Structural complexity in formal pragmatics

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Part 3: Alternatives to the upper-bound hypothesis

Goals for this class:

- discuss a set of data that seems to pose a fundamental challenge to the upper bound hypothesis: strengthening based on more complex alternatives under modals
- introduce two recent approaches to this problem and some open questions and problems for each approach
- introduce some open questions in this empirical domain

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1 *The puzzle: Complex alternatives under modal embedding*

1.1 *Recap*

- Recall the core data pattern motivating the upper-bound hypothesis:
  - OBLIGATORY SYMMETRY: If there is a stalemate set consisting of alternatives that are less or equally complex than the prejacent, these alternatives 'block each other' from being negated

    (1) **Paul is going to Canada or the US.**
    stalemate set: {**Paul is going to Canada**, **Paul is going to the US**}

    As a result, no scalar inferences can be derived—only ignorance inferences.
  - OBLIGATORY ASYMMETRY: If there is a stalemate set that contains alternatives which are more complex than the prejacent or structurally incomparable, the stalemate must be resolved by ignoring these alternatives.

    (2) **Paul did some of the problem sets.**
    stalemate set: {**Paul did all of the problem sets**,
    ~~**Paul did some but not all of the problem sets**~~}

    In this case, a scalar inference based on the less complex alternative is derived.
- We captured this data pattern by assuming that
  - alternatives can be negated only if they are innocently excludable[1]
  - innocent excludability is determined relative to the set $ALT_c(\phi)$

[1] Recall: Relative to a prejacent p and alternative set S, an alternative in S is innocently excludable iff it is in each of the maximal subsets of S that are consistently excludable wrt. p.

– THE UPPER-BOUND HYPOTHESIS: $ALT_c(\phi)$ contains only alternatives that do not exceed the prejacent in complexity

- If this is correct, in cases of obligatory asymmetry the problem of making a choice between symmetric alternatives never arises to begin with, because the more complex alternatives are not in $ALT_c(\phi)$.
- In cases where the symmetric alternatives are both within the complexity bound set by the prejacent, on the other hand, we cannot evade the problem.

1.2 *Embedding under universal modals*

- This makes a *prediction*: If we embed a sentence ϕ under an operator δ that removes the symmetry
  1. if ϕ gives rise to obligatory symmetry, $\delta(\phi)$ should allow for a strengthening inference based on each of the alternatives
  2. if ϕ gives rise to obligatory asymmetry, $\delta(\phi)$ should still *only* permit strengthening based on alternatives that are within the complexity bound set by the prejacent
- Schwarz & Wagner (2024b,a) and Haslinger & Schmitt (to appear) argue that the first part of this prediction is borne out, but the second one is not.[2]
- The embedding environments they consider involve *universal modal operators* such as **required**, as well as attitude verbs like **know**, which are often analyzed as universal world quantifiers as well.[3]
  – I assume a standard analysis of **required** as a universal quantifier over worlds:

(3) $$[\![\textbf{required}]\!]^{c,w} = \lambda f_{\langle s,\langle s,t\rangle\rangle}.\lambda p_{\langle s,t\rangle}.\forall w'[f(w)(w') \rightarrow p(w') = 1]$$

  – I assume a simple semantics for **know** that (i) presupposes the complement clause to be true and (ii) requires it to be true in all possible worlds in a set $K_w(x)$, which contains all the worlds compatible with all the justified beliefs of attitude subject x in w

(4) $$[\![\textbf{know}]\!]^{c,w} = \lambda p_{\langle s,t\rangle}.\lambda x_e.\begin{cases} 1 & \text{iff } p(w) = 1 \wedge \forall w' \in K_w(x).p(w') = 1 \\ 0 & \text{iff } p(w) = 1 \wedge \exists w' \in K_w(x).p(w') = 0 \\ \# & \text{otherwise} \end{cases}$$

- We've already seen that in the obligatory symmetry cases, embedding under such operators licenses an inference based on each of the alternatives.

(5) CONTEXT: Jane and Mary both know Paul is planning to visit a single country and that it is a North American country—Canada, the US or Mexico.

[2] Examples of the relevant kind are also discussed by Hirsch (2024), Hirsch & Schwarz (2024). However, Hirsch does not take the modal to be crucial to this effect, but takes the data to show that in general, the theory of symmetry breaking should be based on salience rather than structure. For reasons discussed in handout 1 (as well as Fox & Katzir 2011), I think this conclusion is too radical—sometimes introducing a salience asymmetry is not sufficient for a stalemate set to be broken up in the 'unexpected' direction.

[3] For an introduction to the semantics of modals and attitude verbs, see e.g. von Fintel & Heim (2021).

Jane: **What does Peter know about Paul's travel plans?**
Mary: **Peter only knows that Paul is going to the US or Canada.**
$\rightsquigarrow$ Peter isn't certain that Paul is going to the US
$\rightsquigarrow$ Peter isn't certain that Paul is going to Canada

– In this context, we expect $ALT_c(\phi)$ to be as follows.[4]

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

[4] Excluding redundant disjunctions and abstracting away from the order of the disjuncts. Note that the conjunctive alternatives are not relevant in this context.

– The embedding operator **know** has a property that is crucial for us:

(7) *Embedding under **know** doesn't preserve symmetry*
Given two alternatives ψ and ψ' such that $\{\psi, \psi'\}$ is a stalemate set wrt. prejacent ϕ, {**Peter knows** ψ, **Peter knows** ψ'} is not generally a stalemate set wrt. **Peter knows** ϕ.

This is because a subject who knows ϕ may be *ignorant* as to which of the alternatives ψ and ψ' is true, so that **Peter knows** ψ and **Peter knows** ψ' can both be consistently negated.

(8) a. $[\![$**Peter knows that Paul is going to the US or Canada**$]\!]^{c,w}$
$$= \begin{cases} 1 & \text{iff Paul is going to the US or Canada in } w \\ & \wedge \forall w' \in K_w(\text{Peter}).\text{Paul is going to the US or Canada in } w' \\ 0 & \text{iff Paul is going to the US or Canada in } w \\ & \wedge \exists w' \in K_w(\text{Peter}).\text{Paul is not going to the US and not going to Canada in } w' \\ \# & \text{otherwise} \end{cases}$$

b. $[\![$**Peter knows that Paul is going to the US**$]\!]^{c,w}$
$$= \begin{cases} 1 & \text{iff Paul is going to the US in } w \wedge \forall w' \in K_w(\text{Peter}).\text{Paul is going to the US in } w' \\ 0 & \text{iff Paul is going to the US in } w \wedge \exists w' \in K_w(\text{Peter}).\text{Paul is not going to the US in } w' \\ \# & \text{otherwise} \end{cases}$$

c. $[\![$**Peter knows that Paul is going to Canada**$]\!]^{c,w}$
$$= \begin{cases} 1 & \text{iff Paul is going to Canada in } w \wedge \forall w' \in K_w(\text{Peter}).\text{Paul is going to Canada in } w' \\ 0 & \text{iff Paul is going to Canada in } w \wedge \exists w' \in K_w(\text{Peter}).\text{Paul is not going to Canada in } w' \\ \# & \text{otherwise} \end{cases}$$

– Importantly, the truth conditions in (8-a) can be met without those of (8-b) or (8-c) being met.

This happens e.g. if Mary is ignorant as to which of the two countries Paul is going to. Then K_w(Mary) contains both worlds where he is going to the US and worlds where he is going to Canada.[5]

– So the set consisting of the two disjunct alternatives (8-b) and (8-c) is consistently excludable, and we derive a scalar inference based on both of these propositions.

[5] Recall that our variant of the **exh** operator merely asserts that the innocently excludable alternatives are not true, not that they are false. So it does not require the presuppositions of all the alternatives to be met. For discussions of versions of **exh** that let the presuppositions of the alternatives project, see e.g. Spector & Sudo (2017), Bassi et al. (2021).

- This illustrates a very general pattern that extends to other cases of obligatory symmetry and other universal modals:

(9) Jane: **What is Paul required to do this semester?**
Mary: **He is only required to take syntax or semantics.**
$\rightsquigarrow$ Paul is not required to take syntax
$\rightsquigarrow$ Paul is not required to take semantics

(10) *Embedding under **required** doesn't preserve symmetry*
Given two alternatives ψ and ψ' such that $\{\psi, \psi'\}$ is a stalemate set wrt. prejacent ϕ, {**required** ψ, **required** ψ'} is not generally a stalemate set wrt. **required** ϕ.

(11) consistently excludable alternatives:
{**Paul is required to take syntax, Paul is required to take semantics**}

(12) Jane: **Which city did Paul move to?**
Mary: **I only know that he moved to the US.**
$\rightsquigarrow$ Mary isn't certain that he moved to Boston,
$\rightsquigarrow$ Mary isn't certain that he moved to DC, ...

(13) consistently excludable alternatives:
{**I know that he moved to Boston**, **I know that he moved to DC**, ...}

- Importantly, this pattern seems to extend to cases of obligatory asymmetry: Given the right kind of context, we seem to get inferences based on any alternative participating in the stalemate set, including the more complex alternative.

(14) CONTEXT: Jane got a grant this year. There is a rule concerning these grants: Some of the money has to be spent within the first year. Jane is wondering if there is additionally a requirement to keep some of the money for the next year, or whether she can spend all of it immediately.
Jane: **So, are there any restrictions on what I can do with my grant money this year?**
Mary: **You are only required to spend some of the money.** [6]
a. Jane: ✓**Are you saying I do not have to spend all of it this year?**
(alternative: **you are required to spend all of the money**)
b. Jane: ✓**Are you saying it is possible to spend all of it this year if I want to?**
(alternative: **you are required to spend some but not all of the money**)

(15) CONTEXT: The syllabus says that students who pass the exam get an A if they also did all of the problem sets, and a B if they did some, but not all of the problem sets. Mary has looked at the students' problem sets, but didn't take notes and doesn't remember for every student how many they completed.
Jane: **So what about Paul? What grade will he get?**

[6] The intended reading here seems to require a prosody that is consistent with the entire **some**-DP being in focus. If these examples are pronounced with the main accent on the scalar item (i.e. **some**) and everything after **some** is deaccented, my impression is that the unexpected 'allowed to spend all' inference is no longer there.
If this is correct, it might provide evidence for Fox & Katzir's (2011) hypothesis that only focused elements can be substituted in the derivation of alternatives. However, in other cases this hypothesis seems too strong; **some** appears to be able to trigger a scalar inference even if it is in a deaccented part of the sentence (cf. also Schwarz & Wagner 2024a)

Mary: **I only know that Paul did some of the problem sets.**

a. Jane: **✓Are you saying he might not have done all of them and we might have to give him an B?**
(alternative: **I know that Paul did all of the problem sets**)

b. Jane: **✓Are you saying he might have done all of them and we might be able to give him an A?**
(alternative: **I know that Paul did some but not all of the problem sets**)

- Given the upper-bound hypothesis, we would expect to find the inferences in (14-a) and (15-a), but not those in (14-b) and (15-b). Why isn't this borne out? A speculation:
  - Modal embedding removes the symmetry and makes it possible to exclude both alternatives without inconsistency. Illustrating with (14):

(16) a. $[\![$**[required** $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$**] [you spend some of the money]**$]\!]^{c,w}$
$= 1$ iff $\forall w'[g_c(\langle 1, \langle s, \langle s,t\rangle\rangle\rangle)(w)(w') \rightarrow$ Mary spends some of the money in $w']$

b. $[\![$**[required** $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$**] [you spend all of the money]**$]\!]^{c,w}$
$= 1$ iff $\forall w'[g_c(\langle 1, \langle s, \langle s,t\rangle\rangle\rangle)(w)(w') \rightarrow [$Mary spends all of the money in $w']]$

c. $[\![$**[required** $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$**] [you spend some but not all of the money]**$]\!]^{c,w}$
$= 1$ iff $\forall w'[g_c(\langle 1, \langle s, \langle s,t\rangle\rangle\rangle)(w)(w') \rightarrow [$Mary spends some of the money in $w' \wedge$
$\neg[$Mary spends all of the money in $w']]]$

  - We observe that alternatives that are usually consistently blocked by the symmetry-breaking mechanism become available once the symmetry is removed.
  - So maybe it is not correct to categorically ban more complex alternatives such as (16-c) from $ALT_c(\phi)$.
  - Rather, $ALT_c(\phi)$ can contain alternatives that are more complex than the prejacent, but there is a principle that ensures that *in cases of symmetry*, such alternatives are kicked out.
  - When the embedding configuration removes the stalemate, this restriction is lifted and we can obtain alternatives of arbitrary complexity if they are relevant.

- The hypothesis that more complex alternatives emerge once there is no symmetry problem to be resolved makes a prediction.

  If we make the simplifying assumption that the modal base for modals like **required** has to be internally consistent[7], *existential* modals like **allowed** preserve symmetry:

(17) *Embedding under **allowed** preserves symmetry!*
Given two alternatives ψ and ψ' such that $\{\psi, \psi'\}$ is a stalemate set wrt. prejacent ϕ, {**allowed** ψ, **allowed** ψ'} is still a stalemate set wrt. **allowed** ϕ.

[7] In general, this assumption often seems unwarranted, e.g. when the interpretation of the modal is sensitive to laws or social norms, which may of course be inconsistent (see Kratzer 1977). However, I suspect that in such cases, the context must resolve inconsistencies by selecting a consistent subset of the modal base (compare e.g. von Fintel's (1999) use of selection functions for counterfactuals). In cases where this can't be done in a non-arbitrary way (such as the legal example discussed by Kratzer) the truth conditions of modalized sentences seem hard to judge, maybe even underspecified.

- So if the possibility of strengthening with more complex alternatives is contingent on an embedding environment that removes symmetry, this kind of strengthening should no longer be possible under **allowed**.
- While a closer empirical look at these examples is needed, it seems to me that this prediction is borne out (cf. Haslinger & Schmitt to appear for discussion).

(18) CONTEXT: Jane got a grant this year. There is a rule concerning these grants: Some of the money has to be spent within the first year. Jane is wondering if there is additionally a requirement to keep some of the money for the next year, or whether she can spend all of it immediately.
Jane: **So, are there any restrictions on what I can do with my grant money this year?**
Mary: **You are only allowed to spend some of the money.**
  a. Jane: ✓ **Are you saying I am not allowed to spend all of it this year?**
  (alternative: **you are allowed to spend all of the money**)
  b. Jane: × **Are you saying that I if I spend some of it this year, I have to spend all of it?**
  (alternative: **you are allowed to spend some but not all of the money**)

(19) stalemate set: $\{$**you are allowed to spend all the money**, ~~**you are allowed to spend some but not all of the money**~~$\}$

Q *Can you think of other embedding environments in which more complex alternatives are licensed, but that do not (or not obviously) involve universal modality?*

I will now discuss two recent approaches to this problem for the upper-bound hypothesis

- one from Haslinger & Schmitt (to appear) that involves a relatively conservative modification of the Katzir (2007) framework
- and one due to Schwarz & Wagner (2024b,a) that amounts to a more radical shift in our perspective on symmetry breaking

2 *Relative complexity (Haslinger & Schmitt to appear)*

2.1 *Implementation*

- *Core intuition*: Katzir (2007) is right that stalemates are broken by a structural criterion. But the upper-bound hypothesis is too strong.

  Instead of comparing the complexity of each alternative to the prejacent, we compare the complexity of each alternative *that participates in a stalemate* to the *other alternatives* it is in a stalemate set with.

- We start out with the set $\mathcal{F}_c(\phi)$ of all alternatives that are relevant to Q_c. Within this set, there is always a massive symmetry problem blocking any scalar inference.[8]

(20) For Q_c = 'Which courses is Paul taking?'
$\mathcal{F}_c$(**Paul takes syntax or semantics**)
= {**Paul takes syntax**, **Paul takes semantics**,
not [Paul takes syntax], **not [Paul takes semantics]**,
Paul takes syntax and semantics, **not [Paul takes syntax and semantics]**, ...}

- Within this set, some alternatives are *structurally closer* to the prejacent than others.
  - Intuitively: For an alternative ψ to be closer to ϕ than another alternative ψ', there must be a simplifying derivation using the $\Rightarrow$-relation that connects ϕ to ψ' and has ψ as an intermediate step, but not the other way around.
  - More formally:

(21) Given a prejacent structure ϕ and two alternatives ψ and ψ':
ψ is CLOSER to ϕ than ψ' if one of the following holds:
a. $\psi' \Rightarrow^* \psi \Rightarrow^* \phi$ and $\psi \not\Rightarrow^* \psi'$
b. $\phi \Rightarrow^* \psi \Rightarrow^* \psi'$ and $\psi' \not\Rightarrow^* \psi$

  - For instance:

(22) **not [Paul takes syntax and semantics]**
$\Rightarrow$ **Paul takes syntax and semantics**
$\Rightarrow$ **Paul takes syntax or semantics**

But there is no simplifying derivation connecting **Paul takes syntax and semantics** to **Paul takes syntax or semantics** that has **not [Paul takes syntax and semantics]** as an intermediate step.

(23) **Paul takes syntax and semantics**
$\not\Rightarrow^*$ **not [Paul takes syntax and semantics]**
$\Rightarrow^*$ **Paul takes syntax or semantics**

Such a derivation would contain at least one step that is not a simplification.

So **Paul takes syntax and semantics** is closer to the prejacent **Paul takes syntax or semantics** than **not [Paul takes syntax and semantics]**.

  - Note that neither of the disjunct alternatives **Paul takes syntax** and **Paul takes semantics** is closer than the other.

- The idea is then that we remove the massive symmetry problem from $\mathcal{F}_c(\phi)$ as follows: We get rid of every alternative that

1. is in a stalemate set

[8] In Haslinger & Schmitt (to appear) we assumed following Fox & Katzir (2011) that $\mathcal{F}_c(\phi)$ only contains alternatives obtained by substitutions or deletions within constituents that are focused in ϕ. I abstract away from this issue here.

2. and is not maximally close to the prejacent within that stalemate set

(24) Given a set S of alternatives and a prejacent ϕ, the set $\mathcal{M}_c(\phi, S)$ of MAXIMALLY CLOSE ALTERNATIVES to ϕ in S contains all and only those $\psi \in S$ s.t.

a. ψ and ϕ are structurally related, i.e. $\psi \Rightarrow^* \phi$ or $\phi \Rightarrow^* \psi$

b. and there is no $\psi' \in S$ that is closer to ϕ than ψ.

(25) $ALT_c(\phi) = \{\psi \in \mathcal{F}_c(\phi) : [\![\psi]\!]^c$ is relevant to Q_c $\wedge \forall S \subseteq \mathcal{F}_c(\phi)[\psi \in S \wedge S$ is a stalemate set wrt. $\phi \rightarrow \psi \in \mathcal{M}_c(\phi, S)]\}$

Given ϕ = **Paul takes syntax or semantics**:

– In the stalemate set {**Paul takes syntax and semantics**, **not [Paul takes syntax and semantics]**}, the non-negated alternative is closer to ϕ.

– So in this case, the negated alternative must be removed from $ALT_c(\phi)$.[9]

– In the stalemate set {**Paul takes syntax**, **Paul takes semantics**}, neither alternative is closer to ϕ than the other.

[9] Note that technically, we also generate e.g. **not [not [Paul takes syntax and semantics]]** in $\mathcal{F}_c(\phi)$. This is blocked by the regular negated alternative **not [Paul takes syntax and semantics]**, which forms a stalemate set with it and is closer to ϕ. This negated alternative is then in turn blocked by the conjunctive alternative without negation.

2.2 *Accounting for the modal embedding facts*

- The stalemate set in (26) is resolved in the same way as for negated and non-negated conjunction.

(26) ϕ = **Jane spent some of the money**
{**Jane spent all of the money**, **Jane spent some but not all of the money**}

We have the simplifying derivation in (27), but we don't have a simplifying derivation connecting **some**- and **all**-alternatives that has the **some but not all**-alternative as an intermediate step.

(27) **Jane spent some but not all of the money**
⇒ **Jane spent all of the money**
⇒ **Jane spent some of the money**

- Consider now ϕ = **required [Jane spend some of the money]**.
- In this case the alternatives in (28) do not form a stalemate set.

(28) **required [Jane spend all of the money], required [Jane spend some but not all of the money]**

Since the structural notion of closeness only matters when a stalemate needs to be resolved, both of these alternatives are in $ALT_c(\phi)$ if they are relevant.

- More generally, alternatives **required** ψ for arbitrarily complex ψ are available as long as they are relevant.

  This captures the intuition that **only required** ϕ has the inference that there are no other relevant requirements, no matter how complex they are.

- On the other hand, consider ϕ = **allowed [Jane spend some of the money]**.
- In this case (29) is a stalemate set, so it is resolved in favor of the **all**-alternative, which is closer to ϕ.

(29) **allowed [Jane spend all of the money]**, **allowed [Jane spend some but not all of the money]**

In sum:

- This approach accepts Fox & Katzir's (2011) intuition that structural alternative constraints are the main way of breaking symmetry. In this sense, it is a quite conservative modification of the Katzir theory.
- The main novelty is that structural constraints apply *only when they are needed* to break symmetry.
- Another, less crucial novelty is that instead of always favoring the less complex of two symmetric alternatives, this approach favors the one that is closer to the prejacent. We will see some reasons to do this below.

3 *Output complexity (Schwarz & Wagner 2024b,a)*

3.1 *Implementation*

- *Core intuition*: Katzir's (2007) notion of complexity is crucial for symmetry breaking, but it is not the complexity of the *alternatives* that matters.
- Rather, we need to look at the complexity of BLOCKING EXPRESSIONS—other expressions that would convey the intended strengthening inference directly, i.e. without strengthening.
- On this approach, $ALT_c(\phi)$ can in principle be any subset of the relevant alternatives. There is no requirement to include *every* relevant alternative meeting a certain condition.
- But there is a *blocking constraint* ruling out certain choices of $ALT_c(\phi)$ if they produce a strengthening inference that *could be expressed at least as economically without strengthening*.

(30) BLOCKING CONDITION
Given a context c with a particular choice of the alternative set $ALT_c(\phi)$, the strengthened meaning $[\![\textbf{exh}\ \phi]\!]^c$ for ϕ is unavailable if there is an expression β such that

a. $\{w : [\![\textbf{exh } \phi]\!]^{c,w} = 1\} \subseteq \{w : [\![\beta]\!]^{c,w} = 1\} \subset \{w : [\![\phi]\!]^{c,w} = 1\}$
(the strengthened meaning of ϕ produced by $ALT_c(\phi)$ entails the regular meaning of β, which in turn is stronger than the unstrengthened meaning of ϕ)
b. and β is no more complex than ϕ, i.e. $\phi \Rightarrow^* \beta$.
(adapted from Schwarz & Wagner 2024a:(86))

If conditions (30-a) and (30-b) are met, I call β a BLOCKING EXPRESSION.[10]

(31) Blocking **some** ⇝ 'all'
a. ϕ = **Jane spent some of the money**
b. $ALT_c(\phi) = \{$**Jane spent some of the money**, **Jane spent some but not all of the money**$\}$
c. $[\![\textbf{exh } \phi]\!]^c = \lambda w.$Jane spent all of the money in w
d. blocking expression: β = **Jane spent all of the money**
(**Jane spent some of the money** ⇒ **Jane spent all of the money**)

(32) No blocking of **some** ⇝ 'some but not all'
a. ϕ = **Jane spent some of the money**
b. $ALT_c(\phi) = \{$**Jane spent some of the money, Jane spent all of the money**$\}$
c. $[\![\textbf{exh } \phi]\!]^c = \lambda w.$Jane spent some of the money in $w \wedge \neg$[Jane spent all of the money in w]
d. β = **Jane spent some but not all of the money**?
Not a blocking expression: **Jane spent some of the money** $\not\Rightarrow^*$ **Jane spent some but not all of the money**

[10] In their SuB proceedings paper (Schwarz & Wagner 2024b) and the main text of Schwarz & Wagner (2024a), a simpler version of the blocking constraint is proposed that requires the non-strengthened meaning of the blocking expression to be identical to the strengthened meaning of ϕ. However, as Schwarz & Wagner (2024a) note in Appendix A of their paper, this would lead to problems with the core cases of obligatory symmetry. It would also have a problem with the **allowed/required** contrast, since it would permit strengthening with a **some but not all** alternative under **allowed**.

3.2 *Accounting for the modal embedding facts*

– The strengthened meaning produced by a more complex alternative under **required** is not blocked, because there is no simpler way of generating this inference without **exh**.

(33) a. ϕ = **[required** $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$**] [Jane spend some of the money]**
b. $ALT_c(\phi) = \{$**[required** $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$**] [Jane spend some of the money]**, **[required** $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$**] [Jane spend some but not of the money]**$\}$
c. $[\![\textbf{exh } \phi]\!]^c = \lambda w.\forall w'[g_c(\langle 1,\langle s,\langle s,t\rangle\rangle\rangle)(w)(w') = 1 \rightarrow$ Jane spends some of the money in $w]$ $\wedge \exists w'[g_c(\langle 1,\langle s,\langle s,t\rangle\rangle\rangle)(w)(w') = 1 \wedge$ Jane spends all of the money in $w']$

* β = **Jane is allowed to spend all of the money**?
Not a blocking expression, fails to entail ϕ
* β = **Jane is required to spend some of the money and Jane is allowed to spend all of the money**?
Not a blocking expression, too complex
* β = **Jane is required to spend all of the money**?
Not a blocking expression, not entailed by **exh** ϕ

– In contrast, there is a blocking expression in the **allowed** case, intuitively because in this case the unavailable strengthened meaning entails the **all**-alternative.

(34) a. ϕ = **[allowed $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$] [Jane spend some of the money]**

b. $ALT_c(\phi) = \{$**[allowed $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$] [Jane spend some of the money]**, **[allowed $f_{\langle 1,\langle s,\langle s,t\rangle\rangle\rangle}$] [Jane spend some but not all of the money]**$\}$

c. $[\![$**exh** $\phi]\!]^c = \lambda w.\exists w'[g_c(\langle 1,\langle s,\langle s,t\rangle\rangle\rangle)(w)(w') = 1 \wedge$ Jane spends some of the money in $w'] \wedge \forall w'[[g_c(\langle 1,\langle s,\langle s,t\rangle\rangle\rangle)(w)(w') = 1 \wedge$ Jane spends some of the money in $w'] \rightarrow$ Jane spends all of the money in $w']$

Blocking expression: β = **Jane is allowed to spend all of the money—** entails ϕ and is entailed by **exh** ϕ

4 *Are the good predictions of the Katzir (2007) approach preserved?*

4.1 *Indifference to alternative subtypes?*

- The *relative complexity approach* does not care about the logical relation between the alternatives and the prejacent.
- So it also blocks the unattested anti-exhaustivity inferences in cases where there is no entailment from the alternative to the prejacent, such as (35) (see Cremers et al. 2023 for this phenomenon):

(35) Context: Three teachers—Jane, Mary and Paul—are candidates for the best teacher award.
A: **Who did the students nominate?** B: **They nominated Jane.**

a. $\not\rightsquigarrow$ they nominated both Jane and Mary
✗ ALT_c(**they nominated Jane**) = {**they nominated Jane, not [they nominated Mary]**}

b. $\rightsquigarrow$ they did not nominate Mary
✓ ALT_c(**they nominated Jane**) = {**they nominated Jane, they nominated Mary**}

(36) a. stalemate set:
{**they nominated Mary,** ~~**not [they nominated Mary]**~~} [11]

b. **they nominated Mary** closer to the prejacent than **they did not nominate Mary**

[11] Note that in principle, since Haslinger & Schmitt (to appear) reject the upper bound hypothesis, we could also take the relevant stalemate set to be {**they nominated Jane and Mary, they nominated Jane but not Mary**} with the same result. Therefore, this approach removes one of the counterarguments to the neo-Gricean idea that scalar inferences always have to be based on stronger alternatives.

- For the *output-complexity approach*, on the other hand, it is crucial that the blocking expression must be *stronger* than the prejacent.
- This means that there must be a *stronger* alternative expressing the intended inference without extra structural complexity.

Therefore, the account licenses the unattested anti-exhaustivity inference in cases where there *is* no relevant stronger alternative of the same complexity.

(37) a. ϕ = **they nominated Jane**

b. $ALT_c(\phi)$ = {**they nominated Jane, not [they nominated Mary]**}

c. $[\![\textbf{exh}\ \phi]\!]^c = \lambda w.$the students nominated Jane in $w \wedge$ the students nominated Mary in w]

- β = **they nominated Jane and Mary**?
  Not a blocking expression, too complex
- β = **they nominated Mary**?
  Not a blocking expression, fails to entail ϕ

- *A potential way out* (not pursued by Schwarz & Wagner, but I think it would be interesting to look into): try to combine their approach with the 'locality boundary' idea we discussed last time, where the internal structure of certain constituents is ignored by $\Rightarrow$
- In particular, the proper name examples we discussed suggest that the internal structure of referential DPs can quite often be ignored by $\Rightarrow$. Maybe this could be exploited to make **they nominated Jane and Mary** a legitimate blocking expression
- *Methodological point*: When you encounter a new approach to the symmetry problem, check whether it makes different predictions for scalar strengthening with entailment and ad hoc exhaustivity with no entailment, and whether the differences (if any) are empirically warranted

4.2 *Missing alternatives $\rightsquigarrow$ missing inferences?*

- The *relative complexity* approach explicitly permits inferences based on more complex alternatives if they are not in a stalemate with a 'better' alternatives.
- This means it does not preserve the prediction that scalar inferences triggered by 'weak' lexical items are no longer there in languages where there is no stronger scalemate.
- What is the prediction for possibility modals with no necessity counterpart (cf. Nez Perce)?
  - It depends how the language would paraphrase necessity, and whether the paraphrase in question is STRUCTURALLY CLOSER to a sentence with a possibility modal than a negated necessity statement.
  - This can be the case only if there is a $\Rightarrow^*$-relation connecting the necessity paraphrase to the possibility statement. This depends on the details of the morphosyntax of the language in question
  - To my knowledge, this has not been properly investigated for the existing examples of scaleless modals.
    If in such a language the necessity paraphrases are structurally unrelated to the possibility sentences (i.e. no $\Rightarrow^*$-relation in either direction), the prediction might be the same as on the structural theory.
- The *output complexity* approach also does not block inferences based on more complex alternatives (and does not even require a $\Rightarrow^*$-relation)

- As far as I can see, it would also permit strengthening of possibility to necessity in such languages, because a more complex necessity statement is not a blocking expression
  - Interesting, because for some languages with scaleless modals it has been argued (contra Deal 2011) that they are in fact variable between necessity and weaker meanings (Rullmann et al. 2008, Jeretič 2021)
  - But based on this literature, I don't think we want a theory that permits *both* 'possible and not necessary' and 'necessary' as possible strengthenings

4.3 *Obligatory symmetry*

- On the *relative complexity* approach, there is a problem with instances of obligatory symmetry where the alternatives in the stalemate set differ in complexity.

(38) **John is going to Mexico or [John is going to the US and Canada]**
stalemate set: {**John is going to Mexico**, **John is going to the US and Canada**}

- This is because we now care about the complexity of the alternatives *relative to each other*, not in whether they both meet a given upper bound.
- **John is going to the US and Canada** counts as closer to the prejacent, because it is possible to get from there to **John is going to Mexico** in a simplifying derivation, but not vice versa.

(39) **John is going to Mexico or John is going to the US and Canada**
$\Rightarrow$ **John is going to the US and Canada**
$\Rightarrow$ **John is going to Canada**
$\Rightarrow$ **John is going to Mexico**

(40) **John is going to Mexico or John is going to the US and Canada**
$\Rightarrow$ **John is going to Mexico**
$\not\Rightarrow^*$ **John is going to the US and Canada**

- So it should be possible to break the stalemate, which is clearly wrong.
- *Possible way out* discussed in Haslinger & Schmitt (to appear): Make use of Katzir's (2007) extension of the $\Rightarrow$-relation, which allows us to substitute in more complex expressions that occur elsewhere in the tree.
- Result: In a conjunction either disjunct can be substituted for the other in a single step, so both count as equally close to the prejacent.
- The *output complexity* approach in the version presented above[12] gets these data for free, because each disjunct alternative is a blocking expression.

[12] The original blocking constraint in Schwarz & Wagner (2024b) does not get these examples right, because it required the basic meaning of the blocking expression to be identical to the strengthened meaning it blocks, rather than just entailed by it.

(41) a. ϕ = **John is going to Mexico or John is going to the US and Canada**
b. $ALT_c(\phi) = \{$**John is going to Mexico or John is going to the US and Canada**, **John is going to the US and Canada**$\}$
c. $[\![$**exh** $\phi]\!]^c$ = λw.John is going to Mexico in $w \wedge$ John is not going to both the US and Canada in w]

Blocking expression: β = **John is going to Mexico**

- In contrast, cases of obligatory symmetry triggered by open-class items at different 'specificity levels' are still problematic:

(42) a. ϕ = **Paul is moving to the US**
b. $ALT_c(\phi) = \{$**Paul is moving to the US**, **Paul is moving to Boston**, **Paul is moving to DC**$\}$
c. $[\![$**exh** $\phi]\!]^c$ = λw.Paul is moving to the US in $w \wedge$ Paul is not moving to Boston in $w \wedge$ Paul is not moving to DC in w

β = **Paul is not moving to Boston** etc. not a blocking expression—too complex

Let's summarize the predictions we've looked at so far:

property	*relative complexity*	*output complexity*
obligatory asymmetry without embedding	✓	✓
no obligatory asymmetry under **required**	✓	✓
obligatory asymmetry under **allowed**	✓	✓
indifference to alternative subtypes	✓	× w/o extra assumptions
missing alternatives ⇝ missing inferences	?? [depends on syntax]	×
obligatory symmetry with disjunctions	× w/o extra assumptions	✓
obligatory symmetry with open-class items	only if equally complex	×

It seems clear that

- neither of these two approaches captures the full range of data motivating the Katzir (2007) theory
- several of the issues seem to be related to 'oversensitivity'—within certain subexpressions, structural differences no longer matter

⇒ **lots of potential for future work informed by (morpho)syntax!**

5 *Obligatory asymmetry with less complex alternatives*

We've looked at cases where we don't find obligatory asymmetry even though the upper bound hypothesis predicts it.

There is another set of data that appears to motivate a (partial) move away from the upper bound hypothesis.

These cases involve *obligatory asymmetry between two alternatives that both fall within the upper bound*.

In particular (as pointed out by Morwenna yesterday) this problem arises when the prejacent already contains a negation.

5.1 *The indirect implicature puzzle*

- Romoli (2013) points out that the Katzir (2007) theory has difficulties with scalar inferences involving negative sentences.

(43) **Paul did not do all of the problem sets.**
  a. ⇝ Paul did some of the problem sets
  (✓ **Are you saying he did some of them and should get a B?**)
  b. ⇝̸ Paul did not do any of the problem sets
  (✗ **Are you saying he didn't do any of them and should get a C?**)

(44) **You are not required to present a poster in this class.**
  a. ⇝ the hearer is allowed to present a poster
  (✓ **Are you saying I am allowed to present a poster?**)
  b. ⇝̸ the hearer is not allowed to present a poster
  (✗ **Are you saying I can't present a poster?**)

- Here the scalar approach, which does not permit the derivation of alternatives via deletion, actually does a good job at selecting the right alternative sets:

(45) ϕ = **Paul did not do all of the problem sets**
  a. ✓ $ALT_c(\phi)$ = {**Paul did not do all of the problem sets**, **Paul did not do any of the problem sets**}
  ⇝ 'not all but some'
  b. ✗ $ALT_c(\phi)$ = {**Paul did not do all of the problem sets**, **Paul did some of the problem sets**}
  ⇝ 'none'

(46) ϕ = **You are not required to present a poster**
  a. ✓ $ALT_c(\phi)$ = {**You are not required to present a poster**, **You are not allowed to present a poster**}
  ⇝ 'not required but allowed'
  b. ✗ $ALT_c(\phi)$ = {**You are not required to present a poster**, **You are allowed to present a poster**}
  ⇝ 'not allowed'

- But we have seen that in other cases deletion alternatives are necessary, so a return to the scalar approach is not a promising answer.

- Strikingly, both of these cases involve stalemate sets that are broken up in favor of the *more complex* alternative.

(47) ϕ = **Paul did not do all of the problem sets**
  stalemate set: {**Paul did not do any of the problem sets**, ~~**Paul did some of the problem sets**~~}

(48) ϕ = **You are not required to present a poster**

stalemate set: {**You are not allowed to present a poster**, ~~**You are allowed to present a poster**~~}

5.2 *How do the two alternative theories fare?*

- The *relative complexity* approach favors the negative alternatives because they are structurally closer to the prejacent.
- For instance there is a simplifying derivation from **not all** to **some** that has **not any** as an intermediate step:

(49) **Paul did not do all of the problem sets**
$\Rightarrow$ **Paul did not do any of the problem sets**
$\Rightarrow$ **Paul did some of the problem sets**

- But there is no simplifying derivation from **not all** to **not any** that has **some** as an intermediate step.

(50) **Paul did not do all of the problem sets**
$\Rightarrow$ **Paul did all of the problem sets**
$\Rightarrow$ **Paul did some of the problem sets**
$\not\Rightarrow^*$ **Paul did not do any of the problem sets**

- This means the symmetry is correctly resolved in favor of the *more complex* alternative.[13]
- The *output complexity* approach relies on the presence of blocking expressions involving negative quantification.

[13] In Haslinger & Schmitt (to appear) we used this fact as initial motivation for the notion of being 'closer' to the prejacent and only then extended it to the modal embedding puzzle.

(51) a. ϕ = **Paul did not do all of the problem sets**
b. $ALT_c(\phi) = \{$**Paul did not do all of the problem sets**, **Paul did some of the problem sets**$\}$
c. $[\![$**exh** $\phi]\!]^c = \lambda w.$Paul did not do any of the problem sets in w

Blocking expression: β = **Paul did not do any of the problem sets**

- The attested strengthened readings are of the 'some but not all' type and therefore do not have a blocking expression of the necessary low complexity.

(52) a. ϕ = **Paul did not do all of the problem sets**
b. $ALT_c(\phi) = \{$**Paul did not do all of the problem sets**, **Paul did not do any of the problem sets**$\}$
c. $[\![$**exh** $\phi]\!]^c = \lambda w.$Paul did not do all of the problem sets in $w \wedge$ Paul did some of the problem sets in w

- β = **Paul did some but not all of the problem sets**
  Not a blocking expression—too complex
- β = **Paul did some of the problem sets**
  Not a blocking expression—fails to entail ϕ

- So on this approach as well, the indirect implicature data are correctly accounted for.

5.3 *The antonym puzzle*

- Buccola et al. (2022) and Schwarz & Wagner (2024b,a) raise another similar challenge for the upper-bound hypothesis that seems, at first sight, to favor the output-complexity approach.[14]
- The relevant examples involve embedding of predicates with *complementary lexical antonyms* under a scalar item.

(53) **Some products are unavailable today.**
  a. ⇝ not all products are unavailable today
  alternative: **all products are unavailable today**
  b. ⇝̸ all products are unavailable today
  alternative: **some products are available today**

(54) stalemate set: {**all products are unavailable today**, ~~**some products are available today**~~}

(55) **Some of the students are outside.**
  a. ⇝ not all of the students are outside
  alternative: **all of the students are outside**
  b. ⇝̸ all of the students are outside
  alternative: **some of the students are inside**

(56) stalemate set: {**all of the students are outside**, ~~**some of the students are inside**~~}

- The puzzle here is that this is a clear case of obligatory asymmetry, but the two alternatives in the stalemate set appear to be of equal structural complexity.
- In Haslinger & Schmitt (to appear) we suggested that the issue could be resolved if the internal structure of antonyms matters for the theory of alternatives.
  - In (53), if **unavailable** is syntactically internally complex ([NEG **available**]), the **all**-alternative is closer to the prejacent.
  - In (55), we could make a similar approach work if we assume that negative antonyms are decomposed even in cases where that is not morphologically transparent (e.g. **outside** ↔ [NEG $\sqrt{\text{INSIDE}}$]).[15]
- But this approach is not general enough, because the same puzzle shows up if the two predicate alternatives are not grammatically antonyms, but become complementary given the common ground (see Buccola et al. 2022).

(57) CONTEXT: Drawing a hand of cards from a deck in which every card is either red or black.
Some of my cards are red.

[14] See also Breheny et al. (2018) for related data. For an interesting response to this challenge within an upper-bound theory, which I can't discuss in detail here for reasons of time, see Bar-Lev et al. (2025). The main issue I see with their proposal is that the proposed mechanism—a PARTITION BY EXHAUSTIFICATION constraint (cf. Fox 2018) on $ALT_c(\phi)$—does not straightforwardly extend to alternative sets that are not based on an entailment scale, so the prediction of "indifference to alternative subtypes" is not preserved.

[15] For a discussion of potential evidence in favor of antonym decomposition with relative adjectives, see Büring (2007b,a), Heim (2008).

a. $\rightsquigarrow$ not all of my cards are red
alternative: **all of my cards are red**

b. $\not\rightsquigarrow$ all of the students are red
alternative: **some of my cards are black**

(58) stalemate set: {**all of my cards are red**, ~~**some of my cards are black**~~}

- An approach based on assumptions about antonyms is unlikely to extend to this case. So the *relative-complexity approach* does not capture the whole pattern.
- The *output-complexity approach* successfully captures this pattern, because the impossible strengthenings are yet another instance of strengthening of **some** to 'all', where the **all**-alternative serves as a blocking expression.
- But there is an empirical twist that is not captured by any existing theory.
  - If the scalar expression is a modal rather than an individual quantifier, and the modal is not in focus, it seems that we get the strengthening pattern that is unavailable with **some**.
  - I illustrate this here with an example from German, since I'm not sure yet about the English judgments.

(59) a. A: **Wo dürfen wir uns aufhalten?** 'Where are we allowed to stay?'

b. B:

Sie	**dürfen**	**sich**	**(nur)**	**DRAUSSEN**	**aufhalten.**
you.HON	may.3PL	REFL	(only)	outside	be.located

'You are (only) allowed to stay OUTSIDE.'
$\rightsquigarrow$ A is required to stay outside!

(60) **allowed [you stay outside]**
stalemate set: {~~**required [you stay outside]**~~, **allowed [you stay inside]**}

This is unexpected on the output-complexity approach.

  - In contrast, if the modal is narrowly focused, we get the expected 'not required' inference.

(61) a. A: **Müssen wir uns draußen aufhalten?** 'Are we required to stay outside?'

b. B:

Sie	**DÜRFEN**	**sich**	**draußen**	**aufhalten.**
you.HON	may.3PL	REFL	outside	be.located

'You are ALLOWED to stay outside.'
$\rightsquigarrow$ A is not required to stay outside

(62) **allowed [you stay outside]**
stalemate set: {**required [you stay outside]**, ~~**allowed [you stay inside]**~~}

- The kind of strengthening illustrated in (59-b) is impossible with **some**:

(63) A: **Do you have both black and red cards?** B: **Some of my cards are BLACK.**
$\not\rightsquigarrow$ none of B's cards are red

- Compare the following example in which **some** is absent:

(64) A: **Do you have both black and red cards?** B: **I have BLACK cards.**
$\rightsquigarrow$ none of B's cards are red

- All of this looks a bit like the antonym puzzle might not be due to a hard blocking constraint of the kind posited by the output-complexity approach, but due to an *intervention phenomenon*
- In other words, it suggests a theory with the following overall shape:
  - In case there is a stalemate between alternatives generated by substituting/modifying different subparts of the sentence, the stalemate can be broken by focusing only one of them.[16]
  - But a certain subset of alternative-generating expressions *obligatorily* have to be taken into account to generate alternatives whenever some other expression in their scope does.

[16] Interestingly, this possibility is already present in theories based on the upper-bound approach, such as Fox & Katzir (2011).

(65) ✓ **some** and **black** substituted
$ALT_c(\phi) = \{$**<u>some</u> of my cards are <u>black</u>**, **<u>some</u> of my cards are <u>red</u>**, **<u>all</u> of my cards are <u>black</u>**, **<u>all</u> of my cards are <u>black</u>**$\}$
$\rightsquigarrow$ no symmetry breaking—no scalar inference

(66) ✓ only **some** substituted
$ALT_c(\phi) = \{$**<u>some</u> of my cards are black**, **<u>all</u> of my cards are black**$\}$
$\rightsquigarrow$ attested inference: not all cards are black

(67) ✗ only **black** substituted
$ALT_c(\phi) = \{$**some of my cards are <u>black</u>**, **all of my cards are <u>black</u>**$\}$
$\rightsquigarrow$ attested inference: not all cards are black

  - So focus is a precondition for some alternative triggers, but not others.

- There is independent evidence that individual quantifiers are 'interveners' when it comes to deriving alternatives of expressions in their scope and modals are not.
  - A popular theory of NPI-licensing (for a survey see Chierchia 2013) connects the oddness of NPIs in non-downward-entailing environments to *obligatory strengthening* that differs in two ways from the kind of strengthening we've discussed:
    * alternatives obtained not structurally, but via domain restriction

∗ all the non-entailed alternatives are excluded, i.e. no restriction to innocently excludable alternatives
⇝ strengthening can create contradictions

(68) **#I met any [students $D_{\langle 1,\langle e,t\rangle\rangle}$]**

a. postulated basic meaning: 'I met at least one student in $g(\langle 1, \langle e,t\rangle\rangle)$'

(i) postulated alternatives: 'I met at least one student in D' for $D \subset g(\langle 1, \langle e,t\rangle\rangle)$

(ii) postulated strengthening inference: 'For all $D \subset g(\langle 1, \langle e,t\rangle\rangle)$: I didn't meet a student in D'

– In a DE environment, the alternatives based on domain restriction are entailed, so don't have to be excluded and there is no contradiction.

(69) **I didn't meet any [students $D_{\langle 1,\langle e,t\rangle\rangle}$]**

a. postulated basic meaning: 'I didn't meet a student in $g(\langle 1, \langle e,t\rangle\rangle)$'

b. postulated alternatives: 'I didn't meet a student in D' for $D \subset g(\langle 1, \langle e,t\rangle\rangle)$

c. no strengthening inference (all alternatives are entailed)

– Linebarger (1987) pointed out that non-existential individual quantifiers constitute *interveners* for NPI-licensing

(70) **#I didn't introduce every teacher$_1$ to any of her$_1$ students**

– The strengthening approach can make sense of this given that the 'not every, but some' implicature triggered by the **every**-DP disrupts the entailment relation between the full NPI-sentence and its alternatives (for details, see Chierchia 2013)

– *But*: As Chierchia points out, this intervention effect does not hold for modals

(71) **You are not required to talk to any of the teachers**

– This suggests that we can 'skip' the derivation of an indirect implicature for modals ('not required, but allowed'), but cannot skip it for individual quantifiers ('not every, but some')

– To my knowledge, no good account of this asymmetry yet, but apparently it is crucial to understanding symmetry breaking too

• Overall these observations suggest a theory of alternatives with the following combination of properties:

– A subset of alternative-generating expressions (open-class predicates like **black**, proper names, but also modals) can be substituted only when focused.

– Another subset of alternative-generating expressions (e.g. **some**) can always be substituted, focused or not.

- The latter type of expressions are subject to a 'minimality' condition: Their alternatives have to be taken into account whenever the alternatives of an item in their scope are taken into account.

- There is no existing theory of alternatives with these properties! In particular, this suggests

  - a subdivision among the traditional scalar items (modals vs. individual quantifiers)
  - a nuanced position on Fox & Katzir's (2011) hypothesis that only focused expressions can be substituted in deriving alternatives: there is a subset of cases where this doesn't hold
  - a new question: How can we characterize this subset?
    Hypothesis (from ongoing joint work with Viola Schmitt):
    Interveners are items that have suitable alternatives derivable by deletion only, e.g. definite plural **my cards** for **some of my cards**.
  - Many other possibilities → **potential for future work!**

6 *Some overall methodological conclusions*

- The two approaches we've seen today deviate quite strongly from the upper-bound hypothesis of Katzir (2007), Fox & Katzir (2011)

- But they both still build on the central tool of this literature: asymmetries in structural complexity/the ⇒-relation

- The applications to modal embedding and indirect implicature suggest that this strategy—still working with structural notions (and not throwing the baby out with the bathwater), but revising the mechanisms—is promising

- It seems to me that we should continue working with this tool but reevaluate

  - the role of intervention phenomena in constraining alternatives
  - our understanding of why some types of strengthening are very consistently focus-sensitive as predicted in Fox & Katzir (2011) and others are not
  - whether there are genuine asymmetries between the grammatical roles of replacement and deletion alternatives

- More generally, between this and the morphological decomposition examples discussed yesterday, I think the strengthening literature would benefit from a more 'syntactic' perspective, particularly a focus on locality

References

Bar-Lev, Moshe E., Itai Bassi & Tue Trinh. 2025. Symmetry breaking, Partition by Exhaustification, and Fatal Competition. Manuscript. URL `https://ling.auf.net/lingbuzz/008962`.

Bassi, Itai, Guillermo Del Pinal & Uli Sauerland. 2021. Presuppositional exhaustification. *Semantics and Pragmatics* 14(11). 1–42.

Breheny, Richard, Nathan Klinedinst, Jacopo Romoli & Yasutada Sudo. 2018. The symmetry problem: current theories and prospects. *Natural Language Semantics* 26. 85–110.

Buccola, Brian, Manuel Križ & Emmanuel Chemla. 2022. Conceptual alternatives. Competition in language and beyond. *Linguistics and Philosophy* 45. 265–291.

Büring, Daniel. 2007a. Cross-Polar Nomalies. In T. Friedman & M. Gibson (eds.), *Proceedings of SALT 17*, 37–52. Ithaca, NY: Cornell University.

Büring, Daniel. 2007b. *More* or *Less*. Manuscript, UCLA.

Chierchia, Gennaro. 2013. *Logic in Grammar. Polarity, Free Choice, and Intervention* (Oxford Studies in Semantics and Pragmatics 2). Oxford University Press.

Cremers, Alexandre, Ethan G. Wilcox & Benjamin Spector. 2023. Exhaustivity and Anti-Exhaustivity in the RSA Framework: Testing the Effect of Prior Beliefs. *Cognitive Science* 47(e13286). 1–44.

Deal, Amy Rose. 2011. Modals without scales. *Language* 87(3). 559–585.

von Fintel, Kai. 1999. NPI Licensing, Strawson Entailment, and Context Dependency. *Journal of Semantics* 16. 97–148.

von Fintel, Kai & Irene Heim. 2021. Intensional Semantics. Lecture notes, MIT. URL `https://github.com/fintelkai/fintel-heim-intensional-notes/blob/main/IntensionalSemantics.pdf`.

Fox, Danny. 2018. Partition by exhaustification: Comments on Dayal 1996. *ZAS Papers in Linguistics* 60.

Fox, Danny & Roni Katzir. 2011. On the characterization of alternatives. *Natural Language Semantics* 19. 87–107.

Haslinger, Nina & Viola Schmitt. to appear. Revisiting the role of structural complexity in symmetry breaking. To appear in *Proceedings of Sinn und Bedeutung 29*.

Heim, Irene. 2008. Decomposing Antonyms? In Atle Grønn (ed.), *Proceedings of Sinn und Bedeutung 12*, 212–225. Oslo: ILOS.

Hirsch, Aron. 2024. Constraining alternatives. Handout for an online NYI lecture.

Hirsch, Aron & Bernhard Schwarz. 2024. Constraining alternatives. Talk presented at Sinn und Bedeutung 29.

Jeretič, Paloma. 2021. Modal strengthening in Ecuadorian Siona and the typology of scaleless implicatures. In *Proceedings of SULA 11*, .

Katzir, Roni. 2007. Structurally-defined alternatives. *Linguistics and Philosophy* 30. 669–690.

Kratzer, Angelika. 1977. What "must" and "can" must and can mean. *Linguistics and Philosophy* 1. 337–355.

Linebarger, Marcia C. 1987. Negative Polarity and Grammatical Representation. *Linguistics and Philosophy* 10(3). 325–387.

Romoli, Jacopo. 2013. A problem for the structural characterization of alternatives. *Snippets* 27. 14–15.

Rullmann, Hotze, Lisa Matthewson & Henry Davis. 2008. Modals as distributive indefinites. *Natural Language Semantics* 16. 317–357.

Schwarz, Bernhard & Michael Wagner. 2024a. Resolving symmetry without constraining alternatives. Manuscript, McGill University.

Schwarz, Bernhard & Michael Wagner. 2024b. Symmetry resolution and blocking. In Geraldine Baumann, Daniel Gutzmann, Jonas Koopman, Kristina Liefke, Agata Renans & Tatjana Scheffler (eds.), *Proceedings of Sinn und Bedeutung 28*, 829–847. Bochum: University of Konstanz.

Spector, Benjamin & Yasutada Sudo. 2017. Presupposed ignorance and exhaustification: how scalar implicatures and presuppositions interact. *Linguistics and Philosophy* 40. 473–517.