

Language Development Workshop

Aldeen Foundation

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Overview

- ▶ **Overall Goal:** To understand how language develops in the child, before they come to school, and to gain some knowledge about the different types of atypicality that arise in speech and language.
- ▶ **Specific Goals:** To learn about 4 types of impairment:
 1. Speech Sound Disorder
 2. Phonological Impairment
 3. Specific Language Impairment
 4. Pragmatic/Semantic Impairment
- ▶ **How?** We can only achieve this if you know a little bit about Phonetics, Phonology, Syntax, and Pragmatics.
- ▶ In this workshop, I will introduce you to each of these skills, and then tell you some of what we now know about how that skill develops in the typical child, and how they emerge in a child with an atypical linguistic behavior.

Overview of Phonetic-Phonological Development

- ▶ 2-4 months: Moving the tongue around the mouth, vowel-like sounds.
- ▶ 3-6 months: Vocal tract partially open, nasal like sounds.
- ▶ 6-10 months: Canonical Babbling: Vowel consonant combinations like *ba* and *da*. Repetitive patterns.
- ▶ 8-12 months: Jargon/Variegated babble: Non-repetitive. Prosody of language. Vocalization during play.
- ▶ 12-18 months: Imitation of first words. CV or CVCV shaped words. Assimilation and Substitution: *wawa* for *water*. *nana* for *banana*. *boop* for *boot*. Favored sounds.
- ▶ 18-24 months: 70% of consonants, emergence of CVC, e.g. *dog*. CVCV, non-repetitive, e.g. *puppy*.

Overview of Phonetic-Phonological Development

- ▶ 24-36 months: 75% intelligibility by 36 months. Final consonant deletion. Cluster simplification.
- ▶ 36-48 months: Connected speech intelligible.
- ▶ 46-60 months: Almost 100% intelligibility. Unstable consonants: s, sh, l, r, z, zh, ch, th. Segmentation of word into syllables.

- ▶ To appreciate the meaning of all of this, it's important to start to gain an understanding of the skill that is being gained. What are sounds, how are they composed into syllables and words?
- ▶ What you will now learn: speech segments are made up by combinations of features/gestures, these then compose syllables and words.

- ▶ **Phonetics** is the study of how we use speech as part of language, communication and culture.
- ▶ Articulatory Phonetics studies the motions you make in your vocal tract when speaking.
- ▶ Acoustic Phonetics studies the physical acoustic properties of resulting speech sounds.
- ▶ We will now start to think very concretely and scientifically about how we make the sounds that transmit our cultures and our thoughts.

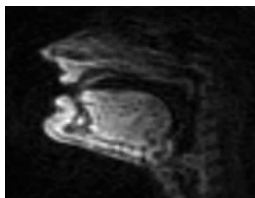
Let's make some sounds: Say after me

- ▶ ffffffffffffffffvvvvvvvvvvv
- ▶ θθθθθθθθθθθθðððððððððððð
- ▶ ssssssssssssssszzzzzzzzzzzz
- ▶ jjjjjjjjjjjjjjj333333333333
- ▶ Do you hear/feel that the first sound in each of these pairs lacks something that the second one does?
- ▶ You can feel the difference by feeling your larynx from the outside.
- ▶ The difference is what we call **Voice**.
- ▶ We say that Voice is a *feature* that differentiates or contrasts /f/ vs. /v/, /θ/ vs. /ð/, /s/ vs. /z/, and /ʃ/ vs. /ʒ/
- ▶ Different actions of the larynx (or 'gestures') are responsible for the *voiceless* vs. *voiced* members of the pairs.

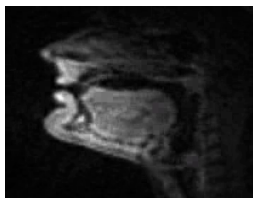
Place of Articulation

- ▶ OK, so the *feature* that differentiates or contrasts each of the members of the pairs is Voice.
- ▶ But what distinguishes each of the pairs from the others? That is, is there something common between /f/ and /v/, let's say, that differentiates both of them from /θ/ and /ð/? Think about which moving part of the vocal tract (organ) you use to articulate each of the pairs, and where that organ is placed.
- ▶ /f/ and /v/ are made by the lips, so they are called *labial*. The lower lip touches the upper teeth, so they're sometimes called *labiodental*.
- ▶ /θ/ and /ð/ are made by placing the tongue tip between (or just behind) the teeth, so they're called *dental*.
- ▶ /s/ and /z/ are made by placing the tongue tip at the ridge behind the teeth, called the alveolar ridge, so we call these sounds *alveolar*.
- ▶ /ʃ/ and /ʒ/ are made by the tongue tip behind the alveolar ridge, so we call these sounds *postalveolar* or sometimes *palatoalveolar*.

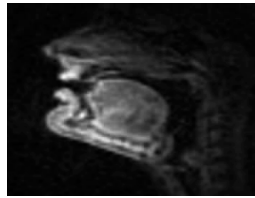
Place of Articulation: MRI



θ



s



ʃ

Voice & Place of Articulation

PofA ↓	Voiceless	Voiced
Labial	f	v
Dental	θ	ð
Alveolar	s	z
Postalveolar	ʃ	ʒ

Some more consonants

- ▶ OK, so the *feature* that differentiates or contrasts each of the members of the pairs /f/ vs. /v/, /θ/ vs. /ð/, /s/ vs. /z/, and /ʃ/ vs. /ʒ/ is **Voice**.
- ▶ And the feature that distinguishes each pair from the others is **Place of Articulation**.
- ▶ Now consider the consonants /p/ vs. /b/, /t/ vs. /d/, /k/ vs. /g/.
- ▶ Within each pair, how does the first consonant differ from the second?
- ▶ Voice! Yes, the *same* feature distinguishing the /f/ vs. /v/, etc.
- ▶ And how do the pairs differ from each other?
- ▶ Again, the same type of feature distinguishing the previous pairs from each other.
- ▶ /p/ and /b/ are articulated with the lips.
- ▶ /t/ and /d/ are articulated by the tongue tip at the alveolar ridge.
- ▶ /k/ and /g/ are articulated by the body (dorsum) of the tongue at what is called the soft palate which we call *velar*.

Voice, Place of Articulation

PofA ↓	Voiceless	Voiced	Voiceless	Voiced
Labial	f	v	p	b
Dental	θ	ð		
Alveolar	s	z	t	d
Postalveolar	ʃ	ʒ		
Velar			k	g

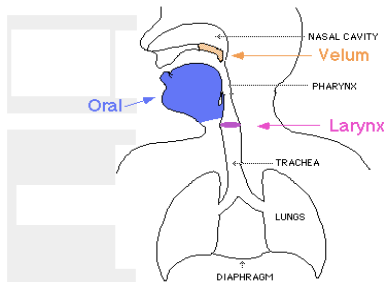
Manner of Articulation

- ▶ But how do /p/, /b/, ... differ from the /f/, /v/, ... set we looked at?
- ▶ Notice how you do each consonant in the /p/, /b/... set: you stop the air in your vocal tract and you release it in an explosion. That's why these consonants are called *stops* or *plosives*.
- ▶ The first set, /f/, /v/, etc. all force air out at a relatively constant pace and do not stop the air, but you can hear a hissing like frication in them, which is why they're called *fricatives*.
- ▶ We say that these consonants have different *manners of articulation*.

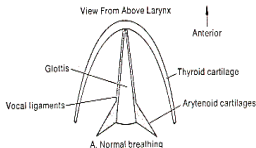
Voice, Place of Articulation, Manner of Articulation

PofA ↓	<u>Fricatives</u>		<u>Stops</u>	
	Voiceless	Voiced	Voiceless	Voiced
Labial	f	v	p	b
Dental	θ	ð		
Alveolar	s	z	t	d
Postalveolar	ʃ	ʒ		
Velar			k	g

Voicing: How does the larynx distinguish voiced and voiceless sounds?



- ▶ The larynx includes two bands of muscles, called the *vocal folds*, that are stretched across the top of the windpipe.
- ▶ If the bands are positioned close to one another, when air comes up through the larynx, they will start to vibrate, like blowing into a rubber band.
- ▶ But if the bands are pulled apart, they will not vibrate.



Consonant Chart

			Stop			
	Fricative		Oral		Nasal	
	-voice	+voice	-voice	+voice	-voice	+voice
labial	f	v	p	b		m
dental	θ	ð				
alveolar	s	z	t	d		n
post-alv	ʃ	ʒ				
velar			k	g		ŋ

Consonant Chart

			Stop			
	Fricative		Oral		Nasal	
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labial	f	v	p	b		m
dental	θ	ð				
alveolar	s	z	t	d		n
post-alv	ʃ	ʒ				
velar			k	g		ŋ

More Consonants

Which Consonants are missing? (There are 7)

/tʃ/ /dʒ/ /w/ /j/ /r/ /l/ /h/



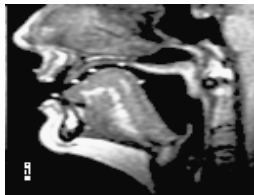
Why are vowel sounds harder to think about than consonants?

One universal reason:

- ▶ For (most) consonants, you can feel where contact is being made by articulators that form the constriction.
- ▶ For (most) vowels, no contact is made when constriction is formed.
- ▶ What is the exception?

Basic Vowel Types: Place of Articulation

- ▶ 3 vowels occur in (almost) all languages of the world
- ▶ They differ in Place of Articulation



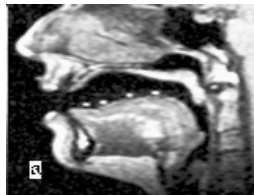
“seed” /i/

palatal



“sued” /u/

velar



“sod” /a/

pharyngeal




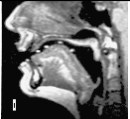



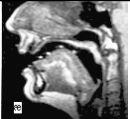

Vowels and the vocal tract as tube

- ▶ You can think of the vocal tract as a tube (with a bend in it).
- ▶ The sound of a particular vowel is determined by the shape of that tube (just as it would be if it were a musical instrument).
- ▶ The shape differences result from their different places of articulation—location along the tube where it is constricted.
- ▶ Plastic tubes shaped in this way will sound like vowels

More English Vowels

- ▶ English has more than three vowels.
- ▶ These are sometimes described in terms of two features: *Height* and *Backness*.
- ▶ Front vowels have a palatal place of articulation.
- ▶ Back vowels have velar, uvular, or pharyngeal places of articulation.
- ▶ Height is related to the height of the jaw.

More English Vowels

		FRONT	BACK		
HIGH		seed <i>/i/</i>			sued <i>/u/</i>
		Sid <i>/ɪ/</i>			soot <i>/ʊ/</i>
		said <i>/ɛ/</i>			
LOW		sad <i>/æ/</i>			sod <i>/ɑ/</i>

Coarticulation and Phonology

- ▶ So far we have only discussed how gestures are composed into segments.
- ▶ But gestures overlap in time. When you say *speak*, s, p, and i all occur at about the same time, even though you think of them as being sequential!
- ▶ A big part of learning to speak is to learn how sounds combine with each other, which we call phonotactics, which is very much language-dependent
- ▶ Some languages allow several consonants to be right after each other, the English: *splash* or *stadium*
- ▶ Many Arabic dialects, for instance, do not allow this: So the word stadium is borrowed as *2istad*.
- ▶ CV, CVC, CCV, CCVC, CCVCC and more are possible syllables in English, but CV is by far the most common kind of syllables, and some languages have only CV.
- ▶ These are also the syllables that occur in babbling.

Speech Sound Disorders

- ▶ Some 2-3% of children at 4 are still unable to make certain sounds like r, l, s, z, sh, zh, th.
- ▶ One hypothesis is that most of these sounds are difficult, because of the complexity of how the tongue needs to move to accomplish them.
- ▶ For th, it's also the rarity of this sound in English.
- ▶ There are also a variety of physiological conditions, such as cleft palate, which prevent the pronunciation of certain consonants. These are usually termed articulatory disorders.

Phonological Impairment

- ▶ Examples: sheep → tip, but sleep → ship
- ▶ lion → la, but light → da
- ▶ These are problems, not in the ability to put gestures together to make a segment, but in putting segments together to make a syllable.
- ▶ The inability to make CVC, CVCC, CCVC, etc. is also a coordination problem that would be classified as PI.
- ▶ The combinatorics of sounds is a very difficult problem to learn, but is still much easier than the combination of graphemes into a written word 😊
- ▶ Evidence: It takes about 3-4 years for most children to learn their language's phonology, but it takes 6-8 years to put letters together to make out a written word, even if they know the individual letters by 3-4 years.
- ▶ Shift to syntax!

Overview of Syntactic Development

- ▶ 12-18 months: 1 or two word utterances, 50% of utterance are nouns
 - ▶ 18-24 months: 33% of utterance are nouns, word order starts. Few closed class items, negation, pronouns, possessive, question intonation
 - ▶ 24-36 months: 3-4 words, negation on auxiliaries, definite/indefinite, closed class items.
 - ▶ 36-48 months: full phrases, wh-questions, tense, aspect, different constructions.
-
- ▶ What are children learning, when they learn syntax? And why does it take so long?

What's in a sentence

- ▶ The cat is on the mat
- ▶ Words, right?
- ▶ Linguists: yes sentences contain words, but there's more than words...
- ▶ If this sentence just contains 6 units, and we have a dictionary defining these 6 units, then language technology would begin by looking up the meanings of these words and then just combining these meanings
- ▶ And then translating the sentence, or ask a question based on that sentence, etc.

Example

- ▶ Kuzo is on the mat
- ▶ The cat is on the mat
- ▶ Kuzo the cat is on the mat
- ▶ The little monster is on the mat
- ▶ The little monster that chased the mouse and scared the poor dog is on the mat
- ▶ He's on the mat
- ▶ A constituent can be substituted for by a pronoun
- ▶ But are *kuzo* or *the little monster* always substitutable by a pronoun?

Hypothesis A, Hypothesis B

- ▶ But are *kuzo* or *the little monster* always substitutable by a pronoun?
- ▶ There are two hypotheses:
 1. **Hypothesis A:** Whenever you encounter a group of words like *kuzo*, *the little monster* or *the cat*, we can substitute those words with a pronoun like *he*, *she*, or *it*.
 2. **Hypothesis B:** Groups of words like *kuzo*, *the little monster* or *the cat*, are not automatically substitutable with a pronoun like *he*, *she*, or *it*.
- ▶ The cat is on the mat → He is on the mat
- ▶ Kuzo is on the mat → He is on the mat
- ▶ Kuzo the cat is on the mat → *Kuzo it is on the mat
- ▶ Kuzo the cat is on the mat → *It the cat is on the mat
- ▶ We have just found evidence against Hypothesis A

Different types of sentence, different tests for constituency

- ▶ **Pronoun Substitution:** The little monster is on the mat → He is on the mat
- ▶ **It-cleft:**
 - ▶ It is Kuzo who chased the mouse
 - ▶ It is the little monster who chased the mouse
 - ▶ It is the little monster that chased the mouse and scared the poor dog who chased the mouse
- ▶ So there is more than one type of sentence: we've seen many statements. The It-cleft is a sentence that focuses a certain constituent.
- ▶ Notice also that the pitch of your voice changes on the focus constituent 😊
- ▶ **Passives:** The mouse was chased by the little monster
- ▶ **Question:** Who chased the mouse?

Grammatical Functions and roles

- ▶ In high school, you may have heard the terms: *subject* and *object* of a verb
- ▶ The cat chased the mouse
- ▶ In this kind of sentence, we would say that *the cat* is the subject, because in this kind of simple sentence, in English, the subject comes before the verb
- ▶ and *the mouse* is the object, because in this kind of simple sentence, in English, the object comes after the verb
- ▶ We've also used the terms: Agent and Patient. Here, the subject is the agent, and the object is the patient
- ▶ So is it the case that the agent is always the subject and the patient is always the object?
- ▶ (No, but let's find out more formally)

Grammatical Functions and roles

- ▶ There are two hypotheses:
 1. **Hypothesis A:** The subject of a sentence is its agent and the object is its patient.
 2. **Hypothesis B:** The grammatical function of subject does not always correspond to the theta role of agent, and the grammatical function of object does not always correspond to the theta role of patient
- ▶ Data to test the hypotheses:
 1. The worker who fixed my cable connection left her toolbox at my place
 2. the toolbox was left at my place
- ▶ So in a passive sentence, the subject, that constituent which is before the verb, is the patient of the verb.
- ▶ Conclusion to be drawn from the argument: We have found evidence against Hypothesis A and evidence for Hypothesis B

Another kind of constituent

- ▶ John ate
- ▶ John ate the salad
- ▶ John ate the salad that he made before the show
- ▶ John ate, and Mary also did
- ▶ John ate the salad, and Mary also did
- ▶ John ate the salad that he made before the show, and Mary also did
- ▶ So we see that a word like *did* substitute for a whole group of words, so this group of words acts as a unit in itself, and is a constituent

Putting it all together

- ▶ Let's take the following sentence
- ▶ The little monster chased the poor little mouse
- ▶ We know that *the little monster* is a constituent, because we can say something like: He chased the poor little mouse
- ▶ We know that *chased the poor little mouse* is a constituent, because we can say something like: Kuzo chased the poor little mouse, and Gato did too
- ▶ We know that *the poor little mouse* is a constituent, because we can say something like: He chased it
- ▶ So we can have constituents within constituents
- ▶ Here's a bracketing of the sentence that shows its constituent structure:
- ▶ $[[\textit{Thelittlemonster}][\textit{chased}[\textit{thepoorlittlemouse}]]]$

Sentences can be infinitely long

- ▶ Kuzo chased the cat
- ▶ Lee thought that Kuzo chased the mouse
- ▶ Jennifer thinks that Lee thought that Mary said that Kuzo chased the mouse
- ▶ Jennifer thinks that Lee thought that Mary said that Miller believes that Andy knows that Kuzo chased the mouse
- ▶ You may never want to say such a sentence, but we say it's grammatical
- ▶ This is the same as saying that your knowledge of the number system allows you to add two numbers, however large, even though you may not have the time, memory, or attention span to add two really large numbers
- ▶ Your knowledge of the number system is numerical *competence*, whereas how much attention and memory for numbers are part of your numerical *competence*.
- ▶ In the same way, we distinguish linguistic competence from

Recursion vs. Iteration

- ▶ The way we tried to construct an infinitely long sentence was a sentence within a sentence within a sentence.
- ▶ That's called recursion.
- ▶ Another way of making an infinitely long sentence is to iterate certain words: I'm very very very very very very... tired
- ▶ Both recursion and iteration can lead to infinitely long sentences, but in very different ways
- ▶ In what ways are they different? *Computationally* 😊

Different kinds of words

- ▶ Verbs: wash, look, kiss, jump, judge, understand, know, prosper
- ▶ Adverb (modify verbs): diligently, again, slowly
- ▶ Noun: table, mat, judge,
- ▶ Adjective (modify nouns): green, lucky, sweaty, tall
- ▶ Determiners (help specify nouns): a, that, the, this
- ▶ Preposition: in, on, at, to, under
- ▶ Pronoun: He, she, you, it, they
- ▶ Proper Noun: Lee, Andrew, Becky, Shri
- ▶ Auxiliary: is, have, were, can, must, will, do, did

Different kinds of phrases

- ▶ Phrases are groups of words that act together, they are kinds of constituents
- ▶ Verb phrases are phrases whose main word is a verb, prepositional phrases are phrases whose main word is a preposition, whereas a determiner phrase or a noun phrase is a phrase whose main word is a determiner or a noun
- ▶ Shri **ate a slice**, and so **did** Andrea
- ▶ Shri ate **a slice**, and liked **it**
- ▶ Caitlin ate **at the park**. She goes **there** a lot.
- ▶ Now let's take a look at the structure of these sentences:

More detailed structures of sentences

- ▶ $[S [DP \textit{thecat}] [VP \textit{chasedthemouse}]]$
- ▶ $[S [DP \textit{theman} [S \textit{whorequested} [DP \textit{thefiles}]]] [VP \textit{returned}]]$

Constituent Order

- ▶ Mary saw John
- ▶ In English, the sentence constituent order is Subject-Verb-Object
- ▶ In Standard Arabic, there are two possible word orders:
- ▶ Dictionary: saw = raat
 1. raat Mary John
 2. Mary raat John
- ▶ We therefore say that Standard Arabic is VSO or SVO

- ▶ Dictionary: see: sehe, believe: glaube, I: Ich, you: dich
- ▶ I saw you
- ▶ Ich sehe dich
- ▶ I believe that Lee kissed Dana
- ▶ Ich glaube dass Lee Dana küsste
- ▶ So we say that in the main sentence, German has SVO, but in an embedded sentence, the order is SOV
- ▶ But: Note that there is still an important *generalization* regarding the position of the verb in any German sentence.
- ▶ German is V2: a verbal entity is always in second constituent

- (19) a. Hamlet Ophelia-yı öp-tü. (S-O-V) (Turkish)
 Hamlet Ophelia+Acc kiss+Past
 'Hamlet kissed Ophelia.'
- b. Hamlet öp-tü Ophelia-yı. (S-V-O)
 Hamlet kiss+Past Ophelia+Acc
 'Hamlet kissed Ophelia.'
- c. öp-tü Hamlet Ophelia-yı. (V-S-O)
 kiss+Past Hamlet Ophelia+Acc
 'Hamlet kissed Ophelia.'
- d. Ophelia-yı öp-tü Hamlet. (O-V-S)
 Ophelia+Acc kiss+Past Hamlet
 'Hamlet kissed Ophelia.'

- ▶ In many languages that allow several word orders, there's an identifier on the NP or DP to say whether it's the subject or object of the verb.
- ▶ The American student saw the Lebanese student
- ▶ Dictionary: the student: altaliba
 1. raat altalibat-u alamrikiyat-u altalibat-a allubnaniyat-a
 2. altalibat-u alamrikiyat-u raat altalibat-a allubnaniyat-a

Subcategorization

- ▶ There are many types of verbs
- ▶ Some verbs have a subject only, whereas some verbs also have an object
- ▶ Intransitive: John slept
- ▶ Transitive: John found the book
- ▶ Interestingly, some intransitive verbs assign agent role to their subject, but others assign patient role to the subject
- ▶ John ate (John is the agent)
- ▶ The ice melted (The ice is the patient)

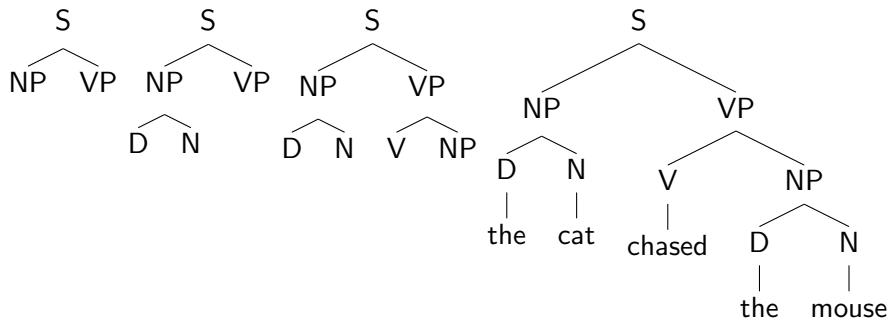
Phrase Structure Grammar

- ▶ The theory/model to account for the structure of sentences we start with is called Phrase Structure Grammar.
- ▶ This theory is simple: A symbol can be re-written as a sequence of symbols.
- ▶ $S \rightarrow NP VP$
- ▶ $NP \rightarrow D N$
- ▶ $VP \rightarrow V NP$
- ▶ $D \rightarrow \text{the}$
- ▶ $D \rightarrow \text{a}$
- ▶ $D \rightarrow \text{this}$
- ▶ $N \rightarrow \text{cat}$
- ▶ $N \rightarrow \text{mouse}$
- ▶ $N \rightarrow \text{book}$
- ▶ $V \rightarrow \text{chased}$
- ▶ $V \rightarrow \text{saw}$

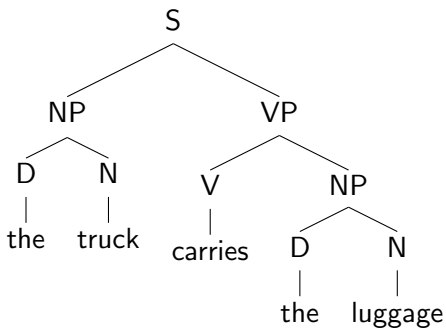
Phrase Structure Grammar: Generation

- ▶ We can use this model to generate language or to recognize language
- ▶ $S \rightarrow NP VP$, $NP \rightarrow D N$, $VP \rightarrow V NP$, ...
- ▶ Now we can generate several sentences
 1. S
 2. NP VP
 3. NP V NP
 4. D N V NP
 5. D N V D N
 6. the cat chased the mouse
- ▶ Of course at the last step, we could have generated several other sentences: a man saw this cat, this mouse chased a cat, the man saw this book, etc.
- ▶ And if we add a few more transitive verbs, and nouns, we can get sentences like: the doctor examined the patient, this truck carries the luggage

Phrase Structure tree



Phrase Structure tree



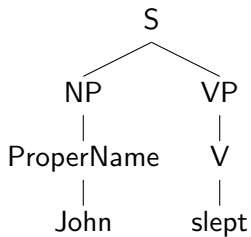
Scientific Reasoning

- ▶ So now we have a model of the English language. Is this a good model?
- ▶ Of course not
- ▶ Here's some data it cannot generate: the boy slept, Mary saw John, and many many others.
- ▶ But let's say that this kind of model is interesting enough to modify

Phrase Structure Grammar

- ▶ $S \rightarrow NP VP$
- ▶ $NP \rightarrow D N$
- ▶ $NP \rightarrow \text{ProperName}$
- ▶ $VP \rightarrow V NP$
- ▶ $VP \rightarrow V$
- ▶ $D \rightarrow \text{the}$
- ▶ $D \rightarrow \text{a}$
- ▶ $D \rightarrow \text{this}$
- ▶ $\text{ProperName} \rightarrow \text{John}$
- ▶ $\text{ProperName} \rightarrow \text{Mary}$
- ▶ $N \rightarrow \text{cat}$
- ▶ $N \rightarrow \text{mouse}$
- ▶ $N \rightarrow \text{book}$
- ▶ $V \rightarrow \text{chased}$
- ▶ $V \rightarrow \text{saw}$
- ▶ $V \rightarrow \text{slept}$

Phrase Structure tree



Phrase Structure Grammar, with yes/no Q, Adj, Aux

- ▶ $S \rightarrow NP VP$
- ▶ $S \rightarrow NP Aux VP$
- ▶ $S \rightarrow Aux NP VP$
- ▶ $NP \rightarrow D N$
- ▶ $NP \rightarrow D A N$
- ▶ $PP \rightarrow P N$
- ▶ $NP \rightarrow ProperName$
- ▶ $VP \rightarrow V NP$
- ▶ $VP \rightarrow V$
- ▶ $D \rightarrow the$
- ▶ $ProperName \rightarrow John$
- ▶ $N \rightarrow mouse$
- ▶ $A \rightarrow big$
- ▶ $V \rightarrow chased$
- ▶ $V \rightarrow slept$
- ▶ $Aux \rightarrow can$

What do the phrase structures of other languages look like? Japanese...

Taro thinks that Hiro showed a picture of himself to Hanako

Taro-ga	Hiro-ga	Hanako-ni	zibun-no	syasin-o	miseta	to	omette	iru
Taro	Hiro	Hanako-to	self	picture	showed	that	think	be

What do the phrase structures of other languages look like? Japanese...

John-ga Vlad-o butta
John Vlad hit

- ▶ So, a transitive verb in Japanese comes after its object
- ▶ What should the VP rewrite rule look like in Japanese?
- ▶ $VP \rightarrow NP V$
- ▶ Now let's go to prepositional phrases: John went to Kobe by car with Mary

John-ga Mary to kuruma da Kobe ni itta
John Mary with car by Kobe to went

- ▶ What should the PP rewrite rule look like in Japanese?
- ▶ $PP \rightarrow NP P$
- ▶ So we call these *postpositions* 😊

One more comparison between English and Japanese

- ▶ Consider the following English sentence:
- ▶ Andrew thinks that Mary showed a picture of himself to Vlad
- ▶ We say that the verb think takes as its object a whole sentence. The word that introduces this *complement* sentence is *that*, so we call this kind of word a complementizer
- ▶ Now let's look at Japanese complementizers for the following sentence:
- ▶ Taro thinks that Hiro showed a picture of himself to Hanako

Taro-ga	Hiro-ga	Hanako-ni	zibun-no	syasin-o	miseta	to	omette	iru
Taro	Hiro	Hanako-to	self	picture	showed	that	think	be

- ▶ So if the English phrase structure rule for a complemented phrase is $CP \rightarrow C S$
- ▶ Then Japanese world have $CP \rightarrow S C$

Head of a phrase, Principled Variation in Phrase Structure

English	VP \rightarrow V NP	PP \rightarrow P NP	CP \rightarrow C S
Japanese	VP \rightarrow NP V	PP \rightarrow NP P	CP \rightarrow S C

- ▶ Head: we call the most important word in a phrase, the word that determines the category of the phrase, the head of that phrase.
- ▶ So the verb is the head of the verb phrase, the preposition is the head of the prepositional phrase, and the complementizer is the head of the complementizer phrase.
- ▶ So now we see a generalization emerge, if we consider just these phrases: Japanese has right-headed phrases, while English has left-headed phrases.
- ▶ Principled Variation Idea: Languages differ from each other in principled ways.
- ▶ The introduction of the idea of a phrase structured rule has allowed us to see that Japanese and English differ from each other in a highly principled way.

Different views of the learning of the grammar

- ▶ The acquisition of syntax is studied from two principal points of view: empiricist and nativist.
- ▶ The empiricist view holds that language learning is based on general learning principles.
- ▶ The nativist view holds that language learning is based on a biological predisposition towards language that all children possess.
- ▶ The nativist view holds for instance, that all languages have phrases, and heads of phrases, and that learning a language like English vs. Japanese is the learning of something very specific: Is my language head-initial or head-final?

Specific Language Impairment

- ▶ Tense problems, dropping s in He sleeps, ate → eat
- ▶ Argument structure problems for verbs
- ▶ Chiat (2000): Mom bought a jacket from the children (describing a situation where the children bought a jacket and gave it to mom)
- ▶ ?The girl is paying the balloon? (describing a picture of a girl buying a balloon from a man)
- ▶ ?The boy filled the milk into the bowl?
- ▶ ?The boy filled the milk on the bottle?

Semantics and Pragmatics

- ▶ Semantics and pragmatics deal with meaning in language: how the meanings of words combine with each other, and the meaning of other sentences in a discourse, to give obtain the meaning of the sentence.
- ▶ Relevant topics: Entailment, Implicature, Presupposition.
- ▶ Entailment Example: *I ate* implies that *I did not eat* is false.
- ▶ Implicature Examples: *I ate some of the pie*, implies: *I did not eat all of the pie*. *There are 3 people in the room*, is false if there are 5 people in the room, even though the sentence is physically true.
- ▶ Presupposition example: *The dog barked* presupposes that there is a dog. *Mary was aware that Jim is traveling* presupposes that Jim is traveling, but *Mary believes that Jim is traveling* doesn't.

Grice's Maxims

- ▶ Quantity: Make your contribution as informative as is required. DO not make your contribution more informative than is necessary.
- ▶ Quality: Do not say what you believe is false. Do not say that which you lack adequate evidence.
- ▶ Relation: Be relevant.
- ▶ There's growing evidence that some symptoms involved in Autism spectrum disorders are to be understood as lack of development of Grice's Maxims (Surian, et al., 1996; Wallace, 2011)
- ▶ Example: Question: "What is your favourite programme on TV?? ?
Answer: "My favourite is sandwiches.? ?
- ▶ Is there any more chocolate? *T.: Yes, I am made of chocolate.

Development of Pragmatics

- ▶ 0-3 months: Follow a moving person, smiles when hearing a voice, excited as caregiver approaches, orient to sound.
- ▶ 3-6 months: Fixed gaze, vocalization to speech, attention to movement, cry when caregiver leaves room.
- ▶ 6-8 months: initialization of vocalization, different vocalizations for different emotions, attention to objects, comprehension of some nouns
- ▶ 8-12 months: request, refusal, communication games, peek-a-boo, imitation of novelty
- ▶ 12-18 months: intents using words, soliciting attention, pointing/vocalizing, comment, answering wh-questions
- ▶ 18-24 months: indication of possession, express problems, turn-taking
- ▶ 24-36 months: make-believe, talking about absent objects, misrepresentation of reality, politeness, Narratives, short dialog
- ▶ 36-48 months: correction of others, fantasies, jokes, teasing, code-switching to younger children, organization of events in time.