Syntax
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Ahmad Abu-Awad

Lecture Notes 2

Abstract

These notes explore the following topics in the Principles and Parameters/Minimalist syntax: First, Binding Theory and C-command are introduced. Then, the notes explore the nature of morphosyntactic features and the processes through which they are checked. In that context, the syntactic operation AGREE is also introduced along with the Hierarchy of Projections (HoP). Then, the Uniformity of Theta-role Assignment Hypothesis (UTAH) is explored briefly. The notes conclude with a contrast between English and Arabic to demonstrate parametric variation among languages.

Binding Theory and C-command

- **NPs**:
  - **Pronouns**: I, we, he, she, it, me, them, him, her…
  - **Anaphors**: Myself, themselves, himself, herself, itself,…
  - **R-expressions**: Sarah, Omar, the students, …

Thus far we've been labeling all of the above as Noun Phrases (NPs). They all have reference; that is, they refer to something given in the sentence or to something in the world. **BINDING THEORY** is a theory that is comprised of three principles that govern the permissible distribution of these NPs.

Let's be more precise. In particular, an **ANAPHOR** is a linguistic expression that does not get its meaning from referring to something in the world, but gets its 'meaning' from something in the sentence, an antecedent, another NP. Thus, in the sentence,

- Sarah is proud of herself,

the anaphor *herself* refers to Sarah, or gets its interpretation (reference) from the NP *Sarah*. The same goes for **PRONOUNS**; they get their meaning not from referring directly to something in the world, but from another NP. Observe,

- Sarah likes Omar. He also likes her, but doesn't like himself.

He here is interpreted as referring to *Omar*, and *her* as referring to *Sarah*. We know this from the facts of agreement. Anaphors and pronouns have to agree with their antecedent in terms their phi-features: number, person, and gender. Note that a proper noun is an inherently **REFERRING EXPRESSION / R-EXPRESSION**, i.e., an NP that gets its reference from the world of things and persons. It can thus function as an **ANTECEDENT** for a pronoun or an anaphor. A pronoun can also function as an antecedent for an anaphor. But an anaphor cannot function as an antecedent for a pronoun as in:

- *Himself likes him.

Furthermore, an R-expression, cannot have either as an antecedent. Observe:

- *Himself likes Omar.
- *He likes Omar.
- *John likes him.

The last two sentences are ungrammatical on the reading that both *He/him* and *Omar* refer to same person. If they do not refer to the same person, they would be grammatical.

We need to formalize these syntactic facts about the distribution of NPs. This is what Binding Theory does.

Let's get to it: Usually, a **subscript** small letter (starting from *i*) called an index is used with NPs where NPs that have the same subscript, i.e., the same **INDEX**, are said to be **COINDEXED**, and are as such said to be **CO-REFERENTIAL**, that is, they have the same referent. NPs that have different subscripts or indexes are not co-referential.

Ok, so here is what we know from sentences like the ones above. Anaphors and pronouns have to co-refer with another NP in the same sentence. In our system, they must be co-indexed with another NP in the sentence. This is what is called an antecedent.

So as not to confuse you with very small print subscripts, I will indicate co-indexing/co-referentiality with small letters in brackets.

Observe:

- Omar (i) likes himself (i).

In the sentence above *Omar* and *himself* are co-indexed/co-referential. *Omar* is the antecedent for *himself*. The sentence is grammatical. *Omar* and *himself* agree in number (both singular), person (both 3rd person), and gender (both masculine).

- *Sarah (i) likes himself (i).

Obviously, it is not enough that an anaphor have an antecedent in the same sentence. It needs to have the proper antecedent, i.e., one that agrees with it in terms of person, number, and gender (phi-features) as we said.

But note still:

- *Omar's (i) mother likes himself (i).

We know that *mother* cannot be a proper antecedent for *himself* as it doesn't agree with it in terms of gender, but the sentence does have an antecedent that agrees with it in terms of its phi-features, viz., *Omar*. Yet, still it is ungrammatical. So, there is more to this relation between the anaphor and its antecedent. Note further:

- Omar's mother (i) likes herself (i).

Try the substitution test. *Omar's* can easily be substituted with *his* as in "His mother likes herself." That is, *Omar's* (the possessor in the possessive structure) seems to work just like a **GENITIVE** pronoun (his, her, its, my, your, their, our).

Note further, that the whole possessive structure ("Omar's mother") can be replaced with *she* as in "She likes herself." We won't go into the details of the structure, but it seems that *mother* is the head of the NP "John's mother." So, how is it that "Omar likes himself" is grammatical, whereas "*Omar's mother likes himself" is ungrammatical? In other words, what changed in the structure so that *Omar* in the latter sentence cannot function as an antecedent for *himself* although it agrees with it in terms of gender, person, and number?

This is where the concept of Binding is necessary to explain this and related phenomena. We've previously explored structural relations between syntactic elements through tree

diagrams, relations like dominance, for example. Let's introduce a new one: **C-COMMAND** (c. was originally an abbreviation of constituent). Here is the formal definition of c-command:

- A node X c-commands its sister and the nodes dominated by its sister.

Thus, the grammaticality of "John likes himself" can be explained by proposing that in this sentence the antecedent *Omar* is in a position to c-command the anaphor *himself*, whereas in "Omar's mother likes himself," *Omar* is longer in a position to c-command the anaphor *himself*.

This relation where one NP is coindexed with and c-commands another NP is known as **Binding**. In other words when one NP is coindexed/co-referential with an antecedent that c-commands it, it is said to be bound by it, or, the other way around, the antecedent is said to bind the other NP. More formally:

- A binds B iff (if and only if)
  A c-commands B
  A is coindexed with B.

So, we might observe that **an anaphor must be bound**. Let's call this Principle A of Binding Theory.

- Sarah (i) saw herself (i) in the mirror.

All is well here. *herself* is bound by another NP in the sentence, so Principle A is not violated and the sentence is grammatical.

But note:

- *Sarah (i) saw that herself (i) was getting old.

Although *Sarah* and *herself* are coindexed and *Sarah* is in a position to c-command the anaphor *herself*, the sentence is still ungrammatical. What is the difference between the last two sentences? Well, it seems that *Sarah* is a bit farther/higher up from the anaphor *herself* in the latter than it was in the former. Thus, the anaphor has to be bound within a certain range or locally. In the last sentence, *herself* is within the embedded clause "that herself was getting old." Thus, it seems the anaphor must be bound within the same clause that contains it. Let's call this range (the same clause that contains it), the **BINDING DOMAIN**.

So, we need to calibrate Principle A above as follows:

- **Principle A**: An anaphor must be bound within its binding domain.

Ok, now to pronouns. Do they have the same Binding Principle? Observe their distribution:

- *Sarah (i) saw her (i) in the mirror.

On the reading that the NP *Sarah* and the pronoun/NP *herself* are co-referential, the sentence is ungrammatical. Thus, it seems what is necessary for anaphors doesn't work for pronouns. The Principle that defines the restrictions on their Binding seems to be the opposite of the one we formulated for anaphors. Let's call that Principle B. Here is a formalism:

- **Principle B**: A pronoun must be free in its binding domain.

Free here means "not bound." So, the last sentence is ungrammatical because it violates this Principle B as the pronoun *her* is bound within its binding domain (by *Sarah*).

Fair enough, but observe:

- *He (i) likes Omar (i).

Now, this doesn't violate Principle B. Although *He* is coindexed with *Omar*, *Omar* does not bind it as it does not c-command it. And yet, the sentence is ungrammatical.

Something else must be at work here. Remember, all of these distributional facts are about establishing reference for NPs in a sentence. We said that pronouns and anaphors do not have inherent reference and therefore have to get it from an antecedent. So, Binding Theory is a way of establishing the Principles of that reference.

Now, proper nouns are inherently referential. They refer to things and persons in the world. Thus, we may observe that they have to be free, i.e., they cannot be bound by another NP in the sentence. Let's put this into a formalism and call it Principle C.

- **Principle C**: R-expressions must be free.

They have to be free in the sentence, so no need to define a binding domain here.

Thus, the ungrammaticality of the last sentence stems from violating Principle C as *Omar* is bound by another NP.

Binding Theory

Principle A: An **anaphor** must be bound within its binding domain.

Principle B: A **pronoun** must be free within its binding domain.

Principle C: An **R-expression** must be free.

So, where are we now?

Well, we've come a long way. Remember this:

In simple terms	The Linguistic Subdiscipline	Unit of Analysis	Module	
Meaning	Semantics	Proposition	Conceptual-Intensional System	Logical Form (LF): The System of Interpretation, i.e., How a sentence is interpreted.
Form/Structure	Syntax	Sentence	**Black Box**: We need to model what happens here, that is, how syntax mediates between sound and meaning. Or, more precisely, how it interfaces with both.	
Sound	Phonology	Utterance	Perceptual-Articulatory System	Phonetic Form (PF): The Sound System, i.e., What a sentence sounds like.

We're still trying to construct a model for how 'sentence structure' interacts with the system of interpretation/meaning on the one hand and the system of pronunciation/sound on the other. We've proposed to approach a sentence as a **DERIVATION** which renders a specific form at **PF** / the **SPELL-OUT**, and another at the **LF** / the System of Interpretation (There are some differences between these things that the previous sentence couples with a slash, but they're not crucial for an introductory course).

A **DERIVATION** thus understood is **a series of syntactic operations that are performed on syntactic objects**. Here is a simplified way to demonstrate this.

First, **NUMERATE** gives us the "words" in the sentence from the **LEXICON** with their various features. And then **MERGE** combines these various syntactic objects by merging them two at a time at the root. There also syntactic objects which merely attach to a maximal projection without changing its distributional properties. This happens through the syntactic process **ADJOIN**. We also proposed **MOVE** which creates a copy of an already existing syntactic object (either a head X, or a maximal projection XP and merges it in another position higher in the hierarchy). And in terms of the various syntactic positions of the arguments of the verb in the *v*P, we noted that the **UNIFORMITY OF THETA-ROLE ASSIGNMENT HYPOTHESIS** (UTAH) allows us to Link syntax (syntactic relations) with semantics (semantic roles). We also noted that (functional) projections are ordered in what we called the **HIERARCHY OF PROJECTION** (HoP) [T > (Neg) > (M) > (Perf) > (Prog) > *v*]. HoP mergers take place as per the stipulation of HoP, not to check uninterpretable features. Finally, we observed that its all about Feature Checking, or more precisely, the checking of uninterpretable features. The latter vary across two axes: **STRONG** uninterpretable features need to be checked very locally either through movement of a matching head or phrase into an adjacent position, or, the old way we introduced before in the semester, through Merge, under sisterhood. **WEAK** uninterpretable features can be checked at a distance (c-command). Another type of uninterpretable features are *unvalued inflectional features* which are valued through **AGREE**. If valued as weak, then they're checked at a distance. If valued as strong, then the item that carries the valued feature needs to move into an adjacent position to the one that does the valuing in order to check the feature locally. And so that's most of what

we covered since the First-Hour Exam.

What follows in these notes is a brief discussion of how that happens and how we arrived at it.

Below is a summary table that lists the major syntactic operations we've encountered:

Numerate	gives the syntactic objects in the sentence. Some of these may not be obviously given by the various words in the sentence like *v* and T in English.
Merge	takes two syntactic objects and combines them at the root to create a new projection. Merge happens to check uninterpretable features. Interpretable (note especially **CATEGORY**) features and remaining uninterpretable features are said to **PERCOLATE** up to the resulting projection. Two Merge operations are allowed for each head depending on whether it has one or two c-selectional features, or none for non-projecting heads. The first Merge is with the **COMPLEMENT**; the second, with the **SPECIFIER**. Mergers above the VP as given by Numerate happen not to check features but as stipulated by the Hierarchy of Projection (HoP), including *v*.
Adjoin	attaches one syntactic object to another without changing the characteristics of the projection to which it adjoins.
Move	creates a copy of an already existing syntactic object in the hierarchy and joins it at a higher position in the derivation.
Agree	values uninterpretable unvalued features either as weak or as strong depending on the language, the item that values, and the item whose feature is being valued.

To wit, sometimes, we argued earlier in the semester, the features and their distribution are not immediately obvious in one language or another. We'll say more on this below.

> **Important Note**: Remember, our theory is a theory of **UNIVERSAL GRAMMAR (UG)** that approaches it a set of **PRINCIPLES AND PARAMETERS (P&P)** and as such attempts to account for all the possible grammars of natural languages. This is part of what we called **EXPLANATORY ADEQUACY**: It is not enough to list all the "rules" of a specific language, or for each natural language. We also need to explain how it can be derived from UG. This is so we can also explain how a child acquires her first language with the speed, uniformity, and ease with which she seems to acquire it. Thus, we noted, Principles were inviolable whereas Parameters allow languages to vary along certain axes (ideally) in a *binary* form, that is, choose between two options.

Observe sentence (1) below:

1. Suad killed Omar.

The 'words' in the "utterance"/the Spell-Out of the sentence are:

Suad	which has the major category feature	[N].
Omar	which has the major category feature	[N].
kill	which has the major category feature	[V].

This is what in semantics is generally called the **PREDICATE** (*kill*) and its **ARGUMENTS** (*Suad* and *Omar*) which together make-up the **PROPOSITION**: the very basic underlying meaning of the **simple declarative sentence, its claim which can be evaluated in terms of its truth or falsity**. We always start from there. So, in terms of the derivation and building tree diagrams, you always start with the VP. Again, remember, what we're trying to do is primarily to account for **what role Structure plays in the Interpretation of the Utterance**; thus the **Sentence** (that abstract construct we proposed at the very beginning of the semester) is what **mediates between Utterance/Sound and Proposition/Meaning**. And again, this relation or mediation is here said to happen according to a Universal Grammar from which all natural languages are derived.

Fair enough, observe the equivalent Arabic sentence in (2), which is to say its Spell-Out stage, or how it is pronounced in Arabic:

2. qatalat suadu omara.
   kill-fem-past Suad-nom Omar-acc.
   "Suad killed Omar"

Not unlike English, the verb in Arabic seems to be what inflects for **TENSE** (past, present), and **ASPECT** (Perfect, Imperfect/Progressive). These (inflectional) morphological features are crucial for the syntax. They are *the stuff* of syntax. This is why we proposed that morphology is impossible to separate from syntax as such and started defining "grammar" as

the study of both morphology and syntax, morphosyntax, we said. Anticipating, things to come, let's digress from this for a bit. Another important element of the meaning of utterances is their Mood: Are they statements (**DECLARATIVES**)? Are they questions (**INTERROGATIVES**)? Or, are they orders (**IMPERATIVES**)?

Important Digression on Pragmatics: What we're concerned with here is the 'semantic' meaning of the sentence, not the intention of the speaker in the utterance. The famous linguist Paul Grice put the distinction thusly: Utterance meaning vs. Speaker meaning. His contention is mainly that taking 'context' into account, the semantic meaning of the specific words or their compositional meaning in a specific structure that underlies an utterance is not enough to account for how speakers use language to mean 'things' that are not immediately discernible from the semantics of words, phrases, and sentences. Speakers would imply things beyond that conventional semantic meaning. For example, if a student asked me for a recommendation and I only wrote "She was always on time and never missed a class," this would imply that I was avoiding writing/speaking about her academic achievement; therefore, the reader/hearer would be excused if she inferred from this that the student I was recommending was not very 'special' academically. Another language philosopher, J.L. Austin, made a distinction between the **LOCUTIONARY ACT** (what is actually said), **ILLOCUTIONARY ACT** (what is meant), and **PERLOCUTIONARY ACT** (what actually happens as a result of the first two) of the utterance. Thus, each 'speech act' (an event of an utterance/speaking) carries an **Illocutionary Force** as well as a **Perlocutionary Force**. This distinction is meant to highlight that people "use words to do things" as the title of his posthumously published lectures has it. Other linguists and language philosophers like John Searle reformulated Austin's distinction in terms of the **DIRECT SPEECH ACT** indicated in the Mood of the utterance (and the sentence underlying it) and the **INDIRECT SPEECH ACT**, what the utterance is actually meant to accomplish or do. The discrepancy between the two, i.e., that one would use a declarative directly associated with a statement or an interrogative directly associated with a question to issue a command or request which is typically associated with imperatives, is usually due to **POLITENESS**. For example, if at a dinner table, someone says to you, "Can you pass the salt?" they're not really asking about your *ability* (*can you?*) to pass the salt, and thus it would be comic, if not impolite, to answer this Yes-No-Question (Y-N-Q) with a simple "No," or even a "Yes" without actually carrying out the indirect request to pass the salt. Thus, the *direct Y-N question* is in this context an *indirect request* that "(You) Pass the Salt!" Instead of the 'direct' imperative which may be construed as impolite or disrespectful depending on the formality of interaction among people and differences in social and political status and authority, social-convention *downgrades* the direct way of *saying things* into the indirect (which is sometimes construed as the polite/respectful) way of *saying things*. These socio-linguistic facts are usually studied under the rubric of Pragmatics and Sociolinguistics, among many other issues. But, I briefly signal them here to remind you of what we said at

> the beginning of the semester. Our theory of grammar makes a distinction between what it calls **COMPETENCE** (which we simply defined as the native speaker's ability to judge sentences as acceptable or unacceptable, to form grammatical sentences, and to interpret them) and **PERFORMANCE** (which we noted was subject to other factors of context and error). In a sense, our theory, focusing on the child acquiring a language, is pre-social. It does not at all concern itself with the 'actual' communication that takes place among people. This is part of the reason why it insists on **Formalizing competence** as distinct from performance. However, the illocutionary forces of sentences still falls within its purview as it attempts to account *formally* for how Imperatives and Interrogatives can be derived in the same way it proposes declaratives are derived, that is, within the Principles and Parameters it proposes.

Yeesh. This was a long, but necessary digression to remind you of what was actually in the purview of morphosyntax for the P&P Theory and the **MINIMALIST PROGRAM**. So, back to that. As we mentioned in class many times, we've thus far been dealing with Declaratives, and indicated very briefly how we think Interrogatives and Imperatives might be derived from them. I wrote here and in previous lecture notes and said in class that we take the Declarative to be the most basic and most important type of sentence. To give an example that we will elaborate on later, take sentence (1) above. In Traditional Grammar, the Yes-No Question (Y-N-Q) is said to be *a change in the order of the constituents* of (1), where the **SUBJECT** and **AUXILIARY** are inverted. Since (1) does not have an auxiliary, *DO*-support is required, that is we use *do* to carry the tense (and Agreement if there) of the sentence. In (1) tense is *past* (we know from the *–ed* inflection on the verb *kill*); therefore, we use *did*, the past form of *do*. Thus you get "Did Suad kill Omar?" Note that the verb now is in the *base* (uninflected or infinitival form, what is sometimes also called the 'citational' form as it is the one under which a word is cited in the dictionary). Had there been an auxiliary like **VERB-BE**, or **HAVE**, or a **MODAL** like *will*, available in the sentence, we wouldn't need *do*-support. We would simply invert the auxiliary given in the sentence with the subject of the sentence.

Observe sentences (3-9):

3. Did Suad kill Omar? [From sentence (1) above]
4. Suad will kill Omar.
5. Will Suad kill Omar?
6. Suad is killing Omar.
7. Is Suad killing Omar?
8. Suad has killed Omar.
9. Has Suad killed Omar?

So, the rule of **SUBJECT-AUXILIARY INVERSION** works well for predicting the formation of Y-N-Q's from Declaratives. We will leave how our theory accounts for this until later. However, there are at least three things we can take from this. First, Traditional Grammar is not all "prescriptive." In fact, its insights are crucial to the endeavor of Generative Grammar and Linguistic Theory more generally. Second, unlike the label **VERB**, **FUNCTIONAL-STRUCTURAL** descriptions like **SUBJECT** and **OBJECT** are not **CATEGORIES**; they are not

word or phrase **LABELS** like the ones we've been doing, and as such they turn out to be quite useful for our attempt to describe the *structure*, or *formation*, or *derivation* as we've now become accustomed to saying, of phrases and sentences especially in accounting for variation in 'word' order among languages (See comments below on **SPECIFIERS, HEADS**, & **COMPLEMENTS**). Third, what traditional grammar calls "word order" is crucial for the interpretation of what in the digression on pragmatics and its relation to syntax and semantics above we called the *illocutionary force* of the utterance or the *Mood* of the sentence. In the language of morphosyntax, the Mood of the sentence is a **DISTRIBUTIONAL** phenomenon, i.e., it depends on the distribution of the morphemes/words/phrases that go into its formation/derivation, on the position that they occupy in the structure. Now, we go on to see what we can make of all of this.

But first a 'word' about 'word order.' For every language, there is a *typical* **ordering** of the constituents called in the functional-structural descriptors Subject and Object in relation to the Verb. This *typical* word order for the declarative sentence is sometimes said to be **UNMARKED**, that is, the most (pragmatically) neutral way of saying things. Any change in that typical order of the constituents structurally-functionally described as subject and object is said to carry an added pragmatic intention. Thus, it is primarily this unmarked order of the simple declarative sentence that comes in the purview of our morphosyntactic/grammatical examination of natural language.

We also noted that languages vary in terms of the unmarked order of these functional-structural descriptors. Note the declarative sentences we started from in (1) and (2) above, reproduced here:

English:	Suad	killed	Omar.	**S V O**
Arabic:	qatalat	su'adu	omara.	**V S O**
	kill-fem-past	Suad-nom	Omar-acc.	

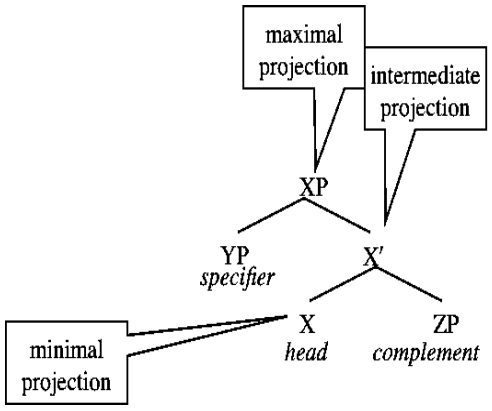
The two languages differ in terms of the order of these three elements. There is a much more complex problem this poses for our theory, one on which a lot of ink was spilt. Let's see how/why.

In general, the patterns observed in various languages are the following:

SVO	e.g., **English**.
SOV	e.g., **Japanese**.
VOS	e.g., **Malagasy**.
OVS	e.g., **Hixkaryana**.
VSO	e.g., **Arabic**.

In the previous set of notes, we proposed that lexical items merge because they have **uninterpretable c-selectional** features that need to be checked. Accordingly, we proposed the syntactic operation **MERGE** which takes two syntactic items and merges them **AT THE ROOT**. In other words, Merge does not care what is inside a structure, doesn't "look" inside phrases. It takes the root of a syntactic structure and Merges it with another where one, the one that does the selection, the one whose uninterpretable feature is being checked through

Merge, **PROJECTS**. We called this syntactic item the **HEAD**. We also called the syntactic item that it merges with the **COMPLEMENT**. This in a way says that Merge must happen so that an uninterpretable feature on the head is checked by merging with a complement that has the same feature. The resulting structure/the projection of the head is called a **MAXIMAL PROJECTION**. All of the features of the head are inherited by its projection, including, most importantly, its category feature. This is why we label the phrase according to that category feature. We also noted that the projection of the head has the same distributional properties as the head. In other words, a Verb Phrase (VP) has the same distributional properties as a Verb. However, there's another way of looking at this. If a head does not project, does not merge with a complement, it is a maximal projection by itself. It is also a **MINIMAL PROJECTION** as such because it is the head. Thus, a Noun that does not select a complement, is a maximal projection itself, i.e., a Noun Phrase (NP). Furthermore, if a head that Merges with a complement still has a c-selectional feature, it needs to merge again with an item whose category feature matches the uninterpretable c-selectional feature on the Verb/head to check that feature. The second Merge is between an **INTERMEDIATE PROJECTION**, the head and its complement, and the **SPECIFIER**. We proposed to call the intermediate level X' (X-bar). This has a history in **Generative Grammar**. Here it is in brief.



In the 1970's and the 1980's, there was a theory that was proposed as a constraint on the projections of head. It went by the name of X-bar Theory. Here is the main idea: The descriptive phrase used for the architecture of X-bar was "well-formed structures." We, start, as we usually do with the abstract. So, here it is:

For any X (Noun, Verb, Adjective, Adverb, Preposition, Inflection, Complementizers, Determiner), a well-formed structure/phrase/XP was said to contain exactly one:

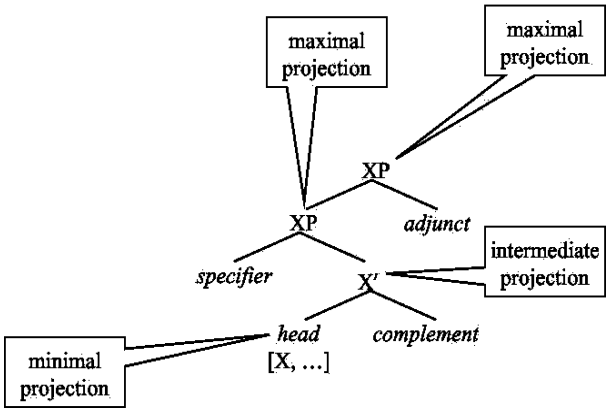
1. head (a lexical item).
2. complement (another XP).
3. specifier (another XP).

Observe the diagram above. Whether through Merge to check c-selectional features, or through X-bar Theory as diagramed here, the order of the various constituents in the projection for the a transitive verb would be Subject/Specifier Verb Object/Complement, the one that English has. But, how do we reconcile the word order for other languages that we observed above. We'll answer that presently, but for now note that our system of selectional features and Merge gives us the same *well-formed* structures without stipulating the template (Recall "Minimalism"). The structure assigned to projections is more or less the same, but now we don't do unnecessary intermediate or maximal projections. It used to be, at least assumed if not actually indicated, that you would start from X go to X' then to XP for each lexical item even if it had no specifier or complement. Now, we only do that when Merge happens to check c-selectional features. When a lexical item doesn't have any c-selectional features, it is both an X and an XP, that is, a minimal projection and a maximal

projection since it projects no further than itself.

So, here we are: **Numerate** gives us the words in the sentence from the lexicon. **Merge** takes two syntactic objects and merges them at the root to create another syntactic item. Merge needs to happen to check c-selectional features. But, some syntactic items are added or joined to a projection not through Merge, i.e., where there are no c-selectional features to be checked. Furthermore, we previously noted that for a 2-place predicate, say a verb, the predicate, assigns theta-roles to its complement and to its specifier. Some other elements that seem not to be required by the verb still appear. Nor do they receive theta-roles from it. These optional elements are called **ADJUNCTS**. They result from another syntactic process that we call **ADJOIN**, *add+join*. They are attached to either side of a maximal projection. Thus, if we take a well-formed sentence, or a successful derivation, like that in sentence (1), we can add many modificational phrases to the Verb Phrase without changing the nature of the projection. For example: "Suad killed Omar yesterday," or "Yesterday, Suad killed Omar." Or, "Suad killed Omar with a knife." Or, "Suad killed Omar unintentionally." Or "Suad killed Omar unintentionally with a gun." Etc. There is also a relative freedom to where such phrases adjoin. They can adjoin on either side of the projection. Note: "Suad unintentionally killed Omar." It seems that the Adverb Phrase (AdvP) *unintentionally* can adjoin either before or after the VP. But wait, if *unintentionally* adjoins before the VP, why is the Specifier/*Suad* placed before it, not after it, inside the VP where it should be? That's one of the phenomena that our theory attempts to answer: Why do some syntactic elements appear (at Spell-Out) elsewhere than they presumably are? We will answer that presently, but there are certain things we need to explain before we're able to do that. Let's conclude this discussion with an abstract tree of a full projection with a head, a complement, a specifier, and an adjunct (though note you can have more than one adjunct, but only one specifier and one complement).

An Abstract Phrase in Full



Towards answering the questions that we posed above, let's formalize the merger operations through the **HEAD PARAMETER**. The Head Parameter specifies the order of the head and complement, i.e. which one comes first, or alternatively, whether the complement is merged to the left or to the right of the head. Now, the setting for the head parameter works the same way for all heads in a language. For example, English is a **HEAD-INITIAL** or head-first language. That is, in English, the head always comes first, right before the complement. So, when the verb merges with the object, the order is *verb* first, *object* second. And, when a preposition (note *pre*-position) merges with its object, the preposition comes first, and so on and so forth for all other heads in the language. Japanese is a **HEAD-FINAL** or head-last language. That is, in Japanese, the head always follows the complement. For example, when the verb merges with its object in Japanese, the order is *object* first, *verb* second. And, what we call a preposition in English, is called a postposition (*post*-position) for Japanese because, it

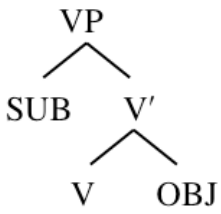
follows its object. You'll also notice the consistency in the head parameter setting for a language when we introduce more (functional) heads.

We can also think of a setting for specifiers in a language. Note that the head parameter as it is explained above concerns the order of the head and the complement. If we take this to the second Merge operation we can note, albeit not determined by this, the specifier can either occur on the right or the left of the phrase resulting from the first Merge. Thus, we can also note that languages may be **SPECIFIER-INITIAL**, or **SPECIFIER-FINAL**. The possibilities for the ordering of three things are six. However, constrained by the head-parameter and the order of the merger operations (the specifier parameter), we only get four. Our prediction holds, as four orders are attested in human languages. Now, let's revisit the topic of "word" order we explored above. Note that the structural-functional descriptions, subject, verb, object correspond to specifier, head, complement respectively. Observe:

Specifier Head Complement	**SVO**	e.g., **English**.
Specifier Complement Head	**SOV**	e.g., **Japanese**.
Head Complement Specifier	**VOS**	e.g., **Malagasy**.
Complement Head Specifier	**OVS**	e.g., **Hixkaryana**.

This is all predictable from the order of the first Merge (head with complement) and the head parameter (head first, or head last) and the second Merge (resulting phrase with specifier) and the specifier parameter (specifier first, specifier last). For example, English is head-initial, specifier-initial. Japanese is head-final, specifier-initial. Malagasy is head-initial, specifier-final, and Hixkaryana is head-final, specifier-final. So, all seems well.

But then how do we account for the word order in Arabic: **VSO**. Based on the order of the two Merge operations and the head and specifier parameters, this is an impossible order as the specifier/subject intervenes between the verb/head and its object/complement. It's not just Arabic; Irish also has this word order. Notice that in Arabic judging from the position of other heads in relation to their complements, it seems that Arabic is a head-initial language. Notice prepositions in Arabic (*huruuf al-jar*). They always precede the complement (*al-majruur bi-harf al-jar*). The order as the Arab grammarian observe is *jar wa majruur*. This is also the same for other (functional) heads in Arabic which we may explore later. Thus, the mystery of the position of the subject between the verb and the object in the Arabic unmarked sentence needs to be explained. Let's put this aside for a moment and we'll come to it later after we've learned a few things about **FUNCTIONAL PROJECTIONS**.



Now, let's go back to sentence (1), "Suad killed Omar." We noted that Numerate gives us the lexical items in the sentence. However, we noted that things like **TENSE** are not given independently of the verb in English. But other languages may not indicate tense on the verb. In fact, in Chinese, the verb does not inflect for Tense, Aspect, or Mood and these 'things' are indicated lexically, words like "yesterday" for past tense, for example. Thus, we may reasonably assume that Tense is also given by Numerate. Considering that every sentence is tensed in English, this seems to lend further support for this assumption. We also demonstrated in class how each *declarative* sentence is in fact a Tense Phrase (TP), but

see the discussion in your textbook for more on this. For now, let me remind you that since the VP contains the predicate and its arguments, Tense is essential for its interpretation and therefore is in a position to c-command it. Tense, Aspect, and Mood are functional heads. This is why your textbook covers the relevant issues under "Functional Projections." We also know from English that other things determine the interpretation and the '**inflection'** on the verb. **PERFECTIVE HAVE** determines the perfect, and **PROGRESSIVE BE** determines the progressive. Here they all are in a sentence.

4. Suad has been killing Omar.

Notice that each of them determines the form of the word that comes after and thus must be in a position to c-command it. As you will have noticed the order is:

- Tense+Have > Be > VP.

Let's explore more data on this:

5. Suad was killing Omar.

Notice now that it is Be that is in Tense. But more:

6. Suad will have been killing Omar.

Now it is the Modal in Tense. And the order is as follows:

- Tense+Modal > Have > Be > VP

More data:

7. Suad will not have been killing Omar.
8. Suad has not been killing Omar.
9. Suad is not killing Omar.
10. Suad did not kill Omar. [from sentence (1) above]

We said previously, that do-support was a last resort when there was nothing to carry tense in the sentence. Furthermore, since the other heads seem to be set in term of their positions in relation to each other, and since Tense should c-command all of them, it would make sense to think of a "hierarchy of projections." Now, two things are obvious from these sentences. First, whatever is highest in the hierarchy is the head that carries the tense, and the order of the hierarchy seems to be:

The Hierarchy of Projections (HoP)

- **T > (Neg) > (M) > (Perf) > (Prog) > VP**

T Tense (present, past)
Neg Negative (not)
M Modal (will, may, can, etc.)
Perf Perfective (have)
Prog Progressive (be)
( ) Optional head (depending on Numerate: what is given in the sentence).

You can consult your textbook for a more detailed discussion of these issues, but this will do it for us here.

Ok, good. But what does it mean to say "the highest auxiliary in the hierarchy carries tense, and when none is available, we use do-support"? This is another mystery that we will answer presently. But we still need to explore things a little further.

Observe the following sentence:

11. Suad gave a book to Omar.

When we talked about transitive verbs, 2-place predicates, it worked for us to say that Merge happens twice. The verb *give* in the sentence above is ditransitive, a 3-place predicate. In other words, each of the arguments in the sentence is obligatory. None of them are adjuncts: The NP "a book" is Theme; the PP "to Omar" is Goal; and the NP "Suad" is Agent. How can we account for that without discarding our Merge constraints and what we know from the theta-criterion? Well, note something about the verb *give* and ditransitive verbs more generally (*send*, *put*, etc.). In a sense they can be lexically decomposed into an "*Agent* causing a *Theme* to move in the direction of a *Goal*." Notice also the verb "kill" in our sentence (1), "Suad killed Omar." *kill* is a transitive verb which in terms of what we've been doing so far has been working for us. But even a verb like *kill* can be decomposed into something like "*Agent* causes *Theme* to die." In other words, in each of these verbs, *give* and *kill*, there is a **causer** involved that we've been glossing as Agent. This is something that is sometimes indicated explicitly in other languages, that is, through different a lexical item.

Now, note that it would make sense for us to propose that the part of the verb that assigns or is associated with the Agent (or Experiencer for mental verbs) theta-role is a different projection within the VP-shell. Let's call that *v* (little vee). But where would this lexical item, this *v* ("little" *v* as opposed to "Big" V) be. Observe the figure on the right above, which indicates how we've been diagramming VP's for transitives thus far. How would we reformulate this to account for our observations about ditransitives?
Let's first stipulate *v* as part of HoP.

The Hierarchy of Projections (HoP)

- **T > (Neg) > (M) > (Perf) > (Prog) > *v***

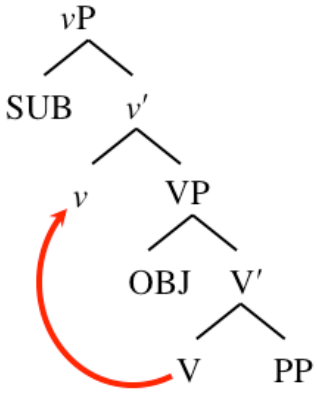
Notice *v* is not optional; it is always there immediately dominating the VP as per the

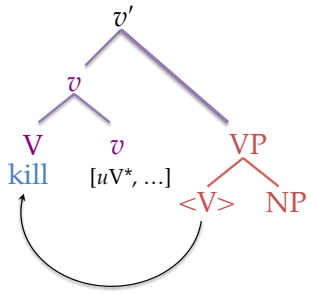
Hierarchy of Projections. Thus, *v* merges with VP because of HoP not to check an uninterpretable feature, just like any of the other projections in HoP.

Now, observe the sentences below:

12. Suad showed Omar to himself.
13. *Suad showed himself to Omar.

These two sentences tell us something about the relation between the Theme/Direct Object and the Goal/Indirect Object in terms of what we already know about the distribution of anaphors. The grammaticality of (12) and the ungrammaticality of (13) demonstrate a structural relation between the direct object NP ("Omar") and the indirect object PP ("to himself") which we explored when we talked about Binding Theory: the direct object NP needs to c-command the indirect object PP. So, now we know two things about the structure: The subject/agent NP needs to be within the projection of *v* and the object/theme NP needs to c-command the PP. Refer to your textbook and online to see how long this took to resolve and the various proposals entertained to resolve it, but here it is in the diagram on the right based on these observations. The (red) arrow on the opposite diagram indicates that V moves into *v*. Thus we get the word order observed for ditransitives. So, here we need to introduce a new syntactic operation **MOVE**. But why does V move into *v*? Just like we observed about Merge, Move is also about feature checking. In fact, we can think of Move as a type of Merge, but instead of introducing a new syntactic object into the derivation, Move creates a copy of an already existing syntactic object and merges it with an already existing syntactic object. So, we propose that *v* has an uninterpretable [*u*V*] which V moves to check locally. The asterisk here is meant to indicate that the feature is **STRONG** and so cannot be checked at a distance; therefore, it has to be checked very locally. Each projection remains in tact and is interpreted as it is as V leaves a copy of itself in its original merger position. Note, however, that that the copy (sometimes called a **TRACE** in **TRACE THEORY**) is *silent*; it is not pronounced at PF. Thus, it is indicated on the diagram on the (left above) with brackets.





We can now easily **LINK** syntactic positions within the *v*P with their semantic interpretation. This is something that is called the **UNIFORMITY OF THETA-ROLE ASSIGNMENT** in the literature. In other words, the syntactic position of an argument tells us what its thematic role is.

Here is how:

Uniformity of Theta-Role Assignment Hypothesis (UTAH)

Agent	NP daughter of *v*P
Theme	NP daughter of VP
Goal	PP daughter of V'.

Now that we've introduced Move thusly, we can account for the extant question of what it means for us to say that "the highest Auxiliary in the projection carries the Tense." Now, we can observe, that what happens is that just like V moves into *v*, the highest auxiliary in the hierarchy moves into T. We also sometimes refer to such movement as head-adjoin since it is a movement from one head position into a higher head position, a head-to-head movement. We'll say why this happens later, but let's now go back to the question of word order.

The word order in the English sentence is still not as our analysis thus far would predict. Note the following sentence:

14. Suad may kill Omar.

Why is the NP *Suad* not pronounced next to the verb *kill* where it belongs as in our analysis of the VP-Shell and HoP. Well, because it moves from Spec-*v*P into Spec-TP, the specifier of the Tense Phrase. T has a strong uninterpretable [*u*N*] or an EPP feature which needs to be checked locally; therefore, the highest NP in the VP-shell moves up into Spec-TP to check it. Thus, we get the word order observed for English and similar languages.
Now, let's turn to HoP in more detail. M, Perf, Prog, and *v* have an unvalued inflectional feature [*u*Infl:] which needs to be valued. T, M, Perf, and Prog can value an unvalued inflectional feature [*u*Infl:]. This happens through a process that we call **AGREE**. Here is the formalism for Agree.

Agree
In the configuration X[F: val] … Y[*u*F:]
F **checks** and **values** *u*F, resulting in
X[F: val] … Y[~~*u*F~~: val]

The ellipses in the formalism above indicates c-command; that is, for a head to value the uninterpretable unvalued feature on another head, it has to be in a position to c-command it. Thus each head in HoP would value the head directly below it depending on what is given in the sentence (Numerate). Each head of course assigns a specific value to the unvalued feature on the head directly below it. Here is a quick list of them:

A list of syntactic items with [*u*Infl:] and the syntactic items that can value [*u*Infl:]:

- *v*, Prog, Perf, and M all have [*u*Infl:] features
- [*u*Infl:] features can be valued (via Agree) by:
  - Tense features (past, present) of T. *-s* or *-ed*.
  - Perf feature of Perf. *-en*.
  - Prog feature of Prog. *-ing*.

- M feature of M. -*Ø*

Notice the color coding in the example below for a demonstration:

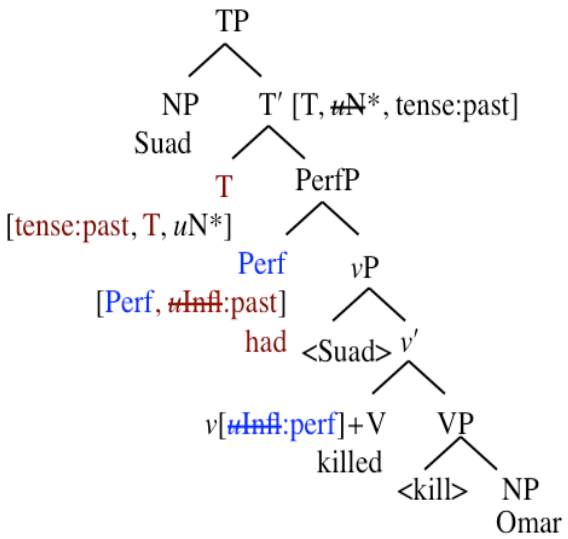
- Suad [past] ha-d be-en kill-ing Omar.

Here is a derivation to demonstrate all of this for the sentence

15. Suad had killed Omar.

First we do Numerate, the words as given by the sentence and their relevant morphosyntactic features. Note *v* and T are always here in this list regardless of the sentence, i.e. they are given by the lexicon. Note also that each word is given in its citational form, that is to say, no inflections appear yet.

Suad [N, …]
v [*u*N, *u*Infl:, …]
have [Perf, *u*Infl:, …]
kill [V, *u*N, …]
Omar [N, …]
T [T, tense:past, …]



Now, we do the structure step by step, but for considerations of space, I'll just refer you to the final tree diagram on the left below, noting the derivation on the right.

First, the verb *kill* merges with the NP *Omar* and checks its [*u*N*] through sisterhood/merger. Then *v* merges with VP per HoP. The verb *kill* moves into *v* and checks the [*u*V*] on *v* locally since it's a strong feature. *v*' then merges with the NP and checks the [*u*N*] that it inherits from *v*. Then Perf *have* merges with *v*P as per HoP. The [*u*Infl:] on *v* is valued as perf (weak) and thus checked at a distance. Then, T merges with PerfP per HoP and values the unvalued feature of Perf as *past* (strong) and checks it locally as Perf moves into T. Finally, the NP Suad moves from Spec-*v*P into Spec-TP as T' has a [*u*N*] which it inherits from T and has to be checked locally/through sisterhood.

Thus, there remains one extant unanswered question that came up in our discussion above. How do we explain the word order of the Arabic sentence where the Subject intervenes between the Verb and the Object (VSO).

Well, let's take an Arabic sentence where we have an auxiliary.

16. kanat su'adu taqtulu omara.
    was-fem Suad killing Omar.

"Suad was killing Omar."

The word order here is Aux-S-V-O. This is the same word order we observed for English before an NP argument moved from within the VP-shell (in the example above, the Agent in Spec-*v*P) into Spec-TP. Furthermore, the object in sentence (16) immediately follows the verb fitting with Arabic being a head-initial language. Notice here also that whereas in sentence (2) "*qatalat su'adu omara*" the verb carries the tense, it is here the Auxiliary that carries the tense. If we take into account our analysis of English and HoP, it would be reasonable to conclude that when the Verb in Arabic carries the Tense, it has moved to T, and when Auxiliary carries the Tense, it is the Auxiliary that has moved to T. In both cases, however, no movement of an NP argument from *v*P takes place. This would account for the word order well, but why should languages differ in this regard?

Well, this is another **parametric variation** among languages. Some features are strong in one language, and are weak in another. Thus, Arabic does not have a strong uninterpretable feature on T [*u*N*] or, put differently, does not have an EPP feature on T. Furthermore, we can say that when T values *v* in Arabic it is valued as strong and therefore *v* has to move into T to check the feature (very) locally as Agree is not enough to check strong features. The same for the Aux in Arabic; when it is valued by T, its feature is valued as strong and therefore it needs to move into T to check it.

This also answers the final extant question (mystery) that we posed above. In English when T values *v*, *v* does not move into T. But when it values any other Aux, that Aux moves into T. We can account for this based on the same analysis we proposed for Arabic, but with the difference that in English, when *v* is valued by T, its feature is not valued as strong and can therefore be checked through Agree without need for movement, whereas when T values an Aux in English, it's feature is valued as strong and therefore needs to move into T to be checked (very) locally.

Here is how English and Arabic seem to contrast in terms of their parameter settings (This needs to be refined much further, but it will help you understand the basics at this stage):

	T values [*u*Infl:] on Aux	T values [*u*Infl:] on *v*	EPP
English	Strong (Aux raises/move into T)	Weak (*v* remains *in situ*)	Strong (closest argument raises/moves into Spec-TP)
Arabic	Strong (Aux raises/move into T)	Strong (*v* raises/move into T)	Weak (*v*P arguments remain *in situ*)

Thus, we may conclude that languages can vary in terms of:

1. Head-complement order.
2. Head-specifier order.
3. Whether [*u*Infl:] on Aux is strong or weak when valued by T.
4. Whether [*u*Infl:] on *v* is strong or weak when valued by T.
5. Whether T has an [*u*N*]/EPP feature or not.