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University of Ain Temouchent, Belhadj Bouchaib
Faculty of letters, languages and social sciences
Vice –Deanship in charge of Post-Graduation, Scientific Research and External Relations

وزارة التعليم العالي والبحث العلمي
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نيابة الكلية المكلفة بما بعد التدرج والبحث العلمي والعلاقات الخارجية

HANDOUT

Title

Psycholinguistics (Psy.ling)

Courses for Master 1 Students of Didactics and Applied Languages

Domain: Letters and Foreign Languages

Stream: English Language

Specialty: Didactics and Applied Languages

Elaborated by Dr. Hassiba KORICHE

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GENERAL OBJECTIVES OF THE SUBJECTS

- To understand the correlation between language and brain and mind functions.

- To acquire a comprehensive understanding of fundamental sub-disciplines of psycholinguistics, encompassing the biological foundations of language (language and the brain)

- To pinpoint the primary regions of the brain associated with language and elucidate the roles performed by these regions

- To comprehend the cognitive processes that enable individuals to utilise language.

- To comprehend how the human mind and brain facilitate language acquisition, understanding, and expression.

- To investigate the structures and processes that underpin an individual's capacity for speech and language comprehension.

- To comprehensively understand fundamental psycholinguistics sub-disciplines, encompassing the biological foundations of language (language and the brain), speech perception, the lexicon, sentence processing, discourse, speech production, and language learning.

- To present and examine the principal theories in the field of psycholinguistics.

Table of Contents

1- Introduction to Psycholinguistics

Objectives :

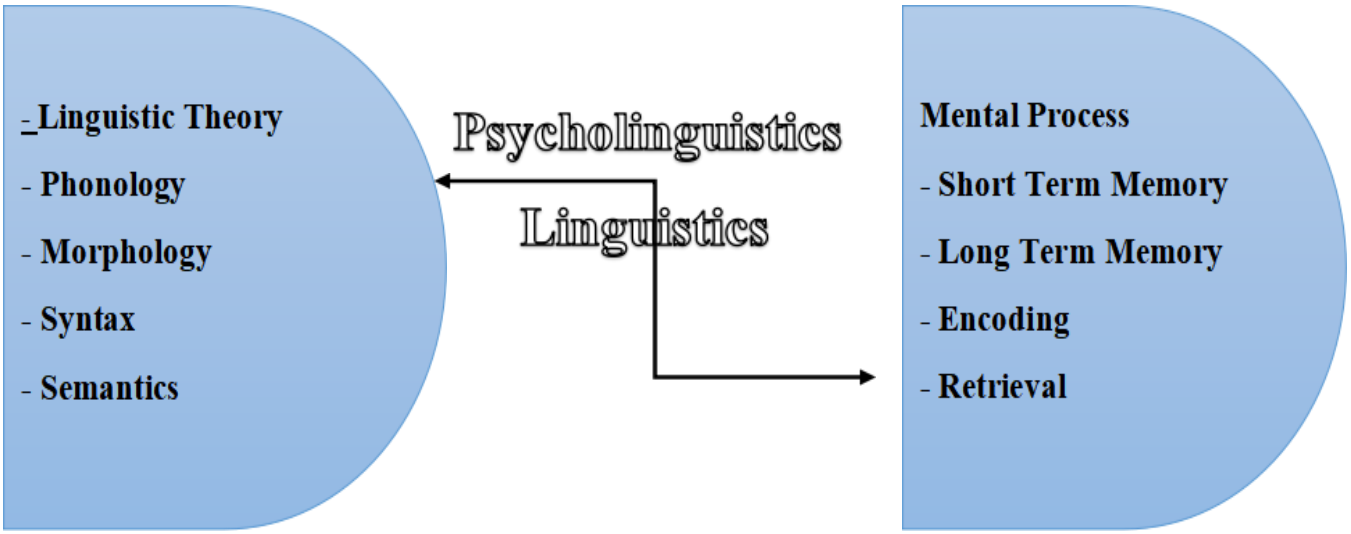
- To introduce the subject
- To deal with the main field related to psycholinguistics
- To reveal the interrelation between Linguistics and psycholinguistics

1.1 Definitions

- Psycholinguistics is a branch of Cognitive Psychology that studies the psychological basis of linguistics competence and performance.
- It is a discipline in which the insights of Linguistics and psychology are brought to bear on the cognitive aspects of language understanding and production (Williams, 2001)
- Studying psychological and neurobiological factors enables humans to acquire, use, and understand language.
- Psycholinguistics is interdisciplinary and is studied in various fields, including Psychology, Cognitive science, and Linguistics.

Recapitulation

Studies done in Psycholinguistics help us to understand the psychology of how we learn and understand language whether it is our first, second, or even third language



1.2 Sub-disciplines within Psycholinguistics

-Theoretical Psycholinguistics

- Developmental Psycholinguistics

- Social Psycholinguistics

- Educational Psycholinguistics

- Neuro-psycholinguistics

-Experimental Psycholinguistics

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- Applied Psycholinguistics

Language theories are related to human mental processes when using language. (phonology/ diction/ Syntax/ discourse/ intonation)

b- Developmental Psycholinguistics

It deals with the process of language acquisition (L1&L2)

c- Social Psycholinguistics

The social aspects of language are a string of thoughts and insights.

d- Educational psycholinguistics

The educational aspects in formal education. i.e., the role of language in teaching reading and language proficiency.

e- **Neurolinguistics**

It examines the relationship between language and the brain, elucidating the processing of language input and the brain's formulation and programming of output. It also illustrates the collaborative function of the hemispheres in language processing.

Furthermore, it examines the effects of brain damage in these regions, referred to as language pathology, which concentrates on individuals experiencing language disruption, such as elderly patients with a cerebral hemorrhage affecting Wernicke's or Broca's areas or younger individuals with brain injuries resulting from accidents.

f- Experimental Psycholinguistics

It deals with the act and effect of using language; it mainly tests models of how the brain and the human cognition system perceive, produce, and represent language.

g- Applied psycholinguistics

It is the application of all the above subfields to other subjects. It focuses on “how research can encourage communication among people, groups, and cultures. (Mininni &Manuti, 2012).

1.3 The Scope of Psycholinguistics

As stated previously, psycholinguistics is part of the emerging field of study called cognitive science, an interdisciplinary venture that draws upon the insights of psychologists, linguists, computer scientists, neuroscientists, and philosophers to study the mind and mental processes. (Johnson, Laird, 1988). Therefore, its scope is broad and is concerned with studies on:

- The manner language is acquired and produced.
- The brain works on language.
- Language acquisition
- The difference between children's language acquisition and learning.
- Linguistic interference
- Language development.
- The role of motivation in foreign language learning.

Indeed, Psycholinguistics' primary concern is language and how it is processed in the brain. The study area includes the components of Linguistics, which deal with phonetics and phonology. It is concerned with how sounds are produced, transmitted, and perceived, while phonology is concerned with how sounds function concerning each other in language.

Regarding morphology, a sub-division of grammar, it studies how sentences are constructed from smaller units called constituents. The other part of grammar is semantics, which studies linguistic meaning. Finally, pragmatics is concerned with the

study of meaning as communicated by a speaker. This type necessarily involves interpreting what people mean in a particular context. On the other hand, psychology-related areas deal with the study of word recognition. The focus is on the ability to recognize written words correctly. It is considered the most frequent cognitive activity involved in reading. Indeed, word recognition is a summation of accuracy and speed of meaning access through decoding printed material.

- **Practice**

Psycholinguistics in Context: Guess the Type ✍

Instructions: Read each of the following cases and write the appropriate type of psycholinguistics from this list:

- Theoretical Psycholinguistics
- Developmental Psycholinguistics
- Social Psycholinguistics
- Educational Psycholinguistics
- Neurolinguistics
- Experimental Psycholinguistics
- Applied Psycholinguistics

Cases

1. **Case1**
   During a class discussion, students analyze how sentence structure influences meaning in complex texts. They are focusing on syntax and how it affects comprehension.
   Type: _____

2. **Case2**
   A speech therapist is working with a patient who lost the ability to speak after a stroke. They assess damage to Broca's area and help the patient regain language functions.
   Type: _____

3.**Case3**

A teacher is designing a reading comprehension program for young ESL learners, focusing on how vocabulary and sentence structure impact reading fluency and academic performance.

Type: _____

4.**Case4**

A researcher is investigating how infants acquire their first words and later form complete sentences in both their first and second languages.

Type: _____

5.**Case5**

A psychologist studies how bilingual individuals process jokes differently in each language and how social context influences their interpretation.

Type: _____

6.**Case6**

In a university lab, a team is running an experiment to test how quickly people recognize spoken words versus written words using eye-tracking technology.

Type: _____

7.**Case7**

An international NGO uses psycholinguistic research to develop culturally appropriate communication strategies for refugees from different linguistic backgrounds.

Type: _____

Text:

Psycholinguistics is defined as a branch of study that combines psychology and linguistics. It is concerned with the relationship between the human mind and language as it examines the process in the brain while producing and perceiving written and spoken discourse. Moreover, it is interested in the ways of storing lexical items and syntactic rules in mind, as well as the processes of speaking and listening are analyzed, along with language acquisition and language disorders.

Psycholinguistics as a separate branch of study emerged in the late 1950s and 1960s due to the Chomskyan revolution. The ideas presented by Chomsky became so important that they quickly gained much publicity and greatly impacted many contemporary views on language. Consequently, psycholinguists also started investigating such matters as processing deep syntactic structure. Based on the transformation of sentences, it was initially discovered that the ease of processing was connected with syntactic complexity, which adds to the processing difficulty, but semantic factors also strongly influence it.

All the same, certain principles of sentence processing that were formulated at that time are still valid. One of them, namely the principle of minimal attachment, means that when processing a sentence that could have multiple meanings, people most frequently tend to choose the simplest meaning or the meaning that, in the syntactic analysis, would present the simplest parse tree with the fewest nodes. Thus, the sentence ‘Mary watched the man with binoculars’ by most language users would be interested that it

was Mary, not the man, who was using binoculars. One other principle worth noting is the principle of late closure, which states that there is the tendency to join the new information to the current phrase or clause, which explains why in a sentence such as 'John said he will leave this morning,' the phrase this morning would be understood as relating to the verb 'leave' and not to 'said.'

Other psycholinguistics investigations into how text processing occurs led to the conclusion that complex sentences can vary depending on the placing of pauses or disfluencies. Additionally, it has been proven that visual contact between speakers strongly influences the ease or difficulty of text processing. During experiments, subjects listened to some sentences, and those who saw the speaker could understand the speech, while those who did not see him often had difficulties with it.

Field notes that psycholinguistics is a domain with fuzzy boundaries, and there is some disagreement among those who teach it about how widely they should set their sights. A broad view of the discipline embraces all of the following:

a- Language processing includes language skills of reading, writing, speaking, and listening, as well as the part played by memory in language.
b- Lexical storage and retrieval: how we store words in our minds and find them when needed.
c- Language acquisition: how an infant acquires his first language
d- Exceptional circumstances: the effects upon language, e.g., deafness, blindness, or being a twin; conditions such as dyslexia or aphasia (the loss of language after brain damage)

e- The brain and language: where language is located in the brain, how it evolved, and whether it is a faculty that is unique to human beings

f- Second language acquisition and use.

Title: ***Psycholinguistics – Comprehension and Application***

Read the text carefully. Then, answer the following questions in complete sentences.

Comprehension Questions

1.Define psycholinguistics in your own words.

2.List three key areas psycholinguistics focuses on.

3.When and why did psycholinguistics emerge as a separate field of study?

4.What is the principle of **minimal attachment**? Give an example.

5.What does the **principle of late closure** mean? Illustrate with the sentence: "John said he will leave this morning."

6.According to the text, how do **visual cues** influence our understanding of spoken language?

7.What role do **pauses or disfluencies** play in processing complex sentences?

8.Field outlines a broad view of psycholinguistics. List four components of this view.

9.What is meant by "**fuzzy boundaries**" concerning psycholinguistics?

Quiz

Q1: What is the primary focus of psycholinguistics?

- Studying cultural language variations
- The relationship between the mind and language
- Writing poetry using linguistic theory
- Translating languages using AI

Q2: When did psycholinguistics become a distinct field?

- The early 1900s
- Post-WWII
- Late 1950s and 1960s
- The early 2000s

Q3: What does the principle of *minimal attachment* imply?

- The brain chooses the simplest syntactic structure
- The brain avoids ambiguity in all sentences
- The brain uses visual cues to interpret speech
- The brain memorizes entire sentences

Q4: In the sentence "John said he will leave this morning," what does *late closure* suggest?

- "This morning" refers to “said.”
- "This morning" refers to “leave.”
- Both are equally possible.
- It refers to the whole sentence.

Q5: What helps improve understanding of spoken language according to the experiments?

- High-speed playback
- Visual contact with the speaker
- Repetition of words
- Reading transcripts

Leisure time: Brain in literature

The Brain is Wider

The brain is wider than the sky,

For put them side by side,

The the other will include

With ease, and you beside

The brain is deeper than the sky,

For, hold them blue to blue

The one the other will absorb

As sponges, buckets do.

The brain is just the weight of God.

For lift them, pound for pound,

And they will differ, if they do.

As syllable from sound

Emily Dickinson

2- Human Language and Animal Communication System

Objectives :

- **Understand the key differences between human language and animal communication systems.**
- **Analyze various theories on the origin and evolution of human language.**
- **Explore and critically evaluate examples of animal communication in species such as birds, bees, and apes.**
- **Identify and explain the design features that distinguish human language.**
- **Develop awareness of how linguistic principles such as semantics, syntax, and phonetics operate in human language but are absent or limited in animal communication.**

2.1- Introduction

All communication systems share the ability to exchange information, and several non-human systems share some features of human language. The fundamental difference between human and non-human communication is that animals are believed to react instinctively in a stereotyped and predictable way.

As diverse and rich as these and other animal signals are, they are not language. The main reason is that the signals are emotional. Their only function is manipulating another animal's behavior, not sharing and exchanging information. Without those functions, animal signals do not qualify as language.

Animals generally communicate using four methods: visual, auditory, tactile, and chemical. Some species rely more on one form of communication over another;

however, they all use various methods to show affection, ward off threats, or attract a mate.

2.2 Animal communication

Communicative behaviour among animals has been analyzed in various disciplines, particularly in ethology. Two comparable approaches may be singled out here: zoo semiotics and bio-communication research. Zoo semiotics, a field founded by the linguist Thomas A. Sebeok (1920–2001), explores the communicative systems of individual species and the characteristics of communication in biological systems. The term bio-communication was coined by the German ethologist Günter Tembrock (1918–2011) to designate forms of transmitting messages between organisms. What is communicated, how and why, and what kind of prerequisites organisms need to express themselves are of special interest.

Animal communication, visual, auditory, olfactory, or tactile, has been studied from various perspectives concerning numerous species. Despite the diversity of approaches, it is fair to say that the communicative behaviour of certain animals has been documented particularly extensively, above all, that of birds, bees, and apes.

It is especially parrots among birds known for their ability to imitate sounds. Some scholars, such as the American ethnologist Irene Pepperberg (2000), would even argue that proper training enables parrots to move beyond mere imitation. In her research, she tried to prove that her now deceased grey parrot named Alex had a vocabulary of about 100 English words and was capable of giving predominantly

correct answers to certain types of questions; this bird managed to name fifty different objects and attribute to them characteristics such as colour, material, or form.

As for honey bees, the Austrian biologist Karl von Frisch (1886–1982) discovered that they communicate the location of food through dance-like movements (von Frisch, 1965, 1977). In addition to various types of dancing, honey bees have other forms of communication, particularly pheromones. Apes have also been popular among researchers studying animal communication, particularly certain types of non-vocal forms (see, for example, Savage-Rumbaugh, Shanker, and Taylor, 1998). Researchers have attempted to teach chimpanzees to select American Sign Language (ASL) elements. A famous example is the chimpanzee Washoe, who learned 132 ASL signs and connected individual signs to meaningful units. However, it has to be added that it took her half a year to acquire the meaning of no more than two signs. Several claims that have been made in connection with the Washoe experiments have been criticized for many reasons.

2.3 Language

How did we get from animal vocalization (barks, howls, calls...) to human language?

Animals often use signs pointing to what they represent but do not use arbitrary and conventional symbols. Examples of signs include sniffles as a sign of an impending cold, clouds as a sign of rain, or a scent as a sign of territory. Symbols include things like the words we use. *Dog, Hund, Chien, cane, perro* -- these symbols refer to the creature so named, yet each one contains nothing that indicates that creature.

Furthermore, phonetics (the sounds), syntax (the grammar), and semantics (the meanings) are the three layers of structure that make up language.

2.3.1 When did language begin?

Language is the most effective method of human communication. The term language is derived from the Latin word lingua, which means tongue. It is an open entity; new words or meanings may be used. Language helps man in several ways. It enables him to reach back into the collective knowledge of his ancestors. It is through language that human beings collect and preserve knowledge and transfer it to the next generation. Most linguists disclose that human language has different realizations, such as written and spoken forms. Human languages have signifiers and signified. Indeed, linguists agree that language is a system of 'vocal signs' with an 'internal structure' used to serve human communication.

Sapir (1921,p 8) asserts, 'language is a purely human and non-instinctive method of communicating ideas, emotions, and desires to employ a system of voluntarily produced symbols.' Similarly, Hall (1968, p 158) defines language as "the institution whereby humans communicate and interact with each other through habitually used-oral-auditory arbitrary symbols." It is important to mention that humans are the only ones that possess language; animals also have their communication system; however, it is not sufficiently developed.

There are many theories about the origins of language. Many of these have traditional amusing names (invented by Max Müller and George Romanes a century ago).

a- The mama theory

Language began with the easiest syllables attached to the most significant objects.

b- The ta-ta theory.

Sir Richard Paget, influenced by Darwin, believed body movement preceded language. Language begins as an unconscious vocal imitation of these movements- like how a child's mouth moves when they use scissors or my tongue sticks out when I try to play the guitar. It evolved into the popular idea that language may have derived from gestures.

c- The bow-wow theory.

Language began as imitations of natural sounds -- moo, choo-choo, crash, clang, buzz, bang, meow... It is more technically referred to as onomatopoeia or echoism.

d- The pooh-pooh theory.

Language began with interjections, instinctive emotive cries such as oh! for surprise and ouch! For pain.

e- **The ding-dong theory**. Some people, including the famous linguist Max Muller, have pointed out that there is a somewhat mysterious correspondence between sounds and meanings. Small, sharp, high things tend to have words with high front vowels in many languages, while big, round, low things tend to have round back vowels! Compare its bitsy teeny weeny with the moon, for example. It is often referred to as sound symbolism.

F - **The yo-he-ho theory**. Language began as rhythmic chants, perhaps ultimately from the grunts of heavy work (heave-ho!). The linguist A. S. Diamond suggests that these were perhaps calls for assistance or cooperation accompanied by appropriate gestures. It may relate yo-he-ho to the ding-dong theory, as in such words as cut, break, crush, strike...

g- **The sing-song theory**. Danish linguist Jesperson suggested that language comes from play, laughter, cooing, courtship, emotional mutterings, etc. He even suggests that contrary to other theories, perhaps some of our first words were long and musical rather than the short grunts many assume we started with.

h- **Hey you! Theory**. A linguist named Revesz suggested that we have always needed interpersonal contact and that language began as sounds to signal identity (here I am!) and belonging (I'm with you!). We may also cry out in fear, anger, or hurt (help me!). It is more commonly called the contact theory.

i- **The hocus pocus theory**. My contribution is that language may have roots in a magical or religious aspect of our ancestors' lives. Perhaps we began by calling out to game animals with magical sounds, which became their names.

k- **The eureka! Theory**. Finally, perhaps language was consciously invented. Perhaps some ancestors thought of assigning arbitrary sounds to mean certain things. Once the idea was had, it would catch on like wildfire!

In the 1960s, linguist Charles Hockett identified “design features” to distinguish human language from animal communication systems. While there are ongoing debates about

the usefulness of these design features, they accurately describe human language's unique properties.

Let us explore the wonders of language through these distinctive design features.

2.4How Design Features Distinguish Human Language from Animal Communication

- The Six Design Features of Human Language

a- Spoken and signed languages share many of the same characteristics. Although the list of initial design elements has changed throughout time, some characteristics appear to be shared by all human languages at the expense of animal communication:

b- Discreteness

Languages are made of discrete, repeatable units that create meaning when combined.

It means that we can combine words or pieces of words to make new ones and combine those words to make sentences. Furthermore, because of the lack of a better term, every language has rules that govern how its units can be combined.

For example,

English plural -s can only come at the end of words: '**pens'**, never 'spen', or 'psen.'

English prepositions must come before their dependents: ‘her with’ (instead of ‘with her’) is not grammatically correct in English. Every language is made of grammatical ‘rules’ like these, though they vary widely depending on the language.

c- Duality of Patterning

- **Words and pieces of words comprise smaller but meaningless units.**

These minor speech units are *phonemes*, sounds in spoken languages, and gestures in sign languages. Phonemes distinguish between words but are not independently meaningful.

For example,

Consider the words ‘fib’ and ‘fit’: phonemes /b/ and / do not mean anything in English independently, but they distinguish between two words with different meanings.

d- Displacement

It is how language communicates things that are not immediately present in space or time.

It includes the past and future, physically distant events, and things that are mentally experienced, like stories, dreams, and emotions.

For example,

Using terms such as ‘back then’ or future tenses such as ‘will’ shows this as part of the language structure.

Displacement is one thing we, humans, can do with language. One thing we do not have to think about consciously is talk about something that is not there: it might be in the past, it might be in the future, it might be hypothetical. We can say, ‘**There is a giant squid 50 feet long, and once I was walking along the beach, I found one of the carcasses washed up’**. You could talk about what happened 10 years ago.

That could happen to some ape that happens to live near the shore. However, the ape could not communicate that to any other ape—no animal could communicate that to another animal, something completely displaced: ‘The other day I saw some queer-colored berries on a bush, and I ate them, and they were not as bad as you might think.’

e- Arbitrariness

The sounds or gestures of a word *usually* are not related in a rational way to meaning.

There is no logical relationship between the word ‘cat’ and the animal to which it refers.

That is not to say that languages do not have *iconicity*—similarity between form and meaning—but that no language is entirely (or even mostly) iconic.

For example,

When you picture the word ‘bed,’ there is no reason for a bed to come to mind. A bed is called a bed because we say so and continue to teach so.

f- Productivity

An indefinite number of linguistic constructions can be made and understood.

Another distinguishing feature is productivity, which means that you can combine the elements of language and combine them in infinite combinations. It is not just eating a banana, wanting it, or where it is. There are all sorts of things about the banana: ‘The banana tastes good,’ ‘The banana is broken,’ ‘I’m going to break this banana so I can fit it into the cooler,’ etc.

This *productivity* is sort of a hallmark of what we are doing. It is not something that animals are so good at. Also, even the hotshot chimpanzees rarely initiate conversation. If you use language and have a thought, you say something. You might be the kind of ape that happens to keep things to itself. Nevertheless, there are presumably some of them running their mouths all the time, as they do within their limits—all of that chattering that apes and chimpanzees tend to do. However, it is rare for one of these ‘talking chimpanzees’ to look up and say, **‘You know…’ Maybe there’d be something like, ‘I’d like a banana,’ but that is rare.** You would have to start it out with, ‘Banana, Washoe?’ and then she would tell you if she were here. However, in general, there is nothing along the lines of, ‘It’s a nice day.’

There are no limits to how many different versions of words can be used to communicate.

For example,

I went to the store. I was going to the store earlier. Earlier, I went to the store. There is no limit on how to express this through communication.

g- Semanticity

Parts of a language including words, pieces of words, and phrases—have a specific meaning.

Words and sentences are not just said to speak. They are spoken to communicate meaning in some way, shape, or for

For example,

The cat flushes the wall. It does not mean anything to an English speaker because it has no meaning. It is a cluster of words that do not communicate meaning.

3- Design Features Found in Animal Communication

While recursion is language-bound, some design features of human language can be found in animal communication. Human languages famously have the property called ***displaced reference***, meaning we can talk about objects and events not present in the immediate environment. Almost all animal communication seems to lack this property. There is one animal that is known for being capable of displaced reference, though, namely honeybees. A forager honeybee, which has found a food source, can communicate with other bees in the hive about the location of this food source through the so-called 'waggle dance,' as Karl von Frisch (1967) described.

3.1 Bee communication has *displacement* because bee dances can describe nectar sources discovered in the past and not immediately experienced. However, in addition to lacking recursion, bee communication has limited *productivity* because the only messages that can be conveyed are about nectar and honey production. It makes minimal use of displaced references. However, it shows that the capacity for displaced reference does not require intelligence of the human order but can evolve in animals with otherwise limited cognitive capacities.

- **Limited productivity of bee communication** also entails limited displacement: the only non-immediate entities that can be talked about are nectar sources.

3.2 **Ape Communication vs. Human Communication**

While excellent ape communication is much more complex than bee communication, there is no evidence that our fellow hominids have actual language**.** Whether they can *learn* language has been hotly debated, but the consensus among researchers is that they cannot. However, one study on the gestures of wild chimpanzees showed that they spontaneously use at least 66 gestures, none of which were taught to them by humans.

The same study showed considerable overlap between these gestures and those used by gorillas and orangutans. Orangutans can mime, a communicative behavior thought to be unique to humans. Studies like these show that great apes are sophisticated communicators and social actors. Regardless, great ape communication systems lack the key feature of human language: recursion.

3.3 The Connection Between Dolphin Communication and Human Communication

Although the question of hominid language may be resolved, there has been a new discussion over dolphin communication. Dolphins are known to have highly developed communication skills and to be able to understand abstract as well as complex language concepts.

Dolphin brains are second only to human brains concerning body-brain ratio. In part, because they are so smart, there is a lot we still do not know about dolphins' cognition, communication, and behavior.

- **Does Dolphin Communication Have Human Language Features?**

We have no evidence that dolphin communication has key human language features, like productivity or recursion. There is insufficient evidence that dolphins use words in the wild, let alone sentences. It is not necessarily disappointing: there is a lot to learn about dolphin cognition, social behavior, and communication, regardless of whether they might have language. Dolphins seem to be even more social than us. A lack of dolphin language does not diminish their intelligence but highlights how special human language is. Social and communicative behaviors are not unique to humans; only humans have developed language.

Language can be considered a capacity, behavior, or both, but status aside, it is uniquely human. All of our behaviors and accomplishments, as individuals and as a collective, rely on the foundation of language.

- Discussion and justification

The examples discussed thus far all seem to prove that animal communication differs from human language, whatever its precise definition may be, in many respects:

a- Natural languages are characterized by their *double articulation*, as has been highlighted by André Martinet in his study *La linguistique synchronique* (Paris, 1965). It means that linguistic elements can be analyzed on two different levels: on the one hand, they can be subdivided into morphemes, i.e., segments consisting of form and meaning (most minor meaningful units, called 'monemes' by Martinet), and on the other hand into phonemes, which have form but no meaning. The structure of the phonological level, on which numerous different sounds are combined according to specific rules, results from the infiniteness of natural languages. Sounds such as bird songs can only be subdivided into

meaningful units of the first level but not into smaller segments, which may alter the meaning.

b- Most animals do not need to learn the meaning of standard signals among their species; this knowledge is either wholly or partly innate in many cases.

c- Most forms of animal communication are reflexes triggered by external signals, thus based upon a situational stimulus-response pattern. Moreover, most animals cannot freshly combine communication elements in a given situation.

d- Animals cannot reach the level of linguistic abstraction and metalinguistic statements, i.e., to talk about language through language. It seems to preclude statements about the past and future. Furthermore, animals cannot express terminological generalizations through symbols.

e- The production of specific signals among animals is gender-specific. In some species, for example, mating calls are only produced by either males or females but not by both.

The differences between human language and animal communication have often been pointed out in linguistic studies. In the nineteenth century, it was scholars such (p. 219) as Jacob Grimm, William Dwight Whitney, and Georg von der Gabelentz who thematized the characteristics of animal communication; in the early twentieth century, Otto Jespersen and Jan Baudouin de Courtenay continued the discussion (see

Notions to keep in mind Human Language VS Animal Communication	
- Unlimited and infinite	- Limited and finite
- Open system	- Closed system
- Extendable &modifiable	- un-extendible & unmodifiable
- Non- instinctive	- Instinctive, not conditioned by
- Conditioned by geography	
- Full of novelty and creativity	/
- Cognitive & behavioral	
- Descriptive & Narrative	

One of the properties attributed to language is that it is a uniquely human behavior. Virtually all human beings spontaneously acquire a language without overt instructions and relatively quickly during childhood, unless they possess handicapping conditions. Researchers have not yet isolated any natural form of animal communication that embodies all of the features of language we have discussed. They have probed the communicative systems of many animals, searching for the linguistic properties that define human language. Although bees, birds, whales, dolphins, and non-human primate are capable of fairly sophisticated message exchanges (Akmajian, Demers, Farmer, & Harnish, 1995; Demers, 1989) their capacities fall short of those of young children.

Features of language that animals are not able to produce

- Negation is another feature exclusive to and present in every human language—including those found in indigenous cultures without advanced technology. Animals are not able to express negation. While some may say that their dog can "let them know" that it does "not" want to eat something by turning away from it, this is not the same as expressing negation grammatically (linguistically). -For example, you could close your eyes or be on the phone and hear someone say, "I do not want to eat these anchovies on my pizza." Even without context, visual information, knowing the person, or even seeing the person or the anchovies, you would comprehend this negative utterance perfectly if you speak the language in which it is spoken. It is another distinguishing feature between human language and animal communication. We can easily combine displacement with negation to illustrate this: Imagine a dog

explaining that it does not mind that you are out of a particular doggie treat because it liked that treat last year but does not like that treat so much anymore.

- The number of words in human languages can vary, but human languages have hundreds of thousands of words.

  Humans can break words down into separate sounds.

- Talking birds also cannot generate new sentences by combining words they have learned, nor can they segment the words they have learned. The utterances of birds cannot be broken down into discrete units. Think of a bird who has learned to say, "Polly wanna cracker." We could ask an English-speaking child to say the same sentence and then say, "Now say 'Polly.' Now, say 'want.' Say 'cracker,'" with great success, and without any crackers or Pollys nearby for visual cues. I am sure you can see how asking the parrot to do the same would be frustrating. In addition, we could ask the child to make the "p" sound, the "ah" sound in *Polly*, or the "l" sound because human language speakers produce words by combining discrete sounds. Good luck asking a parrot to isolate each sound in a word or sentence it has learned!

Can Non-Human Primates Learn Languages?

We have all heard convincing stories about non-human primates, such as chimpanzees being taught human sign language. By now, you can probably think of many aspects of human language that we would never see a chimpanzee reproduce. **Human-signed languages** have grammatical markers that make a word plural, and ways to indicate verb tense, plus many other complexities, but those features have not been produced by any chimps.

An ape named Washoe learned more than 100 signs, and Alex the African Grey also knew more than 100 words, but even if 100 could compare to the hundreds of thousands in a human language, “knowing” a language is infinitely more than memorizing words in a dictionary. From this, we are led to the conclusion that no chimpanzee has ever actually learned a human language. Research also finds that these animals use what they learned from us to play or imitate (like the parrot Alex, who sometimes chose to name every color except the correct one on purpose, or the ape, who frequently continued to sign while humans signed to her—not showing much intention to communicate).

Finally, the most important difference in the animals people have tried to teach language is that They were taught! All of these documented cases of word associations learned by animals required extensive training, from the chimpanzee in the lab to your pet dog at home. No animal has learned any amount of human vocabulary with attached meanings by mere exposure alone—they are always explicitly and painstakingly trained to do this. It is a critical and distinct difference from the process through which human children—at ages that precede being able to use a spoon or be toilet-trained—can comprehend and produce complicated sentences with clear intentions and need to communicate without instruction.

Animals do an infinite number of remarkable feats that we cannot do! It is common knowledge that dogs can smell and hear remarkably better than we can and that dolphins can hold their breath for far longer. However, just as people could not learn how to spin a spider web or see in the dark with the acuity of a cat, it is just as inaccurate to claim that a non-human primate could learn a human language at a fraction of the level that all humans do—especially when we understand and compare the process to the speed and effortlessness with which human children do so.

KEEP IN MIND

Humanness

-Human language uses symbols to communicate. Animal systems use signals, not symbols; animals do not use language.

-Animal communication differs from human language because it lacks the creativity of human language.

-The evidence that animal communication lacks creativity is that animals do not combine small units of meaning into larger ones and then recombine them again in new ways.

-Animal communication lacks creativity because it lacks the arbitrary relationship between the signs and the meanings of the signs.

-In describing the humanness of language, we have set out to distinguish it from animal communication. One key idea to remember when studying language is that communication and language are different. If we look closely at the definition of language, "Language is a system of arbitrary symbols that humans use to create meaningful communication with other users of the same language," we can see that language is used in service to communication. That is, it is a tool or a technique for achieving the goal of communication.

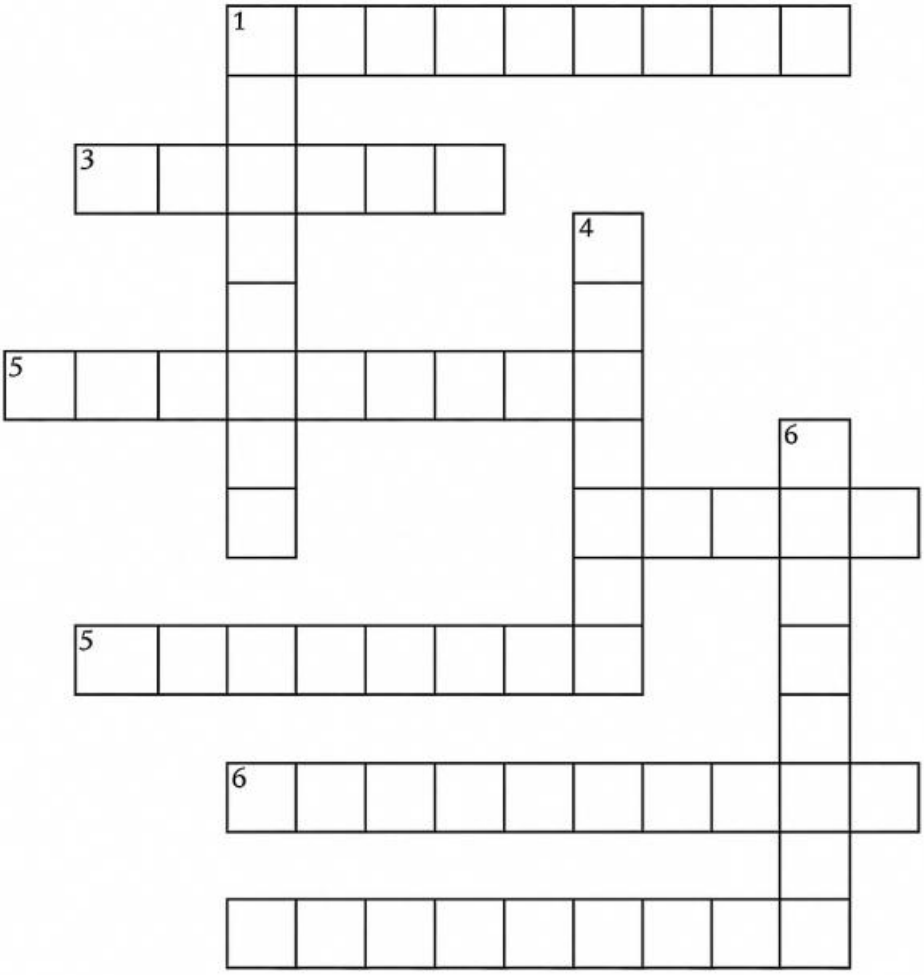
- **<u>Practice</u>**
- **Complete the table which exposes the difference between humans and animals in terms of language and communication with the appropriate characteristics.**

Ambiguity – cultural transmission – duality of patterning – arbitrariness – variety – displacement – biology – interchangeable – creativity

	HUMAN	ANIMAL
----------	Distinctive sounds, called phonemes, are arbitrary and have no meaning. However, humans can string these sounds infinitely to create meaning via words and sentences.	Other animals do not communicate by arranging arbitrary sounds, limiting the number of messages they can create.
----------	New words can be invented easily.	Animals have to evolve in order for signs to change.
----------	Humans can talk about remote, abstract, or imaginary things not happening in their immediate environment.	Animal communication is context-driven – they react to stimuli or indexes.
----------	Any human gender can use the same language.	Certain animal communications in the animal world can only be used by one gender.
----------	Humans acquire language culturally – words must be learned	The way that animals communicate is biological or inborn.
----------	Human language is symbolic, using a set number of sounds (phonemes) and characters (alphabet), which allows ideas to be recorded and preserved.	Animal communication is not symbolic, so it cannot preserve ideas of the past.
----------	On a purely biological level, the human voice box and tongue are unique and required to make the sounds we recognize as language.	Other animals have different biological structures, impacting how they make sounds.
----------	A word or sign can have several meanings	Every sign has only one meaning.
----------	Human language can arrange words into infinite ideas, sometimes called discrete infinity.	Animals only have a limited number of combinations they can use to communicate.

Time for Leisure

Crossword Puzzle: Properties of Human Language



4- The Biological Bases of Human Communication Behaviour

Objectives :

- **The learner will be acquainted with the historical background of language and the brain.**
- **The learner will discover the experiments that revealed the brain parts responsible for language production and perception.**

4.1 Historical background on neurolinguistics observations

The relationship between language functioning and the brain dates back far in history (Clarke & O'Malley, 1968). Indeed, through individuals' accomplishments, a tremendous intellectual insight was provided. Violence provided the very first insights into how the brain controls behavior.

Edwin Smith, an American, acquired a papyrus scroll, which might be the first case in which the consequences of brain injury were mentioned. The scrolls date back to 3000 BC. Indeed, forty-eight cases were discussed in this papyrus. One of the cases mentions that loss of speech skills was the result of head trauma. It was the first time I mentioned an aphasia case (loss of language abilities due to brain damage).

Trauma, which is a brain injury provoked by an external force, is still providing us with insights into brain function. Hippocratic scholars (460-370 B.C.) observed that

brain injury often resulted in contralateral (opposite-sided) paresis (semi-paralysis). Indeed, they mentioned that speech disturbances accompanied left-side brain injury and right-side paresis. However, these observations were not considered.

In the sixteenth century, a great medical scholar named Johan Schenk Von Grafenberg (1530-1598) was the first to mention that language disruption was not caused by tongue paralysis (called now Dysarhia. The ability to articulate speech sounds has been impaired. Simultaneously, G. Mercuriade (1588) first described what is known as pure alexia or alexia without agraphia. i.e., his patient could write but could not read what he had written. Frantz Josef Gall (1758-1828) hypothesized that language was localized in the frontal lobes in 1819. Besides, he was the first to identify the difference between white and gray matter in the brain.

4.2 Localization of function

Researchers first attempted to understand how language was organized within the brain in the nineteenth century by studying aphasic patients. The first behavior of any type to be localized with the human brain was articulate (spoken) language. (Young, 1974).

The French surgeon Pierre Paul Broca (1824-1880) discovered the function and dysfunction in the brain. Broca belonged to an anthropological society whose members examined humans and occasionally directed research on the brains of sick patients. Indeed, they related various behaviours to the shape or size of the cranium or places of damage in the brain. In 1861 Pr. Ernest Aubertin referred to a patient who suffered from a traumatic frontal cranial defect. The experience of applying light pressure to the frontal area while the patient spoke reveals that the patient would stop mid-word. He began speaking only when the compression ceased.

4.2.1 Broca and Leborgne

Broca encountered a patient in Paris named Leborgne. This patient lived in a nursing home for about 21 years.

4.2.1.1 Louis Victor Leborgne's situation

Louis Victor Leborgne lost the capacity to speak—or speak coherently—when he was thirty. When he was brought to Bicêtre, a mental health facility in the suburbs of Paris, he was able to say only one word: Tan. Indeed, that syllable was accompanied by varied pitch, intonation, and expressive hand motions. Still, Leborgne could only pronounce that one syllable. He had been unable to speak normally for two or three months by the time he got to the hospital. Furthermore, he would stay there until his death 21 years later, despite his family's belief that the disease might be transient because he had been effectively managing epilepsy for many years.

Louis Victor showed no symptoms of physical or mental damage save for his incapacity to talk. His mental and physical faculties were nonetheless functional and receptive, and his intelligence appeared undamaged. He tried his best to give a thoughtful response and seemed to understand everything that was required of him. He never stopped attempting to speak, even if the only word he could say was tan, which was typically uttered twice. However, within a decade, Leborgne started exhibiting other symptoms of anguish. His right arm was paralyzed first. His right leg soon did the same. He became less able to see. The same goes for his mind. Tan, the patient as he was known, eventually refused to leave his bed, and he did so for more than seven years. Leborgne got gangrene in April 1861. He was barely able to move due to the inflammation that had spread across his right side. His operation was admitted on April

11, 1861. Additionally, it was there that he first encountered Pierre Paul Broca, a French physician.

Broca focused on studying language. He was intrigued by Leborgne. Despite Gangrene, he chose to assess the patient's mental abilities to see if he was unable to assess the severity of his illness. Because Leborgne was right-handed, it was a challenging task. He was unable to write in addition to not being able to speak. It would be hard to communicate. However, Leborgne could make movements with his left hand, and he was surprisingly in control of numbers, even though many of the gestures were unintelligible. He was able to read a watch's time accurately. He was aware of the exact duration of his stay at Bicêtre. He was still sharp in several aspects, even though his faculties had deteriorated. However, regarding speech, Broca's primary focus, Leborgne, was utterly forgotten. No matter the subject, Broca would always reply, "Tan, tan, combined with varied expressive gestures," as he would later explain his condition. He could no longer utter a syllable, which he typically repeated twice. For this reason, he is referred to as Tan throughout the hospital. Broca referred to the loss of articulated speech as aphasia, or deficiency aphémie. It is currently referred to as Broca's aphasia.

Louis Victor Leborgne died on April 17 at around 11 a.m. His age was fifty-one. A substantial lesion in the frontal area, more precisely in the posterior inferior frontal gyrus, which roughly corresponds to Brodmann's areas 44 and 45, was discovered during a brain biopsy. Leborgne is remembered today as Patient Tan, one of the most well-known patients in psychology history. Furthermore, we recall that his brain served as the foundation for Broca's Area, one of the language regions in cognitive psychology that has been examined the most.

4.2.2.2 Lazar Lelong's Situation

A few months after Leborgne's death, Broca met Lazare Lelong, an 84-year-old grounds worker who was being treated at Bicêtre for dementia. A year earlier, Lelong had, like Leborgne, lost the ability to speak. In contrast to Leborgne's ever-present *tan*, however, he retained the ability to say a few words that held real meaning. Five, to be exact: *oui* (yes), *non* (no), *tois* (from trois, or three; Lelong used it to mean any number whatsoever), *toujours* (always), and *Lelo* (his attempt to say his name).

When Lelong died, his brain, too, was autopsied. What Broca found—a lesion that encompassed much the same area as had been affected in Leborgne's brain—confirmed a suspicion that had been growing ever-stronger in his mind: our speech function was localized. A specific area governed our ability to produce meaningful sounds—and when it was affected, we could lose our ability to communicate. However, the rest of our intelligence and language comprehension would remain intact. Not only was speech function localized, but it could be dissociated into specific areas: comprehension, production, and formation. An injury to one part did not necessitate an injury to others.

The phrenologists who had preached localization of function may have been more off-base than not, but they had gotten it right in one way. We *did* have parts of the brain that were specialized for specific functions. Injure the responsible part, and the function would suffer along with it.

4.3 Earlier similar studies

Broca was far from the first to study the disturbance of speech in the brain. As early as 1770, the German physician and medical writer Johann Gesner published a treatise on a topic he called speech amnesia, *Die Sprachamnesie*, where he described the same type of fluent aphasia that the neurologist Carl Wernicke would make famous over a hundred years later, where patients produced a string of fluent words—that were, alas, gibberish. Not only did Gesner describe the case of KD, along with five later cases, in terms remarkably similar to our current understanding of aphasia, but he made a logical leap that was far beyond the medical knowledge of the day: he realized that this so-called speech amnesia was largely separate from other types of idea generation – and so, the responsible brain injury could well be selective in its impact.

4.4 Localization of Functions

The phrenologists who had preached localization of function may have been more off-base than not, but they had gotten it right in one way. We *did* have parts of the brain that were specialized for specific functions. Injure the responsible part, and the function would suffer along with it.

In 1824, the French physician Jean-Baptiste Bouillard took Gesner's ideas further. Bouillard proposed a remarkable notion: brain function may well be lateralized. In other words, our two hemispheres are not created equal. An injury to the left part of the frontal lobe did not necessarily produce the same impediment as a mirror injury on the right. Bouillard argued, show me someone who suffered a speech impairment while alive, and I will show you someone whose brain, upon autopsy, will have damage in

the left frontal lobe. In 1848, he went as far as to offer 500 francs to any person who could produce the brain of someone who had suffered a speech impairment that did *not* contain damage to the left frontal lobe. As far as we know, his challenge went unanswered.

Bouillard's ideas met with widespread opposition. His notion of such specific functional localization appeared to validate some of the claims of the discredited phrenologists—and that was not a direction the medical establishment wanted to go in. In 1852, however, Bouillard's son-in-law, Ernest Auburtin, came to the aid of his cause. He even went as far as to present a demonstration of his father-in-law's theories in a living patient – as high a proof as they come. The patient in question had attempted to commit suicide by shooting himself in the head. He had only been partially successful and had managed to shoot away the frontal bone—but the lobes underneath had remained intact and were now exposed.

The patient was admitted to Hôpital St. Louis. His intelligence and speech were intact, and he survived for several (what I imagine as excruciating) hours, during which he was subject to an extraordinary experiment. As the patient spoke, a physician applied the flat surface of a spatula to different parts of his exposed brain. With gentle pressure on the frontal lobes, his speech stopped. When the pressure was removed, speech returned. Other functions and consciousness were not affected.

Remarkably, Auburtin's demonstration went largely unnoticed, and it was not until Broca's 1861 case that the full implications of his and Bouillard's work became apparent.

4.4.1 Speech Production Localization

Leborgne's brain presented an opportunity to test and refine Bouillard and Auburtin's theories. However, it was not until 1865, four years after the famed Tan autopsy, that Broca was finally ready to assert that speech production was localized in a specific part of the left frontal lobe, which now bears his name. By that time, he had described the brains of 25 additional patients who had suffered from aphémie and concluded that speech articulation was indeed controlled by the left frontal lobe, just as Bouillard and Auburtin had suspected.

Broca wrote that brain function was not entirely fixed. With time—and therapy—individuals could improve. Most aphasics, he noted, would begin to regain some of their abilities within weeks or become better able to function even with their loss – especially if they were allowed to practice. Could it not be, Broca wondered, that the right hemisphere was taking over some of the functions of the left? In this question, Broca went beyond anyone who had come before him. He anticipated our current understanding of adult brain plasticity, the ability of the brain to learn new ways of function when old ways were no longer an option.

Broca may have been, in many ways, prescient. Nevertheless, he was also not altogether correct. As early as 1906, Pierre Marie—at one time a student of Broca's—noted that Broca's aphasia could be caused by much broader lesions than the ones identified by Broca himself. For instance, injury to the insula and basal ganglia could result in many of the same symptoms. In the 1970s and 1980s, researchers determined that the damage could be broader still. The surrounding frontal cortex and underlying

white matter, the insula, basal ganglia, and parts of the anterior temporal gyrus seemed to be somehow involved in speech production.

Even Leborgne's original lesion, when scanned with modern fMRI technology, extended beyond the areas initially identified by Broca. In 2007, a team of researchers led by Nina Dronkers at the University of California, Davis, decided to reexamine the brains he had carefully preserved. It would mark the third time Leborgne's brain was scanned and the first-time researchers would revisit Lelong's brain.

To examine the extent of both the cortical and subcortical lesions of each brain, Dronkers's team used high-resolution volumetric MRI. What they saw was damage that went far further than Broca had suspected. In both cases, the lesions extended to the superior longitudinal fasciculus, a network of fibers that connects posterior and anterior language regions, and had gone unobserved by Broca (he had decided to preserve the brain intact rather than slice it open). Moreover, while Broca's Area was indeed affected, it was likely not the only culprit in the severity of the observed aphasia. Indeed, the researchers argued that if the damage had been contained to Broca's Area, the speech disruptions would likely have been milder and less pervasive. Broca was correct in localizing speech production. He was slightly less so in his understanding of how extensive that localization may be.

Still, the extent of Broca's contribution to psychology and neuroscience cannot be underestimated. His work set the stage for much of what we now term cognitive neuroscience and neuropsychology. Two significant principles that now govern how we think about the brain—the localization and lateralization of function and the notion that impairment in one area of cognition (i.e., language) as a result of brain damage

does not necessarily signify a general impairment in intellect—are in large part a result of Broca's pioneering work. (Wilder Penfield's maze-dazed mice largely owe their increasingly severe brain damage to Broca's research and conclusions.) Without Broca, our understanding of language would not have likely evolved as quickly as it did—or have significantly impacted the study of other cognitive processes.

However, perhaps his most incredible legacy is one we do not often consider, so engrained has it become in studying psychology and cognition: the habit of learning from the diseased brain. Looking at the moments when the brain goes very wrong, we understand how it manages to go right so often. When we see lesions, we can trace the resulting injury to the underlying function. When we see recovery, we can trace the neural reorganization that made it possible.

- **Practice**

Group Activity: Neurolinguistics Comprehension Questions

Instructions:
Divide the class into two groups: Group A and Group B.
Each group will ask the following questions to the other group. Prepare your answers and be ready to discuss.

Group A Questions (to ask Group B)

1. What is the significance of the Edwin Smith papyrus in the history of neurolinguistics?
2. What was Johan Schenk Von Grafenberg's significant contribution to neurolinguistics?
3. How did researchers in the 19th century attempt to localize language functions in the brain?
4. Who was Louis Victor Leborgne, and what was unique about his condition?
5. What was found in Leborgne's brain after his death?
6. What did Johann Gesner propose in his 1770 treatise about speech amnesia?
7. Describe the experiment conducted by Ernest Auburtin on a living patient.
8. According to Broca, What does the concept of brain plasticity mean?
9. What is Broca's lasting legacy in the field of neurolinguistics?

Group B Questions (to ask Group A)

1- How did Hippocratic scholars contribute to early understandings of brain function and speech?

2- Describe the early observations related to alexia without agraphia.

3- What did Pr. Ernest Aubertin observe when applying pressure to a patient's frontal area?

4- How did Broca determine that Leborgne's intelligence remained intact?

5- How did Lelong's case support Broca's theories?

6- What was Bouillard's hypothesis about lateralization, and how did he try to prove it?

7- What conclusions did Broca reach by 1865 about speech production?

8- How have modern technologies like MRI changed our understanding of Broca's findings?

5- Human Brain and Language

Objectives:

- **The learner will be acquainted with parts of the brain responsible for language.**
- **The learner will discover the different damages to the brain that can affect language perception and comprehension.**

5.1 Introduction

When we think about our right and left hands, if we are right-handed, then the right hand is more skilled at writing, drawing, or reaching for different things. In contrast, your left hand has more trouble forming perfect letters and making the correct movements to cut with scissors or pour water.

When we look at the brain, we also see differences based on the right and left hemispheres or sides of the brain. Like many other parts, we have two brains: one on the right and one on the left sides. The brain is similar to our hands in that the right and left brains are skilled at different functions. The idea that each brain hemisphere is specialized for particular skills or behaviours is known as brain lateralization.

5.2 Facts about the Human Brain

Interesting brain facts! • About 1.4 kg (2% of body weight) mass of fat & protein with 75% water content • W = 140 mm, L = 167 mm, H = 93 mm. The left hemisphere is larger than the right • 40% grey matter (outer covering: cerebral cortex) and 60% white matter (myelinated fiber tracts traveling from the cerebral cortex) • Uses 10 – 23 watts of energy, consuming 20% oxygen from the body. He goes unconscious in 8 – 10 sec. w/o oxygen • 100 billion neurons (166 times human population & would take 171 years to count! (Tony Buzan) • 2,50,000 neurons/ minute in early development & stops growing at 18 • 12 pairs of cranial nerves & 31 pairs of spinal nerves • Thinking initiates electro-chemical-neuro-impulse transmission from 0.5 m/sec - 120 m/sec. (434 km/hr)

The brain has 4 areas called lobes • Frontal • Parietal • Temporal • Occipital

- The Frontal Lobes (Problem-Solving): The most significant part moves your body •Highly developed • Forms your personality
- The Parietal Lobes (Touching) • Two major divisions, Anterior and posterior • Senses hot and cold, hard and soft, and pain • Taste and smell • Helps integrate the senses
- The Temporal Lobes (Hearing) • Processes auditory stimuli • Subdivisions into • Wernicke's Area (associated with speech comprehension) • Broca's Area (associated with speech production)
- The Occipital Lobes (Seeing) • Located at the lower central back of the brain • Processes visual stimuli. Two sides or hemispheres of the brain: LEFT and RIGHT • We have two cerebral hemispheres connected by the corpus callosum

• This is a bundle of nerves that allows each side of the brain to communicate with each other • Each side of the brain processes things differently •

5.3 - Definition of Lateralization

Brain lateralization refers to the idea that the right and left sides of the brain are specialized for particular skills. It represents a fundamental principle of the brain's organization. The division of labour between the right and left hemispheres allows for more complex behavior.

The brain controls motor and sensory activities as well as thought processes. It is divided into two parts called the cerebral hemisphere: the right and the left. Such separation of function is called lateralization. "The brain undergoes a gradual process of lateralization during which the left brain hemisphere and the right hemisphere develop their specialized function." (Lenneberg; 1967, p 158)

Although lateralization is the division of tasks in the brain, there is no complete separation into the left or right; both sides are almost always involved in any given task. The sides of the brain are in constant communication despite two distinct hemispheres. Any time you use your left brain, your right brain is aware of what is happening. To see how connected the right and left brains are, try putting your head with one hand and rubbing your stomach with the other. Doing so is almost impossible because each side of the brain sends a different message to each arm. As those messages conflict, we rub or put, but not both simultaneously. Current evidence does suggest that the left and right hemispheres differ in some way in their function. This difference is not dichotomous but ranges along a continuum.

5.4 Language deficits due to brain damage

The study of language deficits due to brain damage has a long history, as mentioned above. The localization of language in the brain was one of the earliest examples of localization to be discovered, and it served as a significant motivation for other brain research.

In 1864, the French surgeon Paul Broca showed patients with a particular area in the left frontal lobe. He also pointed out that corresponding right hemisphere damage showed little effect on speech. The area in question has come to be known as ***Broca's area,*** and the set of symptoms is *Broca's aphasia*. Broca's aphasics seem to understand what is said to them, but their speech is slow, effortful, and poorly articulated. They have evident difficulty in finding words. Here are two representative quotes from Broca's aphasics.

a- Me … buil-ding…chairs no, no cab-in-nets.
One, saw…then, cutting wood…working…
b- Cookie jar…fall
over…chair…water…empty…ov…ov…
(Examiner: "overflow") Yeah

Example 1:

- **Discussion**

Notice that these quotes are not just slowed-down sentences. They are missing much of the grammatical tissue that holds everyday speech together – things like articles, auxiliary verbs, and tenses. For this reason, Broca's aphasia is also called ***agrammatism***.

Karl Wernicke identified quite different sets of symptoms in 1874. In people with ***Wernicke's aphasia,*** Broca's area is intact, but there is damage in the left temporal lobe, in an area now called ***Wernicke's area***. The speech of Wernicke's aphasics is fluent – if anything, it tends to come out in a big rush. Taking a few words at a time makes a little sense, but the larger parts do not fit at all, and there are often insertions of nonsense words.

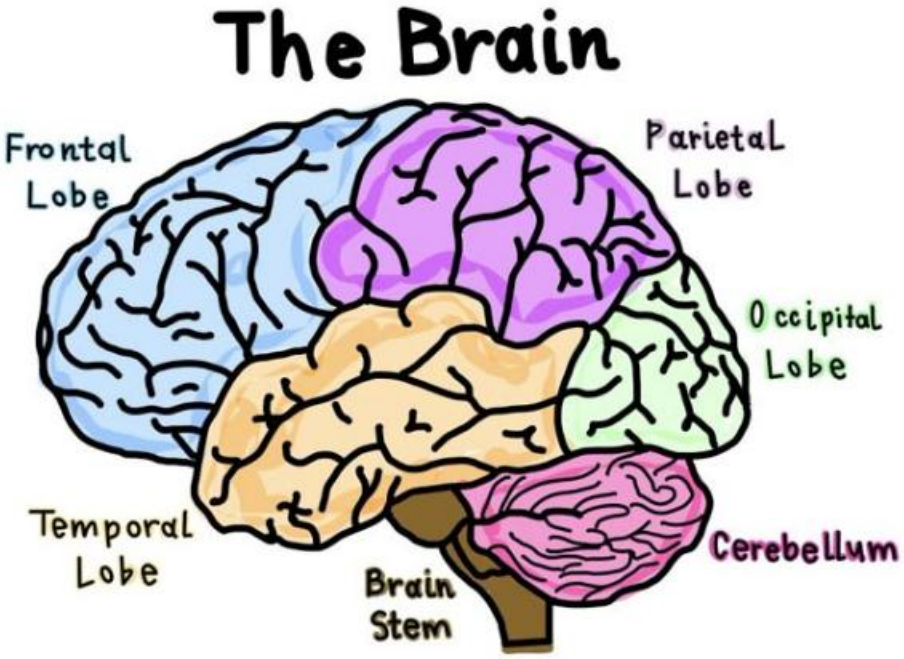
Example 2:

a- **Examiner : "What kind of work have you done ?"**
The kids, all of us, and I, we were working for a long time in the … you know… it's the kind of space, I mean place rear to the spedwan…
Examiner: "Excuse me, but I wanted to know what work you have been doing." If you had said that, we had said that, poomer, near the fortunate, forpunate, tamppoo, all around the fourth of martz. Oh, I get all confused.

b- **Well, this is … mother is away here working out o'here to get her better, but when she's working, the two boys looking in the other part. One their small tile into her time here. She's working another time because she's getting, too.**

Discussion:

Wernicke’s aphasics make much sense; they do not understand much of what you say to them. For instance, for the most part, they do not follow instructions well. By contrast with Broca’s aphasics, who are painfully aware of their deficits, Wernicke’s aphasics often seem unaware that they are not making sense, and they become irritated at people who cannot understand them.



Source:

https://www.pinterest.com/pin/goodnotes-anatomy-brain-diagram-aesthetic-735212707929250833/

There are many other sorts of language deficits due to brain damage:

- Anomic aphasics have word-finding deficits, more extensive versions of the experiences all people occasionally have in being unable to think of a word or a name.
- Conduction aphasics have relatively fluent, meaningful speech but with many pronunciation errors; oddly, they have great difficulty repeating sentences spoken to them. A class of deficits involves reading: some patients can speak

but not read, read but not write, write but not read (even what they have just written), and other combinations.

Keep in Mind

Aphasia

Aphasia is defined as an acquired impairment in the use of language due to damage to certain parts of the brain • This damage could be caused by injury, stroke, or seizures • The language deficits include difficulties in language comprehension and execution

- Major Types of Aphasias :

All aphasias can be classified into two groups • Fluent aphasias – The inability to understand the language of others and the production of less meaningful speech than usual, and Non-fluent aphasias – Difficulty producing fluent, articulated, or self-initiated speech

- Types of Fluent Aphasias •

Wernicke's aphasia – People with this type of aphasia have difficulty or inability to understand others' speech and produce meaningless speech – They generally do not realize their speech is meaningless and are surprised when others cannot understand them – They may demonstrate paragrammatical speech; which means they use inappropriate morphemes. For instance, a person may say to you instead of for you or substitute the word pork for fork – This type of aphasia is produced by damage to Wernicke's area of the brain.

More Types of Fluent Aphasia •

- Conduction aphasia – The main symptom of this type of aphasia is difficulty repeating something someone has just said – People with this condition have relatively good language comprehension, and their conversational speech is only mildly impaired – This type of aphasia is produced by damage to the left temporoparietal region – It has been suggested that this type of aphasia could come about because of deficits in short term memory or phoneme selection

- Anomic aphasia is characterized by difficulty finding names and substituting indefinite nouns and pronouns with substantive words. For instance, people with this affliction will use words like thing,

stuff, or it instead of automobiles, groceries, or furniture. – There are very few cases of pure anomic aphasia, and it is therefore difficult to find the area of the brain responsible – Some have suggested that it is a mild form of Wernicke's aphasia

- Transcortical sensory aphasia – Symptoms of this type of aphasia are fluent speech with some anomia, poor language comprehension, and echolalia. – Echolalia is the tendency to repeat something someone has just said. For instance, if a person with this type of aphasia is asked, "What is your name?" they are predisposed to repeat the question repeatedly instead of answering it. – This aphasia may be caused by damage surrounding and including Wernicke's area

Non-Fluent Aphasias •

- Broca's aphasia – This type of aphasia manifests with difficulties initiating well-articulated conversational speech – The language that is produced is slow, labored, and agrammatical, which means words like a, an, or the and verb tense is left out of their speech – This aphasia is produced by damage to Broca's area of the brain.
- Transcortical motor aphasia – People with this aphasia do not speak unless they are strongly encouraged to do so, and when they do speak, it is labored and non-fluent – Interestingly enough when these people are verbally presented with long, complicated sentences, they can repeat them fluently – This aphasia is produced by damage to the premotor cortex anterior and superior to Broca's area

Broca's Aphasia VS Wernicke's Aphasia

Broca's Aphasia	Wernicke's Aphasia
Broca's aphasia is characterized by nonfluent speech. However, by and large, speech perception is not affected, and language comprehension is normal. Broca's aphasics have a halted speech pattern and have difficulty speaking sentences. There is also evidence that Broca's aphasics have deficits in understanding complex grammar relative	Damage to Wernicke's area results in deficits in language comprehension, a condition called Wernicke's aphasia. Severe Wernicke's aphasia may result in a complete absence of understanding language. Speech is, by and large, fluent, but it may appear not to make sense to listeners, as the patients themselves cannot understand what they are saying. This meaningless speech is sometimes called jargon aphasia. Unlike a person with

to controls, even though their word comprehension shows no such deficit.	Broca's aphasia, a person individuals with Wernicke's aphasia often shows a blithe indifference to their disorder and seems unaware of their problems.

Symptom	**Wernicke's aphasia**
Comprehension of spoken material	Impaired, mild to severe
Segmental phonology	Impaired: phonemic paraphasia, neologism, jargon
Word selection	Impaired: semantic paraphasia, empty speech
Word semantics	Normal?
Fluency (production of speech)	(overly) fluent: logorrhea
Production of writing	Normal
Use function words	Normal
Grammaticality	Normal or mildly impaired: paragrammatism
Repetition of what others say	Impaired: (no evidence)
Conversational proficiency, e.g., turn-taking	Normal
Concern about impairment	little to none
Concern about errors	little to none
Short-term retention and recall of verbal materials	Impaired: (no evidence)

Practice

Choose the best answer.

1- Which part of the brain is responsible for processing visual information?

a- Temporal lobe
b- Occipital lobe
c- Parietal lobe
d- Medulla

2- A person with an injury to her frontal lobe may have difficulty
a- Remembering past events
b- Reasoning and making decisions
c- Seeing
d- Sleeping

3- The central nervous system consists of the
a- Brain and peripheral nerves
b- Automatic and somatic nervous system
c- Brain and spinal cord
d- Pons and frontal lobe

1- Read the given description and decide which kind of aphasia

Problems:

- They did not know why people could not understand him
- He could not participate in his favorite hobbies
- His wife had been told that he was dangerous. The police had put him into a psychiatric facility because they could not understand him.
- Told he was never going to get better
- His wife was frustrated because they could not communicate anymore
- He wanted to order for himself and his wife at a restaurant. He also wanted to order pizzas to his house and email with his grandchildren.

- He spoke using intonation and conversational rhythm, but only about 2% of his words made sense. For example, "the kicker mast the sunt." Additionally, he could not understand much of what was being said to him. His social network was a local Lodge. Unfortunately, it is crucial to speak well and to memorize information. He had little usable reading and writing.

6- Theories and Models of Language Acquisition (A)

Objectives:

- To know the language system a child acquires
- To Explain theories that interpret L1 acquisition
- To Explain the role of caretaker speech in L1 acquisition
- To Explain how children develop morphological, syntactic, and semantic language systems
- To Reveal the importance of the theory of universal grammar

6.1 Introduction

Language acquisition is a complex and unique human quality for which no theory can thoroughly explain how language is attained. However, most of the concepts and theories we do have explaining how native languages are acquired go back to the approaches put forward by researchers such as Skinner, Chomsky, Piaget, and others. Most modern theories we have today have incorporated aspects of these theories into their various findings.

Acquiring Vs. Learning

Language Learning refers to learning about a language, its sound system, and its structure. It is essentially an intellectual exercise. Language acquisition means absorbing a target language's sound system and structure, ideally without thinking explicitly about the language's structure.

Language acquisition has a different approach. Firstly, there is an environment with an adequate context that will enable one to acquire the language most efficiently. The best example is how children learn to speak and communicate.

A child learns subconsciously without thinking of grammatical rules as he/ she needs to communicate in the family. They may say 'children's' instead of 'children' and may be entirely understood because the importance is on the communication text, not the form. It is how all of us acquire our first language.

'*The result of language acquisition… is subconscious. We are generally not consciously aware of the rules of the languages we have acquired. Instead, we have a feel for the correctness. Grammatical sentences "sound right" or feel right, and errors feel wrong, even if we do not consciously know what rules were violated."*

(Krashen, 1982, p10)

"*We will use the term "learning" from now on to refer to conscious knowledge of a second language, knowing the rules, being aware of them, and being able to talk about them. In non-technical terms, learning is 'knowing about' a language, known to most people as 'grammar' or 'rules.' Some synonyms include formal knowledge of a language or explicit meaning."*

(Krashen, 1982, p10)

6.2 Theories and Models of Language Acquisition

Many theories have been put out to explain how young children pick up language comprehension and speech. It is critical to understand that they should not be viewed as merely opposing beliefs that are sequentially replaced. Although behaviorism is thought to provide only a limited explanation today, each theory has contributed to our understanding of the process by highlighting distinct elements.

a- Behaviourism

The term “Behaviorism” was coined by John B. Watson (1913), who based his research on Ivan Pawlow’s findings concerning classical conditioning. Behaviourism concerns human behavior's objective and observable components and how they can be caused or changed. Behaviorism aims to discover laws that rule the relationship between stimuli and specific responses (reactions), considering the resulting consequences.

The behaviourist psychologists developed their theories while conducting experiments on animals. They observed that rats or birds, for example, could be taught to perform various tasks by encouraging habit-forming. Researchers rewarded desirable behavior. It was known as positive reinforcement. Undesirable behavior was punished or not rewarded, known.

The behaviourist B.F.Skinner suggested this theory as an explanation for language acquisition in humans. In verbal behavior (1957), he stated:

> “The basic processes and relations which give verbal behavior its special characteristics are now fairly well understood. Much of the experimental work responsible for this advance has been carried out on other species, but the results have proved surprisingly free of species restrictions. Recent work has shown that the methods can be extended to human behavior without serious modification.” (Cited in Lowe and Graham, 1998, p 68)

Skinner described language as behaviour that, as such, is learned: "A child learns verbal behavior when utterances relatively lacking in pattern, and which are selectively reinforced, gradually take on forms that produce the appropriate consequences in a given verbal community" (Skinner, 1957, p. 40). From his point of view, language was learned through verbal operants controlled by the situation, including the social context, the individual's history, and the complex stimuli in the actual situation. One type of operant is the mand (equivalent to a command), which is reinforced by someone carrying it out. Another is tact (equivalent to a declarative), which is reinforced by social approval (Cook, 2008).

Skinner mentioned that a child is in the imitation phase; indeed, he repeats what his parents or carers say. A successful attempt receives a reward; when the adult recognizes a word spoken by a child, he will praise the child and give what he is asking for. As a result, successful utterances are reinforced while unsuccessful ones are forgotten.

- **Discussion**

Behaviourism's theory limitations

Chomsky‟s Criticisms: - Chomsky argues that the behaviourist theory fails to recognize what has come to be called „the logical problem of language acquisition.‟ - This logical problem refers to the fact that children learn more about the structure of their language than they could reasonably be expected to learn based on the samples of the language they hear.

Chomsky (1959) argues that Skinner does not acknowledge the internal structure of the learner or how they process input information. In that regard, this theory fails to explain why children still make mistakes in the first stages of language acquisition even though they have received the correct input. Therefore, Behaviorism does not explain the mental processes involved in language learning, distancing itself, for instance, from the Sociocultural perspective, which accounts for both the external stimuli and the internal mental structure. - Children do not learn and reproduce many sentences but routinely create new sentences they have never learned. - They internalize rules rather than strings of words (e.g., it breaked /mommy goed). - The language the child is exposed to in the environment is confusing. (e.g., false starts, incomplete sentences, or slips of the tongue) - Children are not systematically corrected or instructed on language points. Parental corrections are inconsistent or even non-existent. - When parents do correct, they tend to focus on meaning and truth values and not on language itself.

- Structures and rules of a language could not be assimilated simply by imitating individual utterances.
- Children's mistakes show that they imitate, try to work out and apply rules. For example, ‘ed,’ the simple past of regular verbs, is used for referring to the past of irregular verbs:

Rised / Instead of ROSE

Seted/ instead of SET

In this case, the child is not copying an adult but **over-applying a rule.**

The child discovered that past tense verbs are formed by adding (ed) that sounds a /d/, /t/, or /Id/. Since there are irregular verbs that the child ignores, he makes this kind of mistake. These kinds of mistakes are known as intelligent mistakes or virtuous errors.

- Most children go through the same stages of language acquisition, and there is a definite sequence of stages. They do not skip **developmental milestones.**
- Children who have not acquired language by seven will never entirely catch up. So, imitation here cannot solve the problem.

7- Theories and Models of Language Acquisition (B)

7.1 Innateness

Noam Chomsky mentioned criticism of the behaviourist theory in 1957. He emphasized the **impoverished language input children** receive. What the child hears is only a small sample of language. Chomsky asserted that children must have an **inborn faculty for language acquisition.** Regarding this theory, the process is **biologically determined-** the human species has evolved a brain whose neural circuits contain linguistic information at birth. The child's natural predisposition to learn language is provoked by hearing speech; the child's brain can interpret what s/he hears according to the structures it already contains. "Universal Grammar permits all children to acquire the language of their environment during a critical period of their development" (Lightbown & Spada, 2006, p. 35). In other words, the UG claims that all humans inherit a language faculty that shapes all languages' forms. Hence, it comprises the system of rules, principles, and conditions that are properties of human languages. In this manner, it gives significant importance to the mind and visualizes learning as a set of parameters and principles (Cook, 2008). This natural faculty is known as the **Language Acquisition Device (LAD).** He stated that all human languages share common principles. It means they all have words for things and actions: verbs and nouns).

Chomsky assured that the LAD contained **specific knowledge about language,** and Dan Issac Slobin has proposed that it may be more like a mechanism for working out language rules.

The child seems to be born not with a set of linguistic categories but with some process mechanism- a set of procedures and inferences rules, if you will – that he uses to process linguistic data. When applied to the input data, these mechanisms are such that the child ends up with something that is a member of the class of human languages. The linguistic universals, then, result from an innate cognitive competence rather than the content of such a competence. (cited in Russel, 2001). Chomsky (1957) argued that language is the product of an unlearned, biologically-based, internal mental structure. Because the rules that underlie a language are too complex to be acquired by children in a few short years, some aspects of language must be innately specified. In short, many aspects of language are not learned but are a part of our biological endowment.

Discussion

- **Fact in favour of the innateness theory**

Several language study areas have supported the idea of an innate language faculty.

- Slobin (1977) pointed out that human anatomy is peculiarly adapted to speech production, unlike apes. Humans have evolved a vocal tract that precisely articulates a vast repertoire of vocal sounds. Moreover, Neuroscience has also identified specific brain areas with distinctly linguistic functions, such as Broca's and Wernicke's areas. People who suffer from a stroke have provided valuable data, depending on the site of brain damage. Indeed, they may suffer a range of language dysfunctions, such as problems with finding words and the inability to interpret syntax. Apes, the subject of many experiments aimed at teaching them to communicate, have proved to be able to learn individual words but have little or no grammatical competence.

- The linguist Derek Bickerton has studied the formation of Dutch-based creoles in Surinam. Escaped enslaved people, living together but having different language groups, were forced to communicate using very limited Dutch. This situation results in a restricted form of language known as a pidgin. The children of these enslaved people turned the pidgin into a whole language. Known by linguists as a creole. They were unaware of the process, but the outcome was a language variety that follows consistent rules and has a full expressive range.
- **Limitations of Chomsky's theory**
- Nativist theory has been criticized on several counts. Linguists have failed to specify the nature of universal grammar. Many linguists have speculated that this may not be possible. Grammar is not learned as rapidly as expected if a great deal of innate knowledge is assumed.
- Chomsky's work on language was theoretical. He was interested in grammar, and much of his work consisted of complex explanations of grammatical rules. He did not study real children. The theory relies on children being exposed to language but takes no account of the interaction between children and their carers.

- **Facts to support the limitations**

In 1977, Bard and Sachs published a study of a child named Jim, the hearing son of deaf parents. Jim's parents wanted their son to learn speech rather than the sign language they used to communicate. He watched much television and listened to the radio. He received frequent language input; however, Jim's progress was limited. As a result, a speech therapist was enlisted to work with him. A great emphasis is placed on

how real children develop language to fulfill their needs and interact with their environment, including others.

8- Theories and Models of Language Acquisition (C)

8.1 The Cognitive Theory

Jean Piaget was a Swiss psychologist famous for his four stages of cognitive development for children, which included language development. However, children do not think like adults, so they must actively construct their understanding of the world through their interactions with their environment before developing language. A child has to understand a concept before he or she can acquire the particular language that expresses that concept. For example, children first become aware of a concept such as relative size, and only afterward do they acquire the words and patterns to convey that concept. A young child cannot voice concepts unknown to them; therefore, once they learn about their environment, they can map language onto their prior experience. A good example of this seriation is that there will be a point in a child's intellectual development when s/he can compare objects concerning size. Piaget suggested that a child who had not yet reached this stage could not learn and use comparative adjectives like "bigger" or "smaller." An infant's experience of a cat is that it meows, is furry, and eats from a bowl in the kitchen; hence, they develop the concept of cat first and then learn to map the word "kitty" onto that concept. Language is only one of the many human mental or cognitive activities, and many cognitivists believe that language emerges within the context of other general cognitive abilities like memory, attention, and problem-solving because it is a part of their broader intellectual development. However, according to Goodluck (1991), once language does emerge, it usually occurs within certain stages, and children go through these stages in a fixed order that is universal to all children. There is a consistent order of mastery of the most common function morphemes in a language, and simple ideas are expressed earlier than more

complex ones, even if they are more grammatically complicated. Piaget's cognitive theory states that children's language reflects the development of their logical thinking and reasoning skills in stages, with each period having a specific name and age reference. There are four stages of Piaget's cognitive development theory, each involving a different aspect of language acquisition:

8.2 Stages of Piaget's cognitive development theory

- **Sensory-Motor Period-** (birth to 2 years) Children are born with "action schemas" to "assimilate" information about the world, such as sucking or grasping. During the sensory-motor period, children's language is "egocentric," and they talk either for themselves or for the pleasure of associating anyone who happens to be there with the moment's activity.
- **Pre-Operational Period-** (2 years to 7) Children's language makes rapid progress, and the development of their "mental schema" lets them quickly "accommodate" new words and situations. Children's language becomes "symbolic," allowing them to talk beyond the "here and now" and about past, future, and feelings.
- Egocentrism- Involves "animism," which refers to young children's tendency to consider everything, including inanimate objects, as being alive. Language is considered egocentric because they see things purely from their perspective.

Operational Period- (7 to 11 years) and (11 years to adulthood) Piaget divides this period into two parts: the period of concrete operations and the period of formal operations. Language at this stage reveals the movement of their thinking from

immature to mature and illogical to logical. They can also "de-center" or view things from a perspective other than their own. At this point, children's language becomes "socialized" and includes questions, answers, commands, and criticisms.

- **Discussion**

- **Advantages of Cognitive theory**

- One strength of the cognitive approach is that it has many practical applications. For example, the Baron-Cohen et al. study demonstrated how the theory of mind was a deficit of autism and provided a new test for the Theory of mind. The test could then be used again to help determine if somebody has autism, whilst the knowledge that people with autism or Asperger's syndrome lack theory of mind can help us better understand what autism consists of and how to accommodate this into school or work situations. Studies such as Loftus and Palmer's experiment into leading questions have also greatly impacted forensic psychology and eyewitness testimony. Therefore, this is an advantageous approach with many contributions to psychology and society.
- The cognitive approach heavily relies on experiments as its primary research method. For example, Loftus and Palmer used a lab experiment to investigate the effect of leading questions on memory, Baron-Cohen et al. used a quasi-experiment to investigate the theory of mind, and Fisher et al. used a field experiment to investigate the effects of cognitive interviewing techniques training on detectives' performance in eyewitness interviews. Experiments allow for cause and effect to be determined (which strengthens the advantage of having practical applications), but more importantly, allow for high control over

confounding variables. It means that cognitive studies are somewhat scientific and have good internal validity as extraneous variables are controlled.

Disadvantages

- The main disadvantage of the cognitive approach is that it refers to cognitive processes we cannot directly observe. It relies heavily on inference. Critics of Loftus and Palmer's leading questions experiments pointed to the validity of the re-constructive memory hypothesis, as we cannot be sure that memory has changed as the researchers could not observe memories. However, only the answers given may have resulted from demand characteristics or poor judgment of speed. Therefore, the cognitive approach may not be scientific because what is taken from the findings is subjective. Assuming findings result from invisible processes is heavily subjective and could lead to self-fulfilling prophecies and internal validity being raised as issues.

The cognitive approach has the key advantage of practical and useful applications but a key disadvantage of being unable to observe the supposed causes of behaviour. The scientific nature of the approach is worthy of discussion as it can be both a strength and weakness, as is its reductionist nature.

9- Theories and Models of Language Acquisition (D)

9.1 Input or Interactionist Theory

A psychologist and social constructivist, Vygotsky laid the foundation for the interactionists' view of language acquisition. According to Vygotsky, social interaction plays an important role in the learning process, and he proposed the zone of proximal development (ZPD), where learners construct the new language through socially mediated interaction. Vygotsky's social development theory was adopted and made prominent in the Western world through Jerome Bruner, who laid the foundations of a model of language development in the context of adult-child interaction.

Under the social interactionist approach, a child's language development occurs within the child's construction of a social world, also known as the "social-cognitive model." (Behaviorism, by contrast, emphasizes the role of stimulus-response conditioning in language acquisition.)

Integrationists view language learning as “an interaction between the learner’s mental abilities and the linguistic environment.” (Ellis, 1985). In other words, language learning occurs because of the interplay between a person and the environment in which he/she develops. Therefore, interactionists focus on how language and cognitive developments occur within interaction (Goh & Silver, 2004).

Interactionists' study is based on communication and assistance to children to correct their wrong sentences. Interactional modifications in negotiating a communication problem are believed to promote comprehensibility/modification. According to this theory, tasks in which there is a need for the participants to exchange

information with each other endorse interactional modifications. Interactionists believe that comprehensible output promotes language acquisition when we attempt to convey a message but fail and must try again. We need correct utterances to speak and exchange our information to help us have output.

Under SIT, the deepest level of representation specifies the communicative intent primarily and semantic content secondarily. This approach to language acquisition theory combines the "traditional behavioral" approach and the "linguistic-semantic" approach to language production. Under SIT, language acquisition is thought to occur differently than under other predominant theories. It emphasizes how the environment shapes acquisition. It is more relevant to children's acquisition than to adult acquisition. Two open questions remain for SIT. One, how does a child's *knowledge* change in the course of development? Two, how is- or how was- the existing language system of an adult formed?

Social integrationists describe a dynamic system where, typically, children cue their parents to supply the appropriate language experience that children require for language advancement. In essence, it supplies a supportive communicative structure[that allows efficient communication despite its primitives. (By contrast, the behavioral approach posits that children are passive beneficiaries of the language training techniques employed by their parents. Also, by contrast, the linguistic approach posits that children are active language processors whose maturing neural systems guide development.

9.2 Core Ideas of the Input/Interactionist Theory

This theory, heavily influenced by Vygotsky's social constructivism, emphasizes the crucial role of **social interaction** and the **linguistic environment** in language development. It posits that language learning is not solely an internal cognitive process or a result of mere exposure but rather emerges from the dynamic interplay between the learner's innate abilities and experiences communicating with others.

9.3 Key Concepts and Principles:

- **Social Interaction as a Catalyst:** Interactionists believe that active participation in communication is the primary driving force behind language acquisition. Through interacting with more proficient speakers, learners are exposed to language in meaningful contexts, receive feedback, and are pushed to communicate their intentions.
- **Vygotsky's Zone of Proximal Development (ZPD):** This is a central concept. The ZPD refers to the gap between what a learner can do independently and what they can achieve with guidance and support from a more knowledgeable individual (e.g., a parent, teacher, or peer). Interaction within the ZPD allows learners to stretch their linguistic abilities and internalize new language structures and vocabulary.
- **Scaffolding (Bruner's Contribution):** Jerome Bruner elaborated on Vygotsky's ideas, highlighting the importance of **scaffolding**. It refers to the temporary support more proficient speakers provide to help learners perform tasks within their ZPD. Scaffolding can take many forms, such as:

- Providing simplified language.
- Asking clarifying questions.
- Offering prompts and cues.
- Restructuring the learner's utterances.
- Modeling correct language use.
- Gradually reducing support as the learner becomes more competent.

9.4 The Social-Cognitive Model

This perspective emphasizes that a child's language development is intertwined with their construction of the social world. As children interact and understand social cues and intentions, their language develops to facilitate and reflect this understanding.

- **Interactional Modifications and Negotiation of Meaning:** Participants actively work to understand each other when communication breakdown occurs. These **interactional modifications** (e.g., clarification requests, repetitions, rephrasing) and the **negotiation of meaning** are crucial for language acquisition. They make input more comprehensible and provide opportunities for learners to notice gaps in their understanding and production.
- **Comprehensible Output:** While comprehensible input (Krashen's theory) is important, interactionists also highlight the significance of **comprehensible output**. Learners who attempt to produce language and encounter difficulties conveying their intended meaning are pushed to modify their output, leading to deeper processing and acquisition. The need to be understood forces learners to pay attention to form and meaning.

- **Communicative Intent and Semantic Content:** Social Interactionist Theory (SIT) suggests that at a deep level of representation, the primary focus is on the communicative intent, with semantic content being secondary. It implies that the desire to communicate and achieve a social goal drives language production, and the specific words and structures used are chosen to fulfill that intent.
- **Dynamic System:** Interactionists view language development as a dynamic system where children actively solicit the linguistic input they need from their environment. They "cue" their parents or caregivers to provide appropriate language experiences through their interactions and communicative attempts.

9.5 Comparison with Other Theories (as highlighted in the text)

- **Behaviorism:** Unlike behaviorism's emphasis on stimulus-response conditioning and imitation, interactionism highlights the learner's active role in constructing language through social engagement and cognitive understanding of social contexts.
- **Linguistic/Nativist Approaches:** Unlike linguistic theories that posit an innate Language Acquisition Device (LAD) guiding development, interactionism emphasizes the environment's and social interaction's crucial role in shaping language acquisition. While acknowledging innate predispositions, it argues that they are activated and shaped through communicative experiences.

Relevance to Child vs. Adult Acquisition

Children rely heavily on interaction with caregivers for language input and scaffolding. Adult language learners, on the other hand, often have more developed

cognitive abilities and may engage in more explicit learning strategies. However, the principles of interaction, comprehensible input and output, and the importance of a supportive learning environment also remain relevant for adult learners.

Recapitulation

The Input/Interactionist Theory paints a picture of language acquisition as a collaborative process. Children are not passive recipients of language, nor are they solely relying on innate mechanisms. Instead, they actively engage with their social world, using interaction as a tool to discover, test, and internalize the complexities of language, with the support and guidance of more proficient speakers playing a vital role in their linguistic

9.6 Limitations of Interactionist Theory

- deVilliers & deVilliers (1992) suggest that parents rarely offer their children direct feedback on the appropriateness of their grammar. Linguistic and social practices vary widely across cultures. Some cultures do not use anything like

the practices described above, yet their children still learn language at a similar rate to Western children.

9.7 Conclusion

The various theories should not be considered as alternatives; each offers a partial explanation of the process. The three views of language learning discussed above stem from the different notions or viewpoints on how a child acquires or learns a language. To behaviourists, language learning is viewed as a learned behaviour through habit formation, conditioned by stimuli and strengthened through practices and reinforcement. On the other hand, Innatists claim that biological mechanisms govern language learning. Interactionists believe that language learning occurs due to the interplay between a person and the environment in which he/she develops.

Keep in Mind

- One of the best-known attempts to construct a behavioristic model of linguistic behavior was embodied in B.F. Skinner's classic, Verbal Behavior (1957).
- Skinner was commonly known for his experiments with animal behavior
- Skinner's theory of verbal behavior extended his general theory of learning by operant conditioning.
- Operant Conditioning: -
- Operant conditioning uses consequences to modify the occurrence and form of behavior.
- It refers to conditioning in which the organism (in this case, a human being) produces a response or operant (a sentence or utterance) without necessarily observable stimuli. - This operant is maintained (learned) by reinforcement (e.g., a positive verbal or nonverbal response from another person). - If a child says "want milk" and a parent gives the child some milk, the operant is reinforced and, over repeated instances, is conditioned.
- According to Skinner, verbal behavior, like other behavior, is controlled by its consequences. - When consequences are rewarding, behavior is maintained and is increased in strength and perhaps frequency.
- When consequences are punishing or a total lack of reinforcement, the behavior is weakened and eventually extinguished.

- Nativist Approach: The term nativist is derived from the fundamental assertion that language acquisition is innately determined, that we are born with a genetic capacity that predisposes us to a systematic perception of the language around us, resulting in the construction of an internalized language system.

- Noam Chomsky claims that children are biologically programmed for language and that language develops in the child just like other biological functions develop.

- Children are born with an exceptional ability to discover the underlying rules of a language system. In this case, the environment makes a fundamental contribution - the availability of people who speak to the child. The child, or the child's biological endowment, will do the rest.

- The three most important contributions of the nativist framework to our understanding of the first language acquisition:

    1- Freedom from the restrictions of the so-called "scientific method" to explore the unseen, unobservable, underlying, abstract linguistic structures being developed in the child;

    2- Systematic description of the child‟ 's linguistic repertoire as either rule-governed or operating out of parallel distributed processing capacities;

    3- The construction of many potential properties of Universal Grammar

- **The Language Acquisition Device (LAD):** LAD is the imaginary "black box" in the brain. It is thought to contain all and only the principles which are universal to all human languages. For the LAD to work, the child needs access only to natural language samples. These language samples serve as a trigger to activate the device. Once it is activated, the child can discover the structure of the language to be learned by matching the innate knowledge of basic grammatical relationships to the structures of the particular language in the environment. More recently, Chomsky and his followers no longer use the term LAD but refer to the child's innate endowment as Universal Grammar (UG). McNeill (1966) described LAD as consisting of four innate linguistic properties:

- The ability to distinguish speech sounds from other sounds in the environment;
- The ability to organize linguistic data into various classes that can later be reformed; knowledge that only a particular kind of linguistic system is possible and that other kinds are not;
- The ability to constantly evaluate the developing linguistic system to construct the simplest possible system from the available linguistic input.

Practice

1.**How does a child's knowledge change in the course of development?**

2.**How is - or how was - the existing language system of an adult formed?**

Task Two: Choose the best answer based on what you have assimilated from the previous data.

1- Which of the following is NOT an example of language acquisition from a behaviourist perspective?

a - Babies learn language by repeatedly associating the object 'dog' with the word 'dog.'
b- Babies learn language by imitating adult patterns of speech.
c- Babies are born with an innate ability to learn language.
d- Babies are rewarded for attempts at speech when their caregivers smile and applaud their efforts.

2- Noam Chomsky argues that babies acquire language
a- because humans are born able to learn language.
b- When caregivers speak softly to infants.
c- By watching adults interact.
d- By repeated exposure to sounds that have meaning.

3- Timm**y is a one-year-old who has started trying to say short words. The following is NOT an aspect of Timmy's acquisition of English as his first language:**

a. Timmy might make mistakes when he first gets to speak.
b. Timmy's central learning resource is listening.
c. Timmy does not require instruction to develop the language.

4- Tania is a student from Bolivia who is currently living in the US. She will begin high school in the fall but is taking an English as a second language class during the summer. The following is NOT an aspect of her process of learning the language:

a. Tania uses telegraphic speech at times.
b. Tania's learning is based on previous grammar knowledge.
c. Tania's English language learning is not part of her usual life.
d. Tania requires instruction to learn the language.

Text :

- **Read the text and answer the questions below**

If you look in a dictionary to find the meaning of the word ‘acquisition,’ you will find it defined as ‘the process of learning skills or getting knowledge.’ So what then is ‘language acquisition,’ and how is language acquisition different from ‘language learning’? Some theorists believe that there is a difference between learning and acquisition. The difference is this: language learning is a conscious or intentional process that may involve studying the language, paying attention to grammar rules, and possibly following a course of instruction. On the other hand, language acquisition is considered a natural process and involves ‘picking up’ language in a non-conscious way through exposure to language, not by studying it. Children acquire their first language and learn its rules through exposure, exposure to examples of the language, and use of it. It is part of the theory of ‘first language acquisition.’

‘Second language acquisition’ is the process and the study of how people learn a language that is not their native language. It is a relatively new field of study, and many questions remain about how languages are learned. However, teachers and theorists believe that we learn a second language by ‘acquiring’ or ‘picking up’ language, but there are some important considerations for second language learners. Second language learners acquire language through exposure to many different examples of the language by reading and hearing it in their environment. We listen and read and develop an understanding of language over a while before we eventually use it ourselves. The period when learners are taking in language, processing it, and perhaps silently practicing it is known as the ‘silent period’ and is considered an important stage in

language acquisition. Once we use the language, there must be an opportunity for interaction so we can use the language, experiment, and make the language work in communication. The final consideration is the need to focus on form. Second language learners must focus on the language, analyze, identify, and practice it. Teachers and learners will also want to look at correcting mistakes so that learners can think about rules and exceptions to rules.

Source: www.cambridgeenglish.org

Exercise 1: Reread the text and answer the following questions.

- 1. What is ‘acquisition’?
- 2. In some people’s opinion, how is language acquisition different from language learning?
- 3. How do children learn their first language?
- 4. What is second language acquisition?
- 5. What are the three considerations mentioned regarding second language acquisition?
- 6. What is ‘exposure’?
- 7. What is the ‘silent period’?
- 8. Why is ‘interaction’ important?
- 9. What is ‘focus on form’?

Exercise 2: Look at the activities and decide if they are related to (A) acquisition, (I) interaction, or (F) focus on form. Write A, I, or F in the column on the right.

- 1- Students read a newspaper and choose one detailed article to study.
- 2. Students read a newspaper article and circle all the reported speech examples.
- 3. Students repeat model sentences in an open class drill.
- 4. Students tell each other in groups about different festivals in their countries.
- 5. Students read each other's essays and suggest improvements.
- 6. Students listen to a recording of a job interview.
- **Read the following conversation and comment.**

Child: Nobody don't like me

Mother: No, say, "Nobody likes me."

Child: Nobody don't like me.

(Eight repetitions of this dialogue)

Mother: No, now listen carefully: say, "Nobody likes me"

Child: Oh! Nobody don't likes me.

(McNeil in the Genesis of Language, 1966)

10- Second Language Acquisition SLA (A)

10.1 - L1 vs L2

Three stages make up the comparison of L1 and L2 learning. The first is the initial state, which many psychologists and linguists think comprises the fundamental understanding of language principles and structures that learners have at the start of L1 or L2 acquisition. Every stage of the development of basic language is covered by the second phase, known as the intermediate states. It encompasses the L2 developmental cycle known as learner language (interlanguage, or IL) and the maturational changes in "child grammar." We shall analyze the L1 and L2 development processes in this phase and then compare the prerequisites for language acquisition. The last stage, the result of L1 and L2 learning, is the third phase. The last stage, the result of L1 and L2 learning, is the third phase.

10.1.1- Initial state

The initial state in children's cognition for L1 is likely an innate capacity for language acquisition; however, it remains uncertain whether this natural ability is present in the initial state of older learners for L2. Certain linguists and psychologists assert that children's genetic predisposition for language acquisition persists throughout their lives, attributing variations in first and second-language learning outcomes to external factors. Some scholars argue that some aspects of children's inherent capacity for first language acquisition persist when learning additional languages, while other components of this natural ability diminish with age. Some scholars argue that the innate capacity for language acquisition does not extend beyond childhood, suggesting

that subsequent language learning resembles acquiring other knowledge domains, such as mathematics or history, in older learners.

The inability to directly observe mental capacity for language learning leads to varying beliefs primarily grounded in theoretical assumptions, which are evaluated through indirect methods that may elicit disagreement among individuals from diverse disciplinary perspectives. Many linguists, for instance, depend on learners' capacity to assess the impossibility of certain L2 utterances, a feature of children's L1 competence linked to innate abilities.

Individuals adopting a social perspective often dismiss judgments of (un)grammaticality as compelling evidence, as these judgments stem from artificial tasks that fail to reflect the genuine contexts of L2 interpretation and usage. Individuals adopting a psychological perspective often dismiss socially constituted evidence, such as natural language production, due to the numerous variables associated with actual social usage that cannot be controlled in experimental investigations. The extent to which innate capacity for language acquisition persists in second language acquisition is significant; however, this issue will likely remain unresolved for several years. It is widely acknowledged that L2 acquisition occurs after L1 acquisition, indicating that a crucial aspect of the initial state for L2 learning is the pre-existing knowledge of L1. It involves understanding the general mechanisms of language and various language-specific characteristics that only partially apply to producing the new L2. The prior knowledge of L1 facilitates the transfer from L1 to L2 in second language development, which is considered part of the second phase of L1 versus L2 learning. L2 learners possess real-world knowledge at the outset of language acquisition, a resource that young children do not have when acquiring their first language. Cognitive development and experience are associated with aging. The initial state for L2 learning encompasses

knowledge of methods for performing interactional functions such as requesting, commanding, promising, and apologizing. These functions develop alongside L1 acquisition but are absent in the L1 initial state.

10.1.2 Intermediate states

L1 and L2 learners experience intermediate stages while transitioning from their initial to final linguistic systems. The development of both L1 and L2 exhibits systematic characteristics, including predictable sequences of phenomena within each language and some similarities in sequencing across languages. Additionally, both L1 and L2 learners engage in creative processes during their language development rather than simply mimicking what they have heard or been taught.

10.1.3 Processes

Development is a spontaneous and predominantly unconscious process in first-language child grammar, closely associated with cognitive maturation. As previously mentioned, children's language abilities develop alongside their maturation. In contrast, the development of learner language (or interlanguage) for L2 learners occurs at an age when cognitive maturity is not a significant factor. L2 learners have attained a level of maturity that enables them to understand and produce complex utterances in their L1, which is not specific to any language. Development in SLA necessitates the involvement of processes beyond maturation. While direct observation of mental capacity and developmental processes is not feasible, we can infer the underlying processes from learners' utterances, indicating their understanding and production at various stages. Although responses to this question differ, there is consensus that cross-linguistic influence, or the transfer of prior knowledge from L1 to L2, is a significant

factor in interlanguage development. Two primary types of transfer are identified: • positive transfer, which occurs when a first language (L1) structure or rule is appropriately applied in a second language (L2) utterance; and • negative transfer (or interference), which arises when an L1 structure or rule is inappropriately applied in an L2 utterance, resulting in an error.

Cross-linguistic influence manifests across all levels of interlanguage, including vocabulary, pronunciation, grammar, and other facets of language structure and usage. Positive transfer enhances second language acquisition by allowing learners to apply existing first language structures or rules to the second language, thereby reducing the need to learn new ones. For instance, a word that retains the same form and meaning in both languages can be appropriately transferred from L1 to L2; for example, "exterior," meaning 'outside,' exists in both Spanish and English, differing only in pronunciation while maintaining identical spelling and meaning. The negative transfer of L1 features can often be deduced from forms in the second language that differ significantly from those produced by native speakers of the L2 or that represent a combination of elements not found in monolingual speech. The transfer of L1 pronunciation to L2 manifests as a "foreign accent" in non-native speakers, representing a prevalent and readily identifiable aspect of L1 influence. Grammatical interference is exemplified in the following utterances produced by learners of English as a second language, which are unlikely to be generated by a native English speaker.

It has been observed that, alongside L1 competence, older children and adults possess world knowledge acquired through cognitive development and experience, which is also accessible for L2 use during intermediate stages. The concepts related to advanced world knowledge frequently exceed the capacity for practical expression with restricted L2 proficiency; however, they can be partially communicated within the

context and are likely to promote L2 vocabulary acquisition. Older children in immigrant families may enter US schools with prior knowledge in academic subjects, such as science and mathematics, that meet or exceed US curriculum expectations. However, they may lack English L2 proficiency to articulate their understanding. The students do not need to relearn those concepts, as they are independent of any specific language; they only require new language-specific forms for representation in L2. Advanced international engineering and computer science students often find it easier to learn English L2 terminology for concepts they have already mastered than native English speakers acquiring those terms and concepts for the first time. Adults from immigrant families in the USA frequently possess driving skills and vocational knowledge applicable to their new social environment. Before passing the USA driver's license test, individuals must acquire a certain level of English proficiency and familiarize themselves with specific rules and regulations; however, they do not need to relearn driving skills. Job-related English can easily integrate with existing vocational knowledge and skills. The transfer of knowledge and skills to a second language (L2) context is facilitated by the availability of first language (L1) support during L2 learning and the sharing of key terminology across languages; however, conceptual transfer occurs regardless of these factors. As previously indicated, numerous skills for social interaction acquired in L1 also transfer to L2. These frequently promote positive transfer and support IL development; however, certain instances may be unsuitable for L2 contexts.

RECAPITULATION

The comparison between first language (L1) and second language (L2) acquisition can be understood across three primary phases: the initial state, intermediate states, and final state. The initial state in L1 learning is widely believed to involve an innate, biological capacity for language acquisition. For L2 learners, however, this natural ability may be diminished or absent due to age-related factors, making prior knowledge of L1 and world experience central components of the initial state in second language learning. L2 learners enter the process equipped with cognitive maturity and pragmatic knowledge that L1 learners do not possess.

During the intermediate states, both L1 and L2 learners follow systematic developmental sequences, although their paths differ. L1 acquisition is closely linked to cognitive development and occurs largely unconsciously. In contrast, L2 development—termed interlanguage—is influenced by factors such as cross-linguistic transfer. This includes positive transfer, where L1 knowledge supports L2 learning, and negative transfer (interference), where L1 features hinder L2 accuracy. These influences can be observed at various linguistic levels including vocabulary, grammar, and pronunciation.

L2 learners also benefit from conceptual knowledge and life experience, allowing them to apply prior content understanding even when their L2 proficiency is limited. This often results in meaningful vocabulary acquisition and skill transfer, especially when terminology or functions overlap between languages. However, some interactional or cultural norms may not transfer appropriately and could lead to communication challenges.

Ultimately, understanding the distinctions and overlaps between L1 and L2 learning helps educators and learners recognize the unique needs, resources, and challenges involved in second language acquisition.

11. Second Language Acquisition SLA (B)

11.1 Necessary Conditions

Input in the target language is crucial for both first and second language acquisition. Children need direct, reciprocal interactions with others for first language acquisition. Individuals cannot acquire their first language solely through experiences such as listening to the radio or watching television. Conversely, face-to-face social interaction typically enhances second language acquisition but is not essential. Specific individuals can attain a significant level of proficiency in a second language despite receiving input solely from distant sources, such as radio, television, or written texts. Evidence of L2 learning is observed in highly motivated individuals whose L2 input was exclusively derived from electronic media and literature due to geographical or political constraints.

11.2 Facilitating conditions

Children acquire their first language (L1) naturally, without formal instruction, and the pace of L1 development remains unaffected mainly by corrections of immature language forms or motivation to communicate. In contrast, various social and individual factors can significantly influence the progression and final proficiency in a second language (L2). Identifying and explaining facilitating conditions addresses the fundamental question of second language acquisition: why are some L2 learners more successful than others?

- Feedback, which includes the correction of those mistakes made by second language learners

- Capacity for memory and analytical ability are included in the aptitude category.

- Motivation, which can be defined as the desire and interest to learn

- Instruction or formal teaching inside educational environments.

The final state signifies the outcome of L1 or L2 acquisition. The result of L1 development is, by definition, native linguistic proficiency. Learning vocabulary and developing specialised registers, such as formal academic writing, may continue into adulthood. The fundamental phonological and grammatical systems of the languages children are exposed to are predominantly formed by the age of five or six. This period also encompasses developing sufficient vocabulary and interaction skills for effective communication. It represents a universal human accomplishment requiring neither exceptional skill nor significant exertion. As commonly defined, the outcome of L2 development cannot achieve native linguistic competence, and learners' proficiency levels exhibit significant variability. Specific learners attain second language (L2) competency that parallels "near-native" or "native-like" competence while preserving native proficiency in their first language (L1). Numerous individuals ultimately cease advancing towards the learning objective in reaction to L2 input, resulting in a final state that exhibits elements of L1 interference or distinctive structures atypical of a natural L2 speaker, known as fossilisation in second language acquisition (SLA). The diverse factors affecting varying degrees of final multilingual development are pertinent to second-language acquisition theory and instructional approaches (e.g., Davies 2003; Han and Odlin 2006). The attainment of L2 competency by extraordinarily successful learners, comparable to their L1, is becoming increasingly significant in SLA theory and research. This possibility complicates the conventional definition of "native speaker."

11.3 Psychological Consideration for SLA

The psychological research on second language acquisition (SLA) has focused on languages and the brain, learning mechanisms, and individual differences among learners.

Brains and languages Since the nineteenth century, researchers in the fields of biology and psychology have wondered where language is stored in the brain. When the systematic study of SLA started in the 1960s, the rapidly growing discipline of neurolinguistics was among the first to impact cognitive ideas. The age-related study on second language acquisition (SLA) is based mainly on the concept proposed by Lenneberg (1967), who stated that there is a key period for language learning and that this period has a neurological basis. Knowledge in this area is greatly expanded by exploratory procedures related to brain surgery on multilingual patients and by developing sophisticated noninvasive imaging tools.

11.4 Learning processes

Information Processing (IP) learning models developed in cognitive psychology and implemented on computers have significantly impacted how we think about learning processes. This framework presupposes that learning a second language is very similar to learning any other very complex skill, and this similarity allows for explaining SLA phenomena. The conventional wisdom holds that processing (in language or any other field) leads to learning. The subject of how second language learners gain knowledge and the need for explanations of sequencing in language development have both been fruitfully addressed by IP-based approaches to second

language acquisition (SLA). Processability is a relatively new paradigm for teaching languages that build on and utilize ideas from intellectual property learning.

11.5 Connectionism

A different paradigm emerged in the 1980s and has since significantly impacted how people learn. It deviates from most existing SLA research paradigms in its view that learning a language does not depend on intrinsic knowledge or the abstraction of principles and norms but rather on strengthening associations (links) between stimuli and responses. Research on language instruction can be theoretically grounded in this approach, which views input frequency as a critical causal component in learning. While learning processes have long been acknowledged as complicated by psychological frameworks, the theory and research on SLA in the twenty-first century, have emphasised the nature and effects of complex systems. It involves closely examining their nonlinear and dynamic nature, self-organisation tendency, and how they interact with other intricate systems. From a psychological standpoint, context (as a complex system) is given more weight than most previous work, and traditional causality definitions are challenged. Dissimilarities among students Most research on SLA learner differences has focused on ensuring students are more proficient than others. It has its roots in psychology's humanistic framework, which has been around for a while in psychology but has only had a significant impact on SLA research and second language instruction since the 1970s (for more on this, see Williams and Burden 1997). Attitude, motivation, and anxiety levels are examples of affective components that this paradigm suggests should be considered concerning learning. This focus also considers age- and sex-related biological differences and some processing-related variances.

Recapitulation

Second language acquisition (SLA) is influenced by a variety of necessary, facilitating, and psychological conditions. A fundamental requirement for both L1 and L2 acquisition is exposure to language input. However, unlike L1 learners—who need direct, reciprocal interaction—L2 learners can achieve a relatively high level of proficiency through indirect input from media and texts, particularly when highly motivated.

Facilitating conditions play a much greater role in L2 than in L1 learning. While children acquire their first language naturally without formal instruction, second language learning outcomes vary widely and are shaped by factors such as feedback, aptitude, motivation, and instruction. These variables explain why some L2 learners achieve greater success than others.

The final state of language learning marks a key distinction between L1 and L2 acquisition. L1 acquisition typically results in full native competence, established early in childhood. In contrast, L2 learners rarely achieve complete native-like proficiency, and many reach a plateau, or fossilized state, where errors persist despite continued exposure. This variability continues to intrigue researchers, particularly regarding whether highly successful L2 learners can truly rival native speakers.

From a psychological perspective, SLA research has explored the relationship between language and the brain, learning processes, and learner differences. Insights from neurolinguistics and studies on the brain's structure and critical periods have deepened understanding of age-related learning constraints. Theories such as Information Processing (IP) and Connectionism conceptualize SLA as a complex skill acquisition process, shaped by attention, frequency of input, and associative learning mechanisms. Recent approaches also emphasize the dynamic and nonlinear nature of language development as part of complex adaptive systems.

Finally, individual learner differences—including age, sex, attitudes, motivation, and anxiety—have become central to SLA inquiry. These factors, rooted in both biological and emotional dimensions, explain variability in learning outcomes and reflect a shift toward more humanistic and learner-centered models in language education.

12- Second Language Acquisition SLA (C)

12.1 Key Theories and Scholars

Second Language Acquisition (SLA) is how individuals learn a language other than their native one. This document presents an overview of major theories and contributions by leading scholars in SLA.

12.1.1 Stephen Krashen – The Monitor Model

Stephen Krashen has received much praise for his Monitor Model, a set of five connected assumptions explaining how learning a second language works. While the Monitor Hypothesis elucidates using taught language to supervise output, the Acquisition-Learning Hypothesis differentiates between the process of subconscious acquisition and conscious learning. The Natural Order Hypothesis proposes that linguistic structures are acquired methodically through learning. The Input Hypothesis asserts that for learners to progress, they need 'comprehensible input' (i+1). On the other hand, the Affective Filter Hypothesis emphasises the role of emotional elements in language learning, such as motivation, anxiety, and confidence.

When it comes to linguistics, Krashen is a renowned authority who specialises in concepts related to language acquisition and development. In his most recent studies, he has mainly concentrated on investigating language learning in languages other than English and languages. During the period beginning in 1980, he wrote over one hundred books and papers and was invited to deliver more than three hundred speeches at universities across the United States and Canada.

Learning a second language can be one of the most challenging acquisitions. In doing this, learning a second language requires commitment and practice. Stephan Krashen developed five hypotheses for second language acquisition as a linguist and theorist.

Stage 1

- -The initial phase is termed the silent period: Learners comprehend the new language audibly but have not yet articulated it. Nonetheless, they are capable of repetition, visual response, and word imitation. Extensive exposure to the new language is essential at this point.

Stage 2

- The second stage is Early Production: learners will develop a receptive and active 1,000-word vocabulary. They will usually answer in one or two-word phrases. A broad exposure to the new language is still key at this stage.

Stage 3

- The third stage is Speech Emergence: learners will have a 3,000-word vocabulary and can now communicate with simple phrases and sentences, which may or may not be grammatically correct. They understand stories and can work on content in the new language. Interaction is essential in developing communicative competence.

Stage 4

- The fourth stage is Intermediate Fluency: at this juncture, learners will possess a vocabulary of 6,000 words and commence utilising more intricate structures in both speaking and writing. They are inclined to articulate their viewpoints. They will continue to make several errors, and it is quite prevalent to translate from their language.

- **Stage 5**
- The fifth and final stage is Advanced Fluency, which requires learners 4 to 10 years to attain proficiency in a second language. Attention on form, prevalent in numerous textbooks and syllabi globally, can align with second language acquisition theory, provided that the attention is directly pertinent to the content learners encounter in the new language. Grammar exercises must align with the ongoing content development.

13- Second Language Acquisition SLA (D)

Second Language Acquisition (SLA) is a complex domain influenced by various theoretical viewpoints and research inputs. Esteemed researchers have investigated how humans attain a second language, each providing distinct perspectives on the procedures, contexts, and factors that promote or obstruct language acquisition. Noam Chomsky's Universal Grammar hypothesis, which asserts an inherent linguistic ability, alongside Jim Cummins' differentiation between conversational and academic language, offers essential insights for researchers and educators. Other significant theories, such as Rod Ellis's task-based learning, Merrill Swain's output hypothesis, and Michael Long's interaction hypothesis, underscore the importance of communication and learner output. Vygotsky, Norton, and Larsen-Freeman's contributions enhance the area by emphasising the significance of social interaction, identity, and the intricacies of learning contexts. These viewpoints thoroughly understand how language is acquired and utilised in practical circumstances.

13.1 Noam Chomsky – Universal Grammar

Noam Chomsky proposed the concept of Universal Grammar, positing that all individuals had an inherent ability to acquire language through a cognitive mechanism he termed the Language Acquisition Device (LAD). While his theory primarily addresses first-language acquisition, it has significant implications for SLA, proposing that second-language learners draw on this inborn grammatical knowledge to internalize new languages.

13.2 Jim Cummins

Jim Cummins distinguished between two types of language proficiency: Basic Interpersonal Communicative Skills (BICS) and Cognitive Academic Language Proficiency (CALP). BICS refers to everyday conversational language learners acquire quickly, while CALP involves the more complex, abstract language required for academic success. His theory is crucial in educational settings to avoid the misconception that conversational fluency equates to full language proficiency.

13.3 Rod Ellis – Task-Based Learning & Interlanguage

Rod Ellis is a prominent figure in SLA known for his work on task-based language teaching and interlanguage. He emphasizes the importance of meaningful interaction and output in language development. Ellis introduced the concept of interlanguage, describing it as a learner's evolving linguistic system influenced by both their first and target languages.

13.4 Merrill Swain – Output Hypothesis

Merrill Swain developed the Output Hypothesis, arguing that language production is as vital as comprehension in learning. According to Swain, 'pushed output'—where learners are required to express themselves beyond their current proficiency—promotes deeper language processing and helps solidify linguistic knowledge.

13.5 Michael Long – Interaction Hypothesis

Michael Long proposed the Interaction Hypothesis, which highlights the role of interaction in language learning. He posited that modified interaction, such as clarification requests and repetition during conversation, aids learners in making input more comprehensible. This negotiation of meaning is seen as a catalyst for language acquisition.

13.6 Lev Vygotsky – Sociocultural Theory

Lev Vygotsky's sociocultural theory has tremendously impacted teaching and learning even though he was not solely SLA theorist. The Zone of Proximal Development (ZPD) concept emphasises that students can reach higher levels of understanding and ability with the assistance of peers or instructors who have more knowledge than they do. According to Vygotsky, social interaction is an essential component of learning, which is why collaboration and discussion are important in second language acquisition.

The study of Second Language Acquisition continues to evolve, drawing from a rich tapestry of theories that reflect the complexity of language learning. The contributions of scholars such as Chomsky, Cummins, Ellis, Swain, Long, Vygotsky, Norton, and Larsen-Freeman provide a robust theoretical framework that informs both research and classroom practice. These theories underscore that language learning is not a one-size-fits-all process but a dynamic interplay of cognitive, social, emotional, and contextual factors. By understanding and applying these concepts, educators can better support learners' diverse needs, create more effective instructional strategies, and foster meaningful, lasting language development. As SLA research advances, these foundational insights will continue to guide innovations in teaching and learning across varied linguistic and cultural landscapes.

Recapitulation

Advantages of being bilingual

During the vast majority of the waking hours of our lives, we are consistently confronted with language. Communication of our thoughts and emotions, connection with other people, identification with our culture, and comprehension of the world around us are all accomplished through language. Furthermore, this rich linguistic environment is not limited to just one language for many individuals but encompasses two or more languages. It is estimated that the majority of people around the world are either bilingual or multilingual.

- Bilingual means being fluent in multiple languages and using both languages regularly. Knowing more than one language changes the brain in a significant way.
- Frequent switching from one language to another enhances mental flexibility.
- Reading skills transfer from one language to another, and bilingual youngsters are more likely to be proficient readers.
- Access to cultures and more tolerance towards other cultures
- Protecting your brain against aging
- Linguistic facilities: Learning another language more quickly
- Deep understanding of the concept of “language.”

- Executive thinking skills and conflict resolution skills
- Memory work and attention spans are both important.
- Skills in abstract thinking and the ability to multitask

Conclusion

- Because two is always better than one

14-Word Processing (A)

Objectives:

- **To define the mental lexicon**
- **To reveal the information, the mental lexicon contains**
- **To show how we mentally represent word forms**
- **It is important to deal with the organization of words and how word meaning is represented in the mind.**
- **To name the areas of the brain that are responsible for storing and retrieving word meanings**
- **To elucidate the brain mechanisms underlying word processing**
- **To deal with the different models that explain word processing**

14.1 The Anatomy of a Word

Words are made up of parts, as molecules are made up of different kinds of atoms, and we can analyze atoms as made up of different kinds of particles. Different psychological and linguistic theories deal with different aspects of words, and different theories make different claims about which parts of words have the most significant impact on mental processes that activate stored information about words. However, classical linguistic theories have provided a good way to organize our thinking about words.

14.1.1 Classical linguistic approaches to word form representation

Syllables can be categorised as onsets (the opening consonant-vowel combination, such as "spa" in "spam") and rimes (the concluding vowel-consonant combination, such as "am" in "spam").

Speech sounds can be amalgamated to form a morpheme, the smallest unit in a language that conveys meaning. The amalgamation of one or more morphemes yields a word.

CAT ⟶ Monomorphemic = (One morpheme)

Blackboard ⟶ Polymorphemic = (More than one morpheme)

Languages facilitate modifications in word meaning; for instance, the noun cat can be transformed by adding the bound morpheme ‘S,’ resulting in the polymorphemic word CATS, which denotes multiple animals.

14.2 The Mental Lexicon

Psycholinguistics examines the cognitive processes related to language use, acquisition, perception, comprehension, and production. The mental lexicon is a subfield of psycholinguistics that examines the organisation of word knowledge within permanent memory (Carroll, 2000). Its definition is enriched by Gui (2000) by adding other characteristics; the mental lexicon is also concerned with how words are retrieved while speaking or writing.

Prominent researchers of language and cognition have postulated the existence of a lexicon. According to Coltheart (2001), Ann Triesman, in 1961, was the first to name a word store as a 'mental dictionary'. However, Aitchison (1987) asserts that "The human word store" is much larger.

The term **mental lexicon** was first introduced by R.C. Oldfield in the article "Things, Words and the Brain"(Quarterly Journal of Experimental Psychology, v. 18, 1966). It is derived from the Greek word lexicon, meaning book, and the Latin word lexis, meaning word. The mental lexicon essentially contains all the items a person knows and needs to communicate. John Stonham describes it as "a repository or storehouse of unpredictable information." In connection with language teaching, it can also be the term vocabulary. Moreover, the mental lexicon stores information about vocabulary items, which includes a wide range of items and the information attached to an item. Semantic information can also be found in the mental lexicon. It stores syntactic information about items.

The mental lexicon is a mental dictionary containing information regarding a word's meaning, pronunciation, syntactic characteristics, etc. The mental lexicon is a construct used in linguistics and psycholinguistics to refer to individual speakers' lexical, or words, representations. The mental lexicon differs from the lexicon in that it is not just a general collection of words; it deals with how each speaker is activated, stored, processed, and retrieved. An individual's mental lexicon changes and grows as new words are learned and are constantly developing, but several theorists argue how this occurs. Scientists have studied the areas of the brain that are concerned with lexical representations.

14.2.1 The Mental Lexicon vs Standard Dictionaries

According to Gui (2000), there are four main differences between the mental lexicon and a traditional dictionary:

Traditional dictionary	The Mental Lexicon
- Words are organized in alphabetical order. - It contains a finite number of words and often cannot keep pace with the continuous evolution of a language. - Words in dictionaries are listed in isolation.	- It can continuously adapt to the appearance or disappearance of words and changes in meanings and pronunciations. - Words are grouped according to various properties and relationships. - The properties associated with word: definition, spelling, pronunciation, and relationships to other words are available

- The mental lexicon is more dynamic and complex than a physical dictionary.

Lexical representations in our brains raise many issues; many questions concerning how we can develop a model of the mental lexicon are taken into consideration. One central issue in developing a mental lexicon model is whether the word's form is represented by its meaning in the duplicate lexical entry or occupies separate entries (Rapp & Goldrick, 2006). We Also wonder how lexical entries are

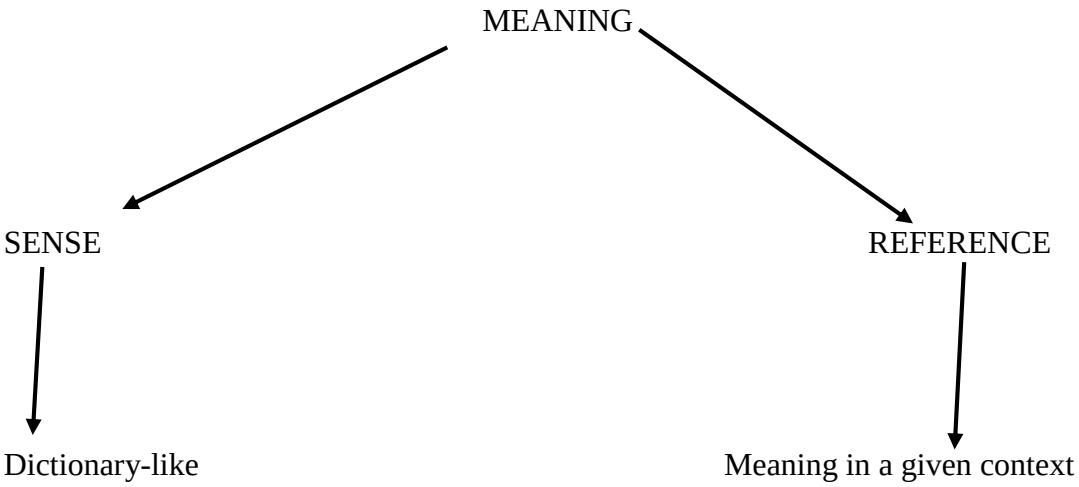
organized and related to each other. Various models try to explain how words are accessed.

14.2.2 Organization of the Mental Lexicon

Contemporary scholars largely concur that the mental lexicon is a network of interconnected elements grounded in semantic relationships. The meanings of words are contingent upon their interrelations within a network of connections.

14.3 Lexical semantics

Words in any language convey meaning from speaker to listener. So, how can we perform this process? When we talk about words' meanings, we have a difference between sense and reference (Jackendoff, 1983)



Encyclopedic knowledge

Different sense

Figure: 1

- When we say **the dark orange one:**
- The listener will identify the object on the left, which is the same referent.
- When we say **the one on the left:**
- It refers to the same object

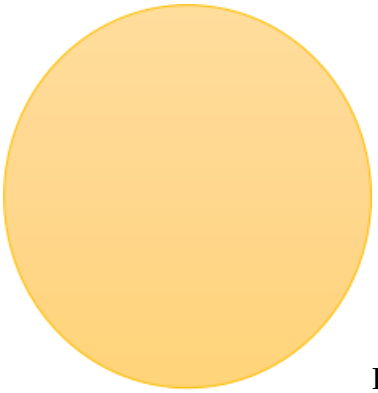
- Two expressions convey identical meanings: we direct our attention to the same object.

Being dark orange ≠ Being on the left

Two distinct expressions convey different meanings at the sense level.

- **Discussion**

If we point to the object with the expression: the bigger one in the context of Figure (1), this means the dark orange object.



However, in the context of Figure (2), this means the pale orange object. **Figure 2**

The meaning of a word is discussed by concentrating on its referent.

14.4 Semantic Models of the Mental Lexicon

- **The Hierarchical Network Model**

This model is the most influential semantic network model dealing with word-meaning relationships. The model supposes that words are stored in one's memory in networks. Each concept represents a node, and the relationships between nodes form a hierarchy. Specific nodes may exist at the same hierarchical level as others while dominated by subordinate nodes. These nodes can also serve as subordinate nodes to other subordinate nodes.

Every word is connected according to its semantic features in this hierarchical network. Collins and Quillian (1969,1970) maintain that since the space available for storing semantic information is limited, storing information in only one network location is beneficial. It is known as the principle of cognitive economy. This model is limited because these hierarchies are not clearly ordered. We do not have a specific model or way to show a precise classification. For example, it is not clear how to order VIRTUE / and GOODNESS.

14.5 Spreading Activation Model

The model assumes a network of word relationships exists in the mental lexicon (Collins & Loftus, 1975). However, these relationships are not necessarily organized in a hierarchical model. Indeed, the organization is similar to a web of interconnecting nodes. A distance between the nodes is determined by structural characteristics such as taxonomic relations and considerations such as typicality and degree of association between related concepts. The retrieval of information involves the “spread” of lexical activation.

- Example:
- The concept of GOOSE is represented as a memory address.
- A significant category of links in semantic network theory is the "IS" type.
- IS encodes the relationships between general categories and the concepts encompassed within those categories.
- Waterfowl can be classified under a broader category, such as birds. The waterfowl category node can be linked to various examples, including duck, goose, coot, and swan.
- Additionally, it may be linked to a higher-order category node, such as a bird.
- A goose is classified as a waterfowl, and a waterfowl is categorised as a bird; consequently, a goose is a bird.

- ⟶ It implies no need to connect the concept goose directly to the more general concept bird, ⇒ which helps conserve memory resources.

Collins and Quillian showed that the statement such as/

A canary can fly also ⟶ refers to another statement: a canary is a bird.

A canary can fly, causing the activation to spread from a canary to a bird that can fly. So, hearing a canary can fly entails implicitly activating the relationship between a canary and a bird, and this property is already activated when subjects read that a canary is a bird. (Collins & Quillian, 1970).

The idea of **spreading activation** explains how information represented in the semantic network is accessed and why related words facilitate access to one another. (Collins & Loftus, 1975; Posner & Synder, 1975).

- **Discussion**
- Spreading activation is a hypothetical mental process when one of the nodes in the semantic network is activated. If someone says GOOSE, the node is activated by matching the phonological (Sound) and orthographic (spelling information), activating other features related to the same concept.
- Properties of spreading activation help explain how people respond during priming tasks.
- Priming occurs when presenting one stimulus at once, which helps people respond to another stimulus at time 2.
- **Limitations**
- Although this original spreading activation model improves upon the hierarchical network model, it is still ambiguous because it does not adequately consider words' phonological, syntactic, or morphological aspects.

- A more recent version of the spreading activation model is represented by Bock and Levelt (1994). It initiates the existence of word knowledge in three levels:

Conceptual / Lemma/ Lexeme

In terms of the Bock and Levelt model, the speaker knew the word's meaning (the concept) and syntactic category (the lemma) but not its phonological features (the lexeme). The spreading activations models' robustness has contributed to their popularity in cognitive psychology and psycholinguistics.

14.6 Conclusion

There are benefits and drawbacks associated with each paradigm, and it is impossible to incorporate all of the lexical knowledge. According to Carroll (2000), the spreading activation model is best because it accurately depicts the internal lexicon.

15-Word Processing (B)

15.1 Access to the Mental Lexicon

Lexical access is the process of activating meanings in the internal lexicon. This activity can be performed in several different ways. One manner is through the sensory perception of the occurrence of a word. For example, if one sees the word ‘box’ on a printed page, one can consider it a familiar word and retrieve appropriate information concerning it to assist one in comprehension. (Carrol, 2000). The term lexical access derives from the concept of a mental lexicon (Oldfield, 1966), a memory system dedicated to storing all that we know about the words in our vocabulary. Any representation or entry in the lexicon is said to contain a language user's collective knowledge about a given word's form syntactic and semantic properties. The lexical access processes then locate a word representation in lexical memory that matches some input representation.

15.2 The Autonomous Search Model

The Autonomous Search Model (Forster, 1976; 1979) is one of the most influential lexical access models. In this model, the word recognition system is divided into two components: one is devoted to the orthographic properties of words, and another focuses on the phonetic properties. Since these properties involve processing words regarding the relevant features, the model is equipped to account for word frequency. It means one accesses common words more quickly than similar rare words.

Despite recent revisions, the autonomous search model cannot account for priming and context effects. (Caroll, 2000)

15.3 The logogen Model

The word Logogen is derived from the Greek Word :

LOGOS ⟶ **WORD**

and

GENES ⟶ **BORN**

John Morton proposed the logogen model (1969); in this model, words in a lexicon are represented by "logogens," which are units that indicate a word's various semantic, orthographic, and phonological attributes. A logogen can be activated through sensory input or contextual information, and these two devices are assumed to work in parallel, as illustrated in the figure below.

The basic unit in the model is termed a logogen. It is a device that accepts information from the sensory analysis mechanisms concerning the properties of linguistic stimuli and context-producing mechanisms. A response is made available when the logogen has accumulated more than a certain amount of information.

The model assumes that each word is associated with a logogen: a unit with phonetic, syntactic, and semantic information. Perceptual or contextual factors can activate Logogen. As more input is heard, activation rises for logogens whose phonetic

representation matches the input. The activation also rises for logogens that match the current context; the first logogen to reach a certain activation threshold is recognized.

⟶ If a letter **"T"** is identified in the input, all logogens' activation levels corresponding to words containing a "T" will increase. So, the logogen fires word is recognized.

Word Processing: Logogen Model

First-generation models of lexical access were based on artificial intelligence-style analyses of the problem of recognizing words from spoken input. John Morton's model is a bottom-up driven system that takes spoken or visual input and uses it to activate previously stored word form representations (Morton, 1969). The heart of the logogen model was a set of processing units that would receive input from either spoken or written modalities and fire when their excitatory inputs exceeded some criterion level of threshold. Morton notes: "The logogen is a device which accepts information from the sensory analysis mechanisms concerning the properties of linguistic stimuli and context producing mechanism. When the logogen has accumulated more than a certain amount of information, a response (in the present) case the response of a single word is made available." Max Coltheart and his colleagues describe the logogen system in this way (Coltheart, Rastle, Perry, & Landgon, 2001, p.209),

"Logogens are evidence-collecting devices collected by a word's logogen exceeds that logogen's threshold, information about that word in the cognition system (e.g., its meaning) is accessed."

A logogen presents each word in a person's vocabulary, so words are recognized when the activation levels of their corresponding logogen exceed some threshold. What must happen for a logogen to have its activation raised above the threshold? In Morton's system, logogen could receive inputs from either spoken words (subject to auditory analysis), written words (subject to visual analysis), or preceding context (which would activate logogens based on semantic attributes). Usually, input would come from either the auditory or visual systems, and not both at once, but it is certainly possible that both auditory and visual evidence could be present simultaneously (as in reading along while someone speaks). The semantic input mechanisms allow context to influence the time it takes to recognize a word. Context words that are semantically related to an individual logogen will raise the activation of the logogen before the listener gets direct perceptual evidence that the corresponding word is present in the input. The logogen system operates on these three kinds of inputs, and when individual logogens become activated at a level above their thresholds, they send signals to an output buffer. Unless new input continues to activate the logogen, the decay function returns its activation to baseline levels within about one second. Once the logogen has been triggered or activated, its activation threshold is temporarily lowered. As a result, less evidence is needed in the acoustic and visual input channels to reactivate the logogen. This mechanism can account for repetition priming effects, and it is easier to recognize a word the second time you see it than the first because the activation threshold is lower the second time.

The logogen model makes two key assumptions. First, it assumes that information flow is strictly bottom-up. Auditory and visual processing units affect logogen activation, but logogens do not affect the activation levels of the auditory and visual processing units that feed into the logogen. Second, it assumes no direct

connections between and among the logogens themselves. As a result, the activation level of one logogen does not affect the activation of any other logogen.

The logogen theory is important in Psycholinguistics because it was one of the first attempts to mathematically model (and therefore explain) how people respond to words. The model was successful in several dimensions. First, it has been known that word frequency affects various behaviors for a long time. Words that occur frequently in a language are easier to process than words that appear less frequently. Why should this be the case? Morton suggested that repeated exposure to high-frequency words lowers the threshold for activation in the logogens that represent those high-frequency words. So, less external evidence ("bottom-up" input) is required before you can recognize a high-frequency word; therefore, you respond faster to high-frequency words than to low-frequency words. It may also help explain why high-frequency words tend to be shorter than low-frequency words (as per Zipf's Law; Zipf, 1949). Shorter words pack less phonological and/or orthographic information than longer words, but this does not make them harder to recognize and process because more frequent exposure lowers their activation. The model also helps explain why high-frequency words are easier to recognize than low-frequency words when they have been degraded by noise. Noise in the signal decreases the quality of the bottom-up input, but high-frequency words do not need as much bottom-up input, so they are recognized even in noisy environments.

Keywords and useful definitions

- **ARTIFICIAL INTELLIGENCE**: is a type of computer technology that is concerned with making machines work in an intelligent way, similar to the way that the human mind works. It is the theory and development of computer systems that can perform tasks typically requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.
-
- **LOGOGEN:** A purely theoretical memory model with three main stages- recall, recognition, and reproduction). For example, the image of a table is activated by hearing or observing the word table or associated terms.
- LOGOGEN: "In one of the many memory models, a logogen is a standalone memory unit corresponding to letters and digits."

- 'Logo': Ancient Greek λόγος (lógos, "word, speech").
- - '-gen': Borrowed from French -gène, from the Ancient Greek -γενής (-genḗs). A producer of something.
- Logogen is a word recognition unit that encapsulates various properties of a given word, such as its appearance, sound, and meaning.
- Each logogen has a threshold (for identification), and words with higher frequencies have lower thresholds.
- If a "t" letter is identified in the input, all logogens' activation levels corresponding to words containing a "t" will increase.
- The "'logogen model '" of 1969 is a model of speech recognition that uses units called " logogens " to explain how humans comprehend spoken or written words.
- The logogen model best explains the word-frequency effect in that words (or logogens) with a higher frequency (or are more common) have a lower threshold.

- **Top-down vs bottom-up processing**
- 1- Top-down: We begin interpreting a sentence spontaneously and automatically based on available information. For instance, we do not have to wait until we have analyzed all the phonemes in a sentence to understand it.

- 2- Bottom-up: analyze phonemes and word boundaries and relate these things to the mental lexicon. It can happen only piece by piece- no forward projection, no prediction

16- The Logogen Model (Practice)

Activities

- **Read the text twice, then do the activities below.**
- **I- Read the text above and say if these statements are true or false (justify)**
- **1-** The logogen model considers speech only.
- 2- It consists of storing new items never dealt with before.
- 3- The Logogen model is based on stimulus
- 4- A response depends on the accumulation of a certain amount of information
- 5- The cognitive system is part of the process of recognizing a word
- 6- The individual's vocabulary is organized in a set of logogen.
- 7- The semantic feature is related to context to precise time allotted for word recognition
- 8- The output buffer is necessary when the activation is above the thresholds.*

*buffer: area in a computer's memory where data can be stored for a short time

II- Answer the following questions according to the text above

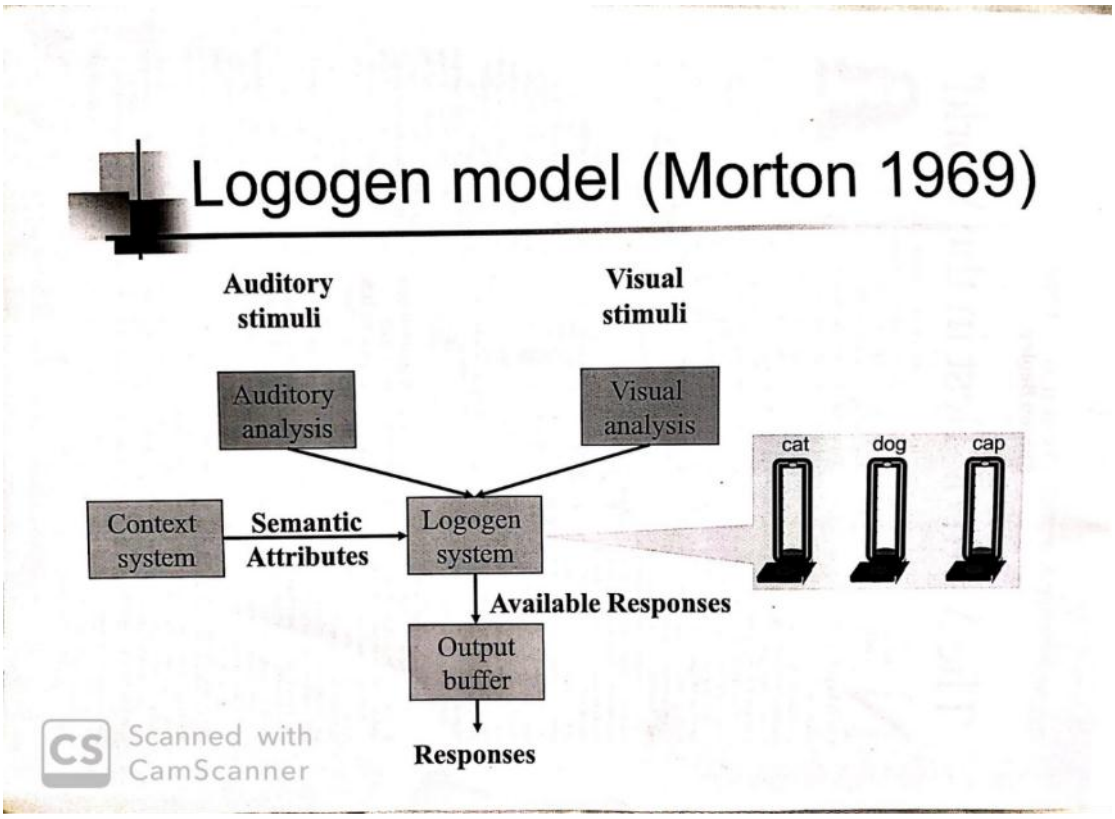
1- What are the necessary elements that contribute to transmitting a given input?

2- How does priming affect function?

3- What is the semantic input system's role?

4- When is word recognition easier?

5- When is it possible to have visual and auditory input simultaneously?


Logogen model (Morton 1969)
Auditory stimuli
Visual stimuli
Auditory analysis
Visual analysis
cat
dog
cap
Context system
Semantic Attributes
Logogen system
Available Responses
Output buffer
Responses
Scanned with CamScanner

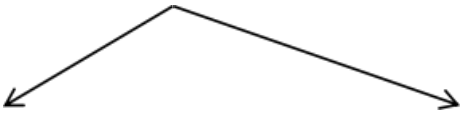
- Lexical entry for each word comes with a logogen
- Logogens specify word attributes

E.g.: - the meaning ⟶ SEMANTIC

-Orthographic ⟶ SPELLING

- Phonological ⟶ SOUND

- These constituents appeal to the activation of a given word in the brain.
- It is activated in two ways.



Sensory input by contextual information

The access is performed when the threshold is reached

- The threshold depends on different factors that contribute to word recognition

E.g., frequency

When a word is frequently used, access is rapid

- The access makes information associated with words available

- The lexical entry for each word comes with a logogen
- The lexical entry only becomes available once the logogen ‘fires.’
- When does the logogen fire?

When you read or hear the word, it means visual analysis or auditory analysis

.

FACTS TO RETAIN ABOUT LOGOGEN THEORY

- Model designed to explain word recognition using a new type of unit known as a "logogen"
- Artificial elements, lexicons, or specialized aspects of memory that include semantic and phonemic information about each item that is contained in memory
- A given lexicon consists of many smaller abstract items known as logogens.
- Logogens contain various properties about the given words, such as their appearance, sound, and meaning.
- Logogens do not store words within themselves; they store information necessary to retrieve whatever word is being searched.

(Morton, J. (1969). Interaction of information in word recognition. *Psychology Review*, 76, 165-178.

III- Use the key information given about the logogen model and write a personal and concise paragraph

17-Word Processing (C)

Word Processing: COHORT MODEL

The Cohort model is another prominent second-generation account of lexical access (Marslen-Wilson, 1987, 1989; Marslen Wilson & Welsh, 1978). The Cohort model was developed specifically to explain lexical access for spoken words. The Cohort model views the process of lexical access as involving three kinds of processes: ***activation (or contact), selection, and integration.*** During the initial activation or contact phase of processing, multiple-word form representations are activated in response to the auditory stimulus; the cohort views contact as being influenced only by bottom-up auditory information and not by contextual information, and so activation in the cohort is referred to as an autonomous process, it is affected by auditory stimulation but not by other potentially relevant cognitive process. It is affected by auditory stimulation but not by other potentially relevant cognitive process. As a result, stored representations of words that do not fit into evolving contexts are activated as long as they match the acoustic properties of the word stimulus. COHORT says that selection depends on the bottom-up stimulus because bottom-up information activates word candidates, but it also depends on context. Words that fit better into the context will have an advantage over words that do not fit, especially in cases where the bottom-up input is ambiguous between two or more stored word candidates. ***Integration*** happens

when the features of the selected word are incorporated into the evolving representation of the entire utterance. During integration, properties of the selected word- its grammatical class and meaning- are evaluated concerning how well they fit with the preceding context. Because COHORT deals with the spoken input, it views lexical access and the activation of word form as resulting from a continuous evaluation of the similarity between the auditory stimulus and stored word form representations based on auditory properties. COHORT also views the process of lexical access as being radically incremental. Word representations are activated as soon as the initial sounds in the acoustic stimulus have been perceived, and people can identify individual words in the speech stream before they hear the entire word.

COHORT is called cohort because lexical access starts with a contact phase in which all words that match the perceived acoustic profile are activated. So, within about 100-150 ms of the onset of a word, a whole group of matching candidate word forms becomes available or more accessible than usual. This group of activated word forms is called ***cohort.*** After this initial activation phase, the lexical access mechanism continues to check the list of activated candidates against further input from the speech stream, and it eliminates candidates that no longer match the input. Simultaneously, it checks the characteristics of each member of the activated cohort against requirements imposed by the context- the correct target word has to have the right syntactic (structural) and semantic (meaning) properties to continue being activated.

One advantage of the COHORT model is that it makes specific predictions about when a word can be recognized and its meaning accessed. COHORT says that word recognition depends on reducing the set of activated words to the one that matches the acoustic input. The recognition point is where the COHORT is reduced to a sole

survivor. (Marslen-Wilson, 1987). A word like ***trespass*** can be recognized well before the end of the word because there are no other words besides trespass that are consistent with the onset ***tres*** (Marslen-Wilson & Tyler, 1980). COHORT allows minor adjustments to the recognition point based on semantic or syntactic requirements imposed by context. Words that are highly predictable in context may be recognized faster than less predictable words. According to COHORT, word recognition is ***contingent*** on two factors: first, there has to be positive evidence for the presence of the word (e.g., the input ***tres*** provides clues that the word trespass is the matching word target). Second, the input has to rule out the presence of other words (e.g., the onset ***TR*** rules out the possibility that the matching word target is tap, top, table, or any other word that does not begin with ***TR)***. So, the word trespass can be recognized as "early" (before the end of the word) only if lexical access includes a mechanism that knows when all other possibilities have been eliminated.

KEY NOTIONS

- Know a word
- Know its phonological, morphological, syntactic, and semantic attribute
- A word's meaning
    - Sense: relationships with other words
    - Reference: relationships between a word and an object or an event
- Internal Lexicon
    - The organization of word knowledge in permanent memory
    - Representation with semantic networks
- Lexical Access
    - Word knowledge activation
    - Influenced by the frequency, attributes, ambiguity, and so on
- Dimension of Word Knowledge

- Phonological Knowledge
- Syntactic Knowledge
- Morphological Knowledge
- Semantic Knowledge

- Top-down vs bottom-up processing

Top-down: We begin interpreting a sentence spontaneously and automatically based on the information. For instance, we do not have to wait until we have analyzed all the phonemes in a sentence to understand it.

Bottom-up: Analyze to isolate phonemes word boundaries and relate these things to the mental lexicon. It can happen only piece by piece- no forward projection, no prediction.

Comparing **top-down** and **bottom-up** processing:

In a lexical priming study, suppose a word is lexically ambiguous and has two meanings. However, suppose that only one of those meanings is appropriate, given the syntactic structure of the sentence the word is in.
Given the syntactic structure, a person using strong top-down processing would only be primed for the appropriate meaning.
A person using powerful bottom-up processing would be primed for both meanings, although only one meaning is appropriate.

Lexical priming: The lexical priming theory suggests that each time a word or phrase is heard or read, it occurs along with other words. It leads you to expect it to appear in a similar context or with the same grammar in the future, and this 'priming' influences the way you use the word or phrase in your speech and writing.

18-Word Processing (D)

- **The Cohort Model (Practice)**

- **TASK ONE: Read the text above and say if the following statements are True or False**

1- The cohort model deals with sentence processing

2- In the cohort model, lexical access goes through three steps.

3- The first step exhibits different word representations

4- Cohort considers the process of lexical access as being regressive.

5- Word activation is a response to the initial sound in the acoustic stimulus.

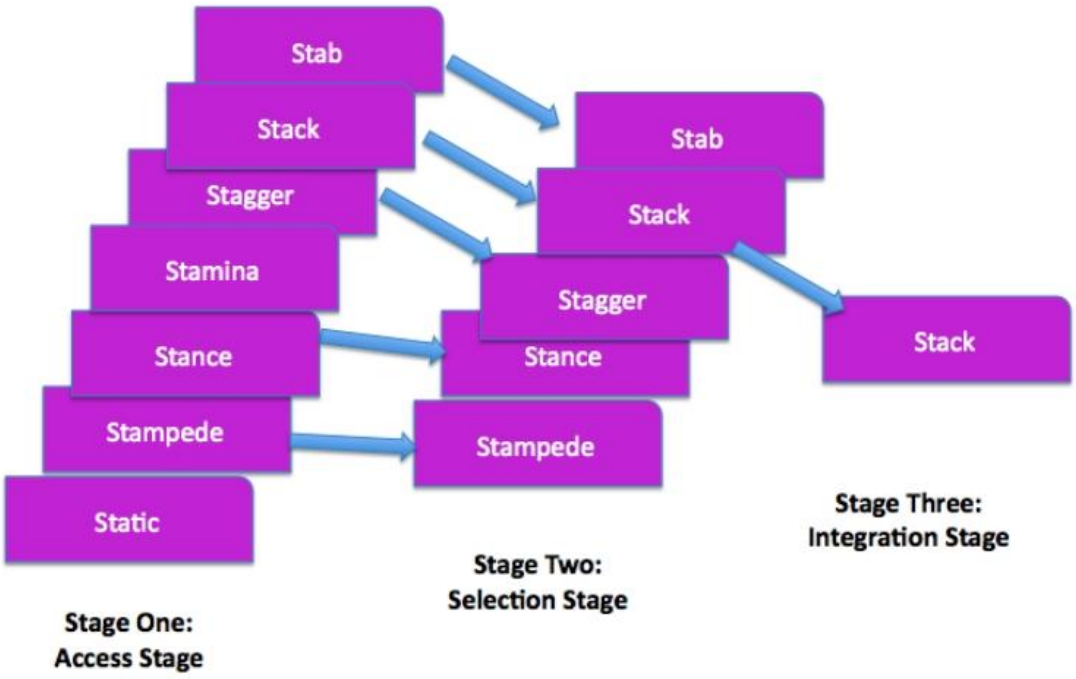
6- The semantic or syntactic requirements are imposed by context.

7- Identifying individual words in the speech stream is impossible before hearing the whole word.

- **TASK TWO: Read the text and answer the following question**

1- The cohort model goes through three kinds of processes to elicit them.

2- Look at the figure and match each representation with the appropriate explanation in the text:



3- How is the **'selection'** step performed?

4- When is the integration phase reached?

5- To what extent is grammar functional during integration?

6- Why is cohort called so?

7- How can the speech stream help in eliminating words from the list?

8- Word recognition is contingent; how?

9- Word recognition is determined under two main conditions: what are they?

TASK THREE:
Fill in the blanks according to the information accessed previously

The Cohort Model

Marslen-Wilson et al. (1987) proposed that when individuals hear a word, its phonological neighbours also get ……1…... The cohort model proposes that words with similar sounds are primed. The cohort model is comprised of three main ……2…..

During stage one, also known as the access stage, the first few sounds of the target word activate all words with a similar sound. For example, in the sentence **"Renee went to buy a toy from the** st**-…,**" *stand, store, stranger*, and other similar ……3…… words would be accessed during the first stage. The set of words that become activated is known as the "cohort." The cohort model resembles Morton's (1969) logogen model in that multiple words can be activated, and the system continues searching through all activated words until it settles on a single choice. The second stage of Marslen-Wilson's (1987) model is known as the ……4…..stage, during which all activated words are progressively eliminated, thus narrowing the cohort. An activated lexical item in the cohort can be eliminated based on inappropriate context or if a better candidate is activated. All lexical items in the cohort remain eliminated until a single lexical item remains, known as the ……5…….stage.

19-Word Processing (E)

Word Processing: The **Trace model**

The TRACE model assumes that activation is ***cascaded***. Cascaded activation contrasts with threshold activation. In the logogen model, threshold activation means that a processing unit (e.g., a logogen) sits quietly until input causes its activation to exceed some threshold value. In a system that uses cascaded activation, units receiving input send output as soon as any activation comes in from other units. Using cascaded activation, visual features in TRACE send activation forward as soon as they are identified, so letter-level processing units start to become active soon after feature-level processing units start to become active. That means that letter representations start to become activated as soon as any visual feature has been identified, and you do not need to perceive all of the features of a letter before you start to activate letter-level processing units. Notice also that individual features are connected to more than one letter-processing unit. The horizontal line visual feature has excitatory connections to the letters "A," "T," "G," and "S" and an inhibitory connection to the letter "N". When a horizontal visual feature is detected in the input, all four letters increase their activation, and the letter "N" decreases in activation. If four different letters are activated, how does the system decide which letter it is seeing? Notice that all connections are inhibitory within the layer of units representing letters (and phonemes). It means that when a letter-processing unit starts to get activated by the bottom-up input from the features, it will try to decrease the activation of the other connected letters. This connection pattern leads to lateral inhibition-processing units within a layer of

units in the network that try to reduce and inhibit each other's activation levels. It makes sense because a feature can be only part of one letter. So, if the feature comes from the letter 't,' the representation of the letter "t" should try to inhibit other possibly competing candidates. After the bottom-up input has been received, inhibitory connections within a processing layer cause different letter representations to compete with one another, and the letter with the most support from the bottom-up features will eventually "win" the competition—its activation will increase, and it will inhibit competing letter representations until eventually there is only one candidate left standing.

Letter representations have a slightly more complex relationship with word form representations. Letters have excitatory inputs to the words they are components of and inhibitory feedback connections from the word layer. It means that, as a word becomes activated, it will feed excitation or inhibition back to the letter level. So if the word able starts to get activation from the letter "A," it will start to activate its other component letters, "B," "L," and "E," via excitatory top-down feedback connections, possibly before those letter representations have been activated by bottom-up input. Simultaneously, activity at the word level for ***able*** will inhibit letter-level representations that are not present in ***able***. It is one of the trace properties that allows it to deal with degraded input. A strictly bottom-up system would not be able to identify the rightmost letter in the figure because it could just as easily be an 'R' as a 'K,' so a strictly bottom-up system might not correctly identify the word as ***work.*** However, in the TRACE model, the intact letters **"W," "O,"** and **"R"** would activate the word form representations "WORK" and "WORM," which would feed activation back to the letter level and the combination of top-down and bottom-up activation from the remaining

intact features would eventually cause activation of the ‘K’ letter representation to exceed possible competitors.

To summarize the TRACE model's important properties, it is a highly interactive system. Bottom-up, top-down feedback, and lateral inhibition combine to determine how much activation any given unit in the network enjoys. The TRACE model explains how and why we can deal with degraded input. The network computes the best fit to the degraded stimulus by simultaneously assessing multiple levels of representation, and a good fit at one level can compensate for a bad fit at another level. Finally, TRACE explains why letters in whole words are easier to perceive than individual letters. Feedback from the word layer boosts the activation of lower-level letter representations.

19.1 Interactive Model

It is an interactive model of auditory word recognition, which allows for the effect of sentence context at any moment during word recognition. In the connectionist TRACE model, word elements are represented by nodes in a network. These word nodes may be positively affected by excitatory connections with lower (feature, phonemic) and higher (sentential) levels of representation. This way, the likelihood of recognizing a contextually appropriate word is influenced. Each cell in the network has a variable activation level and a threshold determining at which activation level the cell starts to influence other cells; this influence may be either positive or negative (i.e., inhibitory connections). The selection of a word is defined in terms of competition between activated word nodes. The word node, which in the end dominates all others, will be recognized. The flow of information through the network is relatively slow.

Therefore, the effects of sentence context may only emerge later during processing, for instance, during selection.

19.2 Practice

Choose the correct answer for each question by circling A, B, C, or D.

1. What type of activation does the TRACE model assume?

- A. Threshold activation
- B. Static activation
- C. Cascaded activation
- D. Delayed activation

2. In contrast to cascaded activation, what does threshold activation require?

- A. Input from sentence context
- B. Constant excitation from letter features
- C. Reaching a certain level before sending output
- D. Simultaneous input from all feature levels

3. when do letter-level processing units activate in the TRACE model?

- A. After the entire word is recognized
- B. Only after all features of a letter are detected
- C. As soon as any visual feature is identified
- D. After sentence context is applied

4. What connections exist between units in the same layer (e.g., letter-level units) in TRACE?

- A. Excitatory
- B. Feedback-only
- C. No connections
- D. Inhibitory

5. What process occurs among competing letter representations in TRACE?

- A. Cooperative facilitation
- B. Lateral inhibition
- C. Word-sentence fusion
- D. Isolated activation

6. How does the TRACE model explain our ability to identify letters in degraded input?

- A. It ignores damaged letters
- B. It relies solely on phoneme activation
- C. It uses both bottom-up and top-down feedback
- D. It postpones recognition until complete input is received

7. According to TRACE, how do word representations affect their component letters?

- A. By suppressing their activation
- B. Through inhibitory signals only
- C. Through top-down excitatory feedback
- D. By re-routing them to phonemic analysis

8. According to TRACE, What is a key reason that whole words are easier to perceive than isolated letters?

- A. Words are stored as images
- B. Letter nodes require less energy when alone
- C. Feedback from word nodes boosts letter activation
- D. Letter units inhibit each other less in words

9. What determines which word node is selected in the TRACE model?

- A. Which word has the most syllables
- B. The word most recently heard
- C. The word node that dominates others via activation
- D. The word with the fewest competing letters

10. What is a limitation of the TRACE model regarding sentence context?

- A. It cannot handle degraded input
- B. It cannot represent phonemes
- C. Sentence context only affects early stages
- D. Effects of sentence context may appear later in processing

20- Sentence Processing (A)

20.1 Introduction

Sentence processing occurs whenever a reader or listener processes a language utterance, either in isolation or in the context of a conversation or a text. Many studies of the human language comprehension process have focused on the reading of single utterances (sentences) without context. Extensive research has shown that language comprehension is affected by the context preceding a given utterance and many other factors.

Human sentence processing is a complex process governed by syntactic and language rules. All research aims to discover how people understand language (Ferreira, Christianson & Hollingworth 2001). There are a variety of theories about how sentences are processed; this account outlines the theory and evidence for the garden path *model of sentence processing*.

20.2 Models

Many influential models of human sentence processing draw on different combinations of architectural choices.

20.2.1 Garden path model

In psycholinguistics, a garden-path sentence is a sentence that is temporarily ambiguous or confusing because it contains a word group that appears to be compatible with more than one structural analysis. It is also called a syntactic garden-path sentence.

“To take someone down the garden path” means to deceive someone, to lead them into believing something is true before they realize they were misled. This case is valid for special sentences, known as garden path sentences. The garden path model of sentence processing itself was proposed by Frazier and Fodor in 1978 (Christianson et al. 2001). The garden path model (Frazier 1987) is a serial modular parsing model. It proposes that a syntactic module constructs a single parse. Contextual and semantic factors influence processing at a later stage and can induce re-analysis of the syntactic parse. Re-analysis is costly and leads to an observable slowdown in reading. When the parser encounters an ambiguity, it is guided by two principles: late closure and minimal attachment. The model has been supported by research on the early left anterior negativity, an event-related potential often elicited as a response to phrase structure violations. Late closure or phrases to be attached to the current clause. For example, "John said he would leave yesterday" would be parsed as John said (he would leave yesterday) and not as John said (he would leave) yesterday (i.e., he spoke yesterday).

Minimal attachment is a parsimony strategy: The parser builds the simplest syntactic structure possible (that is, the one with the fewest phrasal nodes). The garden path model of sentence processing suggests that, when encountering ambiguous sentences, only one meaning is initially processed. Then, upon reaching the end of, or a key point within, the sentence, if the meaning ascribed does not work, the sentence is reparsed until a satisfactory meaning can be ascribed.

Using the sentence “While the man hunted the deer ran into the woods,” Frazier and Fodor proposed that the words ‘the deer’ presented the processing difficulty. When the word ‘ran’ is encountered, the initial attachment of ‘the deer’ as an object of ‘hunted’ can be recognized as wrong. Therefore, rather than being attached to the subordinate

clause, as usual, it is stolen by the matrix verb ‘ran’ to become the latter theme (Christianson et al. 2001).

The garden path model is a two-stage model. The first stage involves syntactic information only, with analysis of the semantic information being part of the second stage.

The *garden path model* relies on two primary principles being adhered to within sentence processing: those of late closure and minimal attachment.

The late closure principle underlies the initial misanalysis in garden path sentences. This principle shows that incoming material is attached within the clause or phrase being processed currently rather than being attached to a separate phrase that has already been processed, hence ‘closed.’ It is referred to as late closure as processing keeps options open as long as possible, and if a word were attached to a clause already processed, thus closed, it would not be available for later clauses, despite apparently being available for this (Christianson et al. 2001).

The minimal attachment principle states that “for any sequence NP-V-NP (noun phrase-verb-noun phrase), the second NP will be interpreted as a direct object” (Ferreira, Henderson 1990). Thus, the attachment of incoming material to the currently analysed phrase should take place using the simplest structure possible. The structure comes from the structural nodes within a sentence (see Figure 1). It can be seen that processing method A utilizes fewer processing nodes, so it is the one that would be adhered to according to the minimal attachment. However, it does not allow for whatever occurs after the word defendant, as this might introduce an anomaly within the processing.

A garden path sentence is an ambiguous sentence that appears to be grammatically wrong but is not. The confusion arises when the reader is tricked into considering nouns as adjectives or verbs or vice versa or when definite or indefinite articles are missing.

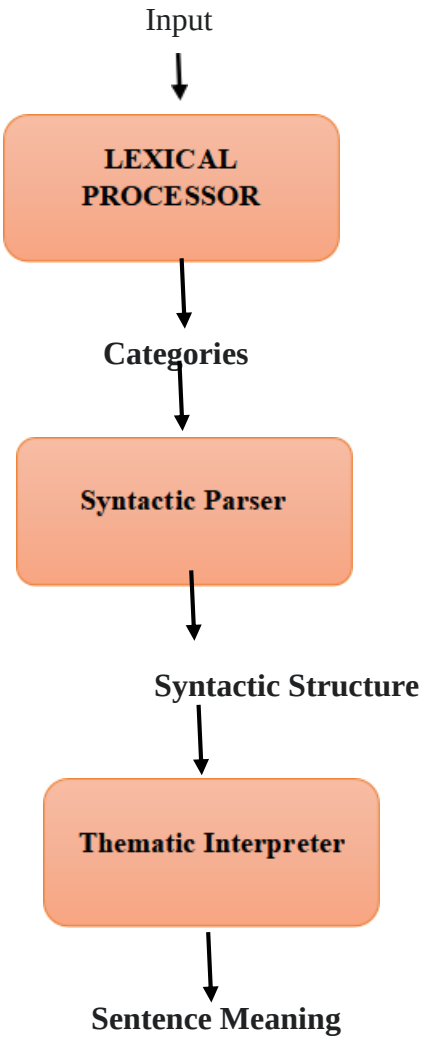


Fig: The Garden Path Model of Syntactic Parsing (Introduction to Psycholinguistics P: 148)

21- Sentence Processing (B)

Garden Path

Example:

"One example of a **garden-path sentence** is: 'Because he always jogs a mile seems a short distance to him.' When reading this sentence, one first wants to continue the phrase 'Because he always jogs' by adding 'a mile' to the phrase, but when reading further, one realizes that the words 'a mile' are the beginning of a new phrase. It shows that we parse a sentence by trying to add new words to a phrase as long as possible. According to this approach, we use syntax first to parse a sentence, and semantics later used to make sense of the sentence."

This kind of sentence can be considered a complex clause in a functional term. A garden path sentence is a sentence with ambiguous meaning both lexically and syntactically that may lead the reader down to a garden path, i.e., a linguistically mistaken or incorrect understanding. Here are some examples of Garden path sentences:

1) The novice accepted the deal before he had a chance to check his finances, which put him in a state of conflict when he realized he had a straight flush (Foss & Jenkins, 1973).

2) I was afraid of Ali's punch, mainly since it had already laid out many tough men who had bragged they could handle that much alcohol (Clark & Clark, 1977).

3) Jay always jogs a mile, which seems like a short distance (Frazier & Rayner, 1982).

4) The girl knows the answer to the physics problem is correct (Frazier & Rayner, 1982).

The reason why these sentences get the name of garden path sentences is that while we are parsing the sentences, we get a subjective impression, like following a garden path to a predictable destination, until we are proved mistaken in our original interpretation, and thus we are forced to backtrack and reinterpret them.

The garden path effect is not caused only by syntactic ambiguity in sentences like "the horse raced past the barn fell," which are famous among psycholinguists. Lexical ambiguity can also cause a garden path effect like "Ali's punch" in sentence 2). It seems these garden path sentences are rare, but they are frequently used in natural discourse. Lexical ambiguity research has shown how readers or hearers determine the contextually appropriate meaning of a word with multiple senses. Lexical ambiguities pervade natural languages, with words exhibiting different types and degrees of ambiguity. In the following sections, garden path sentences will be analyzed from the perspective of functional terms such as lexicogrammar, clause complex, transitivity, theme-rheme structure, and cohesion.

22- Sentence Processing (C)

22.1Introduction

The "garden path" sentence phenomenon, where initial interpretation leads to miscomprehension, highlights the intricate interplay between lexicogrammar – the combined study of vocabulary (lexis) and grammar – and our real-time sentence processing. Even seemingly simple sentences can harbor ambiguities that exploit our inherent parsing strategies, leading to structural or semantic surprises. This section will delve into how both the individual words (lexis) and the grammatical structure (syntax) of garden path sentences contribute to this effect, often forcing a re-evaluation of our initial understanding as we encounter unexpected linguistic cues.

22.2 Lexicogrammar and Garden Path Sentence

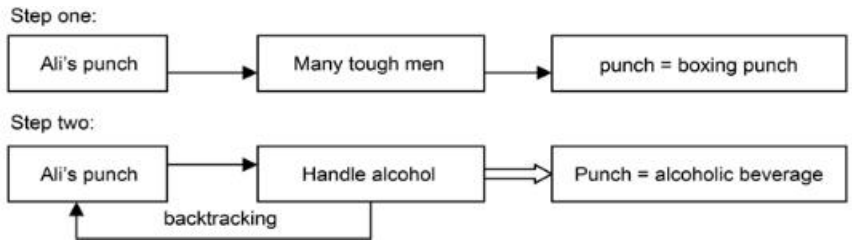
Even some simple sentences like “time flies like an arrow” may have ambiguous meanings if interpreted from a special viewpoint (“time” as an imperative verb, “flies” referring to the disgusting insects). The garden path effect is attributed to lexis and syntactic structure on the one hand and to an unexpected meaning on the other. In other words, the garden path sentence generally brings a structural or semantic surprise.

22.2.1. Lexis and Garden Path Sentence

Some garden path sentences can be understood correctly with some keywords in the sentences. These keywords are mostly polysemous words. With the help of our encyclopedia knowledge, we know at least two different meanings of the word “deal.”

One is related to a business transaction, and the other, relevant in this case, pertains to the distribution of the cards to players in a card game. When reading a sentence, we tend to select the most appropriate meaning from our semantic knowledge of the language to comprehend the sentence, and we have little or no conscious awareness of an alternative. We focus on what we believe is the relevant meaning of "deal" but fail to understand the sentence. As a result, we have to reread from the beginning of the sentence from another aspect of the meaning of "deal." There is another factor that contributes to the garden path effect. It is the knowledge of semantic relationships among the words within the sentence, such as "deal," "finances," and "straight flush". The noun phrase "straight flush" refers to a hand of cards, all of one suit and in a continuous sequence in poker or card games, for example, the seven, eight, nine, ten, and jack of spades or hearts, or diamonds, or clubs.

There are two steps in understanding sentence 2). In this sentence, the keyword is "punch," which means either a heavy boxing striking or the amount of alcoholic beverage. Most people would come to the conclusion that "punch" means a boxing one (illustrated in step one) since they usually relate Ali to the world-known champion boxer and "Ali's punch" to "laid out many tough men." Nevertheless, as soon as they get to the last word, "alcohol," they realize that is not the case and thus have to reread the sentence and eventually get the correct comprehension: "punch" in the sentence means "an amount of alcoholic beverage" (illustrated in step two). This two-step interpretation is illustrated in the following figure:



The two-step interpreting process of sentence

22.2.2 The Power of Polysemy in Garden Path Sentences

Polysemous words are linguistic landmines in sentence processing. When we encounter such a word, our brain rapidly accesses its meanings. However, we typically commit to the meaning, most likely given the preceding context and our general world knowledge. This initial commitment can be a source of the garden path effect if the subsequent parts of the sentence reveal that an alternative, less obvious meaning was intended.

22.3 How Polysemy Leads Us Astray

22.3.1 Frequency Effects

We tend to favor the most frequent meaning of a polysemous word. If a less common meaning is crucial for the correct interpretation of the sentence, we might initially choose the more frequent one, leading to a misparse.

22.3.2 Contextual Priming (Initial Interpretation)

The words and grammatical structures preceding a polysemous word can prime us toward a particular meaning. We will likely be led down the garden path if this initial contextual priming is misleading.

22.3.3 Lack of Immediate Disambiguating Information

Suppose the disambiguating information that signals the less common meaning of a word appears later in the sentence. In that case, we might have already built a syntactic and semantic representation based on the more common meaning, making re-analysis more difficult and noticeable.

22.4 Practice and Illustration

Example 1: "The novice accepted the deal before he had a chance to check his finances, which put him in a state of conflict when he realized he had a straight flush."

- **The Key Polysemous Word:** "deal."
- **Initial Interpretation (Garden Path):** In the context of "accepted" and potentially a novice, the most common meaning of "deal" might be related to an agreement, transaction, or bargain. We might initially understand the sentence as the novice agreeing to some terms before checking his financial situation.
- **Disambiguating Information:** The phrase "straight flush" is the crucial disambiguator. This term is strongly associated with card games.
- **Correct Interpretation (Re-analysis):** Upon encountering "straight flush," we realize that "deal" here refers to the distribution of cards in a game. The novice accepted the cards he was dealt before considering his financial situation in the

context of the game (perhaps betting). The garden path effect arises from the initial, more common interpretation of "deal" being incompatible with the later card-game-related vocabulary.

More Practice

- The old train left the station.

- The florist sent the roses smelled sweet.

- We painted the wall with cracks.

23- Sentence Processing (C)

23.1 Garden Path Sentence as a Clause Complex

Viewpoint plays a role not only in locating an appropriate layer of meaning but also analyses the causal structure of a sentence, a complex one in particular. Syntactic ambiguity arises when a sequence of words has more than one syntactic interpretation. Garden path sentences can arise specifically when the initial part of the sentence leads us to parse it as one type of complex clause, but later words force us to re-analyze the clausal relationships differently. It often happens because:

23.2 Ambiguous Clause Boundaries

- The initial words might seem to form a complete main clause with specific dependencies, but subsequent words suggest a different clausal segmentation. We might initially think a phrase belongs to one clause when it belongs to another or even forms the beginning of a new clause.

24.3 Misleading Connectives or Lack Thereof

- The presence or absence of conjunctions or other linking words can lead us down a particular parsing path regarding the relationship between clauses. For instance, we might expect a particular type of connective based on the initial part of the sentence, but its absence or the presence of a different one forces a re-evaluation of the clausal structure.

23.4 Reduced or Non-Finite Clauses

- Garden path effects can be widespread with reduced clauses (e.g., relative clauses where the relative pronoun and auxiliary verb are omitted) or non-finite clauses (e.g., infinitive or participle clauses). These structures can be ambiguous as their grammatical function and relationship to the main clause might not be immediately clear.

23.5 Examples and Analysis in the Context of Clause Complexes

Let us revisit some classic garden path examples and see how they can be viewed as involving ambiguities in clause complex structures:

- **"While the man hunted the deer ran into the woods."**
- **Initial Parse (Misleading):** We might initially parse "While the man hunted the deer" as a single clause, with "the deer" as the object of "hunted." It sets up a structure where "while" introduces a temporal clause.
- **Re-analysis (Correct):** When we encounter "ran," this interpretation becomes problematic. "Ran" needs a subject. We are then forced to re-analyze "hunted" as part of a reduced relative clause modifying "the man" ("the man who was hunted"), making "While the man hunted" a temporal clause, and "the deer ran into the woods" the main clause. The ambiguity lies in how "the deer" relates to the preceding and following verbs across potential clause boundaries.
- **"The horse raced past the barn fell."**
- **Initial Parse (Misleading):** We tend to see "The horse raced" as the main clause and "raced" as the main verb. "Past the barn" is interpreted as a prepositional phrase modifying the verb.

- **Re-analysis (Correct):** "Fell" forces us to reconsider. "Raced past the barn" is a reduced relative clause modifying "the horse" ("the horse that was raced past the barn"), and "fell" is the main verb of the sentence. The ambiguity lies in the grammatical function of "raced" – is it a main verb or part of a modifier within a clause complex?
- **"Since Jay always jogs a mile seems like a very short distance to him."**
- **Initial Parse (Misleading):** We might initially parse "Since Jay always jogs a mile" as a subordinate clause introduced by "since," with "a mile" as the object of "jogs."
- **Re-analysis (Correct):** "Seems" signals the start of the main clause. We must then re-analyze "a mile" as the subject of "seems" and "Since Jay always jogs" becomes an adverbial clause modifying the main clause. The ambiguity lies in how "a mile" functions grammatically across the potential boundary between the subordinate and main clauses.

23.6 The Role of Viewpoint in Analyzing Clause Complexes

Our initial "viewpoint," or how we initially frame the grammatical relationships within the sentence, influenced by parsing principles like late closure and minimal attachment, can lead us to a particular analysis of the clause complex. When later information contradicts this initial viewpoint, we experience the garden path effect and must shift our perspective on how the clauses are structured and related.

In essence, understanding garden path sentences as clause complexes involves recognizing how the ambiguity arises from how the words can be grouped into different clauses and how the relationships between these clauses can be misinterpreted based on

the initial parts of the sentence. The need to backtrack and re-analyze the sentence often involves restructuring our understanding of the clausal boundaries and the grammatical roles of different phrases within the complex.

23.7 Conclusion

In conclusion, the intricacies of clause complex structures provide fertile ground for the garden path effect. As demonstrated through the ambiguities of clause boundaries, the misleading presence or absence of connectives, and the condensed nature of reduced and non-finite clauses, our initial parsing strategies can easily lead us to an incorrect interpretation of how multiple clauses relate within a sentence. The subsequent need to revise our understanding of these clausal relationships underscores the dynamic and sometimes challenging nature of real-time language processing, highlighting how our initial "viewpoint" on the syntactic structure is constantly subject to revision as we navigate the complexities of language.

24- Sentence Processing (D)

24.1 Constraint-based model

Constraint-based theories of language comprehension highlight the utilisation of extensive probabilistic information by individuals present in the linguistic signal. The frequencies and distribution of events within linguistic environments can be discerned through statistical learning, which enhances language comprehension. Language users are observed to arrive at one interpretation over another when comprehending an ambiguous sentence by quickly integrating probabilistic constraints.

24.2 Key Features

1. Parallel Processing: All interpretations are considered at once.
2. Immediate Integration of Constraints: Syntactic, semantic, and contextual cues are used initially.
3. Probabilistic and Interactive: Interpretations are based on prior linguistic experience.
4. No Syntax-First Assumption: Syntax does not take precedence over other types of information.

24.3 Cognitive and Computational Basis

The model aligns with cognitive psychology findings (e.g., eye-tracking, ERP) and is often implemented dynamically in connectionist or neural network models that weight constraints.

Example

"The evidence examined by the lawyer turned out to be unreliable." A constraint-based approach avoids garden-path errors by simultaneously using plausibility (evidence cannot be examined) and structure.

Supporting Evidence

• Eye-tracking studies show early effects of semantics

• Lexical frequency influences parsing

- Cross-linguistic evidence supports the model

In conclusion, the garden path model emphasises a sequential, syntax-first approach, which may be subject to re-analysis based on semantic and contextual mismatches. On the other hand, constraint-based models propose a parallel, interactive approach in which multiple sources of information are continuously integrated to arrive at the most likely correct interpretation. Both models have considerably advanced this understanding of the intricacies of human language processing and have made significant contributions.

Recapitulation

The "garden path" model. This model posits that when encountering ambiguous sentences, our minds initially construct a single, most likely interpretation based on syntactic rules like "late closure" and "minimal attachment." If this initial interpretation turns out to be incorrect as we read further, we experience a "garden path effect," requiring us to re-analyze the sentence to arrive at the correct meaning. The text illustrates this with examples of garden path sentences and discusses how lexical and syntactic ambiguities, as well as our background knowledge, can lead us down these linguistic "garden paths." It also briefly contrasts the garden path model with constraint-based models, which propose that we consider multiple interpretations simultaneously, using various linguistic cues to arrive at the most probable meaning.

24.4 Practice

- **Read the following sentences and identify where the ambiguity lies**

a. The old man the boat.

b. The horse raced past the barn fell.

c. The complex houses married and single soldiers and their families.

d. The prime number few.

e. The man who hunts ducks out on weekends.

f. Until the police arrest the drug dealers control the street.

g. Fat people eat accumulates.

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