A new take on shielding and locality of (anti-)licensing of PPIs

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1 Data of interest

- In certain languages, disjunctions exhibit PPI behavior (cf. Szabolcsi (2002, 2004)):
  - ▷ **anti-licensing** – cannot be interpreted in the scope of a clausemate negation (only a wide scope interpretation is available) (1),
  - ▷ **rescuing** – acceptable in the scope of an even number of negative operators (2),
  - ▷ **shielding** – acceptable under a clausemate negation if an element with universal force intervenes (3),and
  - ▷ **locality of anti-licensing** – acceptable in the scope of an extra-clausal negation (4).
- Consider French *ou* 'or' (Spector, 2014).

(1) Marie n'a pas invité Léa ou Jean à dîner.
Marie has not invited Lea or Jean for dinner
  a. Mary didn't invite Lucy or she didn't invite John for dinner. *or>not*
  b. *Neither Lucy not John were invited to dinner by Mary. *not>or*

(2) Il est peu probable que Paul n'ait pas invité Pierre ou Julie à dîner.
'It is unlikely that Paul didn't invite Pierre or Julie for dinner.'
(*lit: 'It is likely that Paul invited Pierre or that he invited Julie.'*)

(3) Mary n'a pas toujours allée voir John ou Bill.
'Mary didn't always visit John or Bill.'

(4) Paul ne pense pas que Marie ait invité Pierre ou Julie à dîner.
'Paul doesn't think that Marie invited Pierre or Julie for dinner.'
  a. Paul doesn't think that M invited P or he doesn't think that M invited J.
  b. Paul doesn't think that M invited P and he doesn't think that M invited J.

- Nicolae (2015), following Spector (2014), provides an account for the first two PPI properties and offers a thrilling yet most likely untenable explanation for the fourth.
- **Today's goal**: extend the proposal to account for the second two properties.
  - ▷ The analysis will take the acceptability of PPIs under non-local negation to correlate with their acceptability under negation in the presence of a shielding operator.

The new ideas presented in this presentation find their origin in a very insightful coffee break with Luka Crnič. The background work has benefited tremendously from conversations with Gennaro Chierchia, Danny Fox, Andreas Haida, Uli Sauerland and Benjamin Spector. I have also received useful feedback from the audiences at the following workshops and conferences: Utrecht Rose talk, NELS 46, ZAS internal workshop, MIT's workshop on Exhaustivity and the Göttingen and Jerusalem workshops on negation, respectively. All errors are mine.

2 The grammatical approach to implicature calculation

- Implicatures are derived in the grammar via a mechanism of exhaustification.
  - ▷ Scalar elements activate alternatives and the grammar integrates these alternatives in a systematic way within the meaning of the utterance.
- Scalar implicatures are the result of a syntactic ambiguity resolution in favor of an LF which contains an exhaustivity operator $\mathcal{E}xh$ (Chierchia, Fox, and Spector 2012, building on work in Krifka 1995, Chierchia 2004, Spector 2006, Fox 2007, among others).

(5) $\mathcal{E}xh(p) = p \wedge \forall q \in \mathbf{IE}(p, \mathcal{A}lt(p))[p \not\subseteq q \rightarrow \neg q]$
where: $\mathbf{IE}(p, \mathcal{A}lt(p)) = \lambda q.\neg\exists r \in \mathcal{A}lt^{\not\Rightarrow}(p)$ s.t. $(p \wedge \neg q) \rightarrow r$.
and $\mathcal{A}lt^{\not\Rightarrow}(p)$ are those elements among $\mathcal{A}lt(p)$ which are not entailed by p

- ▷ *(p is true and any alternative q not entailed by p is false, as long as negating q is consistent with negating any other non-weaker alternative.)*

- A disjunctive sentence activates scalar and domain alternatives (cf. Zimmermann (2000), Sauerland (2004), Alonso-Ovalle (2006), Spector (2006), Fox (2007)).

(6) John talked to Mary or Bill.
  a. $\mathcal{A}lt_{Scalar}$ = {John talked to Mary and Bill}
  b. $\mathcal{A}lt_{Domain}$ = {John talked to Mary, John talked to Bill}

- We will also assume that the distribution of $\mathcal{E}xh$ is governed by the following pragmatic economy condition:

(7) An occurrence of $\mathcal{E}xh$ in a given sentence S is not licensed if eliminating this occurrence leads to a sentence S' such that S' entails or is equivalent to S.
An occurrence of $\mathcal{E}xh$ is licensed if it leads to strengthening. (Fox and Spector, t.a.)

- Note that whereas in UE environments the contribution of $\mathcal{E}xh$ is meaningful, (8), in DE environments its contribution is vacuous, (9).

(8) UE: $p \vee q$
  a. $\mathcal{A}lt(p \vee q) = \{p \wedge q, p, q\}$
  b. $\mathcal{E}xh(p \vee q) = (p \vee q) \wedge \neg(p \wedge q)$
  c. $\mathcal{E}xh[p] \rightarrow p$

(9) DE: $\neg[p \vee q]$
  a. $\mathcal{A}lt(\neg[p \vee q]) = \{\neg(p \wedge q), \neg p, \neg q\}$
  b. $\mathcal{E}xh[\neg(p \vee q)] = \neg(p \vee q)$
  c. $\mathcal{E}xh[p] = p$

3 Spector 2014: obligatory SI as the source of positive polarity

- Complex disjunctions (e.g., French *soit soit* 'either or') cannot occur in the scope of a local negation (10), unless that negation is itself embedded in a DE environment (11):

(10) Pierre ne parle pas soit allemand soit anglais.
'Pierre doesn't speak soit German soit English.'
  a. Pierre doesn't speak German, or he doesn't speak English. *or*>not
  b. *Pierre doesn't speak either German or English. *not*>*or*

(11) Je n'emmène jamais Marie au cinéma sans qu'elle ait demandé la permission soit à son pére soit à sa mére.
'I never bring Marie to the movies without her having asked permission from both her father and mother.'

- Spector claims that the restriction to upward entailing environments should be seen as the result of the following constraint:
  - ▷ Complex disjunctions are scalar elements which trigger obligatory exhaustification.
- Given the economy condition on the insertion of $\mathcal{E}xh$, the restriction of such elements to non-DE environments falls out naturally:
  - ▷ In UE contexts exhaustification gives rise to an SI, hence it leads to strengthening.
  - ▷ In DE contexts the exhaustification is vacuous, i.e. the application of the obligatory exhaustifier doesn't result in strengthening, hence the unavailability of a narrow scope interpretation for PPI-disjunctions.

4 Nicolae 2015 on plain disjunction PPIs

- Plain disjunctions are PPIs in certain languages (in French and Hungarian, but not English and German).
- However, plain disjunctions, regardless of their PPI status, do not obligatorily give rise to SIs, meaning we need a different account than Spector provides for *soit soit*.

(12) a. Marie ira au cinéma lundi ou mardi.
'Marie will go to the movies on Monday or Tuesday.'
b. Absolument! Et elle ira même à la fois lundi ET mardi.
'Absolutely! She will even go both days.'

(13) a. Marie ira au cinéma soit lundi soit mardi.
b. #Absolument! Et elle ira même à la fois lundi ET mardi.

- Two assumptions are needed in order to account for this behavior:
  - ▷ Plain disjunctions can prune their scalar alternative.
  - ▷ A covert doxastic operator is present underlyingly.
- Alternatives can be pruned, i.e. exhaustification can proceed with respect to a subset of the set of IE alternatives (cf. Fox and Katzir (2011), Crnič, Chemla, and Fox (2015)).[1]

(14) Plain disjunction may prune the scalar alternative from its alternative set, whereas complex disjunction may not.

- A plain disjunction can associate with either of the alternative sets in (15), whereas a complex disjunction is restricted to the full alternative set in (15a).

(15) a. $\mathcal{A}lt_S(p \vee q) = \{p, q, p \wedge q\}$
b. $\mathcal{A}lt_D(p \vee q) = \{p, q\}$

- A covert doxastic operator is adjoined at the matrix level at LF, whose contribution is akin to "The speaker is certain that *p*." (cf. Chierchia (2006), Alonso-Ovalle and Menéndez-Benito (2010), Meyer (2013)).

(16) $[\![\Box_x p]\!] = \lambda w.\forall w'[w' \in \mathrm{Dox}(x)(w) \rightarrow p(w')]$
$w' \in Dox(x)(w)$ *iff given the beliefs of x in w, w' could be the actual world.*

[1] See aforementioned works for details on how pruning should be restricted.

- Exhaustification proceeds with respect to the alternatives in (17a), delivering the enriched meaning in (17b) ("The speaker doesn't know which of the disjuncts is true."):[2]

(17) $\Box[p \vee q]$
  a. $\mathcal{A}lt_D(\Box[p \vee q]) = \{\Box p, \Box q\}$
  b. $\mathcal{E}xh_D[\Box[p \vee q]] = \Box[p \vee q] \wedge \neg\Box p \wedge \neg\Box q$

- Note that in the scope of negation, this implicatures disappears; exhaustification is vacuous since the alternatives are entailed by (hence weaker than) the assertion.

(18) $\Box\neg[p \vee q]$ $\qquad\qquad$ $\Box\neg[p \vee q] = \Box\neg p \wedge \Box\neg q$
  a. $\mathcal{A}lt_D(\Box\neg[p \vee q]) = \{\Box\neg p, \Box\neg q\}$ $\qquad$ $[\Box\neg p \wedge \Box\neg q] \rightarrow \Box\neg p$
  b. $\mathcal{E}xh_D[\Box\neg[p \vee q]] = \Box\neg[p \vee q]$ $\qquad$ $[\Box\neg p \wedge \Box\neg q] \rightarrow \Box\neg q$

- If a disjunctive element requires obligatory exhaustification and may prune its scalar alternative, the economy condition on exhaustification derives the restriction to UE:

  ▷ In UE contexts the exhaustification of disjunction gives rise to an epistemic implicatures, (17), hence it leads to strengthening.

  ▷ In DE contexts the exhaustification is vacuous, i.e. the application of the obligatory exhaustifier doesn't result in strengthening, hence the unavailability of a narrow scope interpretation for PPI-disjunctions.

Rescuing by a second negation

- Being embedded under two DE operators is equivalent to being in a positive environment for the purposes of exhaustification: (i) the alternatives are stronger than the assertion, and (ii) the domain exhaustification leads to strengthening.

(19) $\mathcal{E}xh_D[\Box\neg\neg[p \vee q]]$
  a. $\mathcal{A}lt_D(\Box\neg\neg[p \vee q]) = \{\Box\neg\neg p, \Box\neg\neg q\} = \{\Box p, \Box q\}$
  b. $\mathcal{E}xh_D[\Box\neg\neg[p \vee q]] = \Box(p \vee q) \wedge \neg\Box p \wedge \neg\Box q$

5 Shielding

- Szabolcsi (2002): elements that can shield a PPI from a c-commanding negation include universal quantifiers over times/individuals (*always*, *everyone*) and conjunction.

(20) a. French *ou* 'or':
  Mary n'a pas toujours allée voir John ou Bill.
  'Mary didn't always visit John or Bill.'
  b. Hungarian *vagy* 'or':
  János nem hívta fel mindig Katit vagy Marit.
  'John didn't always call Kati or Mari'
  c. English *someone*:
  John didn't always call someone.
  John didn't say something at every party.

[2] The scalar alternative does not have to be pruned, in which case we have two possible results: (i) $\mathcal{E}xh_S > \Box$: the weak implicatures that it's possible that neither disjunct is true, or (ii) $\Box > \mathcal{E}xh_S$: the strong implicatures that it's necessarily the case that neither is true.

- **Generalization**: a universal quantifier, being in the scope of negation, gives rise to an implicature, and this implicature is able to salvage the otherwise illicit configuration.
- In (21) a disjunction occurs in the scope of a universal, which itself occurs in the scope of a negation.
  - ▷ $\mathcal{E}xh$ associates with both the universal and the disjunction, resulting in the set of alternatives in (21a).
  - ▷ The only IE alternatives are the first three in (21a), and their negation results in the strengthened meaning in (21b) ("She didn't always visit one or the other, but sometimes she visited John and sometimes she visited Bill").

(21) $\mathcal{E}xh[\neg\forall x[p(x) \vee q(x)]]$

a. $\mathcal{A}lt(\neg\forall x[p(x) \vee q(x)]) =$
$\{\neg\exists x[p(x) \vee q(x)], \neg\exists x[p(x)], \neg\exists x[q(x)], \neg\forall x[p(x)], \neg\forall x[q(x)]\}$

b. $\mathcal{E}xh[\neg\forall x[p(x) \vee q(x)]] =$
$\neg\forall x[p(x) \vee q(x)] \wedge \exists x[p(x)] \wedge \exists x[q(x)]$

- Since $\mathcal{E}xh$ is obligatory, and its occurrence needs to lead to strengthening, the LF in (21) will be licit given the alternatives introduced by the universal quantifier.
- It's crucial that alternatives introduced by the universal operator enter the calculation.

6 Non-local negation

- The locality condition can be subsumed under the shielding condition as follows:
  - ▷ PPI disjunctions can occur in the scope of a non-local negation because embedding attitude verbs denote universal quantifiers over possible worlds (Hintikka, 1969).
- The analysis proceeds as in the case of the shielding cases, with the only difference being that now we're dealing with quantifiers over worlds rather than individuals.

(22) Marie n'est pas sûr que Paul invité Pierre ou Julie à dîner.
'Marie is not sure that Paul invited Peter or Julie for diner'

- The application of the $\mathcal{E}xh$ operator will lead to the implicature that there is a world in Marie's doxastic worlds where Paul invited Pierre and a world in which Paul invited Julie to dinner.

(23) $\mathcal{E}xh[\neg\Box[p \vee q]]$

a. $\mathcal{A}lt(\neg\Box[p \vee q]) =$
$\{\neg\Diamond[p \vee q], \neg\Diamond p, \neg\Diamond q, \neg\Box p, \neg\Box q\}$

b. $\mathcal{E}xh[\neg\Box[p \vee q]]] =$
$\neg\Box[p \vee q]] \wedge \Diamond p \wedge \Diamond q$

- Neg-raising predicates, like *crois* 'believe' also intervene.

(24) Marie ne croit pas que Paul ait invité Pierre ou Julie à dîner.
'Marie doesn't believe that Paul invited Pierre or Julie for dinner.'

- Following Romoli 2013, we'll assume that neg-raising predicates like *believe* activate the excluded middle proposition rather than an existential alternative.

- The result of exhaustification wrt these alternatives is provided in (25b).

(25) $\mathcal{E}xh[\neg\Box[p \vee q]]$

a. $\mathcal{A}lt(\neg\Box[p \vee q]) =$
$\{\neg[\Box[p \vee q] \vee \Box\neg[p \vee q]], \neg[\Box p \vee \Box\neg p], \neg[\Box q \vee \Box\neg q]\}$

b. $\mathcal{E}xh[\neg\Box[p \vee q]]] =$
$\neg\Box[p \vee q]] \wedge [\Box[p \vee q] \vee \Box\neg[p \vee q]] \wedge [\Box p \vee \Box\neg p] \wedge [\Box q \vee \Box\neg q] =$
$\Box\neg[p \vee q]$

- As before, taking the $\mathcal{E}xh$ operator to associate with both sets of alternatives (that of the attitude predicate and those of the disjunction), allows us to deliver a strengthened meaning, thereby satisfying the condition on exhaustification provided in (7).

7 Predictions and open problems

Global PPIs

- Complex disjunctions like *soit soit*, are global PPIs, i.e., unacceptable in the scope of negation, regardless of its locality (Spector, 2014).

(26) Marie n'est pas sûr que Paul invité soit Pierre soit Julie à dîner.
'Marie is not sure that Paul (will) invite(s) Peter or Julie for diner'

a. Marie isn't sure that he invited Peter, or she isn't sure that he invited Julie.

b. *Marie isn't sure that he invited Peter and she isn't sure that he invited Julie.

- **Prediction:** there should be a correlation between the ability of a universal to shield a PPI from negation and the ability of a PPI to take narrow scope under a non-local negation given that they both have the same source.

  ▷ If a PPI is insensitive to the locality of negation, it should also be insensitive to the presence of a shielding universal operator.

- This prediction is borne out for *soit soit*, which can only receive wide scope in (27).

(27) Mary n'a pas toujours allée voir soit John soit Bill.
'Mary hasn't always visited soit John soit Bill.'

a. Mary hasn't always visited John or she hasn't always visited Bill.

b. *Mary hasn't always visited John or Bill.

- **Open problem:** how can we account for the fact that complex but not plain disjunctions are not sensitive to intervening quantifiers?

  ▷ Maybe we can tie this back to the inability of complex disjunctions to prune their scalar alternative. (hint: unclear how)

Intervention with NPIs

- NPIs exhibit a similar sensitivity to intervening universal elements (cf. Chierchia (2004), Gajewski (2011) and Chierchia (2013)).

(28) *Bill didn't give everyone any gifts.

- Another interesting parallel with NPIs is the fact that certain NPIs can only be licensed locally:

  (29) *Mary isn't sure that John visited in weeks.

- The data in (29) could be seen to parallel the acceptability of local PPIs in the scope of extra-clausal negation, while the data in (28) the acceptability of local PPIs in the presence of an intervening universal quantifier over times/individuals:

  ▷ The intervening attitude verb/universal QP rescues the PPI but disrupts the NPI licensing.

- However, universal modals do not act as interveners for NPI licensing purposes:

  (30) Mary is not required to invite any boys to her party.

- Which leads us to the following question:

Do modal auxiliaries intervene?

- The data below suggests that disjunction can take scope under negation and receive the expected narrow scope interpretation in the presence of an intervening universal modal.

  (31) a. Marie ne doit pas appeler Jean ou Paul.
  'Marie doesn't have to call Jean or Paul.'
  b. Marie n'est pas oblige d'appeler Jean ou Paul.
  'Marie is not obligated to call Jean or Paul.'

- Another prediction is that non-universal interveners should not be able to rescue a PPI in the scope of negation (assuming that PPI could otherwise be saved by a universal intervener).

  ▷ Initial judgements suggest that *ou* **can** receive a narrow scope interpretation in (32), which is not expected given that the application of $\mathcal{E}xh$ cannot lead to strengthening, so this is independently problematic.

  (32) Marie ne peut pas appeler Jean ou Bill.
  'Marie could not call John or Bill.'

8 Summary

- I argued in Nicolae 2015 that the PPI behavior of plain disjunction can be thought of as the interplay between a semantic requirement for obligatory exhaustification and an economy condition which prevents vacuous exhaustification, coupled with the possibility of plain disjunction to prune its scalar alternative.

  ▷ This approach can predict the restriction of such PPIs to (locally) upward entailing environments.

- The main contribution of this paper is to show that shielding and ability of PPIs to receive narrow-scope interpretations under non-local negations should be seen as one and the same phenomenon, namely as intervention by universal quantifiers rescuing an otherwise illicit configuration.

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