Structural complexity in formal pragmatics

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Part 2: The upper bound hypothesis and its predictions

Last time: We introduced different linguistic phenomena in which a type t expression ϕ gets STRENGTHENED based on a set $ALT_c(\phi)$ of alternatives, and different theories of how this works.

We then looked at two types of examples in which the strengthening mechanism can in principle encounter STALEMATE SETS that can't be broken up in a non-arbitrary way.[1]

- OBLIGATORY SYMMETRY: $ALT_c(\phi)$ must include all or none of the alternatives in the stalemate set

(1) ϕ = **Paul is going to the US or Canada**

a. ✓ $ALT_c(\phi) = \{$**Paul is going to the US**, **Paul is going to Canada**, **Paul is going to the US and Canada**$\}$
$[\![$**exh** $\phi]\!]^{c,w} = 1$ iff Paul is going to the US or Canada, but not both in w [2]

b. × $ALT_c(\phi) = \{$**Paul is going to Canada**, **Paul is going to the US and Canada**$\}$
$[\![$**exh** $\phi]\!]^{c,w} = 1$ iff Paul is going to the US and is not going to Canada in w

- OBLIGATORY ASYMMETRY: one particular alternative has to be kicked out, so that no stalemate set arises to begin with

(2) ϕ = **Paul did some of the problem sets**

a. ✓ $ALT_c(\phi) = \{$**Paul did some of the p-sets**, **Paul did all of the p-sets**$\}$
$[\![$**exh** $\phi]\!]^{c,w} = 1$ iff Paul did some, but not all of the problem sets in w

b. × $ALT_c(\phi) = \{$**Paul did some of the p-sets**, **Paul did some of the p-sets and Paul did not do all of the p-sets**$\}$
$[\![$**exh** $\phi]\!]^{c,w} = 1$ iff Paul did all of the problem sets in w

Goals for this class:

- show how a simplified version of Katzir's (2007) implementation of the UPPER BOUND HYPOTHESIS addresses this basic puzzle

(3) UPPER BOUND HYPOTHESIS
$ALT_c(\phi)$ can only contain expressions whose structural complexity does not exceed that of ϕ.

I would like to thank Viola Schmitt, Clemens Mayr, Diego Feinmann and Jacopo Romoli for drawing my attention to various puzzles discussed on this handout.

[1] Recall: Given a prejacent sentence ϕ denoting a proposition p

- a set S of propositions is CONSISTENTLY EXCLUDABLE given p iff there is a world in which p is true but none of the propositions in S are true
- a set A of sentences is SYMMETRIC given ϕ iff the set of propositions expressed by sentences in A is not consistently excludable given p
- a set A of sentences is a STALEMATE SET given ϕ iff A is symmetric given ϕ and no proper subset of A is symmetric given ϕ.

[2] Recall that we assumed that **exh** only negates alternatives that are INNOCENTLY EXCLUDABLE, i.e. that are in every maximal subset of $ALT_c(\phi)$ that corresponds to a consistently excludable set of propositions. The alternatives **Paul is going to Canada** and **Paul is going to the US** are not innocently excludable.

- discuss some bigger-picture predictions of this hypothesis, and evidence for and against these predictions

Two overall points I want to stress:

- There are reasons to think theories of strengthening should be sensitive to the *syntactic form* of the prejacent and the alternatives, rather than just salience (Hirsch 2024, Hirsch & Schwarz 2024) or logical relations between them
- But arguably Katzir's (2007) implementation is a bit oversensitive—in some cases, we might expect exact syntactic complexity of the alternatives to matter, but then it doesn't

1 *Katzir's variant of the upper-bound hypothesis*

Here I discuss a slightly simplified version of Katzir's (2007) proposal. His proposal includes a special condition for alternatives that are mentioned in the discourse context, which we will come back to later.

1.1 *Defining structural complexity*

- The examples we've discussed so far suggest that we need a theory of the following form.
  - We define a relation $\Rightarrow$ between LFs (i.e. syntactic trees).
    $\phi \Rightarrow \psi$ means that ψ is obtained from ϕ by means of one of a set of operations that do not count as increasing complexity.
  - $\phi \Rightarrow^* \psi$ then means ψ is derived from ϕ via zero or more $\Rightarrow$-steps.
  - We take $ALT_c(\phi)$ to contain all the alternatives that are (i) relevant and (ii) can be obtained from the prejacent via $\Rightarrow^*$

    (4) $ALT_c(\phi) = \{\psi : \phi \Rightarrow^* \psi \wedge [\![\psi]\!]^c \text{ is relevant to } Q_c\}$

- Which operations should we take into account in defining $\Rightarrow$? For now let's limit ourselves to two:
  - LEXICAL REPLACEMENT: replacing a terminal of the syntactic tree with another terminal of the same syntactic category[3]

    (5) [some [of [the [problem sets]]]] [1 [PAST [Paul [do t_1]]]]
    $\Rightarrow$ [all [of [the [problem sets]]]] [1 [PAST [Paul [do t_1]]]]

  - DELETION: replacing a constituent with one of its proper subconstituents

    (6) [[the US] [or Canada]] [1 [PRES [PROG [Paul [go [to t_1]]]]]]
    $\Rightarrow$ Canada [1 [PRES [PROG [Paul [go [to t_1]]]]]]

- the relation $\Rightarrow^*$ allows us to combine several such operations, e.g.:

[3] It is a bit unclear whether the 'same category' requirement is actually well motivated. I assume it here simply to stay maximally close to Katzir (2007). If you subscribe to the view that syntactic categories are bundles of features, the intention here is not necessarily identity of all features; rather, we would presumably need a distinction between 'categorial' and 'non-categorial' features.

I won't generally provide this much detail about the syntactic trees, this is just to illustrate the general principle.

(7) [some [of [the students]]] [2 [[[the US] [or Canada]] [1 [PRES [PROG [t_2 [go [to [t_1]]]]]]]]]
⇒ [all [of [the students]]] [2 [[[the US] [or Canada]] [1 [PRES [PROG [t_2 [go [to [t_1]]]]]]]]]
⇒ [all [of [the students]]] [2 [Canada [1 [PRES [PROG [t_2 [go [to [t_1]]]]]]]]]

1.2 *Accounting for the basic cases*

- It should be clear that this definition of $ALT_c(\phi)$ can never give rise to alternatives whose LFs have more nodes than that of ϕ.
- This automatically rules out the unavailable alternatives in all of the following cases.

prejacent	alternative
Paul did some of the p-sets	**✓Paul did all of the p-sets** **# Paul did (some but) not all of the p-sets**
you are allowed to present a poster	**✓you are required to present a poster** **# you are (allowed but) not required to present a poster**
the water is warm	**✓the water is hot** **# the water is (warm but) not hot**
Ann has to vaccinate all of her cats	**Ann has to vaccinate both of her cats** **# Ann has to vaccinate all three of her cats**
Ann is going to nominate a student she is supervising	**✓Ann is going to nominate the student she is supervising** **# Ann is going to nominate one of the many students she is supervising**

- The available alternatives are correctly ruled in—if the expressions being replaced are simple terminals as opposed to syntactically complex expressions. [4]
- Consider the case of obligatory symmetry again:

(8) CONTEXT: It is common ground that Paul is planning to travel to one (and only one) North American country—Canada, Mexico or the US—but it's unknown which country he decided on.
  a. ϕ = **Paul is going to the US or Canada**
  b. relevant alternatives: **Paul is going to the US, Paul is going to Canada, Paul is going to Mexico,**
  Paul is not going to the US, Paul is not going to Canada,
  . . . ,
  Paul is going to the US or Canada, . . . ,
  Paul is not going to the US or Canada, . . . [5]

– A negative alternative such as **Paul is not going to the US** can not be obtained by deletion and lexical replacement: We would have to add a new node that forms a constituent neither with the disjunction nor with the predicate it combines with.[6]

[4] We will see later that for some cases listed here, this is not obvious (e.g. **both** and person features).

[5] Alternatives with a conjunction (**Paul is going to the US and Canada**, etc.) can be assumed to be irrelevant here, because this possibility is ruled out by the common ground.

[6] Note that the need to block **Paul is not going to the US** as an alternative of **Paul is going to the US or Canada** provides a reason to define complexity in a way that is structure-sensitive, rather than e.g. by counting the terminal nodes of the LF or counting all the nodes.

(9) [[the US] [or Canada]] [1 [PRES [PROG [Paul [go [to [t_1]]]]]]]
$\not\Rightarrow^*$ not [[the US] [1 [PRES [PROG [Paul [go [to [t_1]]]]]]]

– So we end up with the following alternative set:[7]

(10) $ALT_c(\phi)$ = {**Paul is going to the US**, **Paul is going to Canada**, **Paul is going to Mexico**, **Paul is going to the US or Canada**, **Paul is going to the US or Mexico**, **Paul is going to Mexico or Canada**}

The maximal consistently excludable subsets are:

(11) a. {**Paul is going to the US**, **Paul is going to Mexico**, **Paul is going to the US or Mexico**}
b. {**Paul is going to Canada**, **Paul is going to Mexico**, **Paul is going to Mexico or Canada**}

So the only innocently excludable alternative is **Paul is going to Mexico**, and we correctly block the derivation of a scalar inference based on either of the disjuncts.

(12) $[\![$**exh [Paul is moving to the US or Canada]**$]\!]^{c,w}$ = 1 iff Paul is going to the US or to Canada in w ∧ Paul is not going to Mexico in w

[7] Technically we also get word-order variants like **Paul is going to Canada or the US** and redundant disjunctions like **Paul is going to Canada or Canada**. For the output of **exh**, ignoring these alternatives won't make a difference.

• We can reason similarly in a case like (13), and also in (14), given the (non-obvious) assumption that all the other city names **Boston** could be replaced with count as syntactic terminals without internal structure.

(13) a. Q_c: Can Paul claim the C-3 tax credit, which requires having more than one child, and can he claim the C-4 credit, which requires having more than two children?
b. Mary: **Paul has at least two children.**
$\rightsquigarrow$ Mary does not know whether Paul has exactly two children or more than two
$\not\rightsquigarrow$ Paul has exactly two children, $\not\rightsquigarrow$ Paul has more than two children
c. $ALT_c(\phi)$ = {**Paul has at least two children**, **Paul has two children**, **Paul has at least three children**} [8]

(14) a. Mary: **What city did Paul move to?**
Jane: **Well, he moved to the US.**
$\rightsquigarrow$ Jane does not know which US city Paul moved to
$\not\rightsquigarrow$ Paul didn't move to Boston, $\not\rightsquigarrow$ Paul didn't move to DC, ...
b. relevant alternatives: {**he moved to Boston, he moved to DC,** ...}

[8] Depending on the exact representation of the 'standard phrase' (the **than**-phrase) in a comparative, maybe **Paul has less than two children** and **Paul has less than three children** are also structural alternatives, given that superlative forms of adjectives arguably structurally contain the comparative forms (Bobaljik 2012). This will not affect the conclusion that only an ignorance inference is possible here.

• Note that for this reasoning to go through, the question under discussion Q_c has to be such that all the alternatives in the stalemate set(s) are relevant.

– This is not entirely self-evident: Technically, Q_c for (15) could be a three-way partition as in (16), in which case both the disjunction and **Paul is going to the US** are relevant, but **Paul is going to Canada** is not.

(15) **Paul is going to Canada or the US.**

(16) $\{\{w$: Paul is not going to Canada and is not going to the US in $w\}$,
$\{w$: Paul is going to Canada and is not going to the US in $w\}$,
$\{w$: Paul is going to the US in $w\}\}$

– This does not correspond to any 'natural' question that can easily be asked, but the system as it stands won't rule it out.

– However, there is a literature arguing on independent grounds that disjunctions require 'parallelism' wrt. the QUD, i.e. they have to address a QUD to which each disjunct is relevant.[9]

– If we have an independent account of this parallelism requirement, it could be exploited to rule out partitions like (16).

[9] See e.g. Zhang (2022), Hénot-Mortier (2025).

• In sum, we now have an implementation of the upper bound constraint that makes the following predictions:

– In case a stalemate set contains some alternatives that cannot be obtained from the prejacent via lexical replacement and deletion, we get OBLIGATORY ASYMMETRY.

As a result, scalar inferences are derived only for alternatives that are derivable from the prejacent without an increase in complexity.

– In case all the alternatives in a stalemate set can be obtained from the prejacent via lexical replacement and deletion, we get OBLIGATORY SYMMETRY.

1.3 Comparison with the scalar replacement approach

• Katzir's structural approach is a reaction to decades of work that assumes a different picture of alternative constraints.

• This picture goes back to Horn (1972); see also Gazdar (1979), Sauerland (2004) for more recent expositions. I think that for most linguists (outside certain subcommunities of people working on formal pragmatics) it is still the default theory.

– The starting assumption[10] is that some expressions (typically only lexical primitives) are organized into asymmetrically ordered *scales*.

(17) scales ordered by entailment[11]

a. {**some**, **all**}
b. {**allowed**, **required**}
c. {**warm**, **hot**}
d. {**cold**, **cool**}
e. {**one**, **two**, . . . , **twenty-two**, . . . , **one thousand**, . . .}

[10] Sometimes it is assumed that this ordering must be total, but as already discussed in Horn (1972) and Gazdar (1979) this might be too strong. The example of person features below is potentially problematic, if Sauerland (2008) is correct that neither the first nor the second person is semantically unmarked relative to the other.

[11] Numerals are both atypical scalar elements in terms of processing, acquisition and behavior under embedding (see e.g. Chemla & Singh 2014 for a survey) and include complex expressions that are very unlikely to be lexicalized (**one hundred and twenty-one**). These two ways in which numerals are problematic for a scalar theory of inferences are likely to be related, but it's unclear how.

(18) scales ordered by presuppositional strength
   a. {**a**, **the**}
   b. {**all**, **both**}
   c. person features: {**3rd**, **1st**, **2nd**}

(19) scales ordered by 'expectation', stereotypical temporal order etc. without any logical relation
   a. {**misdemeanor**, **felony**}
   b. {**engaged, married**}
   c. {**BA**, **MA**, **PhD**}

- One immediate question raised by this approach is how to predict when lexical items form a scale, i.e. what the relevant ordering relations are.[12]

- That said, assuming that a set $\mathcal{S}$ of scales can be derived from the lexicon of a language, the scalar approach can be thought of as a restricted variant of the structural complexity approach in which only replacements with 'scalemates' are permitted.

(20) a. An expression α is a SCALEMATE of an expression β iff there is a scale in $\mathcal{S}$ containing both α and β.
   b. $\phi \Rightarrow \psi$ iff ψ is the result of replacing a subexpression of ϕ with one of its scalemates

- In a certain sense, this is much more restrictive than Katzir's (2007) structural theory.
  - If scales are limited to syntactic primitives, the definition of $\Rightarrow$ in (20-b) derives strictly fewer alternatives.
  - Specifically, $\psi \in ALT_c(\phi)$ can hold only if ψ and ϕ have exactly the same tree structure except possibly for the labeling of the terminal nodes.

- This still accounts for our core cases of obligatory asymmetry (assuming, as we did before, that the available alternatives involve simple lexical items).

(21) **Paul is going to the US** $\notin ALT_c($**Paul is going to the US or Canada**$)$

- But there are two core properties that distinguish this approach from Katzir's (2007) replacement + deletion approach
  - For Katzir's approach, it is irrelevant whether or not the alternatives are asymmetrically ordered wrt. some property
  - The scalar approach doesn't generate alternatives by deletion

1.4 Evidence for deletion alternatives

Let's look in a bit more detail at the latter point (we'll return to the first point in Section 2 below)

[12] A common talking point in the later literature that moves away from the scale idea is that scales need to be stipulated and therefore constitute an additional kind of lexical knowledge (besides the basic meanings of lexical items); but my impression from reading Horn (1972) is that he takes them to be ultimately predictable once we have a theory of the set of semantic relations that matter in cases like (19) and the way they depend on context.

- We don't straightforwardly predict that a coordinate structure has its coordinates as alternatives—we can only replace the disjunction with another connective and do replacements within the disjuncts:

(22) **Paul is going to visit his parents**
$\notin ALT_c$(**Paul is going to visit his parents or travel to Canada**)

- An unembedded disjunction does not trigger a scalar inference, as we've seen—but the inference becomes available when we embed the disjunction under an operator that removes the symmetry.

(23) Jane: **What do you know about Paul's summer plans?**
Mary: **I (only) know that he is going to visit his parents or travel to Canada.**
$\rightsquigarrow$ Mary doesn't know that he is going to visit his parents
$\rightsquigarrow$ Mary doesn't know that he is going to travel to Canada

(24) $ALT_c(\phi)$ according to Katzir (2007):
{**I know that he is going to visit his parents or travel to Canada**,
I know that he is going to visit his parents and travel to Canada,
I know that he is going to visit his parents,
I know that he is going to travel to Canada }

Here the deletion alternatives straightforwardly yield the attested inference, but it's unclear how to get this inference from the scalar theory.[13]

- Katzir (2007) lists several more types of inferences that are most easily understood in terms of alternatives derived by deletion, e.g.:

(25) a. **Everyone who has visited both the US and Canada has had this experience.**
$\rightsquigarrow$ not everyone who has visited the US has had this experience
$\rightsquigarrow$ not everyone who has visited Canada has had this experience
b. alternatives: **everyone who has visited the US has had this experience**, **everyone who has visited Canada has had this experience**

(26) a. **Everyone who owns a red car is a potential suspect.**
$\rightsquigarrow$ not everyone who owns a car is a potential suspect
b. alternative: **everyone who owns a car is a potential suspect**

(27) a. **Every tenant who owns a bike will get a key to the bike room.**
$\rightsquigarrow$ not every tenant will get a key to the bike room
b. alternative: **every tenant will get a key to the bike room**

[13] Sauerland (2004) proposes a technical fix in terms of silent operators L and R that are semantically binary connectives, but produce meanings equivalent to the left and the right conjunct, respectively. This is compatible with the letter of the scalar theory, but not its spirit since it amounts to positing lexical items that are never pronounced, only to derive alternatives that don't involve replacement with any known lexical item.

If the disjuncts are structurally parallel (e.g. **Paul is going to the US or Canada**), it is technically possible to obtain something like **Paul is going to Canada or Canada** by lexical replacement. This is equivalent to **Paul is going to Canada** given a classical meaning for disjunction. However, this strategy does not work for the example in the main text, where the disjuncts are structurally quite different.

1.5 Presupposition strengthening based on deletion alternatives?

- Interestingly, the point might extend to presupposition strengthening, which would strengthen the case that the theory of alternatives is the same across linguistic phenomena.
- Rouillard & Schwarz (2017) claim that there are also cases of presupposition strengthening with less complex alternatives (see also Aravind 2018):

(28) CONTEXT: It is common knowledge that John scored exactly two points.
  a. ✓**The two points John scored impressed Mary.**
  b. #**The two or three points John scored impressed Mary.**

(29) CONTEXT: It is common knowledge that every boy owns a bike.
  a. ✓**No boy lost his bike.**
  b. #**No boy who has a bike lost his bike**

- However, I don't find it completely evident that these are violations of MP.
  - (28-b) and (29-b) both have contextually equivalent alternatives that are strictly less complex ((28-a) and (29-a))
  - So they might be cases of oddness triggered by redundancy, i.e. violations of Grice's (1975) Manner submaxim 'Be brief!'[14]
- A possibly more convincing argument comes from a phenomenon that is actually problematic for standard versions of MAXIMIZE PRESUPPOSITION: antipresuppositions triggered by **unaware**.

(31) CONTEXT: It is common knowledge among the discourse participants that all the linguistics students smoke. John, however, is not sure whether any of them smoke.
  a. #**John is unaware that some of the linguistics students smoke.**
  b. ✓**John is unaware that all of the linguistics students smoke.**

  - An **unaware**-sentence presupposes that the complement clause is true and asserts that the attitude subject is not certain that it is true.
  - Note that the uncertainty condition is stronger for (31-a) than for (31-b), so even if it is common ground that in fact all students smoke, (31-a) and (31-b) are not contextually equivalent.
  - This means that the effect in (31), despite patterning like a MP effect in several ways, is not accounted for by the standard version of MP.
  - Various authors have proposed strengthening theories that do not require contextual equivalence to generate an anti-presupposition and can therefore account for (31)[15]

[14] That is, their oddness might be on a par with cases like (30):

(30) **#If John is from France, he is from France and has a French passport.**

[15] See e.g. Gajewski & Sharvit 2012, Spector & Sudo 2017, Anvari 2018, 2019 a.o.

– Importantly, the contrast in (31) can be replicated with disjunctions and their disjuncts (Spector & Sudo 2017)

(32) CONTEXT: It is common knowledge among the discourse participants that Paul is moving to the US. John (who is not participant in the conversation) has no idea that he is moving to North America at all.

a. **#John is unaware that Paul is moving to the US or Canada.**
b. **✓John is unaware that Paul is moving to the US.**

- In sum, assuming that alternatives are derivable by deletion seems to capture something systematic about strengthening.

  If so, this provides an argument for Katzir's structural approach over the scalar theory.

- However, we'll have to look in more detail at whether the generality of Katzir's (2007) theory is in fact justified. Examples like (33), where symmetry is broken by salience, might indicate that it is *too* general.

(33) CONTEXT: A doctor said that to stay healthy in old age, it is important to exercise regularly, meditate regularly and not smoke.
Mary: **So is Jane doing what the doctor recommended?**
Paul: **Well, she (only) exercises.**
⇝ Jane doesn't meditate, ⇝ Jane still smokes

- *Next step*: Discuss some high-level predictions of this theory (some of which are shared with some versions of the scalar theory) and evidence for and against them.

2 *Prediction: Strengthening is indifferent to subtypes of alternatives*

- Scalar theories typically require some kind of ordering of the alternatives—if not by entailment, then by 'expectedness', or an ordering corresponding to a social hierarchy, etc.

- On Katzir's structural theory, lexical substitutions are possible regardless of whether there are any asymmetries in meaning.

- This means that it extends to cases like (34), which involves alternatives generated by substituting open-class items (proper names) that do not stand in any ordering relation.

(34) CONTEXT: Three teachers are eligible for the best teacher award: Mary, Jane and Paul.
A: **Which teachers did the students nominate for the best teacher award?** B: **They nominated Mary**.
⇝ they didn't nominate Jane and Paul

(35) A: **Which teachers did the students nominate for the best teacher award?**
B: **Half of the students nominated Mary, and the others nominated Paul.**

- Intuitively, we want to have the following alternative sets, which are generated by Katzir's approach via lexical substitution:

(36) $ALT_c(\textbf{I nominated Mary}) = \{\textbf{I nominated Mary}, \textbf{I nominated Jane}, \textbf{I nominated Paul}\}$

(37) a. [half of the students [1 [$_\alpha$ PAST [t_1 [nominate Mary]]]]]
b. $ALT_c(\alpha) = \{[\text{PAST}\ [t_1\ [\text{nominate Mary}]]], [\text{PAST}\ [t_1\ [\text{nominate Jane}]]], [\text{PAST}\ [t_1\ [\text{nominate Paul}]]]\}$

- But there are no asymmetries among the alternatives in this set[16]
- Nonetheless, these inferences (sometimes discussed under headings like PARTICULARIZED IMPLICATURES or AD-HOC EXHAUSTIVITY INFERENCES) pattern with scalar inferences in various ways.[17]
  - cancellation and suspension[18]

    (38) a. **They nominated Mary. They also nominated Paul.**
    b. **They nominated Mary, and possibly Paul.**

  - reinforcement

    (39) **They nominated Mary, but not Paul.**

  - analogy between **only** and covert strengthening

    (40) **They only nominated Mary.** $\rightsquigarrow$ they didn't nominate Jane and Paul

- Crucially for us, the analogy extends to the way symmetry breaking works.
  - We cannot derive the negation of an ad-hoc exhaustivity inference, sometimes known as an ANTI-EXHAUSTIVITY INFERENCE[19]

    (41) CONTEXT: Three teachers are eligible for the best teacher award: Mary, Jane and Paul.
    A: **Which teachers did the students nominate for the best teacher award?** B: **They nominated Mary**.
    a. ✓ A: **Are you saying they didn't nominate Jane?**
    b. ✗ A: **Are you saying they also nominated Jane?**

    (42) Given the structural theory:
    a. **they nominated Jane** $\in ALT_c(\textbf{they nominated Mary})$
    b. **they nominated Mary** $\not\Rightarrow^*$ **[not [they nominated Jane]]**
    [not [they nominated Jane]] $\notin ALT_c(\textbf{they nominated Mary})$

[16] In particular, it's not necessary for the inference in (36) that Mary is less likely than the others to be nominated.

[17] There are also some disanalogies—for instance, some counterparts of **at least**, such as German **mindestens**, are not very good in cases like (34). But this does not necessarily show that the theory of strengthening must be sensitive to scalar orderings—it could be the semantics of **mindestens** that is sensitive to them.

[18] The obligatoriness of **also** here also distinguishes these particularized implicatures from typical scalar inferences, where **even** or expressions like **in fact** would be more appropriate. Again, this might reflect the semantics and use-conditions of these items, rather than two fundamentally different forms of strengthening.

[19] See Cremers et al. 2023 for experimental work relevant to this point. They argue that Rational Speech Act models of implicature calculation (Goodman & Stuhlmüller 2013, Spector 2017) face a problem because they are able to generate anti-exhaustivity inferences.

  - Note that in principle, there is a way of reconciling ad-hoc exhaustivity inferences with the view that strengthening always involves an asymmetry between alternatives.

    The actual alternative set could be of the following kind:

    (43) ALT_c(**they nominated Mary**) = {**they nominated Mary**, **they nominated Mary and Jane**, **they nominated Mary and Paul**, **they nominated Mary, Jane and Paul**}

  - The problem, though, is that this involves alternatives that are more complex than the prejacent, and therefore ruled out by both scalar theories and Katzir's structural theory.

- In sum, one advantage of the structural approach of Katzir (2007) is that it leads us to expect analogies between strengthening inferences that involve entailment-based scales and those that do not.

- This is important to keep in mind when reading the recent literature on puzzles that challenge Katzir's theory.

  - Several current approaches to these puzzles rely crucially on there being a certain entailment relation between alternatives, or on the alternatives being logically independent.[20]
  - This means they predict entailment-based scalar inferences to pattern differently from ad-hoc exhaustivity inferences, as well as inferences based on non-entailment based scales (**has an MA** $\rightsquigarrow$ 'doesn't have a PhD', etc.)
  - So when you encounter a new alternative to structural theories (or if you are trying to develop one), it's important to check whether it predicts such a disanalogy and, if so, whether it is empirically warranted

[20] See for instance Trinh & Haida (2015) on ad hoc exhaustivity inferences caused by more complex alternatives, Schwarz & Wagner (2024b,a) on breaking symmetry via a blocking condition, as well as Bar-Lev et al. (2025) on a problem case involving antonyms (more on which later).

3 *Prediction: Missing alternatives result in missing inferences*

- We now consider a prediction Katzir's (2007) structural approach shares with scalar theories that only permit lexical replacement.

- On such theories, the potential of an item for scalar inferences is constrained by the *inventory of meanings lexicalized by other items of the same category*.

- This predicts that two languages A and B can have lexical items with the same basic meaning, such that the item in language A gets strengthened, but its counterpart in language B does not, because it lacks a scalar competitor.[21]

- Here I briefly discuss one case where this prediction looks plausible—Deal's (2011) work on SCALELESS MODALS in Nez Perce. Scaleless modals are existential modals that lack a universal competitor.

[21] There is also a large literature arguing that in the absence of scalar competitors, other forms of strengthening occur that would usually be blocked by the scalar inference (see e.g. Bowler 2014, Crnič 2025 a.m.o.). I won't discuss this in more detail here since these other strengthening mechanisms build on analyses of free choice disjunction that are beyond the scope of this class (see e.g. Fox 2007).

- Nez Perce[22] has a modal verb affix **o'qa** that seems ambiguous or underspecified between possibility and necessity:
  - In a translation task, bilingual speakers volunteered English translations with both **can** and **should** (e.g. (44-b,c) for (44-a)), and produce **o'qa** when asked to translate English sentences with both **can** and **should**.

    (44) CONTEXT: A friend is preparing for a camping trip. I am taking this person around my camping supplies and suggesting appropriate things. I hand them two blankets and say:
    a. **'inéhne-no'qa 'ee kii lepít cíickan.**
    take-MOD you DEM two blanket
    b. 'You can take these two blankets.'
    c. 'You should take these two blankets.' (Deal 2011:561, (1))

- It might seem that **o'qa** is either ambiguous or context-dependent, and can express either an existential or a universal meaning.[23]
- However, Deal argues for something else: **o'qa** is unambiguously a possibility modal and has the same meaning as existential modals in English, except that it is more restricted wrt. modal flavor.[24]
  - Sometimes speakers comment that translations with necessity modals are inaccurate:

    (45) PROMPT: According to the rules, I should leave.
    a. **tamáalwit-ki 'aat-ó'qa.**
    rule-INST go.out-MOD
    b. Consultant: 'That's not really saying I should go out. It's just saying I COULD go out.' (Deal 2011:564, (11))

  - In downward-entailing environments, **o'qa** behaves exactly like an English possibility modal. Paraphrases corresponding to negated necessity are rejected even if they make sense in the context:

    (46) **Wéet'u máwa hi-pa-'yáaŝ-no'qa 'inpeew'etúu-nm.**
    not when 3SUBJ-S.PL-find-MOD police-ERG
    a. 'The police would never find me.' $(\neg > \Diamond)$
    b. #'It's possible that the police won't ever find me.' $(\neg > \Box)$
    (Deal 2011:574, (48))

- But because it lacks a scalar inference, it is felicitous in contexts where a necessity statement would be true.
- Why does **o'qa** not trigger scalar inferences? Because an **o'qa**-sentence does not have an alternative of equal or lower complexity with a necessity modal that can express the same modal flavors.[25]
- Strategies Nez Perce speakers use to express necessity meanings include 'simulated imperatives' (47), negated speech verbs plus possibility modal (48), attitude ascriptions (e.g. 'want'), or future statements expressed with prospective aspect.

[22] Nez Perce (Sahaptian) is an endangered indigenous language spoken in the northwestern US that had about 30 speakers when Deal's paper was written. By now the number of speakers has become even smaller.

[23] This kind of variability has been argued to exist in other indigenous languages of the Pacific Northwest; see e.g. Rullmann et al. (2008) on St'át'imcets (Salish).

[24] There is something methodologically a bit odd here: If Deal is right, the English translations with **should** that her consultants accepted are not actually equivalent to the Nez Perce sentences, but strictly stronger. In contrast, English translations with necessity modals in DE contexts would have been weaker than the Nez Perce sentences and were not accepted. This in itself is not a problem—translations provided in a fieldwork setting often do not respect truth-conditional equivalence (e.g. Matthewson 2004), and maybe speakers are more likely to accept a stronger translation than a weaker one. But then it is surprising that Deal's consultants sometimes offered the weaker **o'qa** sentences as a translation of necessity statements in English. It seems that Deal would have to claim that the lack of scalar alternatives affects what people do in a translation task.

[25] Nez Perce has several epistemic modals, but **o'qa** cannot be used in examples with an epistemic flavor. There is another affix that expresses non-epistemic modality, but it also appears to differ from **o'qa** in the modal flavors it permits rather than strength. There is also a deverbalizing suffix **(n/t)e's** that expresses non-epistemic modality, but it is restricted to special cases of circumstantial modality, involving function or purpose, and therefore in most cases not a plausible competitor for **o'qa** for reasons of relevance.

(47) **c'alawí tamáalwit hi-hí-ce-∅ 'áac-im,**
if rule 3SUBJ-say-IMPF-PRES enter-CISLOC.IMPV
kaa 'aac-ó'.
then enter-PROSP
'If I have to go in, I will.'
lit. 'If the rule says, Enter!, then I will enter.'
(Deal 2011:578, (64))

(48) **imee-nik-o'qa mét'u wéet'u 'ee hí-ce-∅**
2SG.REFL-lie.down-MOD but not you tell-IMPF-PRES
kúnk'u 'ee 'imee-nik-o'qa.
always you 2SG.REFL-lie.down-MOD
'You could lie down, but I'm not telling you you could stay in bed all the time.' (Deal 2011:578, (65))[26]

[26] The prompt given to the consultant here was: 'You can stay in bed, but you don't have to.' Yet, Deal's other observations about **o'qa** in downward-entailing environments together with the translation in (48) suggest that the sentence conveys the speaker *shouldn't* stay in bed.

- Crucially, these strategies involve a lot of extra structure not present in **o'qa** sentences; for instance, (47) and (48) both involve an extra layer of embedding under a speech verb.
- So, given the upper-bound hypothesis, these sentences could not be in the ALT_c set of an **o'qa** sentence. Deal argues that the apparent difference in strength between **o'qa** and its English counterparts (**can, possible**, etc.) is fully explained by this.
- Later work on scaleless modals in other languages has taken a different approach: They assume that if scalar strengthening is ruled out, a different strengthening mechanism that is not structure-sensitive applies and strengthens the modal to a necessity meaning in non-downward-entailing environments.[27]
- On the other hand, there are cases in which we find what looks like a scalar inference without the putative alternative being lexicalized.
  - Breheny et al. (2018): so-called MAXIMUM-STANDARD predicates—predicates that intuitively pick out the 'highest point' in a scale—trigger scalar inferences that follow the **not all** $\rightsquigarrow$ 'some' pattern

    (49) **The glass is not full.**
    $\rightsquigarrow$ the glass is not empty
    $\not\rightsquigarrow$ the glass is empty

  - In cases where there is an antonym targeting the other scale endpoint, this is a case of obligatory asymmetry that does not follow from structural or scalar theories

    (50) stalemate set: {**the glass is empty**, ~~**the glass is not empty**~~}

  - The puzzle then seems to be why we can get rid of the **not empty** alternative.[28]
  - But in fact the issue seems to be even more fundamental: We find the same kind of strengthening in the absence of a lexicalized alternative.[29]

[27] See e.g. Jeretič (2021) for an application of this idea to modals in Siona (Tucanoan), an endangered indigenous language of Ecuador. Jeretič shows that the dispreference for translations with necessity modals that Deal reports does not hold in this language. Taken at face value, this might suggest that some scaleless existential modals are strengthened to universal modals and others are not, depending on independent factors such as the availability of so-called 'subdomain alternatives' (Chierchia 2013, Bar-Lev 2021).

[28] Note that trying to appeal to antonym decomposition, where [NEG full] $\leftrightarrow$ **empty**, would arguably get rid of both alternatives: (49) has a sentential negation (i.e. [NEG [the glass is full]]); there is no $\Rightarrow^*$-path from this structure to a structure in which the negation directly combines with **full**.

[29] Maybe the case of **not required** $\rightsquigarrow$ 'not impossible' discussed in Breheny et al. (2018) is of a similar kind, if **impossible** is internally complex.

– For instance, German **erreichen** 'reach' patterns like a maximum-standard predicate e.g. in terms of the modifiers it takes, but lacks a lexical antonym targeting the other scale endpoint.

(51) **Der Zug hat Wien nicht erreicht.**
the train has Vienna not reached
'The train did not reach Vienna.'
$\rightsquigarrow$ the train started moving in the direction of Vienna
$\not\rightsquigarrow$ the train never started moving in the direction of Vienna

– Similarly, **vollständig** 'complete' gives rise to a 'partiality' inference that can't be triggered by a scalar alternative meaning that means all the documents are absent, because there is no suitable scalar antonym

(52) **Ihre Dokumente sind nicht vollständig.**
your.HON documents are not complete
'You didn't collect all the documents.'
$\rightsquigarrow$ the hearer collected some of the documents
$\not\rightsquigarrow$ the hearer did not collect any of the documents

– This suggests that in (49), both of the **empty**-alternatives should be blocked and the real explanandum is how to derive the scalar inferences without relying on antonyms.

• To my knowledge, nobody understands why 'scaleless' maximum-standard degree predicates do not pattern with scaleless modals.

• More generally, it is striking how much of the evidence in favor of the conclusion that 'missing alternatives result in missing inferences' come from two empirical domains: modals and coordinators.[30]

• I'm not sure that this is just an accident of the history of science—maybe it tells us that besides the structural mechanism for deriving alternatives, there are other mechanisms that are restricted to certain semantic configurations (e.g. degree predication?).[31]

$\Rightarrow$ *potential for future work* on why some categories of scalar expressions seem to show variation between expressions with/without scalar competitors and others do not

4 *Prediction: Structural differences matter regardless of how small they are*

• In the cases of obligatory asymmetry we've looked at, the unavailable alternatives involve alternatives that are very clearly more complex (extra negation, extra phrasal modifier, . . .)

• But the alternatives that *are* available do not always self-evidently fall within the complexity bound imposed by the prejacent.

[30] However, see Crnič et al. (2015) for an interesting new argument in favor of this conclusion, which relies on the difference between existential and universal quantifiers wrt. exceptional wide scope.

[31] Another response could be to base a theory of alternatives on 'conceptual' complexity rather than structural complexity (Buccola et al. 2022). The big challenge for this approach is to come up with ways of determining/testing the 'conceptual complexity' associated with a given meaning.

- This issue becomes particularly urgent if we make two assumptions that, while not completely mainstream in (morpho)syntax, are often implicitly made by semanticists:

  1. *separate (interpretable) features correspond to separate syntactic primitives*
  2. *the mapping from syntactic primitives to exponents can be many-to-one*

- Let's be slightly more explicit about this:

  – The idea that features correspond to separate syntactic terminals is common in cartography[32]

  – It is also at the core of morphosyntactic frameworks like Nanosyntax and more generally, theories that adopt the notion of SPANNING—the possibility of a single vocabulary item realizing a 'stretch' of the functional sequence.[33]

  – Here I will informally make use of the spanning idea by making use of lexical entries of the following form:

    (53) $[X_1\ [X_2\ [\ldots X_n]]] \leftrightarrow \alpha$
    where the X_i are syntactic primitives and α is an exponent

  – Such a lexical entry means that the exponent α can realize a structure in which X_{i+1} heads the complement of X_i for $1 \leq i < n$

    (54) example: German 'strong' adjective/determiner inflection + Caha's (2013) case hierarchy
    a. [NOM [MASC]] ↔ **-er**
    b. [ACC [NOM [MASC]]] ↔ **-en**
    c. [GEN [ACC [NOM [MASC]]]] ↔ **-es**
    d. ...

  – I abstract away from the details of how competition between more and less specific exponents works in such systems.
    But the core intuition (see e.g. Blix 2021) is that
    * a structure can be spelled out by an exponent that has a *superset* of the features appearing in the structure
    * a variant of the Elsewhere Principle favors exponents with fewer unnecessary features

  – Such theories make it easy to encode morphosyntactic 'markedness' directly in terms of *more structure*, without extra devices such as $+/-$ feature values

- In my experience, semanticists rarely talk about cartography, spanning, etc., but as soon as the compositional semantics of elements below the 'word level' is at issue, decomposition into separate syntactic primitives for separate features is extremely common![34]

- This is unsurprising, because from a semanticist's perspective, the notion of feature bundles as the primitives of syntax is

[32] See e.g. Kayne 2008, Cinque & Rizzi 2009 for introductory treatments.

[33] See Abels & Muriungi 2008, Svenonius 2012, 2020, Blix 2021 a.o. for spanning, and Starke 2009, Baunaz et al. 2018, Caha 2020 for Nanosyntax. Related ideas have also been explored within Distributed Morphology (Radkevich 2010, Bobaljik 2012).

[34] Such decomposition into several primitives corresponding to a single exponent even appears in Heim & Kratzer (1998), when they talk about presuppositions of pronouns.

1. inelegant (we would need a separate rule to compose bundles consisting of several interpretable features)
2. extremely limiting (this rule can't be sensitive to the order in which the primitives compose, so it's difficult to see how they could differ in type, etc.)

- But if we follow the lead of cartography and spanning/nanosyntax approaches and assume that morphosyntactic markedness ≈ more structure, this has consequences for the notion of structural complexity that matters in pragmatics!
- I think we should start taking this seriously as a problem for the upper bound hypothesis.

4.1 Person

- We claimed above that the inference that the referent of a 3rd person pronoun is not the speaker or the hearer is an anti-presupposition.[35]
- This follows straightforwardly if sentences 3rd person pronouns have local person alternatives in their ALT_c set.
  - In the semantics literature, it is common to represent person on pronouns in terms of a single syntactic primitive per person value (see e.g. Sauerland 2008, Heim 2008).

(55) a. $[\![\textsc{1st}]\!]^{c,w} = \lambda x_e : x \text{ contains } s_c.x$
b. $[\![\textsc{2nd}]\!]^{c,w} = \lambda x_e : x \text{ contains } h_c \wedge x \text{ does not contain } s_c.x$
c. $[\![\textsc{3rd}]\!]^{c,w} = \lambda x_e.x$

  - Combining this with a feature $\textsc{ref}_i$ that contributes the referential index, we get pronoun structures of equal complexity.[36]

(56) a. $[\textsc{1st ref}_i] \leftrightarrow$ **I**
b. $[\textsc{2nd ref}_i] \leftrightarrow$ **you**
c. $[\textsc{3rd ref}_i] \leftrightarrow$ **they**

(57) $[\![\textsc{ref}_i]\!]^{c,w} = g_c(i)$

  - If $g_c(2) = s_c$, (58-a) and (58-b) end up contextually equivalent, so MP applies and favors (58-a)

(58) a. [[$\textsc{1st ref}_2$] [have beautiful handwriting]]
b. [[$\textsc{3rd ref}_2$] [have beautiful handwriting]]

  - If $g_c(2) \neq s_c$, (58-a) is a presupposition failure in c, so not contextually equivalent to (58-b), and fails to block (58-b)

- But the morphosyntactic literature contains lots of evidence that 1st and 2nd person are more marked than 3rd[37]
- This is commonly cashed out in terms of a difference in the complexity of the representations.

[35] An interesting argument for this comes from the fact that 3rd person is recruited for honorific pronouns with local person referents, but not vice versa (Sauerland 2008, Wang 2025).

[36] Abstracting away from gender, or assuming (perhaps implausibly?) that singular **they** is the 3rd person pronoun unmarked for gender.

[37] See e.g. Harley & Ritter 2002, Béjar & Rezac 2009, Blix 2021 a.o.

(59) a. [1ST REF$_i$] $\leftrightarrow$ **I**
b. [2ND REF$_i$] $\leftrightarrow$ **you** [38]
c. REF$_i$ $\leftrightarrow$ **they**

[38] The morphosyntactic literature often takes one of the local persons to have a more complex structure that contains the structure of the other local person. On the other hand, semanticists such as Sauerland 2008 have pointed out that neither of the local persons shows anti-presupposition behavior. I leave it open here what the best way of resolving this conflict is.

- But then the MP competition between sentences with 3rd person pronouns and their local person competitors contradicts the upper bound assumption!

4.2 Number

- Tradition has it that singular indefinites like **a cat** quantify over 'single individuals' and plural definites like **(some) cats** quantify over 'groups' of individuals.

(60) a. **Ann just bought a cat.**
b. **Ann just bought some cats.**
$\rightsquigarrow$ Ann bought more than one cat

- Further, (60-a) has an optional scalar inference triggered by competition with (60-b)—an ANTI-MULTIPLICITY INFERENCE

(61) Mary: **Ann just bought a cat.**
Jane: **Are you saying she bought just one?**

- How can we model the semantics of plural indefinites in such a way that this inference is licensed?
  - In plural semantics (see e.g. Nouwen 2015 for an introduction), the domain D_e of individuals is enriched by 'sum individuals'.
  - It is assumed that D_e contains a set A of ATOMIC individuals, i.e. individuals that do not have semantically 'accessible' parts (or whose part-whole structure does not matter for plural semantics)
  - In addition, D_e is enriched with a SUM INDIVIDUAL $\bigoplus(S)$ for every nonempty subset S of A. Given two individuals $a, b \in A$, we write $a \oplus b$ for $\bigoplus(\{a, b\})$.[39]

[39] For the technicalities of how this can be implemented and the properties of the sum operation, see e.g. Champollion 2016.

- Against this background, we might want to say that
  - **a cat** quantifies over atomic individuals
  - **(some) cats** quantifies over sums consisting of multiple parts (the MULTIPLICITY INFERENCE)

- The multiplicity inference is often taken to be the result of strengthening itself—e.g. it tends to disappear in downward-entailing environments.[40]

[40] See e.g. Mayr (2015) for an implementation in terms of **exh**.

(62) **If you own cats, you have to vaccinate them.**
a. ✓ 'If you own one or more cats, you have to vaccinate each of them.'

b. too weak: 'If you own two or more cats, you have to vaccinate each of them.'

- Here I abstract away from this and assume the following sentence meanings prior to global strengthening.[41]

[41] Mayr assumes that the derivation of (63-b) involves strengthening within the restrictor of the indefinite.

(63) a. $[\![\textbf{Ann bought a cat}]\!]^{c,w}$
= 1 iff $\exists x[x$ is a cat in $w \wedge$ Ann bought every atomic part of x in $w]$
b. $[\![\textbf{Ann bought some cats}]\!]^{c,w}$
= 1 iff $\exists x[x$ is a sum of two or more cats in $w \wedge$ Ann bought every atomic part of x in $w]$

- If **Ann bought a cat** can have **Ann bought cats** or **Ann bought some cats** among its alternatives, the anti-multiplicity inference follows straightforwardly
- But the morphosyntactic literature tells us that the singular is likely to have a less complex representation than the plural!
  - evidence from morphological containment (e.g. Corbett 2004, cf. also Bale et al. 2011 although they draw a weaker conclusion): if one number value lacks overt marking, it is generally the singular
  - Nevins (2011): 'omnivorous' plural and lack of intervention phenomena triggered by singular number (e.g. no Number-Case Constraint to parallel the Person-Case Constraint) suggests representing singular as absence of plural[42]
- This would mean (64-a) has (64-b) among its alternatives, again in violation of the upper-bound hypothesis.

[42] An open question is how to square this with the existence of languages in which so-called 'general number' or 'number-neutral' nouns exist besides singular and plural.

(64) a. [a cat] [1 [Ann bought t_1]]
b. [some [PL cat]] [1 [Ann bought t_1]]

4.3 Other cases

- Once we take morphosyntactic evidence for decomposition seriously, it is easy to find other examples of this type in the literature:
  - Dillon & Johnson (2024) argue that Condition B effects as in (65-a) reduce to MP, with the competitor being an alternative with a reflexive (65-b)

    (65) a. ***Ann$_1$ nominated her$_1$ for the best paper award.**
    b. **Ann$_1$ nominated herself$_1$ for the best paper award.**

    In English, though, reflexives like **herself** are pretty clearly more complex, and Dillon & Johnson (2024) assume a syntactic decomposition with a SELF-morpheme taking separate scope.
  - Aravind (2018) points out that the oddness of **a** when **another** could have been used has properties of an anti-presupposition.

    (66) a. ??**First I ate an apple. Then I ate an apple.**

b. **First I ate an apple. Then I ate another apple.**

(67) CONTEXT: Mary has no idea that Jane has had a drink before.
Jane (to Mary): **Now I want a / ??another drink.**

But **another** transparently decomposes into **a** and **other**, again challenging the upper bound hypothesis.[43]

– Several authors[44] take items like **both** to be the spell-out of a complex structure that involves a universal quantifier $Q_\forall$ and a DUAL feature, with **all** being the spell-out in the context of plural.

  * If the DUAL feature is taken to be in complementary distribution with PL, this makes sense of the MP asymmetry in (68).

    (68) a. ✓**John broke both of his arms.**
    b. #**John broke all of his arms.**

  * However, there is evidence that the dual is featurally marked relative to the plural, coming from typology of number systems (69) as well as containment asymmetries and syncretisms (see e.g. Corbett 2004:§2 for relevant data).

    (69) Greenberg's (1963) Universal 34
    No language has a trial number unless it has a dual. No language has a dual unless it has a plural.

  * On the view that extra features amount to extra syntactic structure, this would make the structure spelled out by **both** more complex than that spelled out by **all**.[45]

    (70) a. $[\text{PL } Q_\forall] \leftrightarrow$ **all**
    b. $[\text{DUAL } [\text{PL } Q_\forall]] \leftrightarrow$ **both**

  * If so, **all** again has a more complex competitor for MP.

– Haslinger et al. (2025) propose a decomposition of distributive quantifiers like **every** and **each** into quantificational and individuation-related primitives:

(71) a. $[Q_\forall] \leftrightarrow$ **all**
b. $[Q_\forall\ [\text{ONE}_\emptyset]] \leftrightarrow$ **every**
c. $[Q_\forall\ [\text{ONE}_\emptyset\ [\text{ONE}_{AT}]]] \leftrightarrow$ **each**

They analyze the primitives $\text{ONE}_\emptyset$ and ONE_{AT} as presupposition triggers requiring the NP-predicate to be quantized and atomic, respectively.

They suggest that the ungrammaticality of **all** with singular complements could then be analyzed as a MP-effect. But again, this is possible only if more complex competitors for MP are available.

Q *Can you find other such cases in a language or a domain of grammar that you are working on?*

[43] Aravind concludes that the apparent competition between **a** and **another** is not a 'real' MP effect, based on the finding that its acquisition trajectory is different from the standard MP example of **all** vs. **both**. I think it would be interesting to see whether other apparent cases of MP in which the alternative is *transparently* more complex pattern similarly in acquisition.

[44] See e.g. Aravind (2018:§4.5.3) and more recently Jeretič et al. (2023).

[45] Additionally, in Haslinger et al. (2025) we argue that the distribution of plural universal quantifier forms like **all** is in fact sensitive to semantic properties rather than morphosyntactic number features. If so, Aravind's hypothesis that **both** involves a dual feature could still be maintained, but we might not want to posit a plural feature for **all**.

- *Overall conclusion*: In many cases, extra complexity corresponding to 'marked' morphosyntactic features does not seem to matter for the purpose of constraining alternatives.
  - This issue has received almost no attention in the literature on alternatives, even though it opens up the potential for research in pragmatics that directly informs morphosyntax and vice versa.[46]
  - ⇒ **lots of potential for future work!**
  - Later this week, we will look at a structural theory that rejects/weakens the upper-bound hypothesis (Haslinger & Schmitt to appear) and can make sense of this phenomenon to some extent.

[46] One exception that I know of is ongoing (not yet published) work by Jonathan Bobaljik and Viola Schmitt exploring potential differences between extra structural complexity based on affixes and based on words.

- An open question, however, is what the syntactic distribution of these 'exceptions' is. For instance, are they sensitive to
  - Head vs. specifier?
  - Extra structure based on affixes vs. 'words'?[47]
  - features belonging to the 'same paradigm' vs. 'different paradigm'?[48]

[47] Raises the question of how to define a word in a system where every feature is its own structural primitive; cf. Svenonius 2012.

[48] If we're working with a realizational view of morphology where the morphological component of the grammar simply maps syntactic trees to phonological structures, 'paradigms' are presumably not a primitive notion. This suggests we need a semantic definition of 'same paradigm'.

5 *Prediction: Structural differences matter anywhere in an alternative*

- Another set of counterexamples has to do with cases in which 'underspecific' answers to a question give rise to ignorance and scalar inferences involving more complex alternatives.
- A simple, well-known case of this are examples where the more complex subexpression is actually brought up explicitly in the question:

(72) A: **Is it very warm in Berlin today?** B: **It's warm.**
⇝ it is not very warm in Berlin

(73) A: **Does Peter collect expensive cars?** B: **He collects cars.**
⇝ he does not collect expensive cars

- Katzir (2007) actually has a fix for cases of this type.

He suggests to modify ⇒ in such a way that if a complex expression is mentioned in the immediate discourse context, it can be substituted in as if it were a lexical item.[49]

[49] For further discussion of this definition, see Trinh & Haida (2015).

(74) $\phi \Rightarrow_c \psi$ iff one of the following holds:
  a. ψ is the result of replacing a syntactic terminal in ϕ with a different terminal of the same category
  b. ψ is the result of replacing some constituent α of ϕ with a proper subconstituent of α
  c. [new] ψ is the result of replacing a syntactic terminal in ϕ with an expression of the same category that occurs in the immediate discourse context of ϕ in c

- But there are superficially similar cases where the more complex alternatives are not actually mentioned.

(75) a. Mary: **What's the color and make of Paul's car?**
Jane: **Well, he has a red car.**
$\rightsquigarrow$ Jane doesn't know the make of Paul's car
b. Mary: **What's the color and make of Paul's car?**
Jane: **Well, he has a Toyota.**
$\rightsquigarrow$ Jane doesn't know the color of Paul's car

The ignorance inference in (75-a) is unsurprising—it involves alternatives meeting the upper bound condition.

(76) $ALT_c(\textbf{he has a red car}) = \{\textbf{he has a red Toyota}, \textbf{he has a red Volkswagen}, \ldots\}$

But in (76-b) we get an analogous inference. This suggests the need for more complex alternatives:

(77) $ALT_c(\textbf{he has a Toyota}) = \{\textbf{he has a red Toyota}, \textbf{he has a blue Toyota}, \ldots\}$

- (75) is a case of obligatory symmetry. But there are also cases where we might expect obligatory asymmetry, but do not find it. Place names are a case in point.

(78) A: **So which country is Paul traveling to?** B: **He's going to North America.**
$\rightsquigarrow$ A doesn't know which country in North America Paul is traveling to

(79) impossible symmetry breaking: $ALT_c(\textbf{he's going to North America})$ = {**he's going to Mexico**, **he's going to Canada**, ~~**he's going to the United States**~~}

This might not be that problematic—maybe **the United States** is too 'idiomatic' to count as complex—but the phenomenon is quite general.

In particular, a common issue for the literature on ignorance inferences triggered by place names is that these inferences still happen if not every place at the relevant 'specificity level' has a name.[50]

(80) CONTEXT: In Antarctica, not every region has a name yet, but there are a few named regions.
A: **So where exactly is this research station Paul is traveling to?** B: **It's in Antarctica.**
$\rightsquigarrow$ A doesn't know where exactly in Antarctica it is
$\not\rightsquigarrow$ it is not in any of the named regions in Antarctica

- A well-known instance of obligatory symmetry studied by Katzir (2013) a.o. involves scalar antonyms (**cheap**/**expensive**, **tall**/**short**).

[50] This is occasionally pointed out as a problem in the literature, e.g. Meyer (2013), Hénot-Mortier (2025), but to my knowledge hasn't been seriously addressed.

(81) A: **What does the suspect look like—height, hair color, eye color . . . ?**
B: **Well, he was blond and had green eyes.**
A: **✓Are you saying you don't know anything about his height?**

Given that **short** and **tall** arguably do not jointly exhaust the height scale (e.g. (82) is consistent), it's unclear why we have to derive an ignorance inference, and not a scalar inference that the suspect is of average height.

(82) **The suspect is neither short nor tall.**

- In sum, in many cases involving alternatives of open-class expressions, their internal complexity does not seem to count. A related puzzle involves numerals, where the internal complexity of **twenty-one**, **one hundred and one** etc. does not seem to matter.

(83) A: **So, what's the exact number of cars in Peter's collection?** B: **Peter owns twenty cars.**
⇝ Peter does not own twenty-one cars

- Descriptively, it seems that some subconstituents are treated as 'opaque' for the purposes of determining structural complexity asymmetries.

  In other words, there are locality restrictions on what parts of the structure we are allowed to 'look into' in deriving alternatives.s

- To my knowledge, this has not discussed explicitly by authors who otherwise take complexity seriously as a factor in constraining alternatives.

- Here's a sketch of what a definition of structural alternatives with locality restrictions could look like, without committing to a particular restriction.

  – We introduce a diacritic $\ominus$ to mark the opaque constituents.

  – We define the following replacement relation:

  (84) $\phi \Rightarrow \psi$ iff one of the following holds:
  a. ψ is the result of replacing a syntactic terminal in ϕ with a different terminal of the same category
  b. ψ is the result of replacing some constituent α of ϕ with a proper subconstituent β of α, such that no $\ominus$-marked constituent properly dominates β
  c. ψ is the result of replacing an $\ominus$-marked constituent with an arbitrary well-formed expression of the same category (which is still $\ominus$-marked)

  – This permits e.g.:

(85) **[Peter [owns [[$_\ominus$ twenty] cars]]]**
⇒ **[Peter [owns [[$_\ominus$ twenty one] cars]]]**

(86) **[Paul [has [a [$_\ominus$ Toyota]]]]**
⇒ **[Paul [has [a [$_\ominus$ red Toyota]]]]**

– Crucially, for an $\ominus$-expression arbitrary relevant alternatives can be generated regardless of their complexity. So in (85) every numeral generates an alternative, and in (86) we can add modifiers of arbitrary complexity as in:

(87) **[Paul [has [a [$_\ominus$ Toyota]]]]**
⇒ **[Paul [has [a [$_\ominus$ Toyota [that is not red]]]]]**

– So an $\ominus$-constituent will often (depending on the embedding environment . . .) give rise to an alternative set with obligatory symmetry no matter how the alternatives are expressed.

– At the same time, relative to a given choice of $\ominus$-marked constituent, not everything is permitted. Outside the $\ominus$-marked constituents, deletion is possible but structure addition is not.

(88) **[not [Peter [own [[$_\ominus$ twenty] cars]]]]**
⇒ **[Peter [owns [[$_\ominus$ twenty] cars]]]**

(89) **[Peter [own [[$_\ominus$ twenty] cars]]]**
$\not\Rightarrow^*$ **[not [Peter [own [[$_\ominus$ twenty] cars]]]]**

• Given this general picture, the question arises: what can we say about the distribution of $\ominus$, or rather, what is the actual theory that could replace $\ominus$?

• This kind of question has to my knowledge not been investigated all in the structural alternative literature. But from a syntactic perspective, where we find all kinds of locality effects, it's a very natural question!

• Some hypotheses and questions ($\rightsquigarrow$ **potential for future work!**)

– Is $\ominus$-marking constrained by some notion of locality domains that could be described in syntactic terms?

– Is it constrained by syntactic category? Here the work of Paillé (2022) is relevant, who assumes that lexical-category predicates formed by $v, n, a, \ldots$ undergo obligatory strengthening.

⇒ *Hypothesis*: all lexical-category predicates come with $\ominus$-marking[51]

– Would account for the proper name cases, assuming following Matushansky (2009) that proper names are DPs consisting of a silent determiner and a noun. The noun could then be $\ominus$-marked

– Fox & Katzir (2011) argued that in general, replacement and deletion to derive structural alternatives are possible only within a focused constituent.

(90) a. A: **What are you interested in?** B: **I am interested in SEMANTICS$_F$**

[51] An obvious problem case would be lexical-category scalar predicates such as **warm/hot** (although **The water is warm but not hot** would still not be an alternative to **the water is warm**$_\ominus$ if the negation is sentential). The **full/empty** case discussed earlier in this handout is also problematic.

$\rightsquigarrow$ B isn't interested in applied linguistics; ✕ alternative: **I am interested in applied linguistics**

b. A: **Who is interested in semantics?** B: **I$_F$ am interested in semantics**
$\not\rightsquigarrow$ B isn't interested in applied linguistics; ✕ alternative: **I am interested in applied linguistics**

– But it has been noted that this might be too strong—scalar inferences appear to be possible even in cases where the scalar expression is intuitively not in focus (cf. Krifka's point that scalar items behave as if they had an 'inherent focus'; cf. also Schwarz & Wagner 2024a)

(91) A: **Who is taking any of the syntax classes?**
B: **PAUL$_F$ is taking some of the syntax classes.**
A: ✓ **Are you saying he isn't taking all of them?**

– So, maybe it is not strengthening inferences per se that require focus, but inferences derived from $\ominus$-marked constituents.

$\Rightarrow$ *Hypothesis* if so: $\ominus$-marking is only possible within a focused constituent

– Note that the converse is not true, i.e. focused constituents don't need to be $\ominus$-marked—otherwise it would be impossible to break symmetry between **some** and **some but not all** in cases like (92) where the whole sentence is focused

(92) A: **What happened?** B: **Paul submitted some of his problem sets.**

– But is there a correlation between types of alternatives that *do* strictly require focus, as in (92), and types of alternatives that permit more complex alternatives (like **applied linguistics**?

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