Compositionality without word boundaries: *(the) more* and *(the) most*

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- **Compositionality**
  The meaning of a complex expression is a function of the meanings of its parts and how they are put together.
- **What are the "parts"**?
  This question can be asked in many ways: Surface constituents? LF constituents? Only audible parts? Also phonetically empty ones? What about type shifters? Etc.
- **Today's question**
  Are **phonological words** necessarily parts, even minimal (primitive) parts**,** that a compositional grammar should take into account?
  If not, what parts are to be recognized?

Lessons from Distributed Morphology and some versions of Minimalist Syntax

Distributed Morphology
(Halle & Marantz 1994; Embick 2010; and others)

Hierarchical syntactic structure all the way down to roots; Late Insertion of vocabulary items.

The architecture is compatible with various different theories of locality and linearization.

The typological differences between polysynthetic and isolating languages do not require the postulation of radically different mechanisms in UG.

The phonological word has no special status in semantic interpretation.

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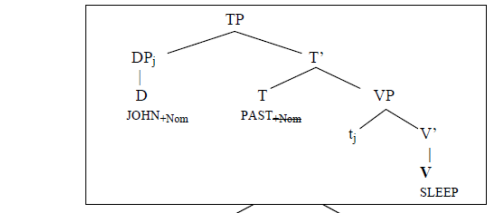
Example: *John slept* (Harley 2011)



Linearization, Morphological Merger, Late Insertion, Phonological constraints

SLEEP ⇔ /slEp/ [[PAST]T ___]
PAST ⇔ /d/
[[/dZAn/]DP [/slEpd/]VP]TP]
[>>dZAn >>slEpt]

LF Interpretation

VP: ιi[∃e[SLEEP(e, John) & DURING(e,i)]]
TP: BEFORE(utt-time, ιi[∃e[SLEEP(e, John) & DURING(e,i)]])

Lessons from Distributed Morphology and some versions of Minimalist Syntax

Some versions of Minimalist syntax
(Julien 2002; Kayne 2005a,b, 2010; Koopman 2005; Koopman & Szabolcsi 2000; Sigurðsson 2004; Starke 2009; many others)

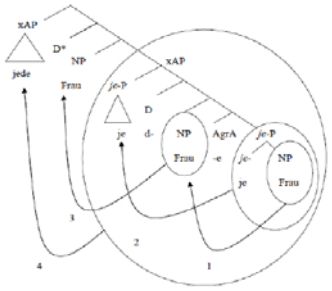
Each syntactic head carries one and only one feature. Then, phonological words correspond to potentially large chunks of syntactic structure.

Especially when remnant movement is allowed, many words will not even correspond to complex heads assembled by head movement in syntax, because at least some of the building blocks are phrases.

Many words will not even correspond to complex heads assembled by head movement in syntax

Example: *jede Frau* `every woman' (Leu 2009)
jeder *je* `distributive particle'
d `relative complementizer
adjectival agreement

gut-**er** Mann je–d–**er** Mann
gut-**e** Frau je–d–**e** Frau
gut-**es** Kind je–d–**es** Kind
d-**er** Mann
d-**ie** Frau
d-**as** Kind



Moral

- Words are not distinguished building blocks in syntax or morphology.
- Then, we do not expect words to be distinguished building blocks for compositional semantics.
- Specifically, word boundaries are neither upper bounds nor lower bounds for compositional semantics.

Not "lower bounds"

"Words" are not compositional primitives. Complex meanings cannot be simply written into the lexical entries, without asking how the parts of the word contribute to them.

Not "upper bounds"

Parts of a "word" may reach out to interact with, or operate on, the rest of the sentence. (NB Barker's parasitic scope formalizes a very similar kind of action.)

Moral

- Words are not distinguished building blocks in syntax or morphology.
- Then, we do not expect words to be distinguished building blocks for compositional semantics.
- Specifically, word boundaries are neither upper bounds nor lower bounds for compositional semantics.

Plan for this talk

Recap why amount superlative *most* is a poster child for the "no word boundaries" approach (Heim 2001, Hackl 2009), and reap some further benefits by pursuing that approach even more vigorously.

For more adventurous applications
see Szabolcsi (2010: Ch 12.5) and subseq.

Background: Superlatives

Who expects to climb the tallest mountain?

Absolute reading, ABS
`Who expects to climb the mountain that is taller than any other mountain [in the area]?'
Relative reading, REL
`Who expects to climb a taller mountain than how tall a mountain anyone else expects to climb?'

Heim 1985, Szabolcsi 1986, Hackl 2009, others:
In ABS, -est has DP-internal scope.
In REL, -est has sentential scope.
Calls for setting aside word boundaries.

Most as a superlative: *many-est*

- Like *tallest*, *most* and *fewest* have relative readings:
  Who expects to climb the most/fewest mountains?
  `more/fewer than anyone else expects to climb'
- Like *tallest, most* has an absolute reading, which is equivalent to the classical proportional reading:
  Most (of the) men snore =
  $|\text{MEN} \cap \text{SNORE}| > |\text{MEN} \cap \text{NOT SNORE}|$
  But *fewest* doesn't:
  ** Fewest (of the) men snore*

Hackl 2009: A decompositional analysis can explain these; one that takes *most, fewest* to be lexical primitives cannot.

(Hackl 2009)

- MANY (d)(mtns) = $\lambda x[P(x) \wedge |x| \geq d]$
  `the set of pluralities *x* with a property (e.g. *mountains*) and with cardinality at least *d*'
- If defined, -EST(C)(B)(x) is true iff
  $\forall y[(y \in C \wedge y \neq x) \rightarrow \max\{d : B(d)(x)\} > \max\{d : B(d)(y)\}]$
  `in the set *C* of pluralities, *x* has a greater degree of *B*-ness than any $y \neq x$'
- -EST(C)(B)(x) is defined iff *x* has an alternative in the context set *C* of things with some degree of *B*-ness.
  (If *B*=*blue*, then members of *C* are somewhat blue, if *B*=*numerous*, then members of *C* are not empty, ...)
- Note: same –EST in both relative and absolute readings

absolute *[the] tallest* : relative *[the] tallest* =
proportional *most* : relative *[the] most*

Who climbed the tallest mountain?

a. `a mountain$_C$ taller than any other mtn$_C$' — ABSOLUTE
b. `a mountain taller than how tall a mtn anyone$_C$ else climbed' — RELATIVE

Who climbed *die meisten Berge*?

a_1. `more mountains$_C$ than how many mtns$_C$ he didn't climb'
a_2. `a mountain-set$_C$ with greater cardinality than the cardinality of any other mtn-set$_C$'

PROPORTIONAL = ABSOLUTE

b. ` a mountain-set with greater cardinality than the mtn-sets anyone$_C$ else climbed' — RELATIVE

Is the best good enough?
The view from suppletion

The Comparative-Superlative Generalizations (Bobaljik, to app)

ABB		good – better – best
ABC		bonus – melior – optimus
AAB	*	*good – gooder – best*
ABA	*	*good – better – goodest*

H. *sok – több – a legtöbb*
many more the most

The Containment Hypothesis:
The representation of the superlative properly contains that of the comparative.

[[[adjective] comparative] superlative] `Adj + more than + all others'

* [[adjective] superlative] `Adj + more than all others'

(Bobaljik, to app)

- Together with DM's Late Insertion (Realization), Under-specification, Elsewhere Ordering, and Locality, Containment accounts for the Comparative-Superlative Generalizations (and the Root Suppletion Gen.)
- Why Containment?
  Not part of UG. Due to intrinsic limits on possible morpheme meanings.
  Related to the Complexity Condition (no more than one interpretable feature per head).
- If Containment is correct, Hackl's **MANY-EST** does not decompose enough (ought to be **MANY-ER-T**)
  It accounts for ABB and ABC, but not for *ABA or *AAB.

This talk will pursue the analysis

[[[MANY] comparative] superlative]

especially with reference to relative superlatives
(with an appendix on absolute superlatives)

I hope to show that
[[[MANY] comparative] superlative]
facilitates
revisiting / resolving / discovering
some interesting further issues

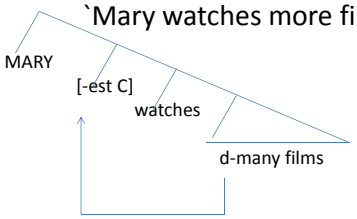
#1 Mountains compared, or climbers compared?

#2 A definite article in indefinites?

#3 Absolute, non-partitive *most* is generic in English and Hungarian, but *more* and relative *the most* aren't.

Not too difficult to build
[[[MANY] comparative] superlative]
with Heim--Hackl semantics

Recap:
In relative superlatives, *-est* takes sentential scope
Who watches the most films?
MARY watches the most films.
`Mary watches more films than anyone else does'



(Context set *C* will be suppressed where possible)

We build
[[[MANY] comparative] superlative]
with Heim--Hackl semantics

Step 1: **Comparative**
er(watch d-many films) = watch more films
Step 2: **Relative superlative**
(the … t)(er(watch d-many films)) = watch the most films
Step 3: **Absolute superlative**
special case of relative sup, with **=** in the place of watch

*

(1) Mari tö-bb filmet néz meg, mint Zsuzsa. Hungarian
(2) MARI nézi meg a leg- tö- -bb filmet.
(3) Mari meg-nézi a leg- tö- -bb filmet.
Mary pfx-watches the sup-many-comp film-acc

Step 1: comparative

er2(watch d-many films) = watch more films

d-many: λNλd ∃a [N(a) & |a|≥ d]
d-many films: λBλfλd∃a[f(B)(a) & |a|≥ d](films)
λRλz[d-many films(λR'λz'λgλy[R'(y)(z') & g(y)](R)(z))]
watch d-many films: λzλd∃a[watch(a)(z) & films(a) & |a|≥d]
er1: λGλF[max(F) > max(G)]
er2: λPλxλy[max(P(y)) > max(P(x))]
er2(watch d-many films):

λxλy[max(λd∃a[watch(a)(y) & films(a) & |a|≥ d])
> max(λd∃a[watch(a)(x) & films(a) & |a|≥ d])]

than Sue [does]: λTλu[T(Sue)(u)]

Step 1: comparative, in words

er2(watch d-many films) = watch more films

Mary watches more films than Sue [does]

Starting from
d-many: λNλd ∃a [N(a) & |a|≥ d]
er1: λGλF[max(F) > max(G)]
than Sue [does]: λTλu[T(Sue)(u)] ,

watch more films is interpreted as a two-place relation between individuals (here, Sue and Mary) such that the second watches more films than the first

λxλy[max(λd∃a[watch(a)(y) & films(a) & |a|≥ d])
> max(λd∃a[watch(a)(x) & films(a) & |a|≥ d])]

Step 2: relative superlative

(the … t)(er2(watch d-many films)) = watch the most films

MARY watches the most films.

With `than anyone else' in the place of `than Sue',

the … t: λPλu∀v[v≠u][T(v)(u)]

watch the most films is interpreted as the property of being an individual who watches more films than anyone else.

λu∀v[v≠u][max(λd∃a[watch(a)(u) & films(a) &|a|≥d])
> max(λd∃a[watch(a)(v) & films(a) & |a|≥d])]

Step 2: relative and absolute superlatives

(the … t)(er2(watch d-many films)) = watch the most films

the … t: λPλu∀v[v≠u][T(v)(u)]
(the … t)(er2(watch d-many films)):

λu∀v[v≠u][max(λd∃a[watch(a)(u) & films(a) &|a|≥d])
> max(λd∃a[watch(a)(v) & films(a) & |a|≥d])]

With some type-change magic (parasitic scope taking à la Barker 2007, Solomon 2009 for *the same*), the most can be gummed together as
λNλRλu∀v [v≠u][max(λd∃a[Rau & Na & |a|≥d])
> max(λd∃a[Rav & Na & |a|≥d])]

Step 3: absolute superlative *most* (see appendix)
∃(the_most(films)(=))

Issue #1 A classical dilemma
What do relative superlatives compare?
Mountains or climbers?

"We differ from Heim in that for us both readings of the superlative noun phrase in [*Who climbed the highest mountain?*] involve comparing mountains relative to height…"
(Farkas & Kiss 2000: 441)

"Do we compare the heights of the mountains climbed, or the climbing achievements of the climbers? Do the sentences mean different things depending on whether we compare mountain heights or mountain climbers' achievements?"
(Sharvit & Stateva 2002: 453)

An intriguing situation!

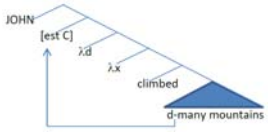
Outstanding semanticists puzzle, not so much over what the exact truth conditions are, but, what these sentences are about.

And apparently, they come to different conclusions.

Preview of two analyses

Hackl 2009

climbers



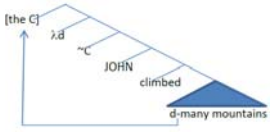
[-est C] [λd λx. x climbed d-many mtns]

[[-est]] = λC λD λx. ∀y∈C[x≠y → max{d: D(d)(x)} > max{d: D(d)(y)}]
C = {x: ∃d. x climbed d-many mtns}

the is interpreted as ∃

Krasikova 2011

degree sets of mountains



[the C] *[λd. JOHN climbed [d-many mtns]~C]

[[the]] = λC.ιD[C(D) →∀D'[C(D')→D'⊆D]

C = {D: ∃x[D= λd∃Y[mtns(Y) & climbed(Y)(x) & |Y|≥d]}

-est is an uninterpreted feature on most (worlds left out by AS)

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Preview of the argument

The Heim--Hackl analysis and the Krasikova analysis of relative superlatives are most likely truth-conditionally equivalent, but

they seem to be built off of two different comparative constructions, and inherit their properties.

Heim—Hackl (compare climbers) is built off of *more*,
Krasikova (compare mountain heights) is built off of *the more*.

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Meet the players

more

Context: Bill made $100.
… John made MORE money.
… John made MORE money than Bill (did)/than $100.

"Relative comparative" *more*

Context: John and Bill worked.
WHO made more money?
Of the two, WHO made more money?
WHO made more money than the other?
Did JOHN make more money, or did BILL?

WHO/JOHN made more money than Bill = vs. a 3rd guy
JOHN made more money than BILL. = just narration

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Plain stressed *MORE* calls for a than-clause whose content is freely chosen (*than Bill, than $100*, etc.)

But there is a "relative comparative" *more* that doesn't have a such a than-clause. At most *than the other* can be added. (Elsewhere it's probably accompanied by a silent `than the other.')

I submit that Heim & Hackl's superlative is intuitively built off of this latter construction, with *more than anyone else* in the place of *more than the other*.

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the more (non-conditional)

Naturally occurring examples

Sarah wrote the more books, but Elizabeth is the better remembered.

Bunker Hill was not won by the side which had the more courage, but by that which had the more ammunition.

Who makes the more money, football players or baseball players?

[W]e all know who has the more medals between these two soldiers.

In the event of a tie, the team that has the fewer points scored against it will win.

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Many of you won't accept the *the more* examples…

but you will agree regarding this contrast:

JOHN made more money than the other.
John made MORE money than Bill.

* JOHN made the more money than the other.
* John made the MORE money than Bill.

The inability of `the more' to take a than-clause is replicated in languages in which `the more' by itself is normal, e.g. French and Hungarian.

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French, Hungarian
√ the more [of the two] -- * the more than

Qui a bu plus de vin, Jean ou Pierre?
Qui a bu le plus de vin, Jean ou Pierre?

le plus de is also the superlative

Qui a bu plus de vin que Marie?
* Qui a vu le plus de vin que Marie?

Ki ivott több bort, Jani vagy Pali?
Ki itta a több bort, Jani vagy Pali?

superlative is *a legtöbb*

Ki ivott több bort, mint Mari?
* Ki itta a több bort, mint Mari?

How do the meanings differ?

Hungarian speakers and English speakers who accept both `more' and `the more' say,

Who drank more wine?
Ki ivott több bort?

interested in what people did

Who drank the more wine?
Ki itta a több bort?

interested in the greater amount of wine drunk and who it was drunk by

Intriguingly reminiscent of the two views regarding what relative superlatives compare.

Relative *most* alongside *the most*?

Naturally occurring examples

When only one promotional code can be used - pick the one that saves you most money!

[I]t's good to keep track of all your expenses in a spreadsheet, so you can see what you are spending most money on in the garden.

Which animal has most hair per square inches on its body?

Most races are won by the guy who has most luck at the collisions at the start.

Exists, but fairly rare outside headlines.

But perfectly fine with adverbial and predicative superlatives:

Who spoke most / loudest?, Who was loudest?

Why are there two views on relative superlatives?

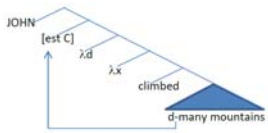
	compares climbers	compares (cardinalities of) mtns
2	*more mtns (than…)*	*% the more mtns (*than…)*
>2	*% most mtns*	*the most mtns*

Heim, Hackl
`more than any other'

Krasikova
`the largest D associated with any'

Two truth-conditionally equivalent views

Hackl 2009
climbers



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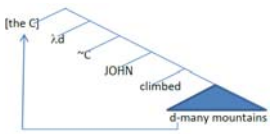
C = {x: ∃d. x climbed d-many mtns}

the is interpreted as ∃

`more than any other'
cf. Russian **bol'she vsex / vsego**

Krasikova 2011
degree sets of mountains



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C = {D: ∃x[D= λd∃Y[mtns(Y) & climbed(Y)(x) & |Y|≥d]}

-est is an uninterpreted feature on many

`the largest D associated with any'

Who is "right"?

- The Heim--Hackl analysis and the Krasikova analysis of relative superlatives are most likely truth-conditionally equivalent, but they seem to be built off of two different comparative constructions.
- Probably each is "right" for some languages, and both may coexist in (varieties of) the same language.
- Because they are built differently, they correspond to different intuitions and, probably, to different processing strategies.
- Assuming Interface Transparency (Hackl et al. and Lidz et al.), this might be experimentally testable.

Both analyses ought to be broken down more

Krasikova 2011 writes all the semantics into *the* (unique maximal degree set) and its restriction (degree sets assoc. with mountain climbers). Her –*est* is a primitive, and uninterpreted.

Hackl 2009 writes all the semantics into –*est*, treated as a primitive. He has no use for *the*. (Correct, if the analysis is really one of bare *%most*, i.e. *bol'she vsex/vsego* `more than all …'. May be a problem, if intended for *the most*, etc.)

On to Issue #2

What is the definite article doing in relative superlatives, which are indefinite by various indefiniteness tests (Szabolcsi 1986, 2010)?

- Relational *have*:
  Does SUE have the most siblings?
- Adnominal *each*:
  Who gave the children the most books each?
  `Who gave more books per child than how many books per child anyone else gave?'
- Amount expression split:
  János DOKTORRAL találkozott a legtöbbel.
  John DOKTOR-WITH met the most-with.

Indefiniteness explained

In Krasikova 2011, unicity pertains to degree sets, not to individuals:

Who has the tallest sibling / the most siblings?

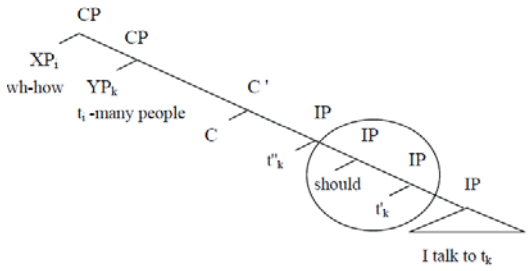
`The maximal degree set s.th. someone has <u>some sibling(s) with smartness/cardinality of that degree</u> is a degree-set s.th. WHO has <u>some sibling(s) with smartness/cardinality of that degree</u>?'

Also has an edge over Farkas & Kiss (2000: fn 15) when Sue's sibs are 6'4" and 6'2"; all others <6' :

SUE has the tallest sibling – true, not undefined

Cf. Cresti 1995

How many people (should) I talk to?



t-many people: $\lambda Q \exists^{m} x[person'(x) \wedge Q(x)]$
wh-how: $\lambda R \lambda p \exists n[num(n) \wedge R(n)(p)]$
wh-how t-many people I talk to:
$\lambda p \exists n[num(n) \wedge p = \hat{} \exists^{n} x[person'(x) \wedge talk'(I', x)]]$

Proposal: relative *more/most money*, delivering Heim--Hackl semantics

cf. slides 19-21

<u>d-much</u> $\lambda N \lambda d \exists a [N(a) \ \& \ \mu(a) \geq d]$
<u>er2</u> $\lambda P \lambda y \lambda x.\ max(P(x)) > max(P(y))$
$\varnothing_{ER}$, $\varnothing_{EST}$

- Than-clause: quantifier over the λy-bound argument:

Mary makes MORE money <u>than Sue [does]</u>

- Silent quantifiers $\varnothing_{ER}$, $\varnothing_{EST}$ accompany <u>-er</u> in the absence of an overt quantifier.

MARY makes more money ~~than the other of the two~~
% MARY makes most money ~~of all~~

Proposal: relative *the more/the most money*, delivering Krasikova(ean) semantics from same or compatible bits as my Heim--Hackl semantics

<u>d-much</u> $\lambda N \lambda d \exists a [N(a) \ \& \ \mu(a) \geq d]$
<u>er1</u> $\lambda G \lambda F[max(F) > max(G)]$

- Let H be <u>d-much money that z made</u> = $\lambda z \lambda d \exists a[made(a)(z) \ \& \ money(a) \ \& \ \mu(a) \geq d]$
- $C = \lambda D \exists x[D=M(x)]$
- Replace K's [[**the** C]] with [[**the of-all er1** C]] = $\iota D[C(D) \rightarrow \forall D'[C(D') \rightarrow (D=D' \vee \mathbf{er1}(D')(D))]]$
- Finish, as Krasikova, with [[the of-all er1 C]] *[H(Mary)]
- Similarly for *%the more money*, with of-the-two.

Aside on focus

Relative readings don't depend on focus on another phrase,

We should console the girl who got the fewest letters. (Szabolcsi 1986)
How do you win this game? By making the fewest errors. (after Heim 1999, citing C.L.Baker)

although such focus is one of the devices that can determine the frame of comparison.

By default, the relative superlative phrase bears nuclear stress (Sharvit & Stateva 2002: 485). It yields its stress to an interrogative or contrastively focused phrase.

Appendix on Issue #3

Recap: *die meisten Berge* is ambiguous between the relative and the absolute/proportional readings

The Hackl—Heim semantics of absolute superlatives can be obtained from the relative one by setting R to = (i.e. Existential Disclosure)

$\lambda N \lambda R \lambda u \forall v\, [v \neq u][\max(\lambda d \exists a[Rau \,\&\, Na \,\&\, |a| \geq d]) > \max(\lambda d \exists a[Rav \,\&\, Na \,\&\, |a| \geq d])](films)(=)$

$= \lambda u \forall v\, [v \neq u][\max(\lambda d \exists a[a=u \,\&\, films(a) \,\&\, |a| \geq d]) > \max(\lambda d \exists a[a=v \,\&\, films(a) \,\&\, |a| \geq d])]$

$= \lambda u \forall v\, [v \neq u][\max(\lambda d[films(u) \,\&\, |u| \geq d]) > \max(\lambda d[films(v) \,\&\, |v| \geq d])]$

But… what do these English sentences mean?

Absolute superlatives

Mary hates most sandwiches.	✓kinds	* pieces
Mary tasted most sandwiches.	✓kinds	* pieces
Mary tasted most of the sandwiches.		✓ pieces
* Mary caught most burglars.		* persons
Mary caught most of the burglars.		✓ persons
* Mary drank most whiskey.		* stuff
Mary drank most whiskeys.	✓kinds	
Mary drank most of the whiskey.		✓stuff

ALTHOUGH in comparatives and relative superlatives,

MARY tasted **more**/**the most** sandwiches.	✓pieces
MARY caught **more**/**the most** burglars.	✓persons
MARY drank **more**/**the most** whiskey.	✓stuff

Most NP is generic, and so distributive

Crnic 2009, with reference to Matthewson 2001, Nakanishi & Romero 2004, Lønning 1987

Most NP = *most* + *bare plural/mass term*, a kind-quantifier.

Most NP combines with a kind predicate, or with a non-kind predicate, if the predicate is shifted via Chierchia's DKP (Derived Kind Predication) or GEN_C operator.

DKP collapses *all/most/some NP*. Go for GEN_C.

GEN_C distributes the predicate to minimal realizations of a subkind, and so collective, cumulative, and mass-amount readings are out.

Subtrigging enables one-member kinds: episodic readings, still distributive.

Crnic unfortunately starts from a primitive *most*. In any case, the data show that absolute *most* is not simply a DP-internal version of the relative one (in all its uses, in every language).

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