

Current Grammar

1. Organization

Our grammar has several types of rules, which are organized roughly as in (1):

(1) Phrase Structure Rules \Rightarrow **Deep Structure** \Leftarrow Lexicon

Transformations
Form Rules
 \Downarrow
Surface Structure

DEEP STRUCTURE is the representation that is the result of PHRASE STRUCTURE RULES and LEXICAL INSERTION. TRANSFORMATIONS apply, one by one, to derive new structures. The FORM RULES also apply (at some point in the derivation) to add morphological features to some of the elements. The structure that is the result of applying all the applicable transformations and the form rules is called SURFACE STRUCTURE.

DEEP STRUCTURE interfaces with the Semantic Component. Thus, transformations do not change meaning. SURFACE STRUCTURE is the input to the phonology; hence, everything needs to be in the right order and all necessary morphological information must be in place by Surface Structure.

Remember that Deep Structures do not always correspond to grammatical sentences - sometimes obligatory transformations and/or form rules need to apply. Also, Surface structures do not have to conform to the Phrase Structure Rules - the Transformation may move things around, etc., in a way that would not have been directly generated by the Phrase Structure Rules.

2. Phrase Structure Rules

- (2) S → {NP, CP} VP
NP → {(DP) (AP) N (PP), pn, Name}
DP → {D, NP Poss}
VP → {(V_m) (V_{have}) (V_{b-A}) V (NP) (AP) (PP) (CP)
or- VP {PP, Adv}
PP → P NP
AP → (Int) A
CP → C S

3. Lexical Entries

Lexical entries contain everything that is idiosyncratic to particular lexical items. This includes the phonological shape (which we represent with the standard English spelling), idiosyncratic morphological information (e.g. irregular verb forms, plurals, etc.), the syntactic category (N, V, P, etc.), subcategorization, and lexical semantics (what the word means). We are particularly interested one aspect of the a verb's meaning - the list of participants (SEMANTIC ROLES) entailed to occur with any use of the verb. This is the 'who did what to whom' part of the semantics. For example, any event denoted with the verb *eat* will entail an 'eater' and an 'eatee':

- (3) *eat*, V, [__ (NP)]
(eater, eatee)

Note that *eat* subcategorizes for an optional NP. Nevertheless, any sentence that uses *eat* will entail an eatee, even if It is not expressed syntactically. Also note that *eat* subcategorizes for one phrase (NP), but there are two semantic roles in the argument structure. This is because one of its semantic roles is assigned to the subject (and verbs do not subcategorize for subjects - they can only subcategorize for sisters). By 'subject' I mean the NP that is the daughter of the S-node.

In general, verbs have one more semantic role than the number of subcategorized arguments. Here are some possibilities:

- (4) a. *faint*, V, [__]
(fainter)
b. *see*, V, [__ NP]
(seer, thing)

- c. *fall*, V, [__ (PP)]
(thing, location)
- d. *send*, V, [__ NP (PP)]
(sender, thing, location)
- e. *put*, V, [__ NP PP]
(putter, thing, location)
- f. *be* V, [__ {NP, PP, AP}]
(x, y) [note: the two arguments are equate in some way, or the AP or PP's denotation is predicated to subject]
- g. *believe* V, [__ CP]
(experiencer, proposition)
PASSIVE, RAISING ,and EXTRAPOSITION obligatory, if the CP is CP_{for}
- h. *be likely* V, [__]
(proposition)
- i. *be unlikely* V, [__]
(proposition)
- j. *seem* V, [__]
(proposition)
RAISING and EXTRAPOSITION obligatory
- k. *be obvious* V, [__]
(proposition)
RAISING not allowed
- l. *like* V, [__ {NP, CP}]
(experiencer, theme)
- m. *be eager* V, [__ {NP, CP_{for}}]
(experiencer, theme)
- n. *want* V, [__ {NP, CP_{for}}]
(experiencer, theme)

The lexical entries in (4h-k) have a single proposition semantic role – this ensures that these verbs require CP subjects at deep structure – Extraposition can later move this CP to the VP.

Once Extraposition applies, the structural description for Raising is met, so Raising can apply as well, except *be obvious* in (4k) has a lexical specification saying that Raising is not allowed; this prevents examples like (5) from being generated:

(5)* The book is obvious to be interesting.

The verb *seem* in (4j) specifies that both Extraposition and Raising is required. This means that if a CP_{for} is chosen, the result will be a Raising construction (6a); if CP_{that} is chosen, there must be an Extraposition construction (6b). The deepstructure CP subject must move by surface structure, so (7a-b) are not possible. (7c) shows that Raising is obligator if there is a CP_{for}.

- (6) a. The book seems to be interesting.
b. It seems that the book is interesting.
- (7) a. * For the book to be interesting seems.
b. * That the book is interesting seems.
c. * It seems for the book to be interesting.

The verb *believe* (4g) takes a CP object at deep structure; if there is a CP_{that}, this can remain in object position by surface structure (8a). If *believe* is passivized, the CP moves to subject position (8b), and then Extraposition is possible (8c). However, if a CP_{for} is chosen, then The CP must passivize, and then both Extraposition and Raising must apply (8d). The ungrammatical examples in in (9) show that a passivized *believe*, with a CP_{for}, behaves in a manner similar to *seem*.

- (8) a. Everyone believes that the book is interesting.
b. That the book is interesting is believed by everyone.
c. It is believed by everyone that the book is interesting.
d. The book is believed by everyone to be interesting
- (9) a. * Everyone believes for the book to be interesting.
b. * For the book to be interesting is believed by everyone.
c. * It is believed by everyone for the book to be interesting.

The verbs in (4l-n) have CP objects; when the CP is a CP_{for}, Equi is required when the matrix and embedded subjects are co-referential:

- (10)a. We are eager for the children to win the race.
b. The children are eager to win the race.

In order to hook up semantic roles with syntactic structures, we assume the following linking rules:

(11) LINKING RULES

- a. Associate the first semantic role with the subject of the sentence.
- b. Associate any remaining semantic roles with the verb's (subcategorized) sisters, left to right.

These linking rules apply as part of the interface between Deep Structure and the semantic interpretation. This establishes 'who did what to whom' in order to feed into the semantic component. Transformations may move things around, delete things, etc., but the 'who did what to whom' will have already been established.

When a verb associates a semantic role with a phrase, it imposes SELECTIONAL RESTRICTIONS on that phrase, according to the type of semantic role. For example the 'SEER' role entails animate, sentient entities. Hence, (12a) is a good sentence while (12b) is bizarre:

- (12) a. The kids saw the movie. (note: '#' is used to
b. # The table saw the movie. indicate 'bizarre')

Other semantic roles, such as THING, do not require animate nor sentient entities:

- (13) a. The kids saw Kim. animate THING ok
b. The kids saw the movie. inanimate THING ok
(14) a. The kid fell off the slide. animate THING ok
b. The book fell off the slide. animate THING ok

The lexical entry in (4f) ensures that *seem* will take CP subjects at Deep Structure. Raising verbs, like *seem*, have clausal subjects at Deep Structure, but the embedded subject can raise to the matrix subject position by Surface Structure. Hence, in a Raising construction, the Surface Structure subject will not receive a semantic role from the matrix verb. This is in contrast with Equi verbs, which have non-clausal subjects at Deep Structure, and whose surface subjects *do* receive a semantic role from the matrix verb. Keep these facts firmly in mind when thinking about the difference between Raising and Equi.

4. Transformations and Form Rules

Transformations alter phrase structure; that is, they delete things, insert things, and move things around. The result is a new phrase structure. Again, note that the output of a transformation does not need to abide by the phrase structure rules.

Transformations consist of a STRUCTURAL DESCRIPTION (SD), which identifies what kinds of structure a transformation can apply to, and a STRUCTURAL CHANGE (SC), which says how the phrase structure is to be changed.

(15) **PASSIVE:** (optional)

	NP	X	V	{NP, CP}	Y
SD:	1	2	3	4	5
SC:	4	2	V _{b-B+3}	∅	5 + [PP by 1]

This transformation applies to any sentence that begins with an NP, perhaps followed by some auxiliaries, then a verb and an immediately following NP (or CP). It moves the NP (or CP) from its position after the verb to the subject position, it adds the auxiliary V_{b-B} before the verb, and builds a PP that contains the preposition *by* and the NP that was the old subject. This new PP becomes a sister to the last element in Y (indicated by '+')

Transformations can be optional or obligatory.

Form rules (also known as morpho-syntactic rules) express generalizations about the form that a category has (= the way it is pronounced) depending on where it is located in constituent structure. Among the phenomena handled by these rules are subject-verb agreement, and verb forms. Form rules add a morphological feature or features to a category depending on a category that is immediately adjacent to it. These rules have one of the forms shown below:

- (16) a. $X \rightarrow X_{[A]} / \text{---} Y$
 b. $X \rightarrow X_{[A]} / Y \text{---}$

Later, the morphology interprets the features as instructions for how (the words in) this category should be pronounced. Form rules are obligatory. Form rules cannot alter phrase structure; they cannot delete or add structure. They can only add morphological features.

5. The Organization of Transformations and Form Rules

Since our phrase structure rules create Deep Structures with embedded clauses, we have a possibility that there may be more than one S-node in a structure. From the Deep Structure that underlies (11a), the following sentences may emerge:

- (17) a. Max believed that Pat wrote letters.
 b. Max believed that letters were written by Pat.
 c. That Pat wrote letters was believed by Max.
 d. That letters were written by Pat was proven by max.

(17a): *no PASSIVE anywhere*

(17b): *PASSIVE in the embedded clause*

(17c): *PASSIVE in the main clause*

(17d): *PASSIVE in the embedded and main clauses*

Therefore, we will assume that transformation may apply in both embedded and main clauses. The way this is assumed to happen is as follows:

(18) CYCLIC APPLICATION

- a. First, go through the list of CYCLIC TRANSFORMATIONS and FORM RULES, in order, in the embedded clause.
- b. Then go up to the next clause up and go through the list all over again.

In this way, the transformations apply CYCLICALLY; that is, each clause defines a CYCLE in which the ordered list of transformations is applied. Thus, in (17b) passive applies only in the embedded clause on the first cycle; in (17c) it is skipped in the embedded clause (it is an optional transformation), but is applied in the main clause on the second cycle. In (17d) it is applied in the embedded clause on the first cycle, then again when its turn comes around on the second, main-clause cycle. For the purpose of cyclic applications ‘embedded clause’ may be either a CP or an S.

Also, we will assume that transformations are LOCAL; that is, they cannot reach into an embedded clause unless explicitly sanctioned. We implement this with the LOCALITY CONSTRAINT in (19):

(19) LOCALITY CONSTRAINT: In a transformation, no variable may contain a clause-boundary.

This means that unless a clause boundary is explicitly mentioned in the structural description of a transformation, the transformation will be clause-bounded. So transformations like PASSIVE are clause bounded, but RAISING and EQUI, which explicitly mention a CP-boundary, operate across two clauses. One exception to (19) is the unbounded, non-local WH-MOVEMENT transformation, which can apply across multiple clauses.

The transformations and form rules are arranged in an ordered list. Once a Deep Structure is created, we simply go down the list and see which rules can apply. If a transformation can apply then we apply it (if it is optional we may apply it or not), creating a new structure. Then we continue down the list. The Form Rules come at the end of the CYCLIC TRANSFORMATIONS – those that apply on each cycle. There are two POST-CYCLIC TRANSFORMATIONS that don’t apply until the end of the last (main clause) cycle. After all transformations have been considered, the result is a Surface Structure. Any Surface Structure our grammar can produce is predicted to correspond to a grammatical sentence. Anything that our grammar does not generate is predicted to be ungrammatical.

Current Transformations and Form Rules

Here is the list of current transformation and form rules in order of application.

CYCLIC TRANSFORMATIONS

TO-PLACEMENT: (OBLIGATORY)

	$[_{CP} for$	$\{NP, CP\}$	(V_m)	X
SD:	1	2	3	4
SC:	1	2	$[V_M to]$	4

PASSIVE: (OPTIONAL)

	NP	X	V	$\{NP, CP\}$	Y
SD:	1	2	3	4	5
SC:	4	2	V_{B-B+3}	\emptyset	$5 + [PP BY 1]$

AGENT DELETION: (optional)

	X	$V_{be-pass}$	Y	$[PP by someone/something]$
SD:	1	2	3	4
SC:	1	2	3	\emptyset

EQUI: (obligatory)

	NP_i	X	V	$[_{CP} C_{for}$	NP_i	Y
SD:	1	2	3	4	5	6
SC:	1	2	3	\emptyset	\emptyset	6

THERE-INSERTION: (optional)

	$NP_{[\alpha pers, \beta num]}$	X	<i>be</i>	PP	Y
SD:	1	2	3	4	5
SC:	$[there]_{pn [\alpha pers, \beta num]}$	2	$3 + 1$	4	5

EXTRAPOSITION: (optional for some verbs; obligatory for others)

	CP	VP
SD:	1	2
SC:	$[it_{pn}]_{NP}$	$2 \# 1$ ('#' means 'daughter of')

RAISING: (optional for some verbs; obligatory for others)

	[it]	X	V	[C for	NP	VP]	Y
SD:	1	2	3	4	5	6	7
SC:	5	2	3	∅	∅	6	7

Condition: term 1 is a pleonastic, term 3 contains a RAISING-verb

FORM RULES: (obligatory)

These all apply in a block during the relevant cycle.

- V → V_[past] or V_[present] / NP _____
- V → V_[α person, β number] / NP_[α person, β number] _____
- V → V_[BARE] / V_m _____
- V → V_[-EN] / V_{have} _____
- V → V_[-ING] / V_{b-A} _____
- V → V_[-EN] / V_{b-B} _____

WH-MOVEMENT: (obligatory)

	X	(wh)	Y
SD:	1	2	3
SC:	2+1	∅	3

Note: ‘wh’ stands an XP with a wh-cord in it

SAI: (obligatory if term 1 is present, otherwise optional)

	(wh)	NP	Aux	X
SD:	1	2	3	4
SC:	1	3 + 2	∅	3

Note: ‘Aux’ stands for V_m, V_{have}, V_{b-A}, V_{b-B}, and main verb *be*