# Quantifier Particles and Compositionality

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Anna Szabolcsi,
New York University

In many languages, the same particles that build quantifier words serve as connectives, additive and scalar particles, question markers, existential verbs, etc.

| | | |
|---|---|---|
| *every(one), every, both, as well as, too, even, ...* | *-mo* | *mind is* |
| *some(one), some, or, whether, at least/about, there is, I wonder, ...* | *-ka* | *vala/vagy/vaj--e* |



| | |
|---|---|
| -mo | mind<br>is |
| -ka | vala/vagy/vaj--e |

Are these particles "the same" across the varied environments?
If so, what is their stable meaning?

Allomorphy and suppletivism in particles are in the background, but not discussed today.



## A sampler from Hungarian

***ki***
who, "indeterminate pronoun"

| | | | |
|---|---|---|---|
| ***vala-ki***<br>someone | *X* ***vagy*** *Y*<br>X or Y | ***vagy*** *száz*<br>about 100 | |
| ***val-ó***<br>be$_{\exists}$-ing | ***vagy****-on (>van)*<br>be$_{\exists}$ indicative | ***vaj****-j-on*<br>let be$_{\exists}$: I wonder | |
| ***mind****-en-****ki***<br>everyone | ***mind*** *X* ***mind*** *Y*<br>X as well as Y<br>*X* ***is*** *(és) Y* ***is***<br>X as well as Y | *Ti* ***mind*** *VP.*<br>you all VP<br>*X* ***is***<br>X too | |
| ***se****-n-****ki***<br>no one | ***se*** *X* ***se*** *Y*<br>neither X nor Y | *X* ***se***<br>nor X | NC items |

## Japanese ***ka*** somewhat similar to ***vala/vagy***

| | |
|---|---|
| **dare-ka** | `someone' |
| gakusei-no **dare-ka** | `some student' (=one of the …) |
| hyaku-nin-to-**ka**-no gakusei | `some 100 students' (=approximately) |
| Tetsuya-**ka** Akira(-**ka**) | `Tetsuya or Akira' |
| **Dare**-ga odorimasu **ka** | `Who dances?' |
| Akira-ga odorimasu **ka** | `Does Akira dance?' |



## Japanese ***mo*** somewhat similar to ***mind***

| | |
|---|---|
| **dare-mo** | `everyone$_{HLL}$/anyone$_{LHH}$' |
| **dono**-hito-**mo** | `every/any person' |
| hyaku-nin-**mo**-no gakusei | `as many as 100 students' |
| Tetsuya-**mo** Akira-**mo** | `Tetsuya as well as Akira' |
| Tetsuya-**mo** | `too/even Tetsuya' |

## Questions about KA-style and MO-style particles

- Do the roles of each particle form a natural class?
  If yes, what is the **unifying syntax/semantics**?
- Are the particles **aided by additional elements**, overt or covert, in fulfilling their varied roles?
  If yes, what are those elements?



## A promising perspective: MO is meet, KA is join

**Every**one dances iff
Kate dances, **and** Mary dances, **and** Joe dances
**Some**one dances iff
Kate dances, **or** Mary dances, **or** Joe dances

- Universal quantification and conjunction are special cases of lattice-theoretic **meet** (glb).
- Existential quantification and disjunction are special cases of lattice-theoretic **join** (lub).

(Gil, Haspelmath, Jayaseelan, Szabolcsi 2010: Ch 12)

## Alternative Semantics for the signature environments of KA

- *whether Joe dances*
  {p: p=^dance(j) ∨ p=^not-dance(j)}
  same as {^dance(j), ^not-dance(j)}
- *who dances*
  {p: ∃x. p=^dance(x)}
  same as {^dance(k), ^dance(m), ^dance(j)}
- *Kate dances, or Mary dances, or Joe dances*
  {^dance(k), ^dance(m), ^dance(j)}
- *Someone dances*
  {^dance(k), ^dance(m), ^dance(j)}

*^ just for brevity*

versus singletons: *Kate dances*, *Everyone dances*, etc.

## View updated, using Alternative Semantics and Inquisitive Semantics

- An **inquisitive proposition** presents a set of multiple alternatives (or, rather, the join of the powersets of such alternatives);
- A **non-inquisitive proposition** presents a singleton set of alternatives (or, rather, a single such powerset).
- **Conjunction and disjunction** re-emerge as Heyting-algebraic meet and join of propositions.

We now have contemporary linguistic analyses, and can still claim: MO is meet, and KA is join.

## The Problem, 1

| | | |
|---|---|---|
| A-MO B-MO | John-MO Mary-MO | `John as well as Mary' |
| A-KA B-KA | John-KA Mary-KA | `John or Mary' |
| | John ran-KA not-KA | `whether or not John ran' |

If MO is ∩ and KA is ∪,
they should not occur **more than once** in
`A ∩ B' and `A ∪ B'.



## The Problem, 2

| | | |
|---|---|---|
| A-MO | John-MO | `John too' |
| A-KA | 100-KA | `approx. 100 m' |
| | John ran-KA | `whether John ran' |

Moreover, if MO is ∩ and KA is ∪,
they should not occur with **a single "junct"**
(that does not even contain a variable).

## A-MO/KA B-MO/KA

| | | |
|---|---|---|
| A-mo B-mo hashitta | J | J |
| A is, B is elszaladt | H | H |
| i A, i B ubezhali | R | R |
| `A as well as B ran away' | | |
| A-hari B-hari ... giyā | S | H |
| `A or B ... went' | | |
| A-də B-də ... giyē | S | D |
| `Did A go, or did B?' | | |
| ... prishla-li Eva ili net | R | R |
| ... megjött-e Éva vagy nem | H | H |
| `whether or not Eve came' | | |

## A-MO/KA

| | | |
|---|---|---|
| A-mo hashitta | J | J |
| A is elszaladt | H | H |
| i A ubezhal | R | R |
| `A, too, ran away' | | |
| Van vagy 100 méter | S | H |
| `It's about 100 m' | | |
| Neem een Chomsky | S | D |
| `Take e.g. Chomsky' | | |
| ... prishla-li Eva | R | R |
| ... megjött-e Éva | H | H |
| `whether Eve came' | | |



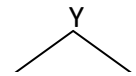
- So, MO is not ∩, and KA is not ∪.

We re-assess the insight:

- MO and KA occur precisely in contexts that are the least upper bound / greatest lower bound of the contribution of the host of MO/KA and something else.



## MO and KA impose semantic (ordering) requirements on the immediate context




[[Y]] is the glb / lub of [[X]] and something else



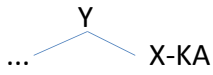

## Step 1: Kobuchi-Philip 2009 on *mo*

| | |
|---|---|
| (gakusei-ga) John-**mo** hashitta<br>`(Among the students,) John, too, ran' | additive presupposition |
| (gakusei-ga) John-**mo** Mary-**mo** hashitta<br>`(Among the students,) John as well as Mary ran' | reciprocally satisfy prspp |
| (gakusei-ga) dono-hito-**mo** hashitta<br>`(Among the students,) every person ran' | reciprocally satisfy prspp |

- MO imposes an additive presupposition (a postsupposition, more precisely).
- The hosts of the multiple occurrences of MO mutually satisfy the requirements of each other's particles.



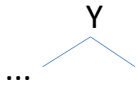
## Step 2: My proposal for KA, roughly,




- KA's requirement: [[X]] < [[Y]] where [[X]], [[Y]] are sets of alternatives.
- The alternatives introduced by KA's host X must be preserved and boosted in the immediate context Y (see slide 29).
- The hosts of the multiple occurrences of KA mutually satisfy the requirements of each other's particles.



## The general picture




- MO's requirement is trivially satisfied if [[Y]] is the meet (glb) of [[X]] and something else.
- KA's requirement is trivially satisfied if [[Y]] is the join (lub) of [[X]] and something else.
- MO and KA do not perform meet/join operations. Who does, then?

## Winter's bullet and silent MEET

Winter 1995, 1998

- A *and* B = A•B = ⟨A, B⟩ *And* merely forms pairs.
- Pairs grow pointwise (much like Hamblinian alternatives).
- At some point silent MEET applies, creating the illusion that *and* scopes there.
- *And* can also be silent (asyndetic conjunction).
- In contrast, OR is cross-linguistically almost never silent (no asyndetic disjunction).

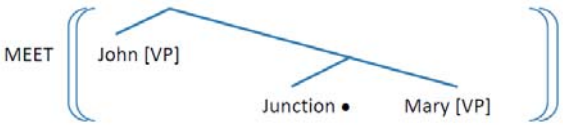


## Step 3: Modify Winter

- Identify *and* or its silent counterpart, interpreted as Winter's •, as den Dikken's 2006 J(unction). Delimit the pointwise growth of pairs.
- Replace Winter's plain Boolean MEET with Dekker's 2012 order-sensitive MEET, which interprets the 2nd conjunct strictly in the context of the 1st.
- Recognize order-sensitive MEET as the default operation on pairs, cf. text-level sequencing.
- Abandon Winter's treatment of *or*; add silent JOIN.

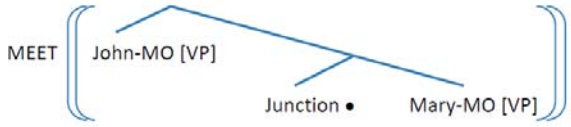


## Pairs with MEET




✓**dist**
✓**coll**

*Jani* *(és)* *Mari* `J and M'



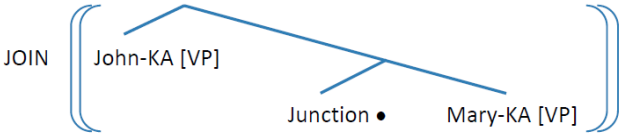

✓**dist**
**# coll**

*Jani is* *(és)* *Mari is*

`J as well as M'



## Step 4: Add silent JOIN




`John or Mary'

JOIN (⟨{^vp(j)}, {^vp(m)}⟩) = {^vp(j), ^vp(m)}

- Which silent operation applies to a given pair?
- If KA is present,
  its [[X]]<[[Y]] requirement forces JOIN.



Cross-linguistically,

## KA is mandated in disjunctions, but not in wh-questions or indefinites

Hans Gretchen
# `Hans or Gretchen'

Wer MAG was?
`Who likes something?'

- For pairs, MEET is the default. KA is needed to trigger JOIN. Elsewhere, MEET applies.
- Where JOIN is the default or there is no default, presence of KA is cross-linguistically variable.
- MO forces MEET as a by-product of its main mission, viz. introducing an additive postsupposition and making the construction irrevocably distributive.



## J(unction) in complex connectives

- *Jani is* *és/∅* *Mari is* — DP-MO J DP-MO — `J as well as M'
- *arma(que)* *∅* *virum-que* — DP(-MO) J DP-MO — Mitrović 2012, 2013 `arms and a man'
  *ad vim* *at-que* *ad arma* — PP-MO∅ J-MO PP-~~MO~~ — `to force and to arms'
- *Boban* *i - li* *Zoran* — DP-KA∅ J-KA DP-~~KA~~ — Arsenijević 2011, Mitr. 2013 `Boban or Zoran'
- *Jani* *∅-vagy* *Mari* — DP-KA∅ J-KA DP-~~KA~~ — `J or M'

## Remainder of discussion

Explore KA in indefinites, wh-questions, and alternative questions.

Define [[X]]<[[Y]] "preserve and boost" in terms of Inquisitive Semantics:

[[X]] < [[Y]] iff every possibility in [[X]] is a possibility in [[Y]], and [[Y]] contains a possibility that was excluded in [[X]].



## KA in indefinites and wh-questions

*Unary KA with no variable in host:*

| | |
|---|---|
| hyaku-nin-to-ka | `some 100 = 100 or a number |
| valami 100 / vagy 100 | in the vicinity of 100' |

*Unary KA with variable in host:*

| | |
|---|---|
| dare-ka odorimasu | `Someone dances' |
| dare-ga odorimasu-ka | `Who dances?' |
| Vala-ki táncol. | |
| Ki táncol? | $\bigvee$ {^dance(x) : x∈person} |



## Alternative questions

| | |
|---|---|
| (a) Alszik? ↗ | `Is he asleep?' |
| (b) Alszik vagy nem? | `Is he asleep, or not?' |
| (c) Alszik-e? ↘ | `Is he asleep-KA?' |
| (d) Alszik-e vagy nem? | `Is he asleep-KA or not?' |

| | |
|---|---|
| Kíváncsi vagyok, hogy | `I am curious SUBORD ...' |
| (a') * ... alszik. | |
| (b') ... alszik vagy nem. | |
| (c') ... alszik-e. | |
| (d') ... alszik-e vagy nem. | |

same patterns with *tea/kávé*



## KA in alternative questions

- Only *Alszik?*↗ is a polarity question (Krifka 2001).
- Polarity questions are a main clause phenomenon.
- Interpreted via the Inquisitive Semantic *?* operator.

- *-e* is a KA-particle (etymol. unrelated to *vala/vagy*).
- *-e* requires [[XP]]<[[YP]].
- In (c, c') the only possible exclusive alternative is "accommodated" [bad label].
- (b,b'), (c,c'), (d,d') are disjunctions. They contain either one KA (*-e* or *vagy*) or two (*-e* and *vagy*).



## How to define KA's requirement?

- [[X]]<[[Y]] must ensure that the "alternatives" of KA's host X are "preserved" and "boosted".
- Approve [[Y]] = JOIN([[X]], [[Z]]) and possibly also [[Y]] = ((JOIN([[X]], [[Z]]))*)* i.e. one-fell-swoop non-inquisitive join (as satisfiers of KA).
- Exclude shrinking, [[Y]] = MEET([[X]], [[Z]]) and endogamy, [[Y]] = (([[X]])*)* (as satisfiers of KA).
- **[[X]] < [[Y]] iff every possibility in [[X]] is a possibility in [[Y]], and [[Y]] contains a possibility that was excluded in [[X]]**.
- This definition is needed if propositions are downward closed; derives Hurford's Constraint.



## Summary

- KA and MO style quantifier particles in their various roles have stable meanings, but they do not perform join or meet.
- The particles impose requirements on the purely semantic contents of their immediate contexts.
- When multiple particles occur, each carries the same requirement, and the hosts mutually satisfy the requirements of each other's particles.
- The particles are aided (at least) by a pair-forming J, silent JOIN, silent order-sensitive MEET (plus non-inquisitive closure, and speech-act operators).
- For the moment I'm pretending that all particles are sentential adjuncts.

## Pocket Inquisitive toolkit (after Roelofsen 2012)

A **proposition** is a non-empty downward closed set of possibilities. A **possibility** is a set of worlds.

[ϕ] = [[John runs]] = POW{w: $run_w(j)$}

The informative content of ϕ, **info(ϕ)** = U[ϕ]

**Meet**: A∩B. **Join**: A∪B. **Psd-cmp**: A* = {β: disjoint(β,UA)}.

A∩A*= ⊥, but A∪A* may not be T. Heyting-algebra.

ϕ is **informative** iff info(ϕ) ≠ W; excludes something in W.

ϕ is **inquisitive** iff info(ϕ)∉[ϕ]; has >1 maximal possibility.

A maximal possibility is an **alternative** in the AltS sense.

Non-inquisitive closure: **[!ϕ]** = ([[ϕ]]*)* = POW(info(ϕ))

Non-informative closure: **[?ϕ]** = [ϕ]∪[ϕ]*

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## KA satisfied in [[Y]]

- KA in inquisitive disjunction
  [[Y]] = JOIN ([[**KA**(Mary runs)]], [[Kate runs]]) =
  POW{w: $run_w(m)$} ∪ POW{w: $run_w(k)$} =
  { ∅, {m¬k}, {mk}, {m¬k,mk}, {k¬m}, {k¬m,mk} }

- KA in disjunction subsequently de-inquisitivized
  [[Y]] = ((JOIN ([[**KA**(Mary runs)]], [[Kate runs]])*)* =
  POW{w: $run_w(m) \vee run_w(k)$} =
  { ∅, {m¬k}, {mk}, {m¬k,mk},
  {k¬m}, {k¬m,mk}, {m¬k,k¬m}, {m¬k,k¬m,mk} }

Both preserve all possibilities in [[Mary runs]], and add a possibility excluded in [[Mary runs]], e.g. {k¬m} = only Kate runs.

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## KA not satisfied in [[Y]]

- KA in conjunction
  [[Y]] = MEET ([[**KA**(Mary runs)]], [[Kate runs]]) =
  POW{w: $run_w(m) \wedge run_w(k)$} = {∅, {mk}}
  MEET eliminates {m¬k} from [[Mary runs]]. Shrinking.

- KA right under non-inquisitive closure, cf. [!ϕ] = ([[ϕ]]*)*
  [[Y]] = ((([**KA**(Mary runs or Kate runs)]])*)* =
  ((POW{w: $run_w(m)$} ∪ POW{w: $run_w(k)$})*)* =
  { ∅, {m¬k}, {mk}, {m¬k,mk}, {k¬m}, {k¬m,mk} ,
  {m¬k,k¬m}, {m¬k,k¬m,mk} }

Non-inq. closure preserves the possibilities in [[Mary runs]], but all new alternatives are joins of old ones. Endogamy.

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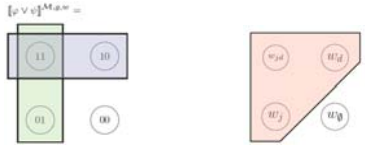
**[[X]] < [[Y]] iff every possibility in [[X]] is a possibility in [[Y]], and [[Y]] contains a possibility that was *excluded* in [[X]].**

[[Mary or Kate runs]] ⊂ [[ **!** (Mary or Kate runs) ]]



if [[! ϕ]] is powerset

Hence my <, defined w.ref.to exclusion. Seems like an artifact, but it derives Hurford's Constraint:

*A or B, if A entails B or conversely

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## ! in indefinites and disjunctions

**Hung. *vala/vagy* is not particularly inquisitive**

- not a "question marker" (unlike J. *ka*, S. *də*)
- not much epistemic uncertainty (unlike S. *də*)
- stem of existential verb (like S. *hō*)
- need **!**, maybe even one-step **!°∨**.

***Bill saw Joe or some girl, but I forget who/which***

ok `whether Bill saw Joe or Bill saw some girl'

- won't suffice: [ϕ_joe] ∪ [ϕ_kate] ∪ [ϕ_mary]
- needed: [ϕ_joe] ∪ (([ϕ_kate]∪[ϕ_mary)])*)*

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## Attach ! to the scopes of externally static operators, but not to all CP boundaries

***Bill didn't invite Kate or Mary, but I forget which***

# `didn't invite **!**(Kate or Mary)'

ok `didn't invite Kate or didn't invite Mary'

***Bill thinks that they hired Kate or Mary, but I forget which [Bill thinks that they hired]***

ok `Bill thinks that they hired Kate
or he thinks that they hired Mary'

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