Language: Entschuldigen Sprechen Sie Englisch

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"Waiter, this soup is fly."

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Language

What is language and how is it different from communication?

Although language is often used as a communication system, there are other communication systems that do not form a true language like (Honey bee dance, smoke from mountains & bird song)

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A natural language has two necessary characteristics:

a) it is regular (governed by a system of rules called grammar)

b) It is productive (infinite combination of things can be expressed)

c) arbitrariness (lack of a necessary resemblances between a word or sentence and what it refers to)

d) discreteness (the system can be sub-divided into recognizable parts e.g., sentences into words, words into sounds)

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The structure of language

Language comprises of a number of system working together. Evaluating the structure of a language requires the study of a conversation

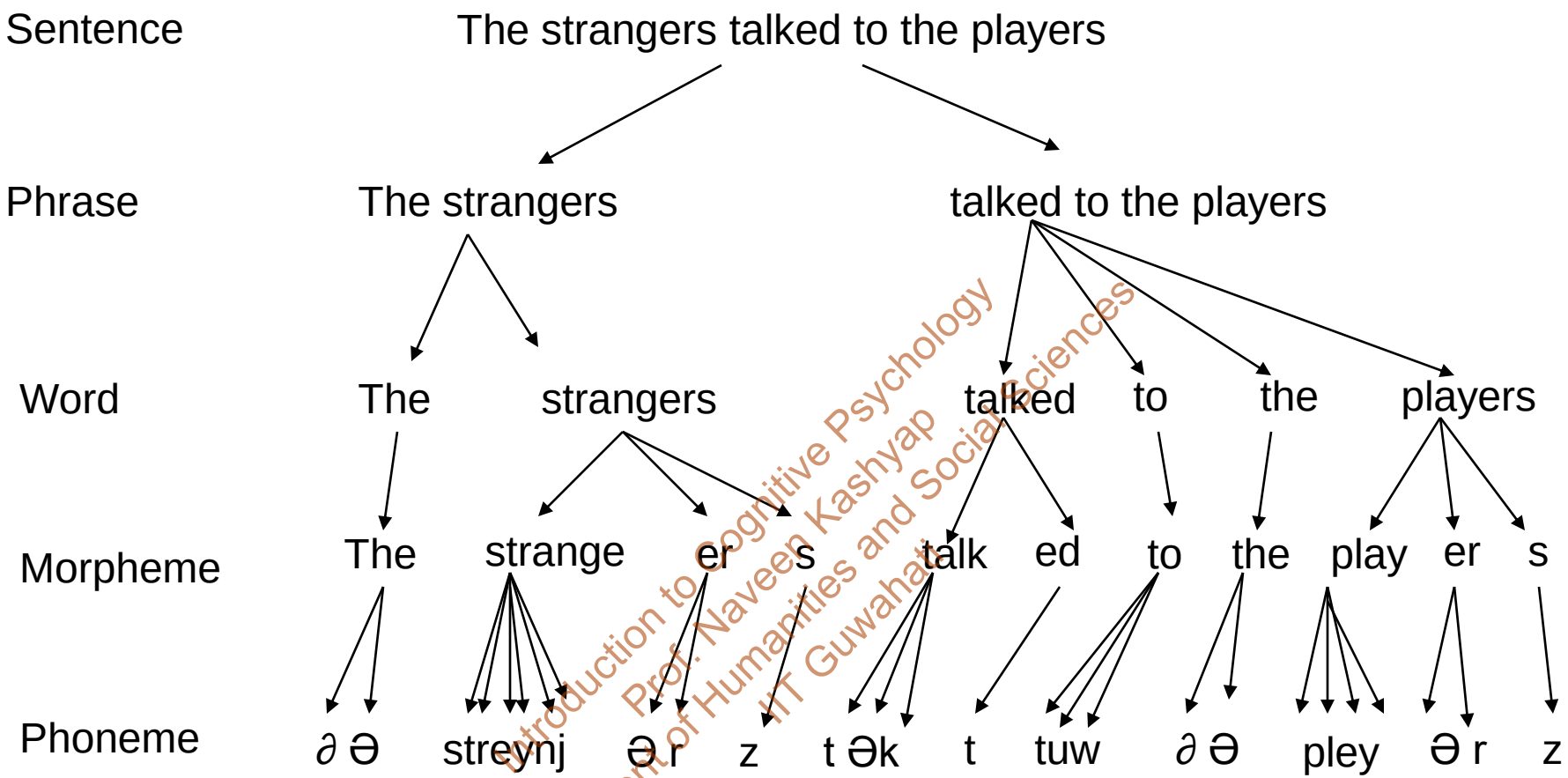
Conversation demands that we listen to & perceive the sounds of the speaker. Different language have different sounds (***called phonemes***). The study of the way in which phonemes can be combined in any given language constitutes the study of ***phonology.***

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The various phonemes are combined together to yield meaningful units of language (***called morphology).*** Word endings, prefixes, tense markers are the critical part of each sentence. Some of the ***morphemes (smallest meaningful units of language)*** are words and needs to be identified in order to study the role played by each word in a sentence. This is done by determining the ***syntax (structure)*** of a sentence

A syntactically correct sentence does not by itself make a good conversation. The sentence must mean something to the listener. Semantics is the branch of psycholinguistics devoted to the study of meanings.

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For conversations to work there must be some flow. Listeners must pay attention and make certain assumptions, and speakers must craft their contribution in ways that will make the listeners job feasible. This aspect of language is called ***pragmatics***

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Grammar is the set of rules for a language. Psychologists distinguish between the explicit and implicit knowledge of linguistic rules between people. Although most of us cannot state with accuracy the rules for English syntax, we can however almost immediately detect violation of the rules

Ran the dog street down cat after yellow the very the

The dog ran down the street after the very yellow cat

Our knowledge of rules is therefore not explicit. We often articulate the so-called *prescriptive rules (don't say ain't),* which tell us how we should talk or write even though we may violate them. In contrast the articulation of *descriptive rule (characterizing which sentences are legal or not)* is hard

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Phonology

The sound of German is different from English. Part of what distinguishes language are their idiosyncratic sounds. ***Phonetics*** the study of speech sound and how they are produced and ***Phonology*** the study of the systematic ways in which speech sounds are combined & altered in language help us in studying the sounds of language

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The English language has 40 phonetic segments (phones). Phoneme refers to the smallest unit of sound that makes a meaningful difference in a given language. If one phoneme of a word is exchanged for another, the word itself gets changed.

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thus if \d\ is replaced with \t\ then *duck* becomes *tuck*

vowels

IPA	examples
ʌ	cup, luck
a:	arm, father
æ	cat, black
ə	away, cinema
e	met, bed
ɜ:	turn, learn
ɪ	hit, sitting
i:	see, heat
ɒ	hot, rock
ɔ:	call, four
ʊ	put, could
u:	blue, food
aɪ	five, eye
aʊ	now, out
əʊ	go, home
eə	where, air
eɪ	say, eight
ɪə	near, here
ɔɪ	boy, join
ʊə	pure, tourist

consonants

IPA	examples
b	bad, lab
d	did, lady
f	find, if
g	give, flag
h	how, hello
j	yes, yellow
k	cat, back
l	leg, little
m	man, lemon
n	no, ten
ŋ	sing, finger
p	pet, map
r	red, try
s	sun, miss
ʃ	she, crash
t	tea, getting
tʃ	check, church
θ	think, both
ð	this, mother
v	voice, five
w	wet, window
z	zoo, lazy
ʒ	pleasure, vision
dʒ	just, large

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Psycholinguists distinguish between consonants and vowels.

Vowels work without obstructing the airflow, simply depending on the shape and position of the tongue and lips (a, e, o) [Halle, 1990]

Consonants are phonemes made by closing or at least almost closing part of the mouth. They differ in

a) place of articulation – where the obstruction of airflow occurs

\b\ & \p\ sounds appear by closing the lips

\s\ & \z\ sounds made by placing the tongue against the hard pallet of the roof of the mouth just behind the ridge of the gums

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b) manner of articulation – mechanism of how the airflow is obstructed

\m\ sound closing the mouth while opening the nasal cavity

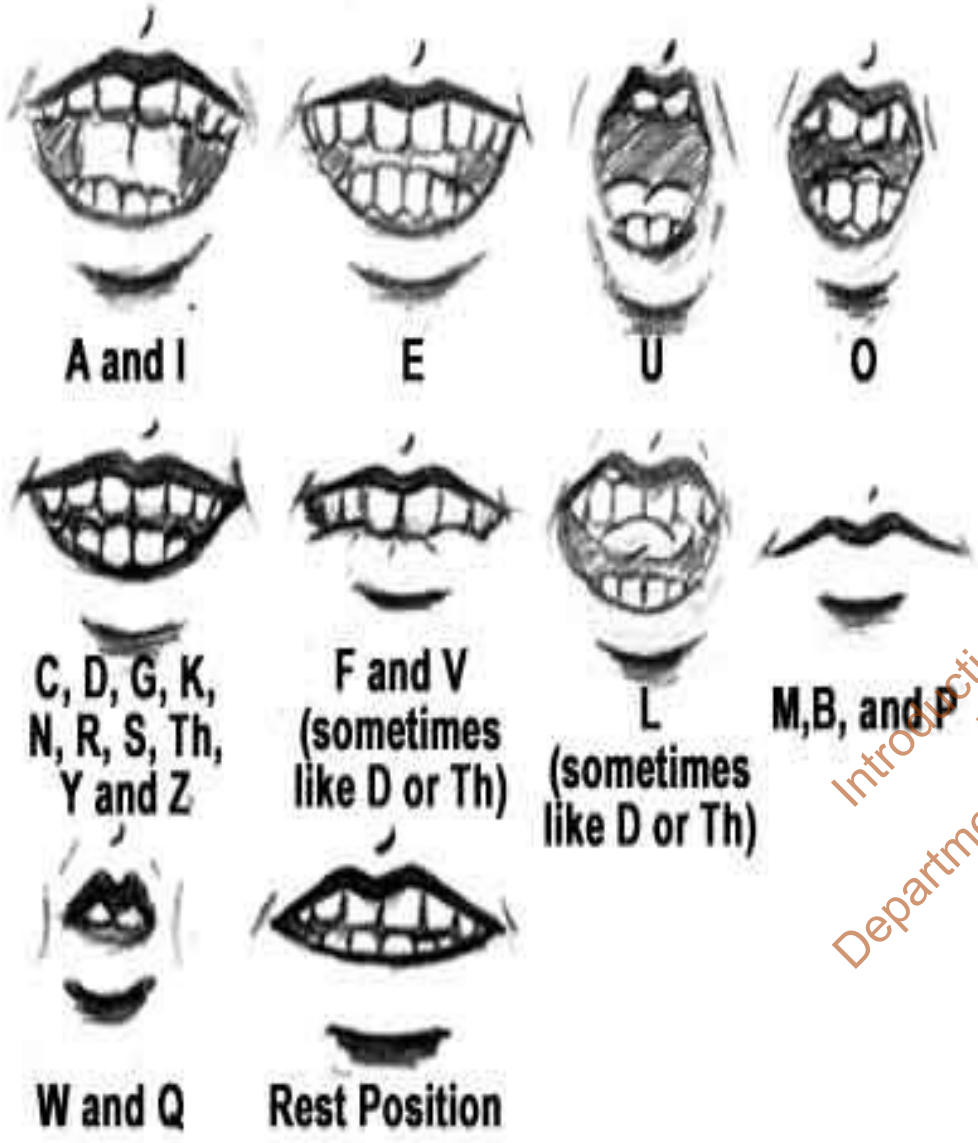
\f\ sound obstruction of the airflow producing a hissing sound

c) voicing – vibration of vocal cords

\s\ in “sa” does not require vocal cord to vibrate

\z\ in “za” requires vocal cord to vibrate

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Features of phonemes are involved in certain *phonological rules* that govern the ways in which phonemes can be combined

a) if two true consonants are at the beginning of an English word then the first must be an \s\. This rule prevents words such as *dtop and mkeech* from being legal words.

b) how to pronounce the plurals for an English word

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If word ends with	Plural ending of word	example
\s z c j s z\	\z\	Places, porches
\p t k f\	\s\	Lips, lists, telegraphs
Anything else	\z\	Clubs, herd

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Why do different languages sound different?

a) they contain different sounds (phonemes)

b) they have different rules for combining these sounds (phonology)

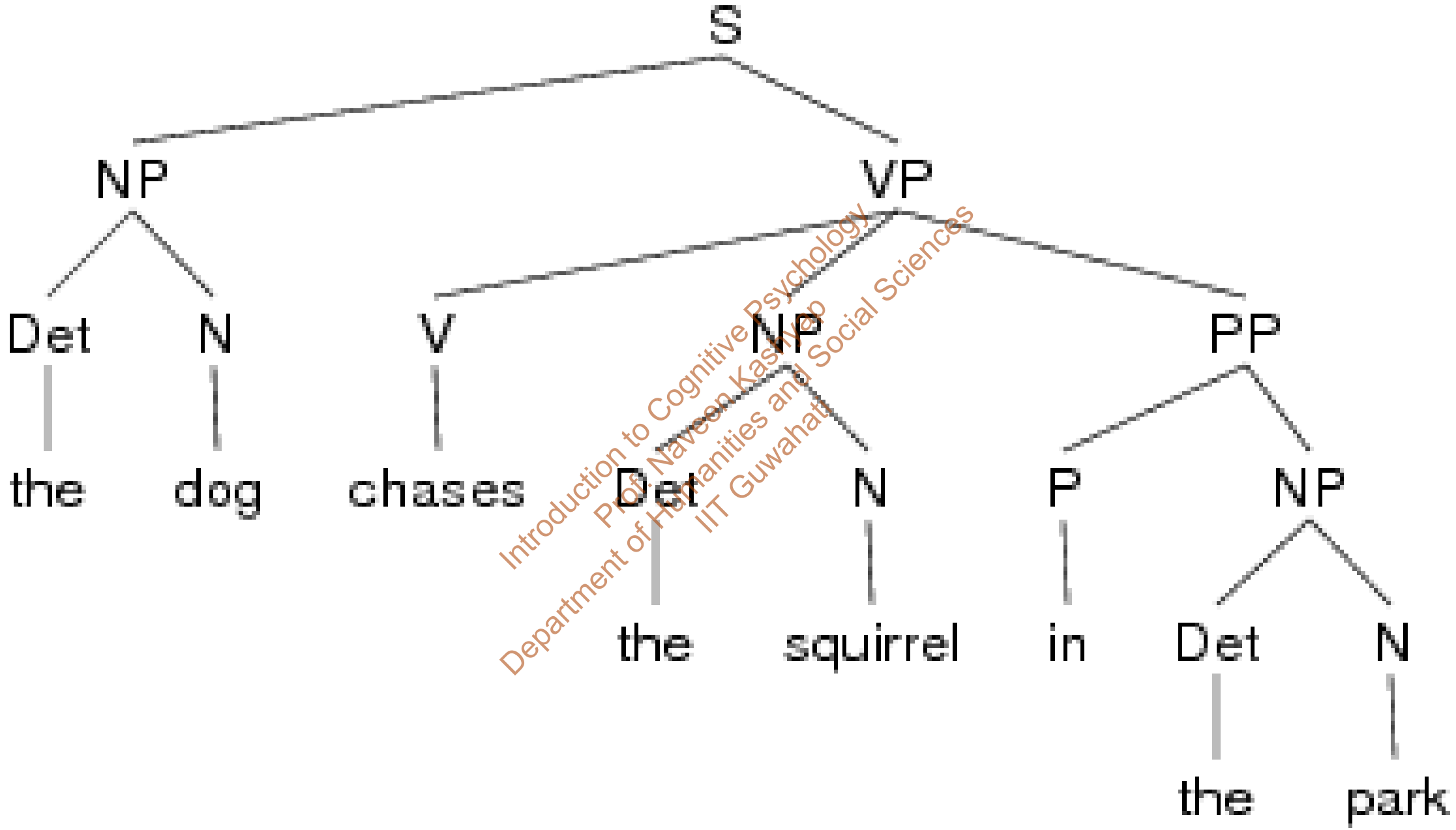
Syntax

Syntax refers to arrangement of words within sentences or to the structure of the sentence, their parts and the way the parts are put together. Syntactic rules govern the ways in which different words or larger phrases can be combined to form “legal” sentences in the language.

To explain what does structure of a sentence mean consider the following

“The Dog Chase the squirrel in the park”

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The diagram shows a *labeled diagram tree* and depicts what is called the *categorical constituent structure* of a sentence. These changes help us explain why certain changes can be made in a sentence and others can't. For example *preposing – taking a certain part of sentence an moving it to the front usually for emphasis.*

My naughty dog, I'm mad at. Naughty dog, I'm mad at my

That inflated price, I will not pay Price, I will not pay that inflated

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How can we concisely summarize of what can and what can't be legally proposed structure of a sentence.?

1) Only constituents labeled as being whole phrases (NP/VP node) can undergo movement from one position in a sentence to another.

2) Phrase structure rule / rewrite rule – describes the ways in which certain symbols can be rewritten as other symbols (S==NP VP)

3) Transformational rule – turn structure such as those depicted in tree diagrams into other structures. (e.g., preposing)

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Semantics

Semantics is the study of meaning and plays an important in language use. The task of designing a complete theory of meaning is currently unfinished but the question that such a theory should explain can be reviewed

Theory of meaning have to explain several things at a minimum (Bierwisch, 1970)

1) Anomaly (why cant one say “coffee ice-cream can take dictation”

2) Self-contradiction (Why is contradictory to say “my dog is not an animal”)

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3) Ambiguity (why isn't it clear when where one intends to go in "I need to go to the bank")

4) Synonymy (why does "the rabbit is not old enough" mean the same as "the rabbit is too young")

5) Entailment (what does "Pat is my uncle" mean that Pat is a man)

When listeners figure out the meaning of a sentence, they need to pay attention to more than just the meaning of individual words. e.g.,

the professor failed the student

the student failed the professor

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The study of semantics also involves the study of *truth conditions* of sentences and of the relationships between sentences. Truth conditions – are simply circumstances that make something true (e.g., The dog chased the cat).

Hence our understanding of the meaning of sentence requires

1) an understanding of the meaning of each word of the sentence

2) an understanding of the syntax of the sentence

3) an understanding of the truth condition of the sentence

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Pragmatics

pragmatics is the study concerning the social rules of language, which include certain etiquette conventions, such as not interrupting another speaker and beginning conversations with certain conventional greetings (Hi, How are you?)

Searle (1979) points that in listening to another person we must understand the kinds of utterances as they demand different responses from us

1) in *assertive* the speaker asserts his/her believes in some propositions

(“It hot in here” or “I am a Gemini””)

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2) *Directives* are instructions from the speaker to the listener (“Close the door” or “Don’t trust him”)

3) *Commissives* are utterances that commit the speaker to some later action (“I promise to be good” or “I will be your wingman”)

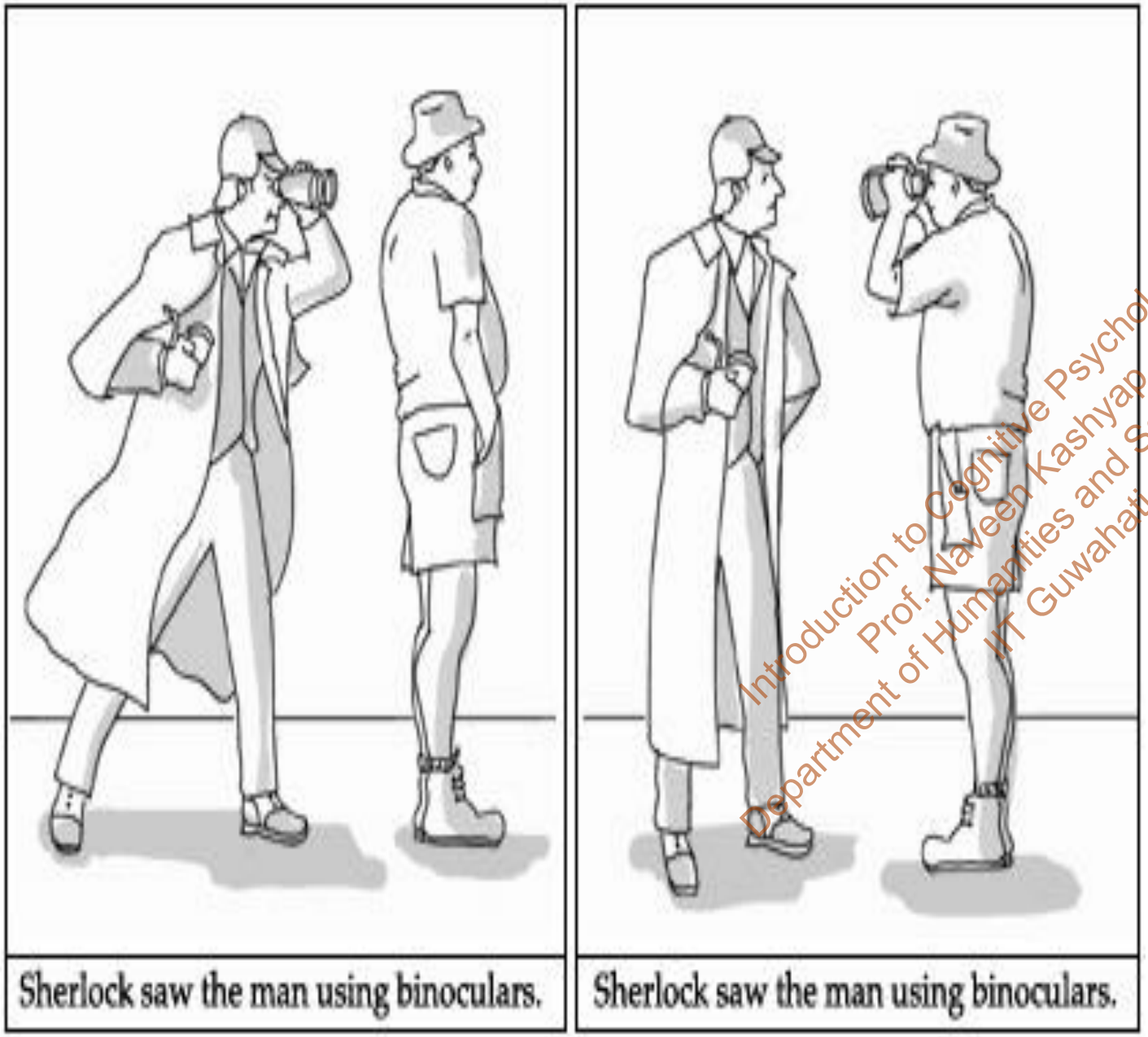
4) *Expressives* describe psychological state of the speaker (“I thank you for the favor you did for me” or “Thank for nothing”)

5) *Declarations* are speech acts in which the utterances itself are the actions (“I now pronounce you husband and wife” or “You are so dead”)

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According to Searle’s *speech act theory* part of our job as listeners' is to figure out which of the five types a particular utterance is and to respond appropriately.

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Language comprehension and production

language like any other information is transformed from raw input to meaningful representation. The steps in undergoing such transformation are

Speech Perception: The simplest way to assume speech perception would be like text perception i.e., one sound at a time using the pauses between sounds to identify when one word ends and the other begin

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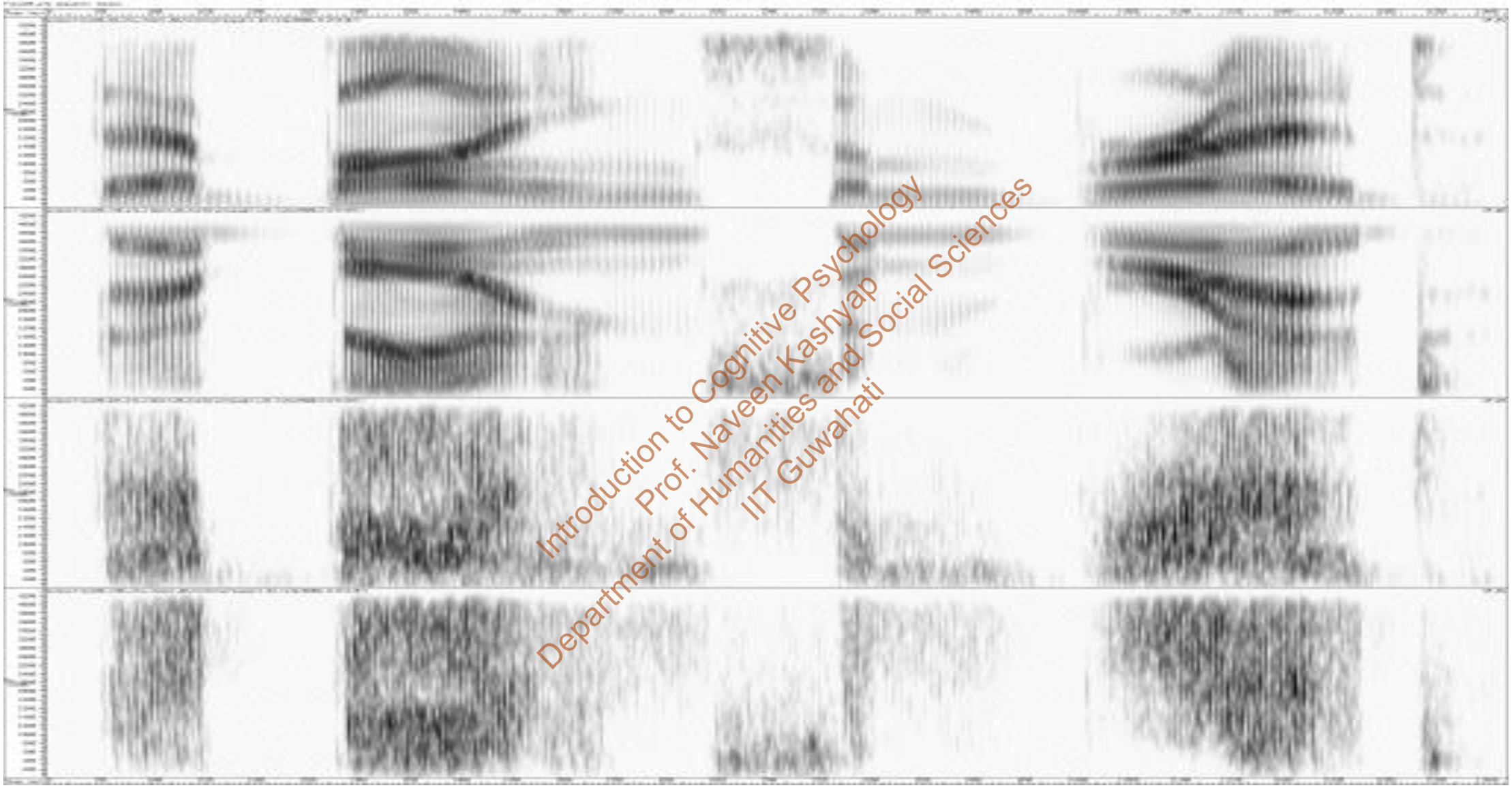
However Milner (1990) described two problems to such a theory

a) speech is continuous
For example refer to the spectrogram of the sentence

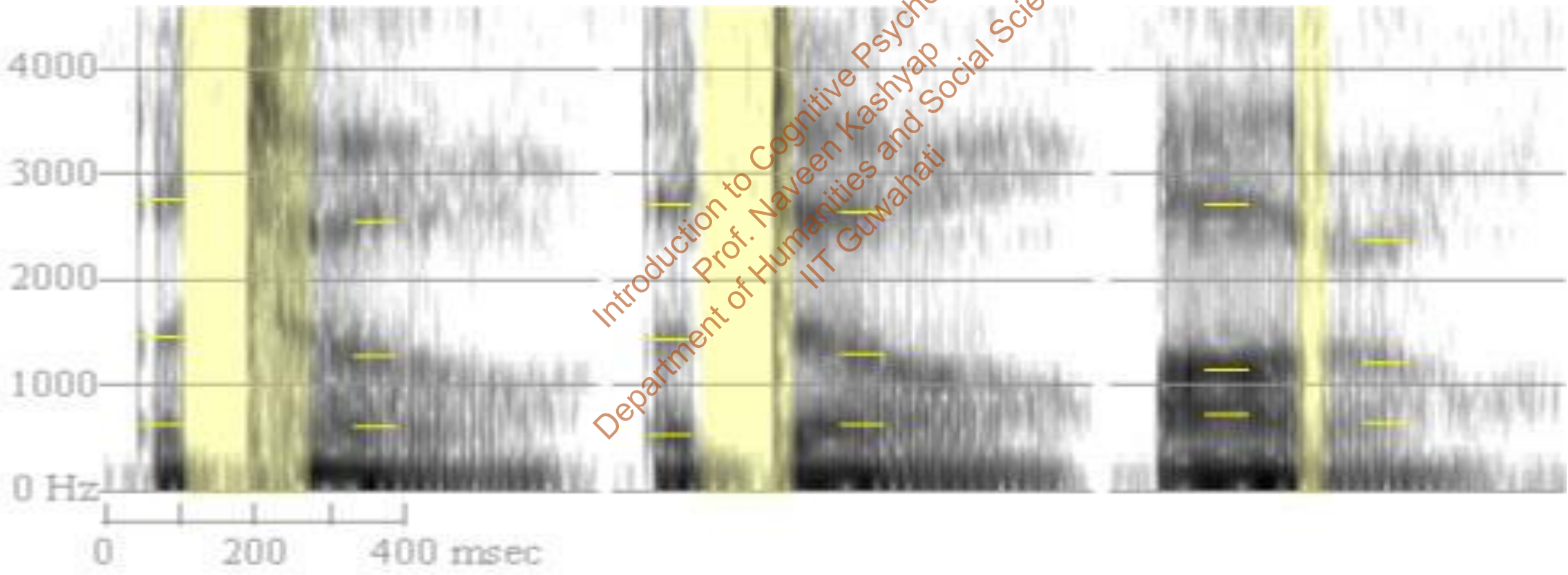
“they are buying some bread”.
Y axis = sound in Hz
X axis = time in sec

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Spectrogram indicated that rarely there are pauses around each sound, rather different sounds from the same word blend into each other


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b) a second problem in speech perception is that a single phoneme sounds different depending on context. e.g., “a toe, a doe & otto”



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Also important here is to note that man / women speak with different frequencies, different accents and across situations (whispering. lecturing etc).

"*how do people then perceive speech*"

the answer lies in the truth that we come specially equipped to perceive speech in efficient ways. Our perception of speech is categorical – in processing speech sounds we automatically without awareness / intention force the sounds into different categories. Thus we pay attention to certain acoustic properties of speech and ignore others

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Perception of speech are also affected by visual cues. This is referred to as context effect. Warren (1970) presented subjects with a sentence “The state governors met with their respective legi**latures convening in the capital city”, in which a 120 millisecond portion has been replaced by a coughing sound. 1/20 people listening to the sentence would identify the cough sound. This restoration of the missing phoneme is called the *phoneme restoration effect*

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People are capable of using a great deal of information to “predict” what the correct sound of a missing segment should be. Warren & Warren (1970) demonstrated this by presenting people with one of the four sentences. Each was the same recording with the exception of the final word that has been spliced of and each contained a ,missing segment as indicated in am asterisk

*a) it was found that the *eel was on the axel*

*b) it was found that the *eel was on the shoe*

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*c) it was found that the *eel was on the orange*

*d) it was found that the *eel was on the table*

Depending on the sentence participants reported hearing "*wheel, heel, peel, meal*"

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Speech errors in production

besides perceiving speech from others we also produce speech for others to comprehend and process. Speech production can lead to generation of *speech errors – instances in which what the speaker intends to say is quite clear but the speaker makes some substitution or reorders the stimulus.* e.g.,

a) Mary keeps food in her *v*esk (substitution of v for d)

b) we'll sit around the *song* and sing *fires (exchange of words)*

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Garret (1988) while studying such speech errors found that *word substitution* has two broad classes of errors

a) error that show meaning relations (finger / toe or walk / run)

b) errors that show form relations (guest / goat or mushroom / mustache)

Sentence comprehension

how do people understand or recover the meaning from sentences?

People pay attention to syntactic constituents however they do not process sentences clause by clause. It seems that people when finish the processing of a sentence, “discard” the exact wording and store only the representations of its gist.

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Comprehending a sentence often involves resolving its possible ambiguities. The interesting thing is that we normally don’t notice ambiguities and only rarely with certain kind of sentences these ambiguities become evident.

a) The horse raced past the barn fell

b) The cotton shirts are made from comes from Arizona

These sentences are called *garden path sentences*

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Results from several studies suggest that when we process ambiguous sentences, all the meaning of an ambiguous word are temporarily available, through a an automatic bottom up process. Context effects do not immediately restrict the listener to the most appropriate “reading” of the word. Instead for a short period all meanings are accessible. Three syllables after the presentation of the ambiguous word only one meaning remains active, suggesting the people resolve sentence ambiguity fairly quickly.

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Comprehending Text Passages

For understanding how people process text passages we first need to know how people read. Just & Carpenter (1987) used the eye tracker to monitor the eye fixations for written text. Results indicate that reading consists of a series of fixations and jump across text, with average fixation & jump lasting 250 and10-20x10^{-3} sec.

Just & Carpenter's model assume that as soon as readers encounter a new word, they try to interpret it and assign it a role. this the *immediacy assumption.* The authors also formulated the *eye-mind hypothesis,* which holds that the interpretation of each word occurs during the time it is fixated.

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Just & Carpenter argued that a number of variables influence fixation duration leading to ease of interpretation. These can be categorized as word length, word frequency and syntactically & semantically anomalous word.

Kintsch & Keenan (1973) found that semantic factors influenced the reading task. They showed that two sentences of equal length might be differentially difficult to process. The source of the difficulty they suggested lies in the *propositional complexity* of the sentence (the number of basic ideas conveyed)

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Took (Romulus, women, by force)

Found (Rome, Romulus)

SABINE (women)

LEGENDARY (Romulus)

Romulus, the legendary founder of Rome, took the women of the Sabine by force

Because (ß, ∂)

Fell down (Cleopatra) = ß

Trust (Cleopatra, figures) = ∂

Foolish (trust)

Fickle (figures)

Political (figures)

Part of (world, figure)

Roman (world)

Cleopatra's downfall lay in her foolish trust in the fickle political figures of the Roman world

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Another factor influencing the processing of text has to do with the relationships among sentences. Haviland & Clark (1974) described the *given-new* strategy, whereby listeners and readers divide sentences into two parts: the given and the new. The given part of a sentence contains information that is (or should be) familiar from the context, the preceding information or background knowledge. The new part contains unfamiliar information. Listeners first search memory for information corresponding to the given information and then update memory by incorporating the new information, often as an elaboration of the given.

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Van den Broek & Gustafson (1999) offers three conclusions from research on reading texts.

a) the mental representation is a construction by the reader that differs from, and goes beyond, the information in the text itself.

b) good representation is coherent

c) readers attentional resources are limited

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Story Grammars

story grammars describe the way people comprehend large integrated pieces of text (using script, schema & grammar of language)

Story grammars are similar to scripts in that both have variables or slots that are filled in differently for different stories (protagonist, setting, plots, conflicts & resolutions). Story grammar are similar to syntactic grammar in that they help us identify the units and the role each unit plays in the story.

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story grammar provides the framework with which to expect certain elements and sequences and to fill in with “default values” things are not explicitly stated.

Title:	The 3 Little Pigs
Character:	3 Little Pigs, Wolf
Problem:	The Wolf wants to eat the 3 Little Pigs.
Events:	
1.	Wolf blows down the straw house.
2.	Wolf blows down the stick house.
3.	Wolf can't blow down the brick house.
4.	Wolf climbs down the chimney.
Resolution:	Wolf falls into a pot of boiling water, runs out the door, and is never seen again.

TABLE I

SUMMARY OF REWRITE RULES FOR A SIMPLE STORY GRAMMAR[a]

FABLE → STORY AND MORAL

STORY → SETTING AND EVENT STRUCTURE

SETTING → { STATE* (AND EVENT*) | EVENT* }

STATE* → STATE ((AND STATE)")

EVENT* → EVENT (({ AND | THEN | CAUSE } EVENT)") ((AND STATE)")

EVENT STRUCTURE → EPISODE ((THEN EPISODE)")

EPISODE → BEGINNING CAUSE DEVELOPMENT CAUSE ENDING

BEGINNING → { EVENT* | EPISODE }

DEVELOPMENT → { SIMPLE REACTION CAUSE ACTION | COMPLEX REACTION CAUSE GOAL PATH }

SIMPLE REACTION → INTERNAL EVENT ((CAUSE INTERNAL EVENT)")

ACTION → EVENT

COMPLEX REACTION → SIMPLE REACTION CAUSE GOAL

GOAL → INTERNAL STATE

GOAL PATH → { ATTEMPT CAUSE OUTCOME | GOAL PATH (CAUSE GOAL PATH)" }

ATTEMPT → EVENT*

OUTCOME → { EVENT* | EPISODE }

ENDING → { EVENT* (AND EMPHASIS) | EMPHASIS | EPISODE }

EMPHASIS → STATE

[a] See text for definitions of STATE and EVENT and for the connections AND THEN and CAUSE.

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Gricean Maxims of Conversation

Grice (1975) believed that for people to converse, each must do more than produce utterances that are phonologically, syntactically and semantically appropriate.

A: ……I just heard that Joe got promoted today. Isn't that great?

B: Salt lake city is located in Utah

C: No, Charles Darwin is the father of modern evolutionary theory

A: What's the square root of 34? / B: Chocolate ice-cream is sweet

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Grice described speakers in a conversation as all following a “general cooperative principle” by following four conversational *maxims*

a) Maxims of quantity

b) Maxims of quality

c) Maxim of relation

d) Maxim of manner

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Violation: Rule A & B ------- uncooperative, obnoxious etc

Rule C ---------- Bizzare

What influence does language have other cognitive processes?

1) Language and other cognitive processes operate independently

2) Language and other cognitive processed are dependent on each other

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The Modularity Hypothesis

Philosopher Jerry Fodor (1982, 1985) argued that some cognitive process in particular perception and language are *modular.* Modularity of a process implies

a) domain specificity: operates specifically with certain kinds of I/O

b) Informationally encapsulated: operates independent of the believes and other information available to the processor

The Whorfian Hypothesis

Benjamin Whorf proposed that language and other cognitive processes are strongly related. He believes that language/s one grows up learning and speaking organize and directs the way one perceives the world, organizes information about the world and thinks.

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