The Syntax/Semantics Interface: Hungarian (LING-UA 37)
Professor Anna Szabolcsi

Fall 2015

PREREQUISITE: LING-UA 4 AND LING-UA 13, OR Permission of the Instructor

Goals

This course studies Hungarian from the perspective of theoretical linguistics, and asks what it tells us about the syntax/semantics interface in universal grammar. Hungarian is known as a language that wears its semantics on its syntactic sleeve. Constituent order transparently identifies the topic and the focus of the sentence, and disambiguates the scopes of operators like “everyone,” “rarely,” and “not.” English, in contrast, signals those pragmatic and semantic relations by subtle intonational clues, if at all. Thus Hungarian offers a laboratory in which to isolate and study some otherwise elusive phenomena, and enables one to ask to what extent they are strictly part of grammar, what tools natural languages use to express them, in what ways natural languages vary in this domain, and so on.

Hungarian is a lucky choice also because, starting from the early 1980s, it has been one of the theoretically best studied non-Indo-European languages. (Hungarian is Uralic.) It has a rich literature in generative syntax, formal semantics, morphology and phonology, and the instructor is among the active researchers of its syntax and semantics. The course will be data-oriented, but at every point we will be able to draw on work that has been vetted by a scholarly community.

Skills

This course offers a unique opportunity to apply the theoretical concepts that students engage with in the required syntax and semantics courses to an “exotic” language. In addition to using those concepts, we dedicate three to four weeks to introducing elements of “A-bar” syntax, propositional logic, predicate logic, and the lambda calculus that are usually not covered in the prerequisite courses, and so we expand the participants’ knowledge of general-purpose theoretical syntax and semantics.

Textbooks


Course requirements

There will be an assignment every week, a reading or a written one, or both. It will be very important to keep up with the readings, for class discussion to proceed in a productive and informed manner. 70% of the course grade will be based on the written assignments and on class participation, including how participation reflects reading preparation. Written assignments are due at the beginning of the first class period of the week. The remaining 30% may be earned with a research paper or a critical review of pertinent literature.

The usual standards of academic integrity apply. Participants are welcome and encouraged to work together, but they must indicate who they worked with and, unless the assignment is expressly a group project, they must write up the results individually.
### Preliminary calendar

<table>
<thead>
<tr>
<th>Block</th>
<th>Mon</th>
<th>Wed</th>
<th>Topics</th>
<th>Core readings (recommended readings will be added)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Sep 2</td>
<td>Sep 9</td>
<td>Introduction and phenomena of Hungarian</td>
<td>Krifka 2006, É. Kiss 2002, Törkenczy 2008</td>
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<td></td>
<td>Sep 14</td>
<td>Sep 16</td>
<td>Syntax of wh-movement and Hungarian focus movement</td>
<td>Sportiche-Koopman-Stabler 2014, É. Kiss 2002</td>
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<tr>
<td>2</td>
<td>Sep 28</td>
<td>Sep 23</td>
<td>Semantics of topic and focus, clefts, and only</td>
<td>Krifka 2006, Rooth 1992</td>
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<td></td>
<td>Sep 21</td>
<td>Sep 30</td>
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<td></td>
<td>Oct 5</td>
<td>Oct 7</td>
<td>Hungarian: contr. focus, csak, EI-Op, EIP, information focus</td>
<td>É. Kiss 2002, Horvath 2010</td>
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<tr>
<td>3</td>
<td>Oct 13</td>
<td>Oct 14</td>
<td>Propositional logic</td>
<td>Allwood et al. 1972</td>
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<tr>
<td>4</td>
<td>Nov 2</td>
<td>Nov 28</td>
<td>Conversational predicate logic, the lambda operator</td>
<td>Allwood et al. 1972</td>
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<td></td>
<td>Nov 9</td>
<td>Nov 11</td>
<td>Quantifier Raising (QR) and quantifier scope in English</td>
<td>Szabolc 2000, 2010</td>
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<td></td>
<td>Nov 16</td>
<td>Nov 18</td>
<td>Quantifier scope in Hungarian</td>
<td>É. Kiss 2002, Brody &amp; Szabolcs 2003</td>
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<tr>
<td>5</td>
<td>Dec 7</td>
<td>Dec 9</td>
<td>-- to be determined --</td>
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<td>Dec 14</td>
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<td>Student presentations</td>
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• Basic notions of Information Structure, or information packaging
  Common Ground (CG) management - pragmatics. Common Ground content - semantics. 
  **Focus**: Alternatives - pragmatics. Operators may use alternatives - semantics.

(1)  a. What did John show Mary?  John showed Mary [the PICTures].
    b. Who did John show the pictures?  John showed [MARY] the pictures.

(2)  a. John only showed Mary [the PICTures].
    b. John only showed [MARY] the pictures.

**Topic**: Aboutness topic - where information is to be stored. Contrastive topic - delimitation.


Hungarian (É. Kiss 2002, Chs 1, 2, 4)

     János MIT mutatott Marinak?

(2')  a. János csak [a KÉpeket] mutatta Marinak.

• **Quantifier scope** (É. Kiss 2002, Ch 5)

(23)  a. János MINDen diáknak HÁrom témát is felajánlott.
    John every student-dat three topic-acc even up-offered
    ‘John offered to each student three essay topics [each’]

    b. János HÁrom témát is MINDen diáknak felajánlott.
    John three topic-acc even every student-dat up-offered
    ‘John offered [the same] three essay topics to each student’

• **Possessor extraction vis-à-vis topic, focus, and quantifier movement** (É. Kiss 2002, Ch 7)

(25b) Jánosnak[ti] elveszett el [DP t’ a [ti pénze]] t’.”.
     John-dat away-lost the money-poss t’.” ‘John’s money got lost’

(25x) KI-nek[ti] veszett el [DP t’ a [ti pénze]] t’?”
     who-dat lost away the money-poss t’?” ‘Whose money got lost?’

(25y) MINDenkinek[ti] TEGnap veszett el [DP t’ a [ti pénze]] t’.”.
     everyone-dat yesterday lost away the money-poss got lost YESterday’
two flavors of configuralionality

overtly articulated left periphery

flat

János MINden diák

flavor

Három témát is

flavor

fell

ajándolt

= (23a)

János MINden diár

KÉpeket mutatta Marinak.

mutatott János Marinak?

= (1’a)

János csak a KÉpeket

mutatta Marinak.

= (2’a)

Jánosnak

eleszett [DP t’ a [ti pénze]] t’’.

= (25b)

KI-neki

veszett el [DP t’ a [ti pénze]] t’’?

= (25x)

MINden-
kinek

veszett el [DP t’ a [ti pénze]] t’’.

= (25y)
Introduction, Part 2 -- Törkenczy 2008

Sounds: First syllable stress.
Length is phonemic. In orthography, C-length indicated by doubling, V-length by acute accent(s).
Vowel harmony (two- or three-way suffixes); unrounded front vowels are transparent.

<table>
<thead>
<tr>
<th>front back</th>
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<tbody>
<tr>
<td>diaeresed</td>
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<tr>
<td>ü, ű</td>
<td>i, í</td>
<td>u, ú</td>
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<tr>
<td>ö, ő</td>
<td>é, ó</td>
<td>ő, é</td>
</tr>
<tr>
<td>e, a</td>
<td>á, é</td>
<td>[á] lower than e, a; á, e more open than a</td>
</tr>
</tbody>
</table>

Verbs: Prt + Stem + Modal + Tense/Mood + 1st/2nd. Sg/Pl. Def/Indef + SFP
Meg- látogat-hat -t -ad -e Péter-t?
pfx- visit -may -past -2sg.def -interrog Peter-acc
‘Were you allowed to visit Peter?’

Verbal particle (separable prefix): perfective; often changes lexical meaning.
Tense: present: ∅, past: -t/-tt,
future: perfective verb in present tense form, or auxiliary verb fog + infinitive.
No sequence of tenses. Shifted tenses in complements of propositional attitudes.
Mood: indicative: ∅, conditional: -na/-ne, subjunctive/imperative –j (full paradigm).
Definite conjugation: transitive verbs with “definite” direct objects,
where proper names, definite descriptions, possessive DPs (not all dialects), reflexive, reciprocal, demonstrative, and 3rd pers pronouns count as “definite;”
Indefinite conjugation: elsewhere.
Possibility modal suffix –hat/-het between Stem and Tense/Mood.
Negation precedes V-stem (not a prefix); yes/no interrogative particle -e is a final suffix.

Nouns: No grammatical gender.
18 distinct case markers, 30+ postpositions.
Possessed morphology and person/number agreement with possessor.
Plural marker –k (possessed plural –i), but not in the presence of numerals.
Definite article a(z); indefinite ∅ or unstressed egy. Bare singular count nouns are grammatical.

Case-marked and postpositional pronouns: (pronoun) + CASE/P + Person.Number
(én)+vel+em, (te)+vel+ed, (ő)+vel+e ‘with me/you/3sg’ but: Petivel
(én)+mellett+em, (te)+mellett+ed, (ő)+mellette+e ‘next to me/you/3sg’ but: Peti mellett

Null subjects: unstressed pronominal subjects must be dropped (as in Italian).
Null objects: unstressed 1st/2nd pers and singular 3rd pers pron. objects can/must be dropped.

Predicative copula, pres/past: Péter magas ∅/volt.
Locative cop., pres/past: A vacsora az asztalon (van)/volt.
Existential cop., pres/past: Van/volt jó megoldás.
Negative loc/exist, pres/past: Nincs/nem volt a vacsora az asztalon / jó megoldás.
Possessive = existential Van/volt/ nincs / nem volt barátom.
Wh-movement

Based on


and

Parallels between Hungarian “focus fronting” (Foc-Move) and English “interrogative wh-fronting” (Wh-Move)

Later we will ask if the Hungarian case is really movement triggered by a [focus] operator feature. For the time being don’t worry about that. “Interrogative wh-fronting” is just one realization of abstract wh-movement.

- Both Foc-Move and Wh-Move target a distinguished left-peripheral position (preverbal vs. clause-initial).

- Both are associated with an interpretive function (focus/contrast vs. interrogation), and not with Case.

- Both are associated with the movement of the aux/verb to some position higher than its normal position (indicated by particle/verb inversion and root clause subject/auxiliary inversion).

- Both Foc-Move and Wh-Move are uninterested in what grammatical function (subject, object, locative, whatever) the moved expression has; they only care about the interpretive aspect.

- If the clause has just one focus/interrogative phrase, that phrase cannot be left “in situ”.

- In both languages, just one constituent per clause can be overtly Foc-Moved/Wh-Moved. Hungarian multiple (non-wh) focusing and English multiple interrogation leave n-1 foci/question words “in situ”.

  This is remarkable in view of the fact that various languages, Hungarian and Russian among them, have multiple interrogative-wh-phrase fronting.

- Both are “unbounded” movements, i.e. they can move a phrase out of its own finite clause. (In Hungarian, this movement is marginal or bad if that clause is indicative, as opposed to infinitival or subjunctive.)

- Both are subject to island constraints. The Minimal Link Condition (Wh-Island Constraint) is a tricky one, because definite individuated expressions (which film, as opposed to how) are not very sensitive to it, and the type of the downstairs clause also matters. Wh/focus islands are “weak” (i.e. selective) islands. The Complex (Definite) DP Constraint is pretty robust and is considered a “strong” (i.e. non-selective) island.

- In neither language do extractions out of wh/focus islands require resumptive pronouns. [How does a filmeket show that?]

- In Hungarian, the landing site of Foc-Move can be preceded by quantifiers and topics, and by the invariant subordinating complementizer hogy. The landing site of interrogative wh-fronting can be preceded by topics and hogy, but not by quantifiers; relative wh-phrases are not in the same position.
Glosses for the examples:

be dob-t-a a film-et a Balaton-ba / ki mi-t
in throw-past.3sg.def the film-acc the Balaton-into who what-acc

1 a Mari be dobta a filmet a Balatonba. Kate will see the film. ‘Mary threw the film in the Balaton’ (neutral)
(neutral declarative)

b * Mari docta be a filmet a Balatonba. * Will Kate see the film. (intended as neutral (a))
(intended as neutral declarative)

2 a A FILMET docta be Mari a Balatonba. Which film will Kate see? ‘Mary threw the FILM in the Balaton’

b * A FILMET bedobta Mari a Balatonba. * Which film Kate will see? (intended as (a))

2 c * A FILMET a Balatonba bedobta Mari. * Which film tomorrow Kate will see?
(intended as (a))

3 a MARI docta be a filmet a BALATONBA, ‘MARY threw the film in the BALATON, Which woman will see which film? [nem pedig KATI a TENERBE. ] and not KATE in the SEA’

b * MARI a BALATONBA docta be a filmet, [nem pedig KATI a TENERBE. ] * Which woman which film will see?

4 a Ki mit dobott be a Balatonba? * Ki dobott be mit a Balatonba? ‘Who threw what in the Balaton?’
Kto gde zhivet? Kto zhivet gde? ‘Who lives where?’ Russian

5 a Mari a BALATONBA docta be a filmet. * Mari a FILMET docta be a Balatonba. ‘Mary threw the film in the BALATON’
When will Kate see the film? With whom will Kate see the film? ‘Mary threw the FILM in the Balaton’
More glosses:

szeret-n-ém  hogy  be-dob-ja  meg  tud-ni  ismer
like-cond-1sg.def  subord  pfx-throw-subjunct-3sg  pfx  know-inf  be.familiar.with

6 a A filmet MARI dobta be a Balatonba. "The film, MARY threw in the Balaton"
b A Balatonba MARI dobta be a filmet. "In the Balaton, MARY threw the film"
c A filmet Mari a BALATONBA dobta be. (similarly with two topics)
d Mari a filmet a BALATONBA dobta be. (similarly with two topics)

7 a * Mari bedobta a FILMET a Balatonba. (intended as 'Mary threw the FILM in the Balaton')
   * Kate will see which film? (intended as a non-echo question)

b * Mari dobta be a FILMET a Balatonba. intended 'Mary threw the FILM in the Balaton'
   * Will Kate see which film? (intended as a non-echo question)

8 a A FILMET szeretném, hogy Mari bedobja a Balatonba. '[(It's) The FILM I'd like for Mary to
   Which film do you think I bought tickets for? throw in the B']

b A FILMET szeretném, hogy a BALATONBA dobja be Mari. likewise
c A FILMET szeretném, hogy MARI dobja be a Balatonba. likewise

9 a A FILMET szeretném megtudni, hogy KI dobta be a Balatonba. '[(It's) The FILM I'd like to find out who
   ? Which film are you wondering who bought tickets for?
   Which film are you wondering whether to buy tickets for? threw in the B']

b A FILMEKET szeretném megtudni, hogy KI dobta be a Balatonba. '[(It's) The FILMS I'd like to find out who'
   Which film are you wondering whether to buy tickets for? threw in the B'

10 a * A FILMET ismerem a helyet, ahol Mari bedobta a Balatonba. '[(It's) The FILM I know the place where
   * Which film do you know the place where Kate saw?

b * A FILMET beszélem a lánnyal, aki bedobta a Balatonba. '[(It's) The FILM I spoke with the woman
   * Which film have you spoken with the girl who saw?

p c * A FILMET terjed a hír, hogy Mari bedobta a Balatonba. '[(It's) The FILM the news is spreading
   * Which film is the rumor that Kate saw spreading?

   that Mary threw in the B'
Information Structure (IS): packaging that responds to the temporary state of the addressee’s mind

Common Ground (CG): a set of propositions that the conversational partners either believe to be true or entertain as assumptions for the sake of the conversation

Assertion and presuppositions pertain to CG content. Conversational moves and structuring that pertain to how the conversation should develop pertain to CG management: questions, invoking alternatives, assigning information to a particular address, delimiting the significance of a contribution, attending to what’s given and what isn’t.

CG management devices, e.g. focus accent, are basically pragmatic. But truth-conditionally relevant elements, e.g. only, may rely on their output, and then the joint effect is semantic, i.e. pertains to CG content.

Focus (marked by intonation, by clefting, by dedicated particles, or perhaps otherwise): indicates the presence of relevant alternatives

Notation: \{ x : \text{dog}(x) \} = \text{the set of dogs} = \text{a set of things} \ x \ \text{such that} \ x \ \text{is a dog}
\{ P : P(\text{John}) \} = \text{the set of properties} \ P \ \text{such that} \ P \ \text{holds of} \ \text{John}
\{ \text{walk}(x) : \text{person}(x) \} = \text{the set of propositions of the form} \ \text{walk}(x), \ \text{such that} \ x \ \text{is person}

Hamblin (1973) meaning for Who saw Fido?
a set of alternative propositions of the form “So-and-so saw Fido”,
i.e. \{\text{saw}(x, \text{fido}) : \text{person}(x)\}

If the people in the universe of discourse are Sam, Kim, and Peter, then
\{\text{saw}(x, \text{fido}) : \text{person}(x)\} = \{\text{saw}(\text{sam, fido}), \text{saw}(\text{kim, fido}), \text{saw}(\text{peter, fido})\}

Rooth (1985, 1992) uses the same kind of sets as focus-induced alternatives, compare question-answer congruence: Who saw Fido? -- PEterF (saw Fido). versus # Peter saw FidoF.

[PEterF] saw Fido: ordinary meaning: saw(peter, fido)
focus-induced alternatives = who saw Fido?
\{\text{saw}(x, \text{fido}) : \text{person}(x)\}

Only [PEterF] saw Fido:
ordinary meaning: for every proposition \ p \ in the set of focus-induced alternatives of [PEterF] saw Fido,
\ p \ is true if and only if \ p \ = \ the ordinary meaning of [PEterF] saw Mary.
focus-induced alternatives: none
i.e. the ordinary meaning of the only-sentence uses, and uses up, the focusalternatives of the constituent that contains focus.

Only PEter saw Fido could be paraphrased as, The only person who saw Fido was Peter.
This interpretation of only ... focus can be literally true in situations when speakers of English naturally use it.

How about these? What is the problem with each?

I went to Penn Station, but I only saw KIM.
I only SWAM yesterday.
I only have two HAmmers.

The solution could be ....

Other expressions that use focus-induced alternatives:

<table>
<thead>
<tr>
<th>English</th>
<th>Hungarian</th>
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<tbody>
<tr>
<td>Even [Peter]$_{F}$ saw Fido</td>
<td>KAtit is láttat.</td>
</tr>
<tr>
<td>Fortunately [Peter]$_{F}$ saw Fido</td>
<td>cannot be true together</td>
</tr>
<tr>
<td>It was [Peter]$_{F}$ who saw Fido</td>
<td>cannot be true together</td>
</tr>
<tr>
<td>I want to teach on [TUESdays]$_{F}$</td>
<td>She DOES like broccoli.</td>
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</table>

**Broad focus:** Peter didn’t [LEAve]$_{F}$, he [ate the COOkie]$_{F}$.

**Complex focus** (pair, triple, etc.): [Peter]$_{F}$ ate [the COOkie]$_{F}$, not [Susan]$_{F}$ [the BIScuit]$_{F}$.

**Multiple focus:** Only [Peter]$_{F}$ saw only [Mary]$_{F}$.

**Focus (SUE) versus focus phrase** (the woman he met at SUE’s party):

- John didn’t introduce Bill to [the woman he met at SUE’s party],
- * but JEN’s / OK but to the woman he met at JEN’s party.

A semantic effect (not fully decisive, but a good illustration):

- John only hated [the woman he met at SUE’s party]
- Does this say, the only person whom John hated was the woman he met at Sue’s party?
- I.e. does this exclude John’s hating Bill?

**Verum focus:** She DOES like broccoli.

*How are the above expressed in Hungarian? What does the occurrence of an expression in the preverbal position (called Spec,FocP in Kiss 2002) express?*

**Exhaustivity**

<table>
<thead>
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<tbody>
<tr>
<td>John saw MAr.</td>
<td>János MArit láttat.</td>
</tr>
<tr>
<td>He also saw KAt.</td>
<td>can be true together</td>
</tr>
<tr>
<td>cannot be true together</td>
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<tr>
<td>It was MAr who John saw.</td>
<td>KAtit is láttat.</td>
</tr>
<tr>
<td>He also saw KAt.</td>
<td>cannot be true together</td>
</tr>
</tbody>
</table>

**What is common, and what is different, between English focus and Hungarian focus?**
I think Jim invited BILL, but perhaps he didn't invite anyone.
I think Jim invited BILL, and maybe he also invited TIM.

I think it was BILL that John invited, but perhaps he didn't invite anyone.
I think it was BILL that John invited, and maybe he also invited Tim.

It was Bill, among others, who pressured him to resign.
It was for this reason, among others, that I chose to attend Haverford.

A: I see that the new list of breadth courses has not yet made its way to the web site. If the website changers in GSAS are being slow, it'd be good to nudge them. (Maybe the changes haven't been approved by the State?)
B: Indeed, it's the State that hasn't yet granted permission, so GSAS refuses to update our website.
   [Note: the question is, who is holding up the website update, not who hasn’t granted permission.]

C: Why don’t you ever come to VISIT? Is your wife getting JEALOUS?
D: It’s not that my WIFE is getting jealous, the TRAIN FARE has become expensive.

Who did Bill invite?  Bill invited JIM.
Who did Bill invite?  Bill invited JIM. He also invited TIM.
Who did Bill invite?  It was JIM that Bill invited.

Only Peter helped.
Not only Peter helped. / It’s not true that only Peter helped.

Bill is not popular here. He was only invited in “2001.
Bill is my son. He was only born in “2001.
Bill is my grandfather. He was only born in “1932.

He was only born in PARIS, the greatest metropolis.
He was only born in PARIS, TX.

When the teacher called on him, he solved the problem only RELUCTANTLY.
When the teacher called on him, he solved the problem only ELEGANTLY.
In all his life, he solved problems only ELEGANTLY.
• **Information focus** = postverbal. Not necessarily exhaustive.

1a  Ki szólalt fel?  Fel-szólalt például KATI.  
who spoke up  up-spoke for.example KATE

1b  Ki szólalt fel?  ?? Fel-szólalt KATI.  
who spoke up  up-spoke KATE

2  Hova menjek?  a. Menj LONDONBA! (=suggestion)  b. LONDONBA menj! (=command)  
where should.go.i  go.imp London-to  London-to go.imp

• **Identificational focus** = preverbal. Exhaustive and carries an existential presupposition.

3  KATI szólalt fel,  # és (valószínűleg) MARI is  fel-szólalt.  
Kate spoke up  and probably  Mary too  up-spoke

4  Azt hiszem,  KATI szólalt fel,  # de talán nem szólalt fel senki.  
that-acc think.l  Kate spoke up  but perhaps not  spoke up  anyone

5  KATI és MARI szólalt fel.  # Tehát KATI szólalt fel.  but OK  Tehát  Kati  felszólalt.  
Kate and Mary  spoke up.  therefore Kate spoke up  therefore Kate  up-spoke

6  Ki szólalt fel?  KATI szólalt fel.  (identificational focus is the normal answer to wh-question)  
who spoke up  Kate spoke up.

7  Chi arriva?  Arriva GIANNI.  (Italian: preverbal contrastive focus is not a normal answer to a wh-question)  
Chi arriva?  # GIANNI arriva.

• **Csak** `only,’ *is* `also,’ and még...is `even’ all associate with expressions bearing intonational focus.  
However, csak attaches to a preverbal (identificational) focus, but  *is* `also’ and még  *is* `even’ do not.

8  Csak KATI szólalt fel.  * Csak KATI felszólalt.  * Felszólalt csak KATI.  * Csak KATI TEGNAP szólalt fel.  
only Kate spoke up  only Kate up-spoke  only Kate up-spoke only Kate  only Kate  y’day  spoke up

9  MARI is  felszólalt.  * MARI is  szólalt fel.  Felszólalt MARI is.  MARI is  TEGNAP szólalt fel.  
Mary also up-spoke  Mary also up-spoke (ok w/ other interpr.)  up-spoke Mary also  Mary also y’day  spoke up

• **A compositionality problem:** Is the preverbal focus expression that csak modifies an identificational focus?  
If Hungarian preverbal focus is by itself exhaustive and carries an existential presupposition, 
and sentences with csak `only’ are exhaustive and scalar and presuppose that the csak-less sentence is true, how is the meaning of the csak-sentence computed from the meaning of the csak-less one?

10  ‘only’  +  ‘it was BILL that Jim invited’  =?  ‘Jim only invited BILL’
Horvath’s (2006, 2010) answers to our two questions:

What is common, and what is different, between English focus and Hungarian focus?

The compositionality problem of plain and csak-modified focus

- Focus in Hungarian is intonational, just as in English.
- There is no syntactic [focus] feature that triggers movement.
- Hungarian has a phonetically null Exhaustive Identification Operator (EI-Op). The semantics of EI-Op is similar to that of csak ‘only’ but not the same. It has the semantics that had traditionally been attributed to identificational focus in the Hungarian literature.
- EI-Op, just like csak, associates with (intonational) focus. They must adjoin to a phrase with focus.
- EI-Op is complementary with csak: either one or the other can attach to a phrase with focus.
- Preverbal placement is due to csak / EI-Op, not to focus itself.
- Hungarian has a functional projection EIP, headed by El0, right above the inflected VP (not AspP).
- An XP modified by csak or EI-Op is attracted to the specifier of EIP, much like a wh-phrase is attracted to the specifier of CP in English (feature-checking).

The Strong Modularity Hypothesis for Discourse-features

No information structure notions – i.e., purely discourse-related notions – can be encoded in the grammar as formal features (= ones that trigger e.g. movement); hence no "discourse-related features" are present in the syntactic derivation. They are available only outside the Chl (=the narrow computational system of human l.).

If EI-Op were not truth-conditionally significant, it would not be involved in obligatory (=syntactic) movement, although it could be involved in optional movement that caters to the needs of an interface.

Evidence:

- csak ‘only’ versus is ‘too’ / még ... is ‘even’ : all associate with intonational focus, but only csak triggers obligatory movement;
- contrastive topics (focus-within-topic).

The compositionality problem does not arise. The meaning of (the Hungarian for) ‘Jim only invited BILL’ is not computed from the meaning of (the Hungarian for) ‘It was BILL that Jim invited’, since EI-Op and csak are complementary.
Set theory and propositional Logic

Set theory, recap

Sets are defined by enumerating their elements. Two sets with the same elements are the same set.

The element-of relation is primitive: \( a \in \{a,b,c\} \)

Set \( A \) is a subset of set \( B \) if and only if there is no element in \( A \) that is not also an element in \( B \):

\[ A \subseteq B \]

It follows that there is a unique empty set \( \emptyset \), and that \( \emptyset \) is a subset of all sets.

Set-theoretic operations

Propositional logic: very coarse-grained:  
*Every robot walks and Susan talks* \( p \land q \)

Predicate logic: much more fine-grained:  
*Every robot walks and Susan talks* \( \forall x[R(x) \rightarrow W(x)] \land T(s) \)

Propositional logic

Each proposition can be characterized with its truth-set: the set of worlds in which it is true.
The truth-set of a tautology is the universal set \( U \). The truth-set of a contradiction is the empty set \( \emptyset \).

The connectives \( \lor, \land, \rightarrow, \neg \) of predicate logic correspond to the set theoretic operations \( \cup, \cap, \setminus \) on their truth-sets.

Truth tables:

\[
\begin{array}{ccc}
p & q & p\land q \\
t & t & t \\
t & f & f \\
f & t & f \\
f & f & f \\
\end{array}
\]

\[
\begin{array}{ccc}
p & q & p\lor q \\
t & t & t \\
t & f & t \\
f & t & t \\
f & f & f \\
\end{array}
\]

\[
\begin{array}{ccc}
p & q & p\rightarrow q \\
t & t & t \\
t & f & f \\
f & t & t \\
f & f & t \\
\end{array}
\]

\[
\begin{array}{ccc}
p & q & \neg p \\
t & t & f \\
t & f & t \\
\end{array}
\]
Propositional logic has \(2^4 = 16\) distinct connectives. They are all definable in terms of \(\&\), \(\sim\) or \(\vee\), \(\sim\) or other small sets of primitives. These definitions can be checked (proved) using Venn-diagrams or truth-tables.

Define \(p \& q\) using \(\{\vee, \sim\}\)

Define \(p \vee q\) using \(\{\&, \sim\}\)

Define \(p \rightarrow q\) using \(\{\vee, \sim\}\)

Define \(p \rightarrow q\) using \(\{\&, \sim\}\)

Some important tautologies (valid, or always true, propositions), see (8) on p.55 of Allwood et al.

Negation is often written as \(\sim\), instead of \(\sim\). This notation is followed below.

(i) \(p \vee \sim p\) (either \(p\) or its negation is true: Excluded Middle, or Tertium Non Datur)
(ii) \(\sim (p \& \sim p)\) (\(p\) and its negation can't be true together)
(iii) \(p \equiv p\) (everything is identical to itself)
(xiv) \(\sim \sim p \equiv p\) (two negations [reversals] cancel out)
(xv) \(p \vee p \equiv p\) (the union of \(P\) with itself is \(P\))
(xvi) \((p \equiv q) \equiv (\sim p \equiv \sim q)\) (negating both sides of an equation preserves the equation)

De Morgan Laws (conjunction and disjunction are duals)
(vi) \(\sim (p \lor q) \equiv \sim p \& \sim q\)
(vii) \(\sim (p \& q) \equiv \sim q \lor \sim p\)

Expressing material implication using negation+disjunction or negation+conjunction:
(xiii) \((p \rightarrow q) \equiv (\sim p \vee q)\) (implication is true iff antecedent is false or consequent is true)
(x) \(\sim (p \rightarrow q) \equiv (p \& \sim q)\) (implication is false iff antecedent is true and consequent is false)
Cross-linguistic variation in the interaction of conjunction and disjunction with negation

De Morgan laws: conjunction and disjunction are duals:

(1) \( \neg (p \lor q) = \neg p \land \neg q \)

Mary didn't take hockey or algebra.

prominent reading: 'Mary didn't take hockey and didn't take algebra'

(2) \( \neg (p \land q) = \neg p \lor \neg q \)

Mary didn't take hockey and algebra.

prominent reading: 'Mary didn't take hockey or didn't take algebra'

(3) Mari nem járt hokira vagy algebrára.

Mari not went hockey-to or algebra-to

cannot mean 'Mary didn’t take hockey and didn’t take algebra'  
can mean 'Mary didn’t take hockey or didn’t take algebra'

(4) Mari nem járt hokira és algebrára.

Mari not went hockey-to and algebra-to

cannot mean 'Mary didn’t take hockey or didn’t take algebra'  
can mean 'Mary didn’t take hockey and didn’t take algebra'

Maybe Hungarian doesn’t obey classical logic?
We discuss the interaction of conjunction with negation first (Szabolcsi & Haddican 2004).

- **Explain why Hungarian negated definite DP-conjunctions behave as in (4).**

- **Ask why English negated definite DP-conjunctions are different (if they are different, to the extent they are different).**

Parallel behavior of the girls and Kate and Mary in non-negated contexts; same in Hungarian:

(5) The girls/Kate and Mary had a beer.  \( \checkmark \) distributive: each her own beer

(6) The girls/Kate and Mary lifted up the table together.  \( \checkmark \) collective

(7) The girls/Kate and Mary were born in London and Boston.  \( \checkmark \) cumulative: each girl has one birth place

(8) Everyone heard the rumor that you had spotted the girls/Kate and Mary.

They are wanted for bank robbery.  \( \checkmark \) cross-sentential (plural) anaphora

(9) Six students took these two subjects/hockey and algebra.  #inverse-distributive scope

#The twelve students graduate in May.  # inverse-distributive scope

Definite plurals in the scope of negation:

(10) He didn’t see the girls.  

\( \checkmark \) 'none of the girls’  

\# 'not all the girls’  

\# not saw-3sg the girls-acc  

\( \checkmark \) 'none of the girls’  

\checkmark \) 'none of the girls’
**Homogeneity presupposition** for distributive predication over definite plurals:

The application of a distributive property $^*P$ to a plurality $A$, $^*P(A)$, has a truth value (true or false) iff either all members of the plurality are $P$, or none of them is $P$. In mixed cases it has no truth value.

Here $^*P$ and $A$ are denotations, not expressions, so Homogeneity should hold irrespective of whether the girls or Kate and Mary denote the plurality $A$. Thus, Hungarian **hoki és algebra** behaves as expected.

**English hockey and algebra** doesn’t behave as expected! Or does it...?

Quantifier meanings in the scope of negation (compare with (10)):

(11) He didn’t see every girl. Nem láttott minden lányt.
    # ’none of the girls’
    √ ’not all the girls’

(12) Mary didn’t take hockey AND algebra. (stressed **AND**)  
(13) Mary didn’t take hockey and algebra. (unstressed **and**)

(14) a. # Mary, Joan **AND** Susan lifted the piano in the air (together).
    b. # Mary, Joan **AND** Susan are a good team.
    c. # Mary, Joan **AND** Susan hate each other.

Hungarian **és** cannot be stressed (unless for correction):

(15) * Mari nem járt hokira ÉS algebrára.

**Do ‘neither’ readings of negated conjunctions exist in English?**

Postverbal versus topicalized conjunction on the ‘neither’ reading:

(16) a. ?? Mary didn’t take hockey and algebra.
    b. Hockey and algebra, Mary didn’t take.

Postverbal versus subject conjunction on the ‘neither’ reading:

(17) a. ?? The petition wasn’t signed by the president and the janitor.
    b. The president and the janitor didn’t sign the petition.

Mere examples versus exhaustive list on the ‘neither’ reading:

(18) a. ?? Mary didn’t take hockey and algebra.
    b. Of the courses on the list, Mary didn’t take hockey and algebra.

Ad hoc conjunctions versus stereotypical pairs on the ‘neither’ reading:

(19) a. ?? Mary didn’t take hockey and algebra.
    b. Mary didn’t take math and physics.

**Conclusion:**
On to the interaction of disjunctions with negation (see Szabolcsi 2002 for further details).

- **Are Hungarian disjunctions unique in resisting being in the immediate scope of negation?**

**someone / valaki**

(20) a. He didn’t see someone.  
   clause-mate negation  
   # `not>some’ i.e. ‘He didn’t see anyone’  
   V `'some > not’

b. I don’t think that he saw someone.  
   extra-clausal negation  
   V `'not > some’ i.e. ‘I think he didn’t see anyone’

(21) Few people saw someone.  
    clause-mate, downward entailing  
    V `'few > some’ i.e. ‘Few people saw anyone’

Same in Hungarian:

(20’) a. Nem látott valakit.  
    b. Nem hiszem, hogy látott (volna) valakit.

(21’) Kevesen láttak valakit.

**Kati vagy Mari**

(22) a. Nem látta Katit vagy Marit.  
    clause-mate negation  
    not saw.3sg Kate-acc or Mary-acc  
    # `not > or’  
    V `'or > not’

b. Nem hiszem, hogy látta (volna) Katit vagy Marit.  
    extra-clausal negation  
    not think.1sg that saw.3sg aux Kate-acc or Mary-acc  
    ‘I don’t think that he saw K or M’  
    V `'not > or’

(23) Kevesen látták Katit vagy Marit.  
    clause-mate, downward entailing  
    ‘Few people saw Kate or Mary’  
    V `'few > or’

**Polarity items** (or, polarity-sensitive items) exhibit scope restrictions with respect to negation or weaker (e.g. downward entailing) operators. Recall the negative polarity expressions **ever, any more wine, yet, at all, ...**

**Someone / valaki** are positive polarity items (PPI). They do not scope directly under clause-mate negation.

Hungarian disjunctions (Kati vagy Mari) exhibit the same pattern. They are also PPIs. Apart from this, Kati vagy Mari has the same behavior as English Kate or Mary.
What do quantifier particles do?

1.1 Quantifier particles cross-linguistically

This paper is part of a larger project to investigate the compositional semantics of quantifier words. Taking apart *someone* and *everyone* and specifying what *some*, *every*, and *one* mean are not daunting tasks. But, in many languages, the same particles that form quantifier words also serve as connectives, additive and scalar particles, question markers, roots of existential verbs, and so on. I will dub these particles “quantifier particles.” The interesting part of the project begins when we set out to investigate whether and how the same interpretations of the particles that work well inside the quantifier words extend to their wider contexts.

English, German, and French may not make this task seem urgent, but many other languages do. I am aware of good literature pertaining to various languages that belong to a vast Sprachbund (linguistic alliance) comprising Athabaskan, East Asian, South-East Asian, Slavic, and Finno-Ugric languages. Consider the following samples. Hungarian *ki* and Japanese *dare*, usually translated as ‘who’, are indeterminate pronouns in the terminology of Kuroda 1965. *Ki* and *dare* form ‘someone’ and ‘everyone’ with the aid of morphemes whose more general distribution is partially exemplified below. The joint distribution of Hungarian *vala*/vagy and etymologically unrelated -e corresponds, roughly, to that of Japanese -ka. The joint distribution of *mind* and etymologically unrelated *is* corresponds to that of -mo. (In (1d,e) the dashes indicate the absence of particles.)

(1) a. vala-ki dare-ka ‘someone’
b. (vagy) A vagy B A-ka B(-ka) ‘A or B’
c. vagy száz hyaku-nin-toka ‘some one hundred = approx. 100’
d. val-, vagy-
    --
    dare-ga V...-ka ‘Who Vs?’
e. -- S-e S-ka ‘whether S’

(2) a. mind-en-ki dare-mo ‘everyone/anyone’
b. mind A mind B A-mo B-mo ‘A as well as B, both A and B’
    A is (és) B is
    ‘A as well as B, both A and B’
c. A is A-mo ‘A too/even A’

I will use the capitalized versions KA and MO as generic representatives of these particles, not as specifically Japanese morphemes.

Szabolcsi (2010: Ch. 12.5), Szabolcsi (2012), and Szabolcsi, Whang & Zu (2014) discuss similar data from a syntactic, semantic, and typological perspective, and raise various questions for compositionality.
a. Do the roles of each particle form a natural class with a stable semantics?

b. Are the particles aided by additional elements, overt or covert, in fulfilling their varied roles? If yes, what are those elements?

c. What do we make of the cross-linguistic similarities and differences in the distribution and interpretation of the particles?

This paper begins to answer the questions in (3) but does not undertake to accomplish it all in one fell swoop. It seeks to identify the common core in the semantics of “quantifier particles” in languages of the Japanese/Hungarian type, and to explain certain fundamental facts about the distribution of KA and MO particles. Accounting for the finer distribution of the particles within individual languages and across languages is left for further research, although some pointers are provided, based on recent literature.

1.2 A promising perspective: join and meet

Regarding the question whether the roles of each particle form a natural class with a stable semantics, a beautiful generalization caught the eyes of many linguists working with data of this sort (Gil 2008, Haspelmath 1997, Jayaseelan 2001, 2008, 2011, among others; see Szabolcsi 2010: Ch 12). In one way or another, the roles of KA involve existential quantification or disjunction, and the roles of MO involve universal quantification or conjunction.

Existential quantification, disjunction, and set union are special cases of lattice-theoretic join. Universal quantification, conjunction, and set intersection are special cases of lattice-theoretic meet. Join and meet can be equivalently defined as operations or as least upper bounds and greatest lower bounds in partially ordered sets. Using this generalization, the suggestion is this:1

(4) KA expresses lattice-theoretic join (\( \cup \)), MO expresses lattice-theoretic meet (\( \cap \)).

Alternative Semantics has thrown a new light on the signature environments of KA. Hamblin (1973), Kratzer & Shimoyama (2002), Simons (2005a,b), Alonso-Ovalle (2006), Aloni (2007), AnderBois (2012), and others proposed that not only polar and wh-questions but also declaratives with indefinite pronouns or disjunctions contribute sets of multiple classical propositions to interpretation. They contrast with declaratives that are atomic or whose main operations are negation, conjunction, or universal quantification; these contribute singleton sets of classical propositions. If the universe consists of Kate, Mary, and Joe, we have,

---

1 In terms of operations: a lattice is an algebra \( \langle A, \cap, \cup \rangle \), where \( \cap \) and \( \cup \) are two-place operations satisfying idempotency, commutativity, associativity, and absorption.

In terms of partial ordering: a lattice is a partially ordered set \( \langle A, \leq \rangle \) that is closed under meet and join. For any subset \( X \) of \( A \), \( c \in A \) is a lower bound of \( X \) iff for every \( x \in X \), \( c \leq x \). The greatest of the lower bounds, if it exists, is the glb, infimum of \( X \). The meet of \( a \) and \( b \), \( a \land b \), is the glb of the two-element subset \( \{a, b\} \) of \( A \). Similarly, the join of \( a \) and \( b \), \( a \lor b \) is the least upper bound (lub, supremum) of the two-element subset \( \{a, b\} \) of \( A \). See Landman (1991, Ch. 6).
Inquisitive Semantics (see Ciardelli et al. 2012, 2013) develops a notion of propositions as non-empty, downward closed sets of information states. The sentences in (5) and (6) are recognized as expressing inquisitive and non-inquisitive propositions, respectively, and disjunction and conjunction re-emerge as (Heyting-algebraic) join and meet. In particular, letting \([[[\varphi]]]\) be an Inquisitive Semantic proposition, (5)--(6) re-emerge as (5')--(6').\(^2\) See details in Section 2.

\((5')\) a. Who dances?, Someone dances, Kate or Mary or Joe dances

\([[[\text{Kate dances}}] \cup [[[\text{Mary dances}}] \cup [[[\text{Joe dances}}]]

b. whether Joe dances

\([[[\text{Joe dances}}] \cup [[[\neg \text{Joe dances}}]]

\((6')\) a. Joe dances

\([[[\text{Joe dances}}]]

b. Everyone dances

\([[[\text{Kate dances}}] \cap [[[\text{Mary dances}}] \cap [[[\text{Joe dances}}]]

The upshot is that the linguistic insights of Alternative Semantics and their reincarnation in Inquisitive Semantics offer an even more interesting way to unify KA’s environments than classical theories. Moreover, the possibility to treat KA as a join and MO as a meet operator is maintained, although in a slightly modified algebraic setting. In other words, it looks like the core roles of KA and MO can be assigned a stable semantics, and a simple one at that.

\(^2\) For simplicity, assume that wh-questions carry an existential presupposition and do not have a partition semantics. Inquisitive Semantics supports different linguistic implementations; this one allows us to bring all three examples under the same heading for initial illustrative purposes.
1.3 Mismatch problems: Too few arguments, too many operators

There are general linguistic problems with this beautiful approach. First, in many unrelated languages the same MO particle occurs in each conjunct. (In three-way conjunctions, there are three MOs.) Hungarian is, Russian i, Romanian şi, and Japanese mo are among the examples.

(7) Schematically

[John MO Mary MO danced.]

Hungarian

János is Mari is táncolt.

‘John danced and Mary danced’

If all MOs are doing the same thing, then MO cannot be a meet (conjunction) operator.

Likewise, in some languages the KA-style particle obligatorily occurs in each disjunct, but the whole construction has the same meaning as a plain English inclusive disjunction. Slade (2011) was the first to identify the pattern in (8) as a critical one to account for. Sinhala -hari and -də (declarative and interrogative disjunctions, respectively) and Malayalam -oo are among the examples. Japanese ka is not obligatory in the second disjunct (Kuroda 1965: 85-86), but recall that I am using capitalized KA as a generic representative of the class.

(8) Schematically

[John KA Mary KA danced.]

Sinhala (Slade 2011)

Gunəpālə hari Chitra hari gaməta giyā.

‘G or C went to the village’

If all KAs are doing the same thing, then KA cannot be a join (disjunction) operator.

The critical question is, should we take each instance of MO and KA seriously? There is good reason to do so. In all the above languages, MO can occur unarily, and then it plays the role of an additive particle like too.

(9) Schematically

Mary danced. [John MO danced.]

Hungarian

János is táncolt.

‘John, too, danced’

The time-honored analysis of too is that it adds the presupposition that the predicate holds of some discourse-salient entity other than the one in focus. Although ultimately the truth of (9) entails that John danced and someone else danced, it would be a stretch to say that English too, Hungarian is, and other additive particles are plain meet (conjunction) operators.

It turns out that or has a use that is fundamentally similar to that of too. The two sentences in (10) might be uttered by the same speaker or by different speakers. Or, John is at home presupposes the availability of a discourse-salient proposition and presents it and the proposition that John is at home as alternative possibilities.

---

3 Many better-known languages iterate disjunctions with an exhausting effect, e.g. French ou A ou B; Russian ili A ili B, Hungarian vagy A vagy B. The Sinhala and Malayalam constructions discussed in the text do not fall into this category (B. Slade, p.c. and K.A. Jayaseelan, p.c.). Either... or... will be compared to both constructions in Section 3.2.5.
(10) Mary is at home. **Or** (perhaps), John is at home.

But KA also has dedicated unary varieties that attach to a numeral to form an approximate numeral. Hungarian *vagy* (plain-vanilla ‘or’) and Japanese *toka* are examples.

(11) Schematically

<table>
<thead>
<tr>
<th>Hungarian</th>
<th>Schematically</th>
</tr>
</thead>
<tbody>
<tr>
<td>John bought 100 KA books.</td>
<td>Hungarian</td>
</tr>
<tr>
<td>‘John bought some 100 books’</td>
<td>‘John bought some 100 books’</td>
</tr>
</tbody>
</table>

Lest the unary KA and reiterated KA data seem too exotic, note that alternative questions in the sense of Krifka (2001) illustrate both cases. This can already be seen from English (12a,b), which Karttunen (1977) treated as equivalent, without any comment on compositionality:

(12) a. **if/whether** Mary danced { {w: dance_w (m)},{w: not dance_w (m)} }
    b. **if/whether** Mary danced or not { {w: dance_w (m)},{w: not dance_w (m)} }

Russian *li* and Hungarian *-e* and *vagy* are KA-particles that occur in such alternative questions, in main as well as in complement clauses. (13a) and (13b) demonstrate that unary, clausal KA alternates with ‘or (=KA) not,’ just as Karttunen (1977) would predict. But in (13c), both are present. The equivalence of these variants will be taken up in some detail in Section 3.2.3.

(13) Schematically

<table>
<thead>
<tr>
<th>Russian</th>
<th>Schematically</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (...) Mary danced KA (Ja sprosil) tancevala-li Masha</td>
<td></td>
</tr>
<tr>
<td>b. (...) Mary danced or (=KA) not (Ja sprosil) tancevala Masha ili net</td>
<td></td>
</tr>
<tr>
<td>c. (...) Mary danced KA or (=KA) not (Ja sprosil) tancevala-li Masha ili net</td>
<td></td>
</tr>
<tr>
<td>‘Did M dance or not?’ and ‘Did M dance or not?’ and</td>
<td></td>
</tr>
<tr>
<td>‘whether M danced or not’ ’(I asked) whether M danced or not’</td>
<td></td>
</tr>
</tbody>
</table>

Not all Russian speakers accept (13c), but the Russian National Corpus offers many examples, classic sources among them, e.g. *On chuvstvoval, chto na nego smotrjat i zhdut, osramitsu li on ili net svoim otvetom.* ‘He felt that they were watching him and waiting [to see] whether or not he would shame himself with his answer’ (Dostoevsky, Notes from the House of the Dead).

In sum, both the reiterated and the unary MO and KA examples indicate that MO and KA cannot embody the meet and join operators.

Where does that leave us with respect to the optimistic conclusions of the previous section? I believe the optimistic conclusions are correct -- but they pertain to the meanings of the larger constructions in which the KA and MO particles occur. They do not and cannot pertain to semantic composition, in particular, to exactly what the particles contribute. Their contribution remains a puzzle. The central claim of this paper will be this:

(14) **MO and KA inhabit contexts interpreted as meets and joins, but they are not meet and join operators themselves.** Instead, MO and KA impose semantic requirements that are satisfied when their contexts are interpreted, respectively, as the meet (greatest lower bound) and the join (least upper bound) of the contribution of their hosts and something else.
### Conversational Predicate Logic (handout / assignment)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Predicate Logic</th>
</tr>
</thead>
<tbody>
<tr>
<td>John walks:</td>
<td>$W(j)$</td>
</tr>
<tr>
<td>John walks and talks:</td>
<td></td>
</tr>
<tr>
<td>John or Mary talks:</td>
<td></td>
</tr>
<tr>
<td>John saw Mary:</td>
<td></td>
</tr>
<tr>
<td>Something barks:</td>
<td>$\exists x[B(x)]$</td>
</tr>
<tr>
<td>Something is a dog and it barks =</td>
<td></td>
</tr>
<tr>
<td>Something that is a dog barks =</td>
<td>$\exists x[D(x) &amp; B(x)]$</td>
</tr>
<tr>
<td>Some dog barks:</td>
<td></td>
</tr>
<tr>
<td>Some dog barks or growls:</td>
<td></td>
</tr>
<tr>
<td>Some dog does not bark:</td>
<td></td>
</tr>
<tr>
<td>No dog barks:</td>
<td></td>
</tr>
<tr>
<td>John saw some dog:</td>
<td></td>
</tr>
<tr>
<td>Everything changes:</td>
<td>$\forall x[C(x)]$</td>
</tr>
<tr>
<td>Everything changes if it is a rule =</td>
<td></td>
</tr>
<tr>
<td>Everything that is a rule changes =</td>
<td>$\forall x[R(x) \rightarrow C(x)]$</td>
</tr>
<tr>
<td>Every rule changes:</td>
<td></td>
</tr>
<tr>
<td>Every rule changes or gets eliminated:</td>
<td></td>
</tr>
<tr>
<td>Not every rule changes:</td>
<td></td>
</tr>
<tr>
<td>No rule changes:</td>
<td></td>
</tr>
<tr>
<td>Every dog saw John:</td>
<td></td>
</tr>
</tbody>
</table>

When translating English to predicate logic, we combine $\exists$ with $\&$ to approximate the content of *some*, and $\forall$ with $\rightarrow$ to approximate the content of *every*. But in predicate logic qua logic, any quantifier may occur with any connective, and the formulae will mean whatever the combination is supposed to mean, e.g. $\forall x[A(x) \& B(x)] = $ Everything is both an A and a B ≠ Everything that is an A is a B.
Add identity = and of course non-identity \( \neq \) (not part of the Allwood et al. system)

John likes Mary.  
Bill likes somebody else [than Mary].  
\[ \exists x [x \neq m \land L(b, x)] \]

John likes Mary.  
Bill likes everybody else [than Mary].  

John likes himself.  

John likes only himself.  

How to express numerical quantification?

At least one dog barks.  
\[ \exists x [D(x) \land B(x)] \]

At least two dogs bark.  
\[ \exists x \exists y [x \neq y \land D(x) \land D(y) \land B(x) \land B(y)] \]

At least three dogs bark.  

Exactly two dogs bark.  

Two dogs bark and nothing else does.
Free vs. bound variables, duals

- \( \text{blue}(x) \neq \text{blue}(y) \)  
  Why?

Pointing with **free variables**:

**This is blue**  'the entity I am pointing to (with my left hand) is blue'  \( \text{blue}(x) \)

**That is blue**  'the entity I am pointing to (with my right hand) is blue'  \( \text{blue}(y) \)

The free variables \( x \) and \( y \) may accidentally point to the same object, but in general, you cannot assume that they do so. Free variables have their own individual identity.

- \( \forall x[\text{blue}(x)] \equiv \forall y[\text{blue}(y)] \)  \( \forall x[\text{blue}(x)] \equiv \exists y[\text{blue}(y)] \)  
  Why?

Making general statements with quantifiers using **bound variables**:

**Everything is blue**  'Whatever I point to, that entity is blue'  \( \forall x[\text{blue}(x)] \) or \( \forall y[\text{blue}(y)] \)

**Something is blue**  'I can point to an entity that is blue'  \( \exists x[\text{blue}(x)] \) or \( \exists y[\text{blue}(y)] \)

A bound variable is a mere placeholder. The sentence says nothing specifically about \( x \) or \( y \).

**Duals** (= related to each other via negation in a particular way)

- \( \exists \) and \( \forall \) are **duals**.  
  Why?

Imagine a universe with 3 elements: \( a, b, c \).  Then:

\[ \exists x[\text{blue}(x)] \equiv \text{blue}(a) \lor \text{blue}(b) \lor \text{blue}(c) \]

\[ \forall x[\text{blue}(x)] \equiv \text{blue}(a) \land \text{blue}(b) \land \text{blue}(c) \]

The propositional connectives \( \lor \) and \( \land \) are duals; see the de Morgan laws.

Then \( \exists \), which is disjunction over the universe and \( \forall \), which is conjunction over the universe, are necessarily duals, too.

\[ \neg \forall x[\text{blue}(x)] \equiv \exists x[\neg \text{blue}(x)] \quad \text{and} \quad \neg \exists x[\text{blue}(x)] \equiv \forall x[\neg \text{blue}(x)] \quad \text{in other words,} \]

\[ \neg \forall x[\neg \text{blue}(x)] \equiv \exists x[\text{blue}(x)] \quad \text{and} \quad \neg \exists x[\neg \text{blue}(x)] \equiv \forall x[\text{blue}(x)] \]

because

\[ \neg(\text{blue}(a) \land \text{blue}(b) \land \text{blue}(c)) \equiv \neg\text{blue}(a) \lor \neg\text{blue}(b) \lor \neg\text{blue}(c) \quad \text{and} \]

\[ \neg(\text{blue}(a) \lor \text{blue}(b) \lor \text{blue}(c)) \equiv \neg\text{blue}(a) \land \neg\text{blue}(b) \land \neg\text{blue}(c) \]
Abbreviate predicates with the first letter of the predicate; you don’t need to give keys.

(3)  (a) Express the meaning of No man flies, using

the quantifier \( \forall \) (and whatever else it takes): ______________________________________

the quantifier \( \exists \) (and whatever else it takes): ______________________________________

(b) Express the meaning of Not every man flies, using

the quantifier \( \forall \) (and whatever else it takes): ______________________________________

the quantifier \( \exists \) (and whatever else it takes): ______________________________________

(c) Express the meaning of Some man flies, using

the quantifier \( \forall \) (and whatever else it takes): ______________________________________

the quantifier \( \exists \) (and whatever else it takes): ______________________________________

(4) Which of these equivalences are tautologies? (I.e. when do the two sides say the same, no matter what?) Briefly explain why (or why not).

Always evaluate both sides of an equation with respect to the same pointing (=assignment of values to free variables. Below, assume everywhere that \( x \to \text{Bill} \) and \( y \to \text{Jeff} \).

(a) \( \forall x[F(x) \land G(y)] \equiv \forall z[F(z) \land G(y)] \)

(b) \( \forall x[F(x)] \land G(x) \equiv \forall y[F(y)] \land G(y) \)

(c) \( \forall x[F(x) \land G(x)] \equiv \forall y[F(y) \land G(y)] \)

(d) \( \forall x[F(x) \land G(x)] \equiv \forall y[F(y) \land G(x)] \)
The semantics of predicate logic

Suppose the universe consists of three dogs and four cats, and arrows correspond to barking at something:

(1) Every dog barked at some cat (on the direct scope reading, S>O)
\[ \forall x[D(x) \rightarrow \exists y[C(y) \& B(x, y)]] \]

is true, because for every individual in the universe, if it is a dog, then we find a cat that it barked at, and if it is not a dog, it does not matter whether we find a cat that it barked at:

(i) \( D(a) \) and \( C(d) \) and \( B(a, d) \) and
(ii) \( D(b) \) and \( C(e) \) and \( B(b, e) \) and
(iii) \( D(c) \) and \( C(g) \) and \( B(c, h) \) and
(iv) \( D(d), D(e), D(f) \) and \( D(h) \) are false.

(2) Every dog barked at some cat (on the inverse scope reading, O>S)
\[ \exists y[C(y) \& \forall x[D(x) \rightarrow B(x,y)]] \]

is false, because we do not find any individual that is a cat and every dog barked at it. It would be true if, for example, each of a, b, and c had barked at f.

Strategy: Working “from outside in”, cash out each quantifier in terms of individuals.

If the quantifier is universal, check whether its scope holds true for every individual that can be assigned to the variable that the quantifier binds. Cf. \( \forall x[F(x)] = F(a) \& F(b) \& \ldots \& F(h) \).

If the quantifier is existential, check whether its scope holds for at least one individual that can be assigned to the variable that the quantifier binds. Cf. \( \exists y[G(y)] = G(a) \lor G(b) \lor \ldots \lor G(h) \).
(5) Work through Exx 14, 15, and 16 using the book’s solutions as a guide. You don’t need to hand them in, but let me know if any of them is not clear.

For Ex 15, note that the book represents the “like” relation as a set of pairs, where the first member of the pair is the liker and the second is the liked one. I have no idea why there are no commas between the pairs enclosed in curly brackets (typo?); there should be commas, just as there as commas in \{a,b\}.

So the formal description of the model \(M\) (universe \(U\) plus interpretation function \(I\)) in Ex 15 corresponds to the following picture. I do not indicate Boy={a,b} and Girl={c,d} so as not to muddle up the drawing.

\[
\begin{align*}
L &= \{<a,a>, <b,b>, <c,c> \\
&<a,c>, <a,d>, <b,c>, <c,a>, <d,a> \}
\end{align*}
\]

(6) Which of the following are valid (true in all worlds)? Construct models that falsify them, if you can.

(a) \((\forall x[D(x) \rightarrow B(x)] \& D(a)) \rightarrow B(a)\)

(b) \((\exists x[D(x) \& B(x)] \& D(a)) \rightarrow B(a)\)

(c) \(\forall x \forall y[H(x,y)] \rightarrow \forall y \forall x[H(x,y)]\)

(d) \(\exists x \exists y[L(x,y)] \rightarrow \exists y \exists x[L(x,y)]\)

(e) \(\forall x \exists y[L(x,y)] \rightarrow \exists y \forall x[L(x,y)]\)

(f) \(\exists y \forall x[L(x,y)] \rightarrow \forall x \exists y[L(x,y)]\)

(g) \(\forall x[A(x) \lor B(x)] \rightarrow (\forall x[A(x)] \lor \forall x[B(x)])\)

(h) \(\forall x[A(x) \& B(x)] \rightarrow (\forall x[A(x)] \& \forall x[B(x)])\)
The lambda operator

Compositionality:
The meaning of a complex expression is a function of the meanings of its parts and of how they are put together.

Then, our grammar needs to specify the meanings of subsentential expressions in precise and practical terms. Using English prose as a vehicle is in principle possible, but difficult to keep precise and practical for the purposes of meaning computation.

Could we use the language of predicate logic? No.

\[
\begin{align*}
\text{John walks:} & \quad W(j) \quad \text{built from } W \text{ and } j \\
\text{John walks and talks:} & \quad W(j) & T(j) \quad \text{built from } ??? & \text{unfortunately, } *W(_) & T(_) \\
\text{Everyone walks:} & \quad \forall x[W(x)] \quad \text{built from } ??? & \text{unfortunately, } *\forall x[_(x)] \\
\text{John walks and calls someone:} & \quad W(j) & \exists y[C(j,y)] \quad \text{built from } ??? & \text{unfortunately, } *W(_) & \exists y[C(_,y)]
\end{align*}
\]

Could we use the language of set theory?

\[
\begin{align*}
\text{John walks and talks:} & \quad j \in \{x: W(x)\} \cap \{x: T(x)\} \\
\text{Everyone walks:} & \quad W \in \{P: \text{Human} \subseteq P\} \quad \text{or, equivalently, } \{x: W(x)\} \in \{P: \text{Human} \subseteq P\} \\
\text{John walks and calls someone:} & \quad j \in \{x: W(x)\} \cap \{x: \{y: C(x,y)\} \neq \emptyset\}
\end{align*}
\]

The lambda operator can be added to our favorite logical language (e.g. predicate logic). It serves to define all possible functions in a clear and computationally convenient manner.

\[
\lambda x[W(x)] \quad = \quad \text{a function } f \text{ from the set of individuals (its domain) to the set of truth values (its range) such that } f \text{ maps any individual to True iff that individual has } W, \text{ and to False iff that individual does not have } W.
\]

Lambda-conversion: \[
\lambda x[W(x)](j) \quad = \quad W(j)
\]

When the function \(\lambda x[W(x)]\) is applied to an argument of the same type as the variable \(x\) (here: individuals), the function value is calculated by writing the argument (here \(j\)) in the place of every occurrence of the variable \(x\) that is directly bound by the operator \(\lambda x\).

\[
\begin{align*}
\text{walks and talks:} & \quad \lambda x[W(x) & T(x)] \\
\text{John walks and talks:} & \quad \lambda x[W(x) & T(x)](j) = W(j) & T(j) \\
\text{everyone:} & \quad \lambda P \forall x[P(x)] \\
\text{Every boy:} & \quad \lambda P \forall x[B(x) \rightarrow P(x)] \\
\text{Everyone walks:} & \quad \lambda P \forall x[P(x)](W) \\
= & \quad \forall x[W(x)] \\
\text{Every boy walks:} & \quad \lambda P \forall x[B(x) \rightarrow P(x)](W) \\
= & \quad \forall x[B(x) \rightarrow W(x)] \\
\text{Everyone walks and talks:} & \quad \lambda P \forall x[P(x)] \left(\lambda x[W(x) & T(x)]\right) \quad \text{... reletter to avoid mishaps ...} \\
& \quad \lambda P \forall x[P(x)] \left(\lambda y[W(y) & T(y)]\right) = \forall x[\lambda y[W(y) & T(y)](x)] = \forall x[W(x) & T(x)]
\end{align*}
\]
Montague (1974), The proper treatment of quantification in ordinary English

May (1977), The Grammar of Quantification (with LF movement)

(22) \( \lambda Q \forall [man'(y) \rightarrow Q(y)](\lambda x_3 \exists_{>1} z[dragon'(z) \land spot'(x_3)(z)]) = \forall y[man'(y) \rightarrow \lambda x_3 \exists_{>1} z[dragon'(z) \land spot'(x_3)(z)][y]] = \forall y[man'(y) \rightarrow \exists_{>1} z[dragon'(z) \land spot'(y)(z)]] \)
Quantifier scope in English -- are the data that simple?

(1) Two parents complained about every teacher.
   direct, S>O?
   inverse, O>S?

(2) More than two parents complained about every teacher.
   direct, S>O?
   inverse, O>S?

(3) At most two parents complained about every teacher.
   direct, S>O?
   inverse, O>S?

(4) Every parent complained about two teachers.
   direct, S>O?
   inverse, O>S?

(5) Every parent complained about more than two teachers.
   direct, S>O?
   inverse, O>S?

(6) Every parent complained about at most two teachers.
   direct, S>O?
   inverse, O>S?

(7) No one here heard the rumor that two sopranos own a tiger.
   'no one here heard the following rumor: Two sopranos owns a tiger'?
   'there are two sopranos in connection with whom no one here heard that they own a tiger'?

(8) No one here heard the rumor that more than two sopranos own a tiger.
   'no one here heard the following rumor: ...'?
   'there are more than two sopranos in connection with whom no one here heard...'?

(9) No one here heard the rumor that every soprano owns a tiger.
   'no one here heard the following rumor: ...'?
   'for every soprano, no one heard heard...'?

(10) Some journalist or other heard the rumor that two sopranos own a tiger.
    'there are two sopranos about whom the same journalist heard...'?
    'there are two sopranos about each of whom a possibly different journalist heard...'?

(11) The girls are a good team.
(12) Ten girls are a good team.
(13) Every girl is a good team.
(14) More/fewer than ten girls are a good team.
Is there order in the madness?

Theories that treat all quantifier phrases alike overgenerate: they predict that all quantifier phrases participate in all possible scope ambiguities. Instead, scope behavior is very varied. But some generalizations emerge. They can typically be stated with reference to what the determiner (D) is within DP.

English DPs fall into four main groups, as below.

Distributive universals: every NP, each NP
Definites and unmodified indefinites: the NP, this/these/that/those NP, all the NP, Joe, Joe and Sue, two NP Counting quantifiers, including those with modified numeral and the non-increasing Ds:
more than two NP, fewer than two NP, two or more NP, few NP, no NP, exactly seven NP, TWO_FOCUS NP
Bare singulars and plurals: Ø water, Ø dogs

Some rough generalizations

Distributive universals easily take inverse scope over any other DP (except no NP) that is within the same tensed clause, but not over ones that are outside the clause.

E.g. Two elves fed every dog: OK ‘for every dog, two possibly different elves’
     Two elves thought that they saw every dog: NOT ‘for every dog, two possibly different elves’

Plural (unmodified in)definites support true collective readings, the other DPs do not.

E.g. The elves make a good team. Two elves make a good team.

Plural (unmodified in)definites easily remain independent of operators that precede/c-command them both within the same clause and outside; but they do not (easily) make those referentially dependent.

E.g. At least three elves fed the dogs/two dogs: OK Which dogs? Spot and King.
     ?? ‘for every one of the dogs, possibly different elves’
     At least three elves thought that Mary had fed the dogs/two dogs: ditto

Counting quantifiers take inverse scope at most over other counting quantifiers, and do not remain independent of preceding/c-commanding operators. But they easily scope directly over DPs that they prec/c-command.

E.g. Every elf fed more/fewer than ten dogs: NOT ‘for each of more/fewer than ten dogs, every elf fed that dog’
     At least one elf fed more than ten dogs: OK/? ‘for each of more than ten dogs, at least one possibly different elf’
     More/Fewer than ten dogs sniffed an elf: OK ‘for each of more/fewer than ten dogs, a possibly different elf’

Bare singulars and plurals take the narrowest possible scope, and do not remain independent.

E.g. At least two elves saw trolls: NOT ‘each troll was seen by possibly different elves’
     I thought that you saw trolls: NOT ‘There are particular trolls that I thought you saw’
Quantifier scope in English, continued

Beghelli & Stowell (1997) for Logical Form in English

- The scope of a quantifier is the domain it c-commands (cf. Reinhart).
- Counting quantifiers, and only counting quantifiers, may reconstruct into their VP-internal positions.

Coming next week:
Discounting contrastive topics, the linear order of operators in the preverbal field of Hungarian is definite/indefinite, distributive quantifier, counting quantifier/exhaustive focus, negative quantifier, negation.
Quantifier scope in Hungarian

(1) Linear order and prosody largely\(^4\) disambiguate the relative scopes of two operators (quantifier, negation):

An operator in the preverbal field takes wider scope than any of the operators that follow it.

(2) Linear order is not determined by grammatical functions (subject, object, etc.).

(3) Linear order is determined by semantic classes.

(4) The classes are remarkably similar to those that emerge in English based in inverse scope, etc.

---

\(^4\) (i) Exception: Contrastive topics scope low, as if they were in the postverbal field.

(ii) The preverbal field is practically unambiguous. It is debated to what extent ambiguities between preverbal and postverbal items, and between two postverbal items, exist. Statistically speaking, when a sentence has more than one quantifier, speakers arrange them unambiguously. But a quantifier normally occurs in the preverbal field even if no ambiguity would arise, so “movement to the preverbal field” is not a last resort disambiguation strategy.
Topics, neutral (RefP):
  names, definites, bare indefinites: valaki `someone', Mari `Mary', (a) hat ember `(the) six people', ...

Topics, contrastive:
  practically anything

Distributive quantifiers & Co. (DistP):
  mindenki `everyone', több, mint hat ember `more than six people', sok ember `many people',
  Mari is `Mary too', még Mari is `even Mary', ki `who' (when non-last in multiple question), ...

Negative concord items (NegP):
  senki `no one', ...

Negated universals:
  nem mindenki `not everyone', ...

Counting quantifiers (CountP):
  hatnál több/kevesebb ember `more/fewer than six people', ritkán `seldom', ...

Incorporated arguments, e.g. bare singulars/plurals:
  újságot olvas `newspaper-acc read', iskolába megy `school-to go', ...

Other “verbal modifiers” (VMs):
  verbal particles, locatives, predicative adjectives and nouns, infinitives, ...

Co-occurrence restrictions exist, mainly with respect to negation and question words.

The preverbal field

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>some alternative orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hat vendégnek six customer-to</td>
<td>tegnap yesterday</td>
<td>minden pincér every waiter</td>
<td>csak a desszerteket only the desserts</td>
<td>ajánlotta. recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>* 3 1 2 4</td>
</tr>
<tr>
<td>1</td>
<td>Hat vendégnek six customer-to</td>
<td>minden pincér every waiter</td>
<td>kevés desszertet few dessert-acc</td>
<td>ajánlott. recommended</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>* 2 1 3 4</td>
</tr>
<tr>
<td>1</td>
<td>Hat vendégnek six customer-to</td>
<td>semelyik pincér none of the waiters</td>
<td>nem a desszerteket not the desserts</td>
<td>ajánlotta. recommended</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>* 3 4 1 2</td>
</tr>
<tr>
<td>1</td>
<td>Tegnap yesterday</td>
<td>melyik pincér waiter</td>
<td>kinek who</td>
<td>milyen desszertet what.kind dessert-acc</td>
<td>ajánlott?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>* 3 1 2 4</td>
</tr>
</tbody>
</table>

‘What dessert did every waiter recommend to every customer yesterday?’

János pincér (2) Juditnak (3) tortát (4), Miklósnak (3) krémest és palacsintát (4),
László pincér(2) Hannának (3) linzert (4), Péternek és Pálnak (3) tortát(4) ajánlott.
É. Kiss, pp. 111, 112, 114

Phrases can move to the topic, distributive, or focus position of the matrix clause, much like wh-phrases can move from the complement to the matrix clause in English (*What do you want for him to do* ?).

'As for the prof, for both students, I would like if he examined them today'
Possessor extraction enables the possessor as well as the possessed to participate independently in semantically motivated movements. (É. Kiss, pp. 126, 162)
Szabolcsi, The Syntax/Semantics Interface: Hungarian  
Dec 7-9, 2015

Spell-out first, or Logical Form first? Is there a +/-QR parameter?  
Bobaljik & Wurmbrand 2012

(2) a. Some toddler read every book. \(\exists > \forall \quad \forall > \exists\)

(2) b. dareka-ga subete-no hon-o yonda  
someone-NOM all-GEN book-ACC read  
\(\exists > \forall \quad *\forall > \exists\)

(2) c. subete-no hon-o dareka-ga yonda  
all-GEN book-ACC someone-NOM read  
\((\exists > \forall) \quad \forall > \exists\)

Scope Transparency (SCoT): If the order of two elements at LF is \(X>Y\), the order at PF is \(X>Y\).

Japanese (2b) obeys the SCoT, English (2a) doesn’t. Why?  
Intuition: because “scrambling” of the direct object, as in (2c), is possible in Japanese but not in English.

This intuition is expressible if  
(i) economy conditions such as SCoT are violable constraints,  
(ii) they are unidirectional: interpretation is computed first and the question is how it can be linearized, and  
(iii) the “availability of QR” (i.e. scoping that doesn’t correspond to surface syntax) varies with specific configurations, not with languages en bloc.

Another economy condition: Fox 2000: seems to start from a given PF and ask what its LF can be. But see section 5.1: Fox’s condition can constrain when QR at LF is possible at all, and LF--PF can then be subject to SCoT.

Scope Economy: Covert scope shifting operations (like QR) are only possible if every single step makes a difference for truth conditions.

(i) A man read every book. QR applied to every book makes a truth conditional difference:  
\(\text{every book} > \text{a man} \quad \text{(instead of a man} > \text{every book)}\)

(ii) Bill read every book. QR applied to every book wouldn’t make a truth conditional difference, because Bill is scopeless (or, always takes wide scope) hence QR in (ii) is disallowed.

(iii) A man read every book, and a woman did too. (a) a man > every book & a woman > every book  
(b) every book > a man & every book > a woman

(iv) Bill read every book, and a woman did too. (a) Bill > every book & a woman > every book  
# (b) Bill > every book & every book > a woman  

(iv) is unambiguous, because ellided clause must be parallel to the full clause, and QR in its full clause is #.
(3a) is a situation in German or Japanese in which the object takes scope over the subject (LF = B→A). Since these are scrambling languages, there are two candidate PFs to consider: the “moved” order (PF = B→A) and the unmoved order (PF = A→B).

Of these, only the moved order faithfully reflects the scope order, satisfying ScoT. The combination of an unmoved surface order, but inverse scope, is thus excluded.

<table>
<thead>
<tr>
<th></th>
<th>LF</th>
<th>PF</th>
<th>ScoT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>B→A→t_B</td>
<td>B→A→t_B</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>B→A→t_B</td>
<td>A→B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>√ (QR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>A→B</td>
<td>A→B</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>A→B</td>
<td>B→A→t_B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Reconstruction)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(5) a. Syntax: [someone]–NOM [every book]–ACC read
“Overt” QR: [every book] [someone] [every book] read
b. LF output: [every book] [someone] [every book] read
c. PF1: [every book] [someone] [every book] read
*PF2: [every book] [someone] [every book] read

(4) *ScoT (2a)

The German/Japanese situation should be contrasted with English (4a). For the corresponding LF (scope of object over subject), the ScoT-respecting PF is unavailable, as English lacks scrambling. In this case, then, there is only one candidate PF to consider, namely PF = A→B. Even though this pairing of LF and PF violates ScoT, there is no better pairing (in English), and hence it is permitted.

<table>
<thead>
<tr>
<th></th>
<th>LF</th>
<th>PF</th>
<th>ScoT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>* Scrambling B→A→t_B</td>
<td>*B→A→t_B</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>√ (QR)</td>
<td>B→A→t_B</td>
<td>A→B</td>
</tr>
<tr>
<td>b.</td>
<td>A→B</td>
<td>A→B</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>√</td>
<td>A→B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Scrambling</td>
<td>A→B</td>
<td>*B→A→t_B</td>
</tr>
</tbody>
</table>

(6) a. Syntax: Some toddler read every book
“Overt” QR: [every book] [some toddler] read [every book]
b. LF: [every book] [some toddler] read [every book]
c. *PF1: [every book] [some toddler] read [every book]
PF2: [every book] [some toddler] read [every book]

*ScoT tolerated
• In English, topicalization and passive do not count as competitors for QR and so they do not rule it out:

(8) a. Every detective interviewed exactly two suspects.  \[\exists \forall; \forall \exists\]
    b. Exactly two suspects, every detective interviewed.  \[\text{PF}: B \rightarrow A\]
    c. Exactly two suspects were interviewed by every detective.  \[\text{PF}: B \rightarrow A\]

Why? They are not sufficiently “similar” to the input of (a): different information structure / lexical items.

• German/Japanese (3b) is in fact ambiguous. This is traditionally attributed to “semantic reconstruction”, i.e. interpreting the lower copy of scrambled “every book”. B&W make a finer distinction, which we ignore.

• “Rigidity” is a property of constructions, not of languages en bloc.

**Inverse linking: DP-internal QR:**

\[\begin{array}{c}
\text{a record by every musician} \\
\text{every musician} \\
\text{a record of/by every musician}
\end{array}\]

allowed in (12a), because overtly extracted version is *, cf. (12b)
not allowed in (13a), because overtly extracted version is OK, cf. (13b)
not allowed in (20a), because QR of adjunct is not possible to begin with (nor is extraction)

(12) **Context:** Two friends are talking about last night, when one of them visited Peter, who’s crazy about jazz. On that occasion, Peter played a record by Miles Davis, a record by John Coltrane, and a record by Fred Frith.

a. Peter hat eine Platte jedes Musikers aufgelegt.
   Peter has a/one record (A) every_gen musician (B) played
   ‘Peter played a record by every musician.’  \[\exists \forall; \forall \exists\]
   b. *Peter hat jedes Musikers eine Platte aufgelegt.
      Peter has every_gen musician (B) a/one record (A) played

(13) a. Peter hat eine Platte von jedem Musiker aufgelegt.
    Peter has a/one record (A) of every musician (B) played
    ‘Peter played a record by every musician.’  *\[\forall \exists\] (without special intonation)
    b. Peter hat von jedem Musiker eine Platte aufgelegt.
       Peter has of every musician (B) a/one record (A) played
       ‘Peter played a record by every musician.’

(20) a. Peter hat eine Platte mit jedem Remix aufgelegt.
    Peter has a record with every remix played
    ‘Peter played a record with every remix.’  \[\forall \exists\] (any intonation)
    b. *Peter hat mit jedem Remix eine Platte aufgelegt.
      Peter has with every remix a record played

In (20a), QR is impossible to begin with, cf. Fathers of few children ever sleep enough. Fathers with few children *ever sleep enough.
PF representations compete to find the best expression of a given LF, not the other way around.

(21) **The ¾ signature**

<table>
<thead>
<tr>
<th></th>
<th>LF</th>
<th>PF</th>
<th>ScoT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>√</td>
<td>A&gt;B</td>
<td>√</td>
</tr>
<tr>
<td>b.</td>
<td>*</td>
<td>A&gt;B</td>
<td>*</td>
</tr>
<tr>
<td>c.</td>
<td>√</td>
<td>B&gt;A</td>
<td>√</td>
</tr>
<tr>
<td>d.</td>
<td>√</td>
<td>B&gt;A</td>
<td>*</td>
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</tbody>
</table>

So why is one mismatched representation allowed, but not the other?
ScoT interacts with some other economy constraint (C1) that privileges A>>B at PF.

In (22), there is an order that satisfies both ScoT and C1, so the other one is disallowed.
In (23), either ScoT or C1 can be satisfied, but not both. In just this case, both LF--PF pairings are possible.

(22) **LF: A>B**

<table>
<thead>
<tr>
<th></th>
<th>LF</th>
<th>PF</th>
<th>ScoT</th>
<th>C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>√</td>
<td>A&gt;B</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>b.</td>
<td>*</td>
<td>A&gt;B</td>
<td>*</td>
<td>*</td>
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</tbody>
</table>

(23) **LF: B>A**

<table>
<thead>
<tr>
<th></th>
<th>LF</th>
<th>PF</th>
<th>ScoT</th>
<th>C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>√</td>
<td>B&gt;A</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>b.</td>
<td>√</td>
<td>B&gt;A</td>
<td>√</td>
<td>*</td>
</tr>
</tbody>
</table>

Another example of the 3/4 signature

**There**-insertion vs. overt movement to subject position

(24) a. (Exactly) one student is likely to be absent.  \(\exists \) » likely; likely » \(\exists\)  
b. There’s likely to be (exactly) one student absent.  \(\exists\) » likely; OK likely » \(\exists\)  
c. *Is likely to be (exactly) one student absent.

(26) **English raising**

<table>
<thead>
<tr>
<th></th>
<th>LF</th>
<th>PF</th>
<th>ScoT</th>
<th>DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>√</td>
<td>(\exists) » likely</td>
<td>(\exists) » likely</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>* (QR)</td>
<td>(\exists) » likely</td>
<td>there likely » (\exists)</td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>√</td>
<td>likely » (\exists)</td>
<td>there likely » (\exists)</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>√ (reconstruction)</td>
<td>likely » (\exists)</td>
<td>(\exists) » likely</td>
<td>*</td>
</tr>
</tbody>
</table>

• **How about Hungarian?** Are there cases of undeniable inverse scope?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
</table>
| everyone be-may sick | everyone sick be-may | sick be-may everyone  
| 'Everyone may become sick' | 'Maybe everyone is sick' (epist.) |