconds; then the target appears. On the left, the prime and target are semantically related; on the right, they are unrelated. Notice that the primes, *nurse* and *cabin*, are matched in length (both are five characters long); primes are also usually matched by frequency and other variables.

In lexical decision tasks, we show learners a related word first, then we show 1) related words like (nurse -doctor) and we show 2) unrelated words (cabin-doctor) then we calculate how long it took participants to respond to the word 'doctor' and check when they respond faster (when it is preceded by a related word, or when it is preceded by an unrelated word).

- Responses to the target word (doctor) will be faster when it is preceded by a related than by an unrelated prime (unrelated word).

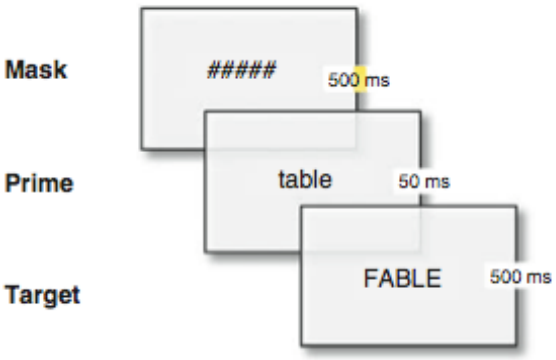


Figure 6.7 Example of a prime–target pair in a masked priming experiment.

Types of priming

1- semantic priming

2- form priming

The examples we have given above are of **semantic** or **associative priming**. In this type of priming there is a meaning relationship between the prime and target word. Other aspects of words also produce priming effects. There is, for instance, **form priming**, in which the prime and the target are not related semantically, but are related in their phonological form: for instance

An experimental method called **masked priming** can be used to study both semantic and form priming. In masked priming, first we show symbols (e.g. for example (@@@) for 500 milliseconds. Then we show the prime word for only 50 milliseconds (impossible to notice consciously), then we show the target word (doctor for example). The results suggest that people respond faster to the word doctor (they say it is a word quickly if it is preceded by a related prime even if it was shown for only 50 milliseconds) and they didn't even notice it but it gives an effect.

+ slides in lectures 11-12-13