

Syntactic Theory 2

Week 2: X'-Theory Review

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1 Introduction

- In this class, we'll focus on "two big facts" that a theory of grammar needs to adequately explain:
 - (1) a. **The First Big Fact:** Sentences are built out of phrases
b. **The Second Big Fact:** Phrases can serve multiple roles in two different positions in the sentence, i.e., phrases can be **displaced**
- GB typically handles these through different mechanisms – X' Theory handles phrase structure, and Move α handles the second. In Minimalism, these will both be handled by the operation Merge, as we'll see later in the semester

2 Context-Free Grammars

- **Constituency tests** show that certain groups of words are eligible to certain syntactic operations, whereas other groups of words are never eligible.
 - (2) a. Dale [_{VP} ate a donut], and Harry did *e* too.
b. Dale [_V ate] a donut, and Harry did *e* a slice of pie.
c. *Dale [_? ate a] donut, and Harry did *e* slice of pie.
 - (3) a. Harry ate a slice of pie, but [_{VP} ate a donut], Dale did *t*.
b. *Harry ate a slice of pie, but [_V ate], Dale did *t* a donut
c. *Harry ate a slice of pie, but [_? ate a], Dale did *t* donut
 - (4) a. Harry [_{VP} ate a slice of pie] and [_{VP} drank some coffee].
b. *Harry [_{VP} ate a slice of pie] and [_V drank]¹.
c. *Harry [_{VP} ate a slice of pie] and [_? drank some].

¹There's another interpretation where *drank* is a VP, in its idiomatic usage.

- Thus, our theory has to be able to capture that words behave in “chunks” and “label” each chunk appropriately for stating generalizations about, e.g., ellipsis, topicalization, coordination, etc.
- Earlier approaches to phrase structure (Chomsky 1955, 1957, 1965) used **context-free grammars** (CFG), a tool borrowed from computer science. A CFG starts with the start symbol S, and then is rewritten until you reach the terminal nodes:

(5) A CFG:

- S → NP VP
- NP → Dale
- NP → coffee
- VP → V NP
- V → drinks

(6)

- S
- NP VP
- Dale VP
- Dale V NP
- Dale V coffee
- Dale drinks coffee

- This approach works to capture the insight that words form constituents, because of their shared history in the derivation. In *Dale drinks coffee*, *drinks coffee* is a VP because a set of rewrite rules went from VP to *drinks* and *coffee*

2.1 Headedness

- CFGs fail to capture the phenomenon of **headedness** or **endocentricity**.
- In a phrase, the **head** tends to be privileged compared to the rest:

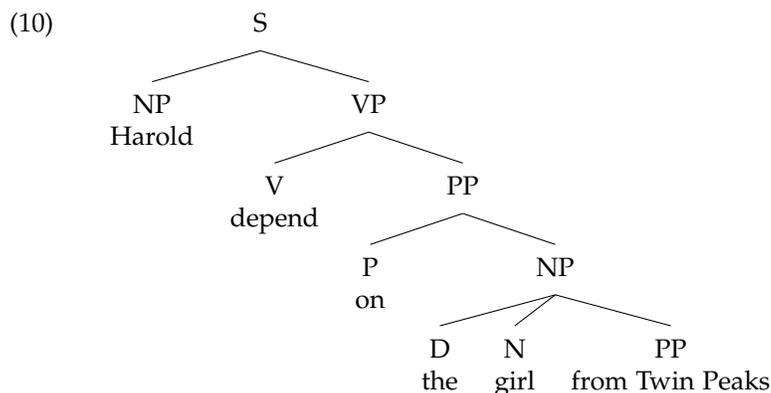
- (7)
- [_{NP} The donuts_[+PI] that Dale_[-PI] ate] were_[+PI] delicious
 - *[_{NP} The donuts_[+PI] that Dale_[-PI] ate] was_[-PI] delicious

- Although there are two nouns in the NPs above, *donuts* is relevant for controlling agreement. Our theory needs to encode that this is an NP headed by *donuts*, and since *donuts* is plural, the entire NP is plural.
- Similarly, lexical items place restrictions (i.e., **select**) their “phrase-mates”. However, this relationship is between heads – a head does not select for the shape of other elements in its contained phrases:

- (8)
- Harold [_{VP} depended [_{PP} on [_{NP} the girl [_{PP} from Twin Peaks]]]]
 - Harold [_{VP} depended [_{PP} on [_{NP} the girl [_{PP} with blond hair]]]]
- (9)
- Harold [_{VP} depended [_{PP} on [_{NP} the girl [_{PP} from Twin Peaks]]]]

b. *Harold [_{VP} depended [_{PP} with [_{NP} the girl [_{PP} from Twin Peaks]]]]

- The verb *depend* requires that the PP contained within its VP is headed by *on*. However, the verb places no restrictions on any other PP:



- However, CFGs do not encode this information. Labels like "V", "VP", "NP" are arbitrary – there is no clear relation between the V in a VP and the VP itself. For instance, the two mini-grammars describe the same language:

- (11)
- $S \rightarrow NP VP$
 - $NP \rightarrow D N$
 - $D \rightarrow \text{the}$
 - $N \rightarrow \text{man}$
 - $VP \rightarrow V$
 - $V \rightarrow \text{sang}$

- (12)
-  →  
 -  →  
 -  → 
 -  → 
 -  → 
 -  → 

- Additionally, CFGs miss the generalization that NPs always have one N head, VPs always have one V head, etc. In a CFG, nothing prevents us from writing rules like the following:

- (13)
- $VP \rightarrow N P D P P N$
 - $VP \rightarrow V V V$

c. NP → VP

- For this reason, Chomsky (1970) proposes a constraint on phrase structure which lead to **X-Bar Theory**. One component of X-bar theory is that every phrase is the **maximal projection** of its head:

- (14) **X-Bar Theory** (first pass):
- a. XP → ...X...

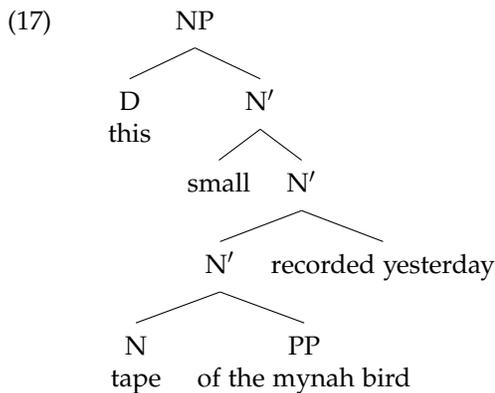
3 X-Bar Theory

- Jackendoff (1977) showed that layers of NPs can be separated:

- (15) Dale played [this [small [[tape of the mynah bird] recorded yesterday.]]]
- a. ... and Harry played that one
- b. ... and Harry played that big one
- c. ... and Harry played that small one recorded last week
- d. *... and Harry played that one of the parrot recorded last week.
- e. ?*... and Harry played one

- The anaphor *one* is able to replacing each layer of the NP, except for the entire NP itself. Similar facts can be found for *do so* anaphora

- (16) For this reason, Jackendoff proposed that there are intermediate projections between the maximal projection (NP) and the minimal projection (N):



- Additionally, we can coordinate X' levels:

- (18) a. Dougie is [_{NP} the [_{N'} mayor of Twin Peaks] and [_{N'} brother to Dwayne]]
- b. Dale [_{VP} [_{V'} ate pie] and [_{V'} drank coffee] at the diner]²

²On the interpretation that both the pie-eating and the coffee-drinking took place at the diner

- c. The [_{AP} very [_{A'} dark green] [_{A'} bright gold] ring]
- d. Dale went [_{PP} right [_{P'} out of the casino] and [_{P'} into the hotel]]

(19) **X-Bar Theory** (second version):

- a. $XP \rightarrow \dots X' \dots$
- b. $X' \rightarrow \dots X' \dots$
- c. $X' \rightarrow \dots X \dots$

- This says that a phrase (XP) can consist of at least one intermediate projection (X'), which itself may dominate another intermediate projection (X'), or the minimal projection (X or X^0).
- Chomsky (1970) originally proposed X' -Theory to capture the similarity between VPs and nominalizations:

- (20) a. Chet discovered the ring
 b. Chet's discovery of the ring

- (21) a. The silent drape runner's creation by Nadine
 b. The silent drape runner was created by Nadine

- (22) a. James's swift get-away
 b. James swiftly got away

- The tight correlation between syntactic position and semantic function across categories lead Chomsky to propose that phrase structure had an underlying blue-print that was category-neutral. We can then understand that the word *discover(y)* is specified for how it relates to its arguments, regardless of whether it's realized as a N or V.
- Additionally, the kinds of trees that Jackendoff (1977) posited seemed to be binary. Indeed, most "flat structures" can be argued to consist of more intermediate projections, suggesting that branching is always **binary**. (Kayne 1994):

(23) **X-Bar Theory** (third version):

- a. $XP \rightarrow ZP X'$
- b. $X' \rightarrow YP X'$
- c. $X' \rightarrow YP X$

3.1 Complements, Adjuncts, Specifiers

- Furthermore, X' Theory posits that the different phrase-mates in an XP play distinct syntactic roles.
- The phrase immediately adjacent to the head often is selected, and is often obligatory. This is the **complement**

- (24) a. Andy [_{VP} [_{V'} depended [_{PP} on Dale]]]

- b. *Andy [_{VP} [_{V'} depended [_{PP} with Dale]]]
- c. *Andy [_{VP} [_{V'} depended]]

- The phrase that is the sister to an X' and the daughter to an X' is typically optional, re-orderable, and unselected. These are **adjuncts**

(25) Andy [_{VP} suddenly [_{V'} accidentally [_{V'} [_{V'} shocked himself] by dropping his gun]]]

- The distinction between these roles is encoded in the fact that the X' **recurses** – since X' can be a daughter of X' , any given X' can be the mother to an adjunct and another X' , which itself might be the mother to an adjunct, etc.
- This predicts that adjuncts may never intervene between a complement and its head:

(26) a. The tape [of the mynah bird] [recorded yesterday]
 b. *The tape [recorded yesterday] [of the mynah bird]

- However, adjuncts may be introduced in any order:

(27) a. The tape of the mynah bird [that was recorded yesterday] [that Dale played] [that surprised Hawk]
 b. The tape of the mynah bird [that Dale played] [that was recorded yesterday] [that surprised Hawk]
 c. The tape of the mynah bird [that surprised Hawk] [that Dale played] [that was recorded yesterday]

- The phrase that is the daughter of the XP and the sister of X' is called the **specifier**. Specifier's must be the outer-most phrase:

(28) a. Laura's secret diary
 b. *secret Laura's diary

- Phrases that move typically target specifier positions, as do subjects and possessors. The status of specifiers is somewhat controversial (Kayne 1994; Chomsky 2013)

(29) **X-Bar Theory** (final version):
 a. $XP \rightarrow ZP_{\text{specifier}} X'$
 b. $X' \rightarrow YP_{\text{adjunct}} X'$
 c. $X' \rightarrow YP_{\text{complement}} X$

4 CPs, TPs, and DPs

- There are three phrase-structure rules that were widely used that seem to break with X' -Theory's endocentricity (Stowell 1981):

- (30) a. $S \rightarrow NP VP$
 b. $S' \rightarrow \text{that } S$
 c. $NP \rightarrow NP 's N'$
- (31) a. [_S Sarah saw a necklace]
 b. [_S Dale heard [_{S'} that [_S Sarah saw a necklace]]]
 c. [_{NP} Laura 's [_{N'} necklace]]

- What is the head of S, S', and what is the relation between a possessor NP and possessee NP?

- Verbs select for the finiteness of their complement:

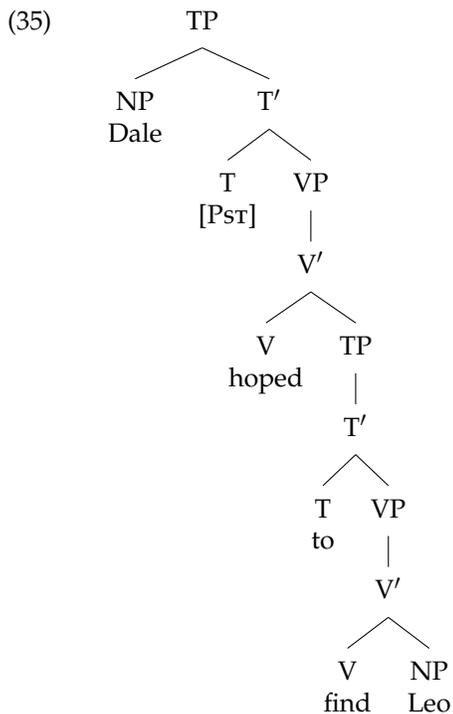
- (32) a. Dale wanted to find Leo
 b. *Dale wanted he will find Leo

- (33) a. Dale hoped to find Leo
 b. Dale hoped he will find Leo

- (34) a. ?*Dale thought to find Leo³
 b. Dale thought he will find Leo

- If we assume that selection is between a head and its complement, then we need somehow for the verbs *want*, *hope*, *think* to “see” the finiteness of the S.
- If we take the clause to be the projection of finiteness, i.e., a TP (**tense phrase**), then the verb can directly select for either a finite T or a non-finite T
- Furthermore, we now have a “spot” for the subject – in the specifier position of TP:

³On the interpretation *Dale thought that he would find Leo*, not on the interpretation *Dale planned to find Leo*



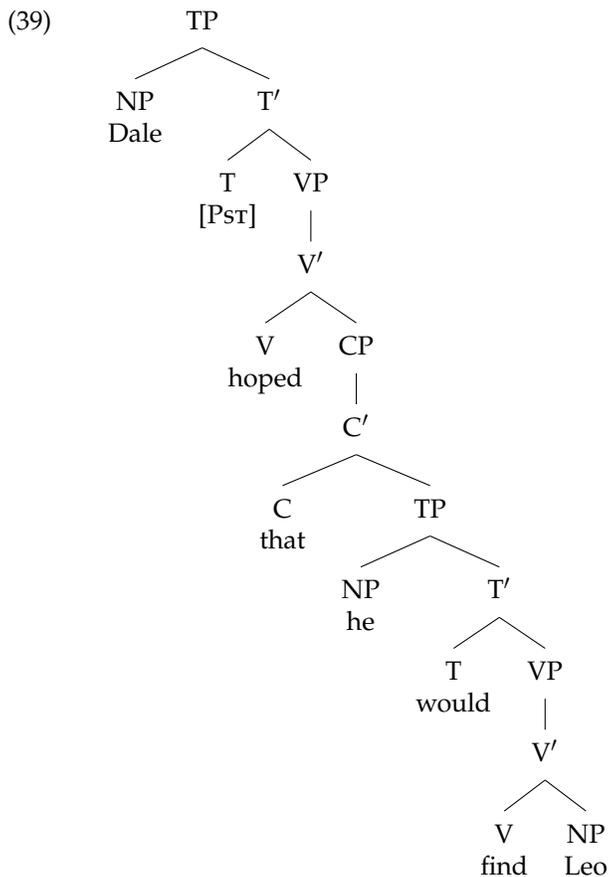
- However, there is a tight correlation between complementizers and finiteness of an embedded clause. For instance, finite clauses can be introduced with *that*, but non-finite clauses may not. They must be introduced with a null/silent complementizer, or with the complementizer *for* if there is a subject:

- (36) a. Dale hoped \emptyset to find Leo
 b. *Dale hoped that to find Leo

- (37) a. Dale thought \emptyset he found Leo
 b. Dale thought that he found Leo

- (38) a. *Dale wanted that to find Leo
 b. Dale wanted for Harry to find Leo
 c. Dale wanted \emptyset Harry to find Leo

- These facts can be explained if we posit that verbs select for CPs – **complementizer phrases**. Then, complementizers select for the tense of the embedded clause:



- The CP hypothesis also provides us with “space” for analyzing subject-auxiliary inversion and *wh*-movement in questions:

(40) [CP What_j [C' C_[+WH]+did_i [TP Dale [T' t [VP investigate t_j]]]]?

- By parity with the TP hypothesis, we'll accept that nominals are actually DPs – **determiner phrases**, with the possessor in Spec,DP (Abney 1987):

(41) [DP Laura [D' 's [NP [N' secret [N' diary]]]]]

- This allows us to formally capture the similarities between nominalizations and clauses:

(42) a. [TP James [T' T_[+Pst]] [VP quickly got away]]
 b. [DP James' [D' 's [NP quick get-away]]]

- With the TP hypothesis, the tense agrees with the subject, not the verb. Instead, T⁰ and V⁰ join together to create an inflected verb. In GB, we assume that agreement is between a **functional** head (C, T, D) and its specifier

5 Odds and Ends

5.1 V, T, C

- Further support for the TP and CP hypothesis comes languages in which the V appears to leave the VP:

- (43) a. [TP Jean embrasse_i [VP souvent [V' t_i à Marie]]
 John hug frequently to Mary
 'John frequently hugs Mary' (French)
- b. [TP John [PRES] [VP frequently [V' hugs Mary]]

- In English, the tense morpheme affixes onto the verb, possibly in a later, morphological component of the grammar (Embick & Noyer 2001). However, the verb syntactically raises to T⁰ in French (Emonds 1978; Pollack 1989).
- The differences in movement may also partially explain why verb agreement is blocked in question formation, verum focus, and in negation in English, but not French:

- (44) a. [CP Did_i [TP Dale t_i [VP solve the crime?]]]
 b. [TP Dale did n't [VP solve the crime]]
 c. [TP Dale DID [VP solve the crime]]
- (45) a. [CP Embrasses-tu [VP à Marie]]?
 hug.2.SG-you to Mary?
 'Do you frequently hug Mary?' (French)
- b. [CP Tu n' embrasses pas [VP à Marie]]
 You NEG hug.2.SG NEG to Mary
 'You don't hug Mary' (French)

- We posit that *do* appears because of a (language-specific) operation “*do*-support”, in which a dummy auxiliary *do* is inserted to host the otherwise stranded morphology in T.

5.2 Head Directionality

- Languages tend to bifurcate into *head-initial* languages and *head-final* languages:

- (46) a. **Head-Initial Languages:** X' → X ZP
 b. **Head-Final Languages:** X' → ZP X

- Head-initial languages:

- (47) a. [CP did_i [TP John t_i [VP go [PP to [DP the [NP store]]]]]] ?
 b. [CP hal [TP Ahmad [VP dhahaba [PP ilā- [DP al- [NP muxzan]]]]] ?
 Q Ahmad go.3.SG.M.PST to the store
 'Did Ahmad go to the store?' (Modern Standard Arabic)

