Issues in the Syntax and Semantics of Equi

LING 233B

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Syntax and semantics of equi

- Syntax
  - Equi complement: saturated (clausal) or not?
    - Generally: S or VP?
    - LFG: COMP or XCOMP? (Dalrymple, 2001)
  - Equi target: anaphoric binding or identity?
    - Generally: anaphoric binding (syntactic or semantic)?
    - LFG: obligatory anaphoric control or functional control?
- Semantics
  - Does the equi complement denote a property (⟨e,t⟩-type) or a proposition (t-type)?*

*Actually, ⟨s,⟨e,t⟩⟩ or ⟨s,t⟩ to be more precise.

Obligatory Anaphoric Control vs. Functional Control

(1) Gonzo tried to blush.

COMP, obligatory anaphoric control

$$t\begin{bmatrix}\text{PRED} & \text{'try'} \\ \text{SUBJ} & g\begin{bmatrix}\text{PRED} & \text{'Gonzo'}\end{bmatrix} \\ \text{COMP} & b\begin{bmatrix}\text{PRED} & \text{'blush'} \\ \text{SUBJ} & p\begin{bmatrix}\text{PRED} & \text{'pro'}\end{bmatrix}\end{bmatrix}\end{bmatrix}$$

$((\uparrow \text{COMP SUBJ})_\sigma \text{ ANT.}) = (\uparrow \text{ SUBJ})_\sigma$
$(p_\sigma \text{ ANTECEDENT}) = g_\sigma$

XCOMP, functional control

$$t\begin{bmatrix}\text{PRED} & \text{'try'} \\ \text{SUBJ} & g\begin{bmatrix}\text{PRED} & \text{'Gonzo'}\end{bmatrix} \\ \text{XCOMP} & b\begin{bmatrix}\text{PRED} & \text{'blush'} \\ \text{SUBJ} & \end{bmatrix}\end{bmatrix}$$

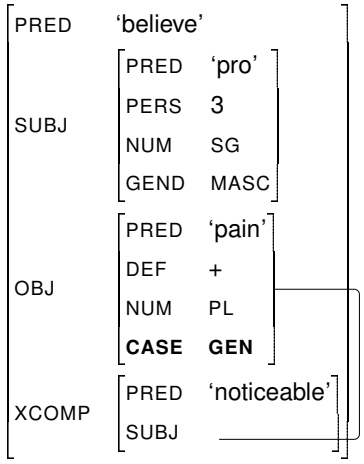
$(\uparrow \text{XCOMP SUBJ}) = (\uparrow \text{ SUBJ})$
$(b \text{ SUBJ}) = g$

Empirical differences between control mechanisms (1)

- **Controller/controllee identity**: functional control requires identity for all features between controller and controllee; oblig. anaphoric control only requires antecedent-anaphor agreement.
- Icelandic: case identity in functional control (Andrews, 1982)
- Raising: raised argument has the quirky case it would receive from the lower predicate; *gæta* assigns GENITIVE to its subject and that is the case on the object of the raising verb *telur*. The default direct object case is ACCUSATIVE.

  (2) Hann telur verkjanna (í barnaskap sínum) ekki gæta.
  he believes pains.GEN (in foolishness his) not noticeable
  'He believes the pains (in his foolishness) not to be noticeable.'

Icelandic: raising



Icelandic: equi

- Equi: no quirky case identity

- *vanta* assigns ACCUSATIVE to its subject, but the subject of the control verb *vonast* has NOMINATIVE case, even though it controls the subject of *vanta*.

(3) Drengina vantar mat.
boys.PL.ACC lack food.ACC
'The boys lack food.'

(4) Ég vonast til að vanta ekki efni í ritgerðina.
I.NOM hope to to lack not material for thesis.DEF
'I hope to not lack material for the thesis.'

Empirical differences between control mechanisms (2)

- **Licensing of overt elements in controllee position**: a closed complement (COMP) should be able to license overt pronominal subjects.

- Serbo-Croatian: (Zec, 1987)
  - Controlled complement introduced by complementizer
  - Controlled complement is finite
  - Finite verbs license pro drop
  - **Under certain conditions, controllee can be overt**

Serbo-Croatian: equi

(5) Petar je želeo da dodje
Petar Aux wanted Comp come(Pres)
'Peter wanted to come.'

(6) Petar$_i$ je želeo da *on*$_i$ dodje
Petar Aux wanted Comp he come(Pres)
'Peter wanted to come.'
'Peter wanted *himself* to come.'

(7) Petar$_i$ je želeo da on$_j$ dodje
Petar Aux wanted Comp he come(Pres)
'Peter wanted him to come.'

English equi

- The evidence we have just examined for equi as obligatory anaphoric control in Icelandic and Serbo-Croatian is not available in English:
  - English has no quirky case
  - English cannot have overt material in the position corresponding to the controllee
- There are nevertheless *some* syntactic differences between raising and equi in English (Jacobson, 1990, 1992)

English: raising vs. equi

- Raising verbs cannot drop their infinitival complements, but equi verbs can:

(8) [Does Gonzo eat vegetables?]
He seems { to / *∅ }

(9) [Does Gonzo eat vegetables?]
He tries { to / ∅ }

- Raising verbs cannot have a topicalized infinitival, but equi verbs can (marginally):

(10) *To eat vegetables, Gonzo seems.

(11) ?To eat vegetables, Gonzo tries.

Equi with COMP?

- Dalrymple (2001) takes Jacobson's tests as distinguishing between XCOMP and COMP complements. Raising verbs takes XCOMPS, but equi verbs in English have a closed complement, COMP; the equi relationship is obligatory anaphoric control, not functional control.
- **Benefits**:
  1. Relates the differences between control and raising that Jacobson noticed to a difference between grammatical functions that are otherwise motivated in the theory.
  2. Paves the way for a universal treatment of control as obligatory anaphoric control, rather than as functional control in some languages and obligatory anaphoric control in others.

Problems with Jacobson's tests (1)

- Jacobson's tests do not distinguish raising and control:
  1. Certain raising verbs do allow infinitival drop:

     (12) Gonzo began eating, stopped, resumed, and continued until he was finished.

  2. Certain control verbs do not allow infinitival drop:

     (13) [Did Gonzo leave?]
     He wanted { to / *∅ }

     (14) [Did Gonzo leave?]
     He attempted { to / *∅ }

- Notice that *attempt* and *try* are synonymous; this is evidence that the difference in dropping the complement is a) syntactic, but b) not indicative of a difference between control and raising.

Problems with Jacobson's tests (2)

- It has been argued that infinitival *to* is itself a raising verb. If this is true, then why can *to* drop its complement?

- It has been argued that *is* is a raising verb. Yet *is* can drop its complement.

  (15) [Is Gonzo a real person?] Actually, he is.

- It has been argued that modals are raising verbs; they can drop their complements.

  (16) [Will Gonzo ever quit smoking?] He might.

Summary of the syntactic issues

- Raising is generally considered to be functional control out of an open complement (XCOMP).

- Control has been modelled as

  – Obligatory anaphoric control: an anaphor-antecedent relationship between a controller and a pronominal control target.

    ○ Appropriate for Icelandic due to case mismatch.

    ○ Appropriate for Serbo-Croatian due to presence of an actual pronominal controllee.

  – Functional control

    ○ Appropriate when there is no evidence for obligatory anaphoric control.

- It is unclear whether control in English is functional control or obligatory anaphoric control.

Semantics: what is the denotation of the complement?

- Does the equi complement denote a property (⟨e,t⟩-type) or a proposition (t-type)?

- Why this is important generally:

  – The choice of denotation affects the predictions our semantics makes about certain entailments (what follows from what?).

  – Entailments are *the* classical concern of semantics.

- Why this is important with respect to the syntax:

  – A property denotation is in some sense more at home with a functional control syntax (although issues of resource accounting arise in our particular framework and other resource-sensitive frameworks).

  – A propositional denotation is more at home with obligatory anaphoric control.

Arguments for the property theory of control

- The proper denotation of a sentence should account for native speakers' intuitions about entailments (i.e., inference patterns).

- Chierchia (1984a,b) argues that treating the control complement as a property accounts for certain inferences, while treating it as a proposition does not.

- The original inference pattern had to do with **quantification**; we also examine an inference pattern to do with **ellipsis**.

Inference from quantification

(17) **Property inference pattern**:
Gonzo tried to go.
Andrew tried everything that Gonzo tried.

Andrew tried to go.

$try(Gonzo, \lambda x.go(x))$
$\forall P.[try(Gonzo, P) \rightarrow try(Andrew, P)]$

$try(Andrew, \lambda x.go(x))$

(18) **Propositional inference pattern**:
Gonzo tried to go.
Andrew tried everything that Gonzo tried.

??
[cf. * Andrew tried for Gonzo to go.]

$try(Gonzo, go(Gonzo))$
$\forall P.[try(Gonzo, P) \rightarrow try(Andrew, P)]$

$try(Andrew, go(Gonzo))$

Inference from ellipsis

(19) **Property inference pattern:**
Gonzo tried to go.
Andrew did too.

Andrew tried to go.

$try(Gonzo, \lambda x.go(x))$
$P(gonzo) = try(\underline{gonzo}, \lambda x.go(x))$
$P \mapsto \lambda y.try(y, \lambda x.go(x))$
$\lambda y.try(y, \lambda x.go(x))(andrew)$

$try(Andrew, \lambda x.go(x))$

Inference from ellipsis (cont.)

(20) **Propositional inference pattern:**
Gonzo tried to go.
Andrew did too.

??
[cf. * Andrew tried for Gonzo to go.]

$try(Gonzo, go(Gonzo))$
$P(gonzo) = try(\underline{gonzo}, go(gonzo))$
$P \mapsto \lambda y.try(y, go(\underline{gonzo}))$
$\mapsto \lambda y.try(y, go(y))$
$\lambda y.try(y, go(gonzo))(andrew)$
$\vee\lambda y.try(y, go(y))(andrew)$

$try(Andrew, go(Gonzo))$
$\vee try(Andrew, go(Andrew))$

Arguments for the propositional theory of control

- The property theory does not have an explanation for the locality of binding for reflexives:

  (21) Gonzo tried to rouse himself/*themselves into action.

  It has been argued that anaphor-antecedent agreement is at least partly syntactically conditioned (Pollard and Sag, 1994), but on a strictly compositional reading of the property theory, there is no syntactic subject for the reflexive. Note that Pollard and Sag (1994) present several arguments against purely semantic theories of agreement (e.g. Dowty and Jacobson, 1989).

- Languages with obligatory anaphoric control have a syntactic pronominal subject. Under a strictly compositional reading, the control complement should denote a proposition. Yet these languages license the inference patterns we just saw (e.g., Serbo-Croatian; Zec, 1987).

Arguments against the property theory of control

- There are inference patterns similar to the ones that argue for the property theory of control which cannot have the same solution. (Dalrymple, 2001)

  (22) Nando does anything Ezio does.
  Ezio$_i$ broke his$_i$ arm playing football.

  Nando$_j$ broke his$_j$ arm playing football.

- There are inference patterns similar to the ones that argue for the property theory of control which seem to have to do with real world knowledge only. (Higginbotham, 1992)

  (23) Nando does anything Ezio does.
  Ezio practices playing the piano.

  Nando practices playing the piano.

Arguments against the property theory of control (cont)

- Higginbotham also argues that the property theory of control cannot account for the second reading of: (Higginbotham, 1992; Dalrymple, 2001)

  (24) They expected to sit next to each other.

  (25) a. Each of them expected to sit next to the other one.

  b. They expected that they would sit next to each other.

Using Dalrymple et al.'s (1998) RECIP operator, the meaning for (25b) is

$$expect(they, \lambda x.RECIP(x, \lambda z \lambda y.sitnextto(z, y)))$$

> The problem with this representation is that a predicate like *expect* denotes a relation between an individual and the property that the individual expects to have. However, an individual cannot enter into a relationship involving a $RECIP$ predicate which must hold of a group and not an individual. (Dalrymple, 2001, 333)

Counterarguments

- Example (22) perhaps does have a similar solution as the control cases we looked at.

  (26) $\forall P.P(ezio) \rightarrow P(nando)$
  $\lambda P.\iota(x, arm(x) \wedge of(ezio, x), P(x))(\underline{\lambda x \lambda y.break(x, y)}(ezio))$

  $\lambda P.\iota(x, arm(x) \wedge of(nando, x), P(x))(\underline{\lambda x \lambda y.break(x, y)}(nando))$

- The argument about practicing the piano seems like question-begging. A good theory of semantics should tell us what lexical entailments follow from given verbs and Chierchia attempts to do this. If Higginbotham is right, why should lexical entailments *ever* matter? Why isn't it *all* just real world knowledge?

- The argument from reciprocals is perhaps solvable if we assume a theory of plurals such as Link's (1998) and if our basic type of individual is group-denoting.

Syntax/semantics mismatches at first blush

- Functional control and the property theory go well.

- Obligatory anaphoric control and the propositional theory go well.

- The other two possibilities — functional control/propositional theory and obligatory anaphoric control/property theory — seem more problematic because there seems to be too few resources or too many.

Functional control: property or proposition (1)

$$t\begin{bmatrix}\text{PRED} & \text{'try'} \\ \text{SUBJ} & g\begin{bmatrix}\text{PRED} & \text{'Gonzo'}\end{bmatrix} \\ \text{XCOMP} & b\begin{bmatrix}\text{PRED} & \text{'blush'} \\ \text{SUBJ} & \end{bmatrix}\end{bmatrix}$$

$gonzo : g_\sigma$
$blush : g_\sigma \multimap b_\sigma$

Property try:
$\lambda x \lambda P.try(x, P) : g_\sigma \multimap ((g_\sigma \multimap b_\sigma) \multimap t_\sigma)$

Proposition try:
$\lambda x \lambda P.try(x, P(x)) : g_\sigma \multimap ((g_\sigma \multimap b_\sigma) \multimap t_\sigma)$

Functional control: property or proposition (2)

$$\dfrac{\dfrac{g_\sigma \qquad g_\sigma \multimap ((g_\sigma \multimap b_\sigma) \multimap t_\sigma)}{(g_\sigma \multimap b_\sigma) \multimap t_\sigma} \qquad g_\sigma \multimap b_\sigma}{t_\sigma}$$

$$\dfrac{\dfrac{gonzo : g_\sigma \qquad \lambda x \lambda P.try(x, P) : g_\sigma \multimap ((g_\sigma \multimap b_\sigma) \multimap t_\sigma)}{\lambda P.try(gonzo, P) : (g_\sigma \multimap b_\sigma) \multimap t_\sigma} \qquad blush : g_\sigma \multimap b_\sigma}{try(gonzo, blush) : t_\sigma}$$

$$\dfrac{\dfrac{gonzo : g_\sigma \qquad \lambda x \lambda P.try(x, P(x)) : g_\sigma \multimap ((g_\sigma \multimap b_\sigma) \multimap t_\sigma)}{\lambda P.try(gonzo, P(gonzo)) : (g_\sigma \multimap b_\sigma) \multimap t_\sigma} \qquad blush : g_\sigma \multimap b_\sigma}{try(gonzo, blush(gonzo)) : t_\sigma}$$

Obligatory anaphoric control: propositional

$$t\begin{bmatrix}\text{PRED} & \text{'try'} \\ \text{SUBJ} & g\begin{bmatrix}\text{PRED} & \text{'Gonzo'}\end{bmatrix} \\ \text{COMP} & b\begin{bmatrix}\text{PRED} & \text{'blush'} \\ \text{SUBJ} & p\begin{bmatrix}\text{PRED} & \text{'pro'}\end{bmatrix}\end{bmatrix}\end{bmatrix}$$

$gonzo : g_\sigma$
$blush : p_\sigma \multimap b_\sigma$
$\lambda z.z \times z : g_\sigma \multimap (p_\sigma \otimes g_\sigma)$
$\lambda x \lambda P.try(x, P) : g_\sigma \multimap b_\sigma \multimap t_\sigma$

$$\dfrac{\dfrac{\dfrac{[u : g_\sigma]^1 \quad \lambda x \lambda P.try(x, P) : g_\sigma \multimap b_\sigma \multimap t_\sigma}{\lambda P.try(u, P) : b_\sigma \multimap t_\sigma} \qquad \dfrac{[w : p_\sigma]^2 \quad blush : p_\sigma \multimap b_\sigma}{blush(w) : b_\sigma}}{try(u, blush(w)) : t_\sigma} \qquad \dfrac{gonzo : g_\sigma \quad \lambda z.z \times z : g_\sigma \multimap (p_\sigma \otimes g_\sigma)}{gonzo \times gonzo : p_\sigma \otimes g_\sigma}\otimes\epsilon,1,2}{let\ gonzo \times gonzo\ be\ u \times w\ in\ try(u, blush(w)) : t_\sigma}}{try(gonzo, blush(gonzo)) : t_\sigma}$$

Obligatory anaphoric control: property

- No longer want the pronominal resource.
- Require a *manager resource* (contributed by the control verb) to consume the pronoun.
- Notice that the control verb looks very much like a functional control verb now.

Obligatory anaphoric control: property

$gonzo : g_\sigma$
$blush : p_\sigma \multimap b_\sigma$
$\lambda z.z \times z : g_\sigma \multimap (p_\sigma \otimes g_\sigma)$

$\lambda x \lambda P.try(x, P) : g_\sigma \multimap ((p_\sigma \multimap b_\sigma) \multimap t_\sigma)$
$\lambda x \lambda y.x : g_\sigma \multimap (p_\sigma \multimap g_\sigma)^*$ Manager resource

$$\dfrac{blush : p_\sigma \multimap b_\sigma \qquad \dfrac{\dfrac{[u : g_\sigma]^1 \quad \lambda x \lambda y.x : g_\sigma \multimap (p_\sigma \multimap g_\sigma)}{\lambda y.u : p_\sigma \multimap g_\sigma} \quad [w : p_\sigma]^2}{u : g_\sigma} \quad \dfrac{\lambda x \lambda P.try(x, P) : g_\sigma \multimap ((p_\sigma \multimap b_\sigma) \multimap t_\sigma) \quad \dfrac{gonzo : g_\sigma \quad \lambda z.z \times z : g_\sigma \multimap (p_\sigma \otimes g_\sigma)}{gonzo \times gonzo : p_\sigma \otimes g_\sigma}}{\lambda P.try(u, P) : (p_\sigma \multimap b_\sigma) \multimap t_\sigma}}{\dfrac{let\ gonzo \times gonzo\ be\ u\ in\ \lambda P.try(u, P) : (p_\sigma \multimap b_\sigma) \multimap t_\sigma}{\lambda P.try(gonzo, P) : (p_\sigma \multimap b_\sigma) \multimap t_\sigma}}}{try(gonzo, blush) : t_\sigma}$$

*Recall that $g_\sigma \multimap (p_\sigma \multimap g_\sigma) \equiv (p_\sigma \otimes g_\sigma) \multimap g_\sigma$

Summary

- There are important unsolved problems in both the syntax and semantics of equi.
- Decisions about the proper syntax affect decisions about the proper semantics to different degrees.
- One crucial criterion for semantic adequacy is capturing proper entailments.

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