# Head-Driven Phrase Structure Grammar
# An Introduction as Background for Grammar Implementation

## Part II: Non-Finite Constructions

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## The empirical challenge of non-finite constructions

In non-finite constructions, the subject of the embedded verb is not expressed as a locally realized dependent.

**Problem 1:** What is interpreted to be the subject of the non-finite verb?

(1) a. *John tried to dance.* (subject)
b. *John promised Peter to dance.* (subject)
c. *John persuaded Peter to dance.* (object)



**Problem 2:** Why do verbs selecting non-finite complements differ w.r.t. what kind of controllers can occur?

(2) a. *John tried to dance.* (subject)
b. *John appeared to dance.* (subject)
(3) a. *John persuaded Peter to dance.* (object)
b. *John expects Peter to dance.* (object)
(4) a. * *It tried to rain.* (subject)
b. *It appeared to rain.* (subject)
(5) a. * *John persuaded it to rain.* (object)
b. *John expects it to rain.* (object)



## Classifying non-finite complements

Verbs selecting non-finite complements can be classified according to

- their **orientation** (subject, direct or indirect object):

  What is interpreted to be the subject of the non-finite complement?

- the **nature of the relationship of the embedding verb to the controller**:

  Is the controller an argument of the embedding verb?

## Empirical basis of classification

**I. Orientation**: Determined by interpretation of embedded infinitive.

**II. Relationship: embedding verb ↔ controller**

*Raising verbs* only mediate the requirement of the complement:

1. If the embedded verb **requires** a **non-referential (= dummy) subject**, so does the raising verb:

(6) a. *It rains.*
b. * *God rains.*
(7) a. *It seems to rain.*
b. * *God seems to rain.*
(8) a. * *It wants to rain.*
b. * *God wants to rain.*



The same holds when a dummy subject is **permitted**:

(9) a. *There is a dragon in the wood.*
b. *Hobbs is a dragon in the wood.*
(10) a. *There seems to be a dragon in the wood.*
b. *Hobbs seems to be a dragon in the wood.*
(11) a. * *There wants to be a dragon in the wood.*
b. *Hobbs wants to be a dragon in the wood.*



2. If the embedded verb **permits a clausal subject**, so does the raising verb:

(12) a. *That Sarah dances fascinates John.*
b. *Sarah fascinates John.*
(13) a. *That Sarah dances seems to fascinate John.*
b. *Sarah seems to fascinate John.*
(14) a. * *That Sarah dances wants to fascinate John.*
b. *Sarah wants to fascinate John.*

3. If the embedded verb has a **subject with an idiomatic interpretation**, so does it when selected by a raising verb:

(15) *The cat is out of the bag.*
(16) *The cat seems to be out of the bag.*
(17) % *The cat wants to be out of the bag.*



4. In languages where **subjectless constructions** exist, raising verbs can embed such subjectless complements:

(18) a. *Dort scheint getanzt zu werden.*
*there seems danced to be*
'People seem to dance over there.'

b. *Ihn scheint zu frieren.*
*him seems to freeze*
'He seems to freeze.'

(19) a. * *Dort versucht getanzt zu werden.*
*there tries danced to be*
b. * *Ihn versucht zu frieren.*
*him tries to freeze*

5. passivization of the non-finite complement results in a paraphrase

(20) a. *John seems to read a book.*
b. *The book seems to be read by John.*

(21) a. *John wants to read a book.*
b. % *The book wants to be read by John.*



## Subject oriented equi verbs

$$\begin{bmatrix} word \\ \text{PHON} \quad <try> \\ \text{SYNSEM} \quad \begin{bmatrix} synsem \\ \text{LOCAL} \quad \begin{bmatrix} local \\ \text{CAT} \quad \begin{bmatrix} cat \\ \text{HEAD} \quad \begin{bmatrix} verb \\ \text{VFORM} \quad bse \end{bmatrix} \\ \text{SUBCAT} \quad \left\langle \text{NP}_{\boxed{1}},\ \text{VP}\left[ inf,\ \text{SUBCAT}\ \left\langle \text{NP}_{\boxed{1}} \right\rangle \right] : \boxed{2} \right\rangle \end{bmatrix} \\ \text{CONT} \quad \begin{bmatrix} try \\ \text{TRYER} \quad \boxed{1} ref \\ \text{SOA-ARG} \quad \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$



## Subject oriented raising verbs

$$\begin{bmatrix} word \\ \text{PHON} \quad <seem> \\ \text{SYNSEM} \quad \begin{bmatrix} synsem \\ \text{LOCAL} \quad \begin{bmatrix} local \\ \text{CAT} \quad \begin{bmatrix} cat \\ \text{HEAD} \quad \begin{bmatrix} verb \\ \text{VFORM} \quad bse \end{bmatrix} \\ \text{SUBCAT} \quad \left\langle \boxed{1},\ \text{VP}\left[ inf,\ \text{SUBCAT}\ \left\langle \boxed{1} \right\rangle \right] : \boxed{2} \right\rangle \end{bmatrix} \\ \text{CONT} \quad \begin{bmatrix} seem \\ \text{SOA-ARG} \quad \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$



## Object oriented equi verbs

$$\begin{bmatrix} word \\ \text{PHON} \quad <persuade> \\ \text{SYNSEM} \quad \begin{bmatrix} synsem \\ \text{LOCAL} \quad \begin{bmatrix} local \\ \text{CAT} \quad \begin{bmatrix} cat \\ \text{HEAD} \quad \begin{bmatrix} verb \\ \text{VFORM} \quad bse \end{bmatrix} \\ \text{SUBCAT} \quad \left\langle \text{NP}_{\boxed{1}},\ \text{NP}_{\boxed{2}},\ \text{VP}\left[ inf,\ \text{SUBCAT}\ \left\langle \text{NP}_{\boxed{2}} \right\rangle \right] : \boxed{3} \right\rangle \end{bmatrix} \\ \text{CONT} \quad \begin{bmatrix} persuade \\ \text{PERSUADER} \quad \boxed{1} ref \\ \text{PERSUADEE} \quad \boxed{2} ref \\ \text{SOA-ARG} \quad \boxed{3} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

## Object oriented raising verbs

$$\left[\begin{array}{ll} \textit{word} & \\ \text{PHON} & \langle \textit{believe} \rangle \\ \text{SYNSEM} & \left[\begin{array}{ll} \textit{synsem} & \\ \text{LOCAL} & \left[\begin{array}{ll} \textit{local} & \\ \text{CAT} & \left[\begin{array}{ll} \textit{cat} & \\ \text{HEAD} & \left[\begin{array}{l} \textit{verb} \\ \text{VFORM}\ \ \textit{bse} \end{array}\right] \\ \text{SUBCAT} & \left\langle \text{NP}_{\boxed{1}},\ \boxed{2},\ \text{VP}\left[\textit{inf},\ \text{SUBCAT}\ \left\langle \boxed{2} \right\rangle\right]\!:\!\boxed{3} \right\rangle \end{array}\right] \\ \text{CONT} & \left[\begin{array}{l} \textit{believe} \\ \text{BELIEVER}\ \ \boxed{1}\textit{ref} \\ \text{SOA-ARG}\ \ \boxed{3} \end{array}\right] \end{array}\right] \end{array}\right] \end{array}\right]$$



## Capturing the generalization behind raising

**Raising Principle** (Pollard and Sag 1994, p. 140)

Let $E$ be a lexical entry whose SUBCAT list $L$
contains an element $X$ not specified as expletive.

Then $X$ is lexically assigned no semantic role in the content of $E$
if and only if
$L$ also contains a (nonsubject) $Y[\text{SUBCAT} < X >]$.



## Raising as a widespread phenomenon
### Complements of other categories

Not only VP but also AP complements are possible complements of raising verbs like *seem* or *appears*:

(22) *John seems/appears intelligent.*
(23) *John seems/appears to be intelligent.*



## Raising as a widespread phenomenon
### More on AP complements

Such AP complements behave parallel to the VP complements of raising verbs, e.g., with respect to clausal subjects:

(24) a. *That he came to her wedding is tasteless.*
b. *John is tasteless.*
(25) a. *That he came to her wedding seems to be tasteless.*
b. *John seems to be tasteless.*
(26) a. *That he came to her wedding seems tasteless.*
b. *John seems tasteless.*
(27) a. * *That he came to her wedding wants to be tasteless.*
b. *John wants to be tasteless.*

## Interesting classes of raising verbs I

**Copula *be* + predicative XP**:

(28) *John is ugly.* (AP complement)

E.g., non-referential subjects of AP complements are possible:

(29) *It is likely that John sings tonight.*

**Certain modal verbs + VP[bse]**:

(30) *John may/must/shall run.*
(31) *It may/must/shall rain.*



## Interesting classes of raising verbs II

**Tense auxiliaries**:

(32) *is* + gerund
  a. *John is running home.*
  b. *It is raining.*
(33) *will* + base form:
  a. *John will run home.*
  b. *It will rain.*
(34) *have* + past-participle:
  a. *John has run home.*
  b. *It has rained.*



## The infitival marker *to*

(35) a. *John will laugh / *to laugh / *laughed / *laughing.*
  b. *John has *laugh / *to laugh / laughed / *laughing.*
  c. *John is *laugh / *to laugh / *laughed / laughing.*
  d. *John seems *laugh / to laugh / *laughed / *laughing.*

What is the status of the infinitival marker *to*? Is it

- part of the morphology of the infinitive, or
- a separate syntactic element?



## Arguing for status of *to* as separate syntactic element

In coordination contexts *to* can select a phrase:

(36) *John seems* [*to* [*come and go*]] *as he pleases.*

The alternative analysis

(37) *John seems* [[*to come*] *and* [*go*]] *as he pleases.*

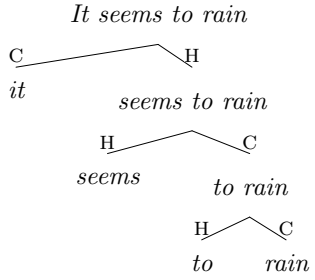
is implausible since the verb form of the coordination is neither only determined by the first conjunct nor always *to*-infinitive if one is present:

(38) * *John seems* [[*go*] *and* [*to come*]]

## What kind of an element is *to*? A raising verb!

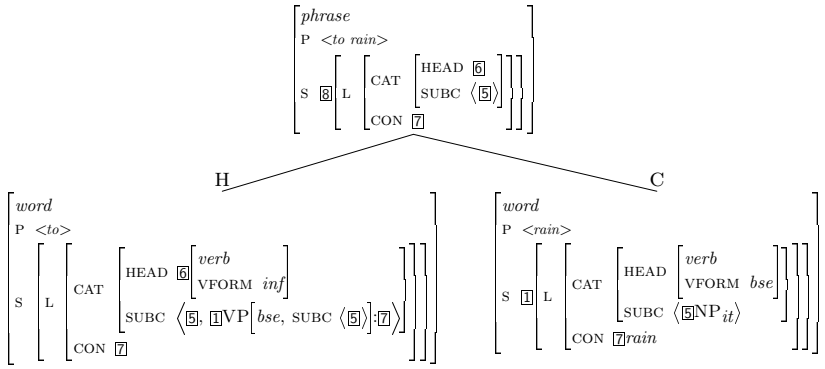
(39) *John seems to run.*
(40) *It seems to rain.*

**A sample raising analysis:**



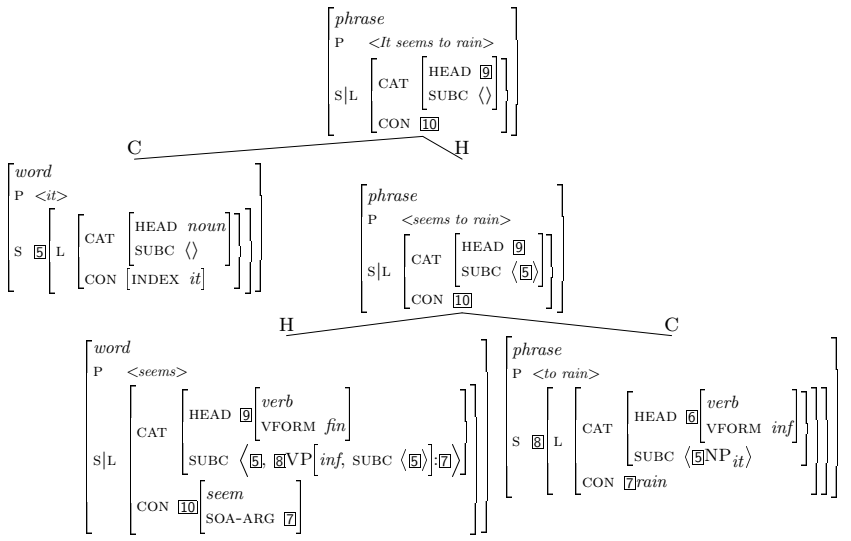



## The subtree *to rain*



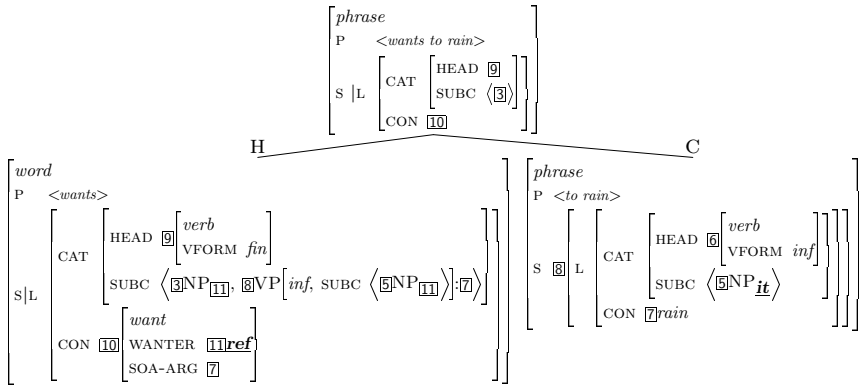



## Analysis of: *It seems to rain*






## Analysis of: **It wants to rain*



## The Passive: subject-to-subject raising

(41) a. *John has stolen the ring.*
b. *The ring was stolen.*

$$\begin{bmatrix} word \\ \text{PHON} \quad \langle has \rangle \\ \text{SYNSEM} \begin{bmatrix} \text{LOCAL} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{VFORM} \ fin \end{bmatrix} \\ \text{SUBCAT} \left\langle \boxed{1}, \text{VP}\left[ past\text{-}participle, \text{SUBCAT} \left\langle \boxed{1} \right\rangle : \boxed{2} \right] \right\rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} perfective \\ \text{SOA-ARG} \ \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

$$\begin{bmatrix} word \\ \text{PHON} \quad \langle was \rangle \\ \text{SYNSEM} \begin{bmatrix} \text{LOCAL} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{VFORM} \ fin \end{bmatrix} \\ \text{SUBCAT} \left\langle \boxed{1}, \text{VP}\left[ passive\text{-}participle, \text{SUBCAT} \left\langle \boxed{1} \right\rangle : \boxed{2} \right] \right\rangle \end{bmatrix} \\ \text{CONT} \ \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$



## Past and Passive Participles

$$\begin{bmatrix} word \\ \text{PHON} \quad \langle stolen \rangle \\ \text{SYNSEM} \begin{bmatrix} \text{LOCAL} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{VFORM} \ past\text{-}participle \end{bmatrix} \\ \text{SUBCAT} \left\langle \text{NP}_{\boxed{1}}, \text{NP}_{\boxed{2}} \right\rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} steal \\ \text{STEALER} \ \boxed{1}ref \\ \text{STOLEN} \ \boxed{2}ref \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

$$\begin{bmatrix} word \\ \text{PHON} \quad \langle stolen \rangle \\ \text{SYNSEM} \begin{bmatrix} \text{LOCAL} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{VFORM} \ passive\text{-}participle \end{bmatrix} \\ \text{SUBCAT} \left\langle \text{NP}_{\boxed{2}} \right\rangle \oplus \left\langle \left( \text{PP}[\text{by}]_{\boxed{1}} \right) \right\rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} steal \\ \text{STEALER} \ \boxed{1}ref \\ \text{STOLEN} \ \boxed{2}ref \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$



## Past and Passive Participles
### A lexical rule to express the generalization

$$\begin{bmatrix} word \\ \text{SYNSEM|LOC|CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{VFORM} \ past\text{-}participle \end{bmatrix} \\ \text{SUBCAT} \left\langle \text{NP}_{\boxed{1}}, \text{NP}_{\boxed{2}} \mid \boxed{3} \right\rangle \end{bmatrix} \end{bmatrix} \mapsto$$

$$\begin{bmatrix} \text{SYNSEM|LOC|CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{VFORM} \ passive\text{-}participle \end{bmatrix} \\ \text{SUBCAT} \left\langle \text{NP}_{\boxed{2}} \right\rangle \oplus \boxed{3} \oplus \left\langle \left( \text{PP}[by]_{\boxed{1}} \right) \right\rangle \end{bmatrix} \end{bmatrix}$$