Raising and control

Ling233B, Resource accounting at the syntax-semantics interface
Monday, January 28, 2002

“Raising” verbs in transformational grammar:

seemed [David to yawn] $\rightarrow$ David seemed to yawn

The subordinate clause subject “raises” to a position in the higher clause.

Raising-to-subject verbs: seem

David seemed to yawn.

$$\begin{bmatrix} \text{PRED} & \text{`seem}\langle\text{XCOMP}\rangle\text{SUBJ'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`David'} \end{bmatrix}_{\boxed{1}} \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{`yawn}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \end{bmatrix} \end{bmatrix}$$

Alternate subcategorization: seem

It seemed that David yawned.

$$
\left[\begin{array}{ll}
\text{PRED} & \text{`seem}\langle\text{COMP}\rangle\text{SUBJ'} \\
\text{SUBJ} & \left[\begin{array}{ll}\text{FORM} & \text{it}\end{array}\right] \\
\text{COMP} & \left[\begin{array}{ll}
\text{PRED} & \text{`yawn}\langle\text{SUBJ}\rangle\text{'} \\
\text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{`David'}\end{array}\right]
\end{array}\right]
\end{array}\right]
$$

Raising-to-object verbs: believe

David believed Chris to know the answer.

$$
\begin{bmatrix}
\text{PRED} & \text{‘believe}\langle\text{SUBJ,XCOMP}\rangle\text{OBJ’} \\
\text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{‘David’} \end{bmatrix} \\
\text{OBJ} & \begin{bmatrix} \text{PRED} & \text{‘Chris’} \end{bmatrix} \\
\text{XCOMP} & \begin{bmatrix}
\text{PRED} & \text{‘know}\langle\text{SUBJ,OBJ}\rangle\text{’} \\
\text{SUBJ} & \\
\text{OBJ} & \begin{bmatrix} \text{SPEC} & \begin{bmatrix} \text{PRED} & \text{‘the’} \end{bmatrix} \\ \text{PRED} & \text{‘answer’} \end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Alternate subcategorization: believe

David believed that Chris knew the answer.

$$
\begin{bmatrix}
\text{PRED} & \text{‘believe}\langle\text{SUBJ,COMP}\rangle\text{’} \\
\text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{‘David’} \end{bmatrix} \\
\text{COMP} & \begin{bmatrix}
\text{PRED} & \text{‘know}\langle\text{SUBJ,OBJ}\rangle\text{’} \\
\text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{‘Chris’} \end{bmatrix} \\
\text{OBJ} & \begin{bmatrix}
\text{SPEC} & \begin{bmatrix} \text{PRED} & \text{‘the’} \end{bmatrix} \\
\text{PRED} & \text{‘answer’}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

$$\mathrm{V}' \longrightarrow \begin{pmatrix} \mathrm{V} \\ \uparrow = \downarrow \end{pmatrix} \begin{pmatrix} \mathrm{NP} \\ (\uparrow \ \mathrm{OBJ}) = \downarrow \end{pmatrix} \begin{pmatrix} \mathrm{VP} \\ (\uparrow \ \mathrm{XCOMP}) = \downarrow \end{pmatrix}$$

seemed V (↑ PRED) = 'seem⟨XCOMP⟩SUBJ'
(↑ SUBJ) = (↑ XCOMP SUBJ)

believed V (↑ PRED) = 'believe⟨SUBJ,XCOMP⟩OBJ'
(↑ OBJ) = (↑ XCOMP SUBJ)

The "control equations":

seemed (↑ SUBJ) = (↑ XCOMP SUBJ)

believed (↑ OBJ) = (↑ XCOMP SUBJ)

It rained.

$$\begin{bmatrix} \text{PRED} & \text{`rain}\langle\rangle\text{SUBJ'} \\ \text{SUBJ} & \begin{bmatrix}\text{FORM} & \text{it}\end{bmatrix} \end{bmatrix}$$

It seemed that it rained.

$$\begin{bmatrix} \text{PRED} & \text{`seem}\langle\text{COMP}\rangle\text{SUBJ'} \\ \text{SUBJ} & \begin{bmatrix}\text{FORM} & \text{it}\end{bmatrix} \\ \text{COMP} & \begin{bmatrix} \text{PRED} & \text{`rain}\langle\rangle\text{SUBJ'} \\ \text{SUBJ} & \begin{bmatrix}\text{FORM} & \text{it}\end{bmatrix} \end{bmatrix} \end{bmatrix}$$

It seemed to rain.

$$\begin{bmatrix} \text{PRED} & \text{`seem}\langle\text{XCOMP}\rangle\text{SUBJ'} \\ \text{SUBJ} & \begin{bmatrix}\text{FORM} & \text{it}\end{bmatrix} \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{`rain}\langle\rangle\text{SUBJ'} \\ \text{SUBJ} & \end{bmatrix} \end{bmatrix}$$

Someone seemed to yawn.

narrow scope interpretation = *It seemed that someone yawned.*
wide scope interpretation = *There is someone who seemed to yawn.*

Narrow scope: $seem(a(X, person(X), yawn(X)))$
Wide scope: $a(X, person(X), seem(yawn(X)))$

David believed someone to yawn.

narrow scope: *David believed that someone yawned.*
wide scope: *There is someone that David believed to yawn.*

Idioms

Tabs seemed to be kept on that situation.

David believed tabs to be kept on that situation.

The cat seemed to have got Chris's tongue.

David believed the cat to have got Chris's tongue.

A unicorn seemed to yawn.

narrow scope interpretation = *It seemed that a unicorn yawned.*
wide scope interpretation = *There is a unicorn that seemed to yawn.*

Narrow scope: $\mathit{seem}(\mathit{a}(X, \mathit{unicorn}(X), \mathit{yawn}(X)))$
Wide scope: $\mathit{a}(X, \mathit{unicorn}(X), \mathit{seem}(\mathit{yawn}(X)))$

David seemed to yawn.

$$
f\begin{bmatrix}
\textsf{PRED} & \textsf{`seem}\langle\textsf{XCOMP}\rangle\textsf{SUBJ'} \\
\textsf{SUBJ} & g\begin{bmatrix}\textsf{PRED} & \textsf{`David'}\end{bmatrix} \\
\textsf{XCOMP} & h\begin{bmatrix}\textsf{PRED} & \textsf{`yawn}\langle\textsf{SUBJ}\rangle\textsf{'} \\ \textsf{SUBJ} & \end{bmatrix}
\end{bmatrix}
$$

seem(*yawn*(*David*)) : f_σ

seemed as a raising verb (David seemed to yawn):

seemed	$(\uparrow$ PRED$)$ = 'seem$\langle$XCOMP$\rangle$SUBJ'
	$(\uparrow$ SUBJ$) = (\uparrow$ XCOMP SUBJ$)$
	$\lambda P.seem(P) : (\uparrow \text{ XCOMP})_\sigma \multimap \uparrow_\sigma$

seemed with a COMP (it seemed that David yawned):

seemed	$(\uparrow$ PRED$)$ = 'seem$\langle$COMP$\rangle$SUBJ'
	$(\uparrow$ SUBJ FORM$)$ = it
	$\lambda P.seem(P) : (\uparrow \text{ COMP})_\sigma \multimap \uparrow_\sigma$

$$\textit{seemed} \quad \begin{array}{l} (\uparrow \text{ PRED}) = \text{`seem}\langle\text{XCOMP}\rangle\text{SUBJ'} \\ (\uparrow \text{ SUBJ}) = (\uparrow \text{ XCOMP SUBJ}) \\ \lambda P.\textit{seem}(P) : (\uparrow \text{ XCOMP})_\sigma \multimap \uparrow_\sigma \end{array}$$

Meaning constructor premises for *David seemed to yawn*:

$$\begin{array}{llcl} \textbf{seem} & \lambda P.\textit{seem}(P) & : & h_\sigma \multimap f_\sigma \\ \textbf{David} & \textit{David} & : & g_\sigma \\ \textbf{yawn} & \lambda X.\textit{yawn}(X) & : & g_\sigma \multimap h_\sigma \end{array}$$

$$\textbf{David}, \textbf{yawn} \vdash \textbf{David-yawn} \quad \textit{yawn}(\textit{David}) : h_\sigma$$

$$\textbf{David-yawn}, \textbf{seem} \vdash \textit{seem}(\textit{yawn}(\textit{David})) : f_\sigma$$

Someone seemed to yawn.

$$f\begin{bmatrix} \text{PRED} & \text{`seem}\langle\text{XCOMP}\rangle\text{SUBJ'} \\ \text{SUBJ} & g\begin{bmatrix} \text{PRED} & \text{`someone'} \end{bmatrix} \\ \text{XCOMP} & h\begin{bmatrix} \text{PRED} & \text{`yawn}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & \end{bmatrix} \end{bmatrix}$$

Narrow scope: $\quad$ *seem*(*a*(X, *person*(X), *yawn*(X))) : f_σ

Wide scope: $\quad$ *a*(X, *person*(X), *seem*(*yawn*(X))) : f_σ

Meaning constructor premises for *Someone seemed to yawn*:

seem	$\lambda P.\textit{seem}(P)$	:	$h_\sigma \multimap f_\sigma$
someone	$\lambda S.\textit{a}(X, \textit{person}(X), S(X))$	:	$\forall H.[g_\sigma \multimap H] \multimap H$
yawn	$\lambda X.\textit{yawn}(X)$	:	$g_\sigma \multimap h_\sigma$

Narrow scope reading:

$$\textbf{someone}, \textbf{yawn} \vdash \ \textbf{someone-yawn} \quad \textit{a}(X, \textit{person}(X), \textit{yawn}(X)) : h_\sigma$$

$$\textbf{someone-yawn}, \textbf{seem} \vdash \ \textit{seem}(\textit{a}(X, \textit{person}(X), \textit{yawn}(X))) : f_\sigma$$

Wide scope reading:

seem	$\lambda P.\mathit{seem}(P)$	:	$h_\sigma \multimap f_\sigma$
yawn	$\lambda X.\mathit{yawn}(X)$	:	$g_\sigma \multimap h_\sigma$
someone	$\lambda S.a(X, \mathit{person}(X), S(X))$	:	$\forall H.[g_\sigma \multimap H] \multimap H$

$$\dfrac{\dfrac{\dfrac{X : [g_\sigma] \qquad \textbf{yawn}}{\mathit{yawn}(X) : h_\sigma} \qquad \textbf{seem}}{\mathit{seem}(\mathit{yawn}(X)) : f_\sigma}}{\textbf{seem-yawn} \quad \lambda X.\mathit{seem}(\mathit{yawn}(X)) : g_\sigma \multimap f_\sigma}$$

$$\textbf{seem-yawn}, \textbf{someone} \vdash a(X, \mathit{person}(X), \mathit{seem}(\mathit{yawn}(X))) : f_\sigma$$

“Equi” verbs in transformational grammar

David tried [David to leave] $\rightarrow$ David tried to leave

“Equi-NP deletion transformation” deleted “equivalent” NP in subordinate clause.

David tried to leave.

$$
\left[\begin{array}{ll}
\text{PRED} & \text{`try}\langle\text{SUBJ,XCOMP}\rangle\text{'} \\
\text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{`David'}\end{array}\right] \\
\text{XCOMP} & \left[\begin{array}{ll}\text{PRED} & \text{`leave}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & \end{array}\right]
\end{array}\right]
$$

David convinced Chris to leave.

$$
\left[\begin{array}{ll}
\text{PRED} & \text{‘convince}\langle\text{SUBJ,OBJ,XCOMP}\rangle\text{’} \\
\text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{‘David’}\end{array}\right] \\
\text{OBJ} & \left[\begin{array}{ll}\text{PRED} & \text{‘Chris’}\end{array}\right] \\
\text{XCOMP} & \left[\begin{array}{ll}\text{PRED} & \text{‘leave}\langle\text{SUBJ}\rangle\text{’} \\ \text{SUBJ} & \end{array}\right]
\end{array}\right]
$$

No alternate subcategorization options:

*It tried that David left.

*David convinced that Chris left.

No nonthematic subjects in XCOMP:

*It tried to rain.

*There tried to be a problem.

No idioms allowed:

*Tabs tried to be kept on David.

*The cat tried to get David's tongue. (only literal reading)

Only wide scope reading for quantifiers:

Someone tried to leave.

A unicorn tried to leave.

$$V' \longrightarrow \begin{pmatrix} \text{V} \\ \uparrow = \downarrow \end{pmatrix} \begin{pmatrix} \text{NP} \\ (\uparrow \text{ OBJ}) = \downarrow \end{pmatrix} \begin{pmatrix} \text{VP} \\ (\uparrow \text{ XCOMP}) = \downarrow \end{pmatrix}$$

tried V $(\uparrow$ PRED$)$ = 'try⟨SUBJ,XCOMP⟩'
$(\uparrow$ SUBJ$) = (\uparrow$ XCOMP SUBJ$)$

convinced V $(\uparrow$ PRED$)$ = 'convince⟨SUBJ,OBJ,XCOMP⟩'
$(\uparrow$ OBJ$) = (\uparrow$ XCOMP SUBJ$)$

The "control equations":

tried $(\uparrow$ SUBJ$) = (\uparrow$ XCOMP SUBJ$)$

convinced $(\uparrow$ OBJ$) = (\uparrow$ XCOMP SUBJ$)$

David tried to leave.

Propositional theory of control: $\mathit{try}(\mathit{David}, \mathit{leave}(\mathit{David}))$

Property theory of control: $\mathit{try}(\mathit{David}, \lambda X.\mathit{leave}(X))$

(Chierchia 1984, 1985; Asudeh 2000, 2001)

More on this on Tuesday.

David tried to leave.

$$f\left[\begin{array}{ll} \text{PRED} & \text{`try}\langle\text{SUBJ,XCOMP}\rangle\text{'} \\ \text{SUBJ} & g\left[\begin{array}{ll}\text{PRED} & \text{`David'}\end{array}\right] \\ \text{XCOMP} & h\left[\begin{array}{ll}\text{PRED} & \text{`leave}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & \end{array}\right] \end{array}\right]$$

$$\textit{try}(\textit{David}, \textit{leave}(\textit{David})) : f_\sigma$$

try (↑ PRED) = 'try⟨SUBJ,XCOMP⟩'
(↑ SUBJ) = (↑ XCOMP SUBJ)
$\lambda X.\lambda P.\mathit{try}(X, P(X))$:
$(\uparrow \text{SUBJ})_\sigma \multimap [[(\uparrow \text{XCOMP SUBJ})_\sigma \multimap (\uparrow \text{XCOMP})_\sigma] \multimap \uparrow_\sigma]$

Meaning constructor premises for *David tried to leave*:

try	$\lambda X.\lambda P.\mathit{try}(X, P(X))$	: $g_\sigma \multimap [[g_\sigma \multimap h_\sigma] \multimap f_\sigma]$
David	*David*	: g_σ
leave	$\lambda X.\mathit{leave}(X)$	: $g_\sigma \multimap h_\sigma$

David, **try** ⊢ **David-try** $\lambda P.\mathit{try}(\mathit{David}, P(X)) : [g_\sigma \multimap h_\sigma] \multimap f_\sigma$

David-try, **leave** ⊢ $\mathit{try}(\mathit{David}, \mathit{leave}(\mathit{David})) : f_\sigma$

Meaning constructor premises for *Someone tried to leave*:

try	$\lambda X.\lambda P.try(X, P(X))$	$: \ g_\sigma \multimap [[g_\sigma \multimap h_\sigma] \multimap f_\sigma]$
someone	$\lambda S.a(X, person(X), S(X))$	$: \ \forall H.[g_\sigma \multimap H] \multimap H$
leave	$\lambda X.leave(X)$	$: \ g_\sigma \multimap h_\sigma$

$$\dfrac{\dfrac{\dfrac{Y : [g_\sigma] \qquad \textbf{try}}{\lambda P.try(Y, P(Y)) : h_\sigma} \qquad \textbf{leave}}{try(Y, leave(Y)) : f_\sigma}}{\textbf{try-leave} \quad \lambda X.try(X, leave(X)) : g_\sigma \multimap f_\sigma}$$

$$\textbf{someone}, \textbf{try-leave} \vdash \ a(X, person(X), try(X, leave(X))) : f_\sigma$$

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Chierchia, G. (1984). Anaphoric properties of infinitives and gerunds. In *Proceedings of the Third West Coast Conference on Formal Linguistics* (M. Cobler, S. MacKaye, and M. Wescoat, eds.), 28–39. Stanford Linguistics Association, Stanford, CA.

Chierchia, G. (1985). Formal semantics and the grammar of predication. *Linguistic Inquiry* **16** (3), 417–443.