Epistemic Disjunction and Obligatory Ignorance[*]

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Outline

- Puzzle: *how some disjunctions in Russian are special*
- Background: *exhaustification, exclusivity, free choice and distributive inferences*
- Proposal: *obligatory ignorance and its representation*
- Summing up: *what has been learned*

1. Puzzle

- There are two complex disjunctions in Russian, *to li…to li…* and *ne to…ne to…*, with special properties that set them apart both complex disjunctions (*ili…ili…* in Russian, *soit…soit…* in French) and from simple disjunctions (*ili* in Russian, *or* in English, *ou* in French etc.).

- *Ignorance and exclusivity inferences*

To li…to li… and *ne to…ne to…* pattern with other disjunctions:

(1) a. John saw (either) a cat or a dog.
b. Jean a vu un chat ou un chien.
c. Džon videl košku ili sobaku.

(2) a. Jean a vu soit un chat soit un chien.
b. Džon videl ili košku, ili sobaku.
John saw or a cat or a dog

(3) Džon videl to li košku, to li sobaku / ne to košku, ne to sobaku.

(1), (2), (3)
↪ $\neg B_S$[John saw a cat] & $\neg B_S$[John saw a dog] *Ignorance*
↪ B_S[¬ [John saw both a cat and a dog]] *Exclusivity*

- *Scope of disjunction w.r.t. to negation*

Simple disjunctions are local PPIs in Russian and French (Spector 2014), but not in English:

(4) a. John didn't see (either) a cat or a dog.
b. Jean n'a pas vu un chat ou un chien.
c. Džon ne videl košku ili sobaku.

Narrow scope w.r.t. negation: ¬[John saw a cat ∨ John saw a dog] ✓(4a) *(4b) *(4c)
Wide scope w.r.t. negation: ¬[John saw a cat] ∨ ¬[John saw a dog]] ✓(4a) ✓(4b) ✓(4c)

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(5) a. John doubts that he saw a cat or a dog.
b. Jean doute qu' il ait vu un chat ou un chien.
c. Džon somnevaetsja čto *pro* videl košku ili sobaku.

Narrow scope w.r.t. negation: J. doubts [J. saw a cat ∨ J. saw a dog] ✓(5a) ✓(5b) ✓(5c)
Wide scope w.r.t. negation: J. doubts [J. saw a cat] ∨ J. doubts [J. saw a dog] ✓(5a) ✓(5b) ✓(5c)

Complex disjunctions are global PPIs in both French (Spector 2014) and Russian:

(6) a. Jean n'a pas vu soit un chat soit un chien. * ¬ > ∨; ✓ ∨ > ¬
b. Džon ne videl ili košku ili sobaku. * ¬ > ∨; ✓ ∨ > ¬
John didn't see or a cat or a dog

(7) a. Jean doute qu' il ait vu soit un chat soit un chien. * ¬ > ∨; ✓ ∨ > ¬
b. Džon somnevaetsja čto *pro* videl ili košku ili sobaku. * ¬ > ∨; ✓ ∨ > ¬
John doubts that he saw or a cat or a dog

To li…to li… and *ne to…ne to…* pattern with French and Russian complex disjunctions:

(8) Džon ne videl to li košku, to li sobaku. * ¬ > ∨; ✓ ∨ > ¬
John didn't see TO LI a cat TO LI a dog

(9) Džon somnevaetsja čto *pro* videl to li košku, to li sobaku. * ¬ > ∨; ✓ ∨ > ¬
John doubts that he saw TO LI a cat TO LI a dog

- *Free choice and distributive inferences*

Under existential modals, disjunctions normally give rise to free choice permission inferences, in which case ignorance is obviated. This is true for all simple and complex disjunctions in English, French and Russian (10), except for *to li…to li…/ne to…ne to…* (11):

(10) a. You may take (either) an apple or an orange.
b. Tu peut prendre une pomme ou une orange.
c. Ty možeš vzjat' jabloko ili apel'sin.

↪ You may take an apple & You make take an orange *Free Choice*

(11) a. Tu peut prendre soit une pomme soit une orange.
b. Ty možeš vzjat' ili jabloko, ili apel'sin.
You may take or an apple or an orange

↪ You may take an apple & You make take an orange *Free Choice*

(12) Ty možeš vzjat' to li jabloko, to li apel'sin / ne to jabloko, ne to apel'sin
You may take TO LI an apple TO LI an orange

↛ You may take an apple & You make take an orange **Free Choice*
(↪ It is either an apple or an orange (I am not sure) that you are allowed to take.)

Under universal quantifiers, disjunctions give rise to distributive inferences (see Crnič et al. 2015 for a recent discussion). In these cases ignorance can be obviated. Again, this is true for for all simple and complex disjunctions in English, French and Russian (13a,b,c), but not for *to li…to li…/ne to…ne to…* (13d):

(13) Scenario: Three boys arrived: John, Bob, and Bill. I see that Bill brought a dog, Bob also brought a dog, and John brought a cat. I have no doubts about which boy brought which pet.

a. Every boy brought (either) a cat or a dog.
b. Chaque garçon a apporté un chat ou un chien / soit un chat, soit un chien.
c. Každyj mal'čik prinës (ili) košku ili sobaku.

d. * Každyj mal'čik prinës to li košku to li sobaku / ne to košku, ne to sobaku.
Every boy brought TO LI a cat TO LI a dog

2. Background

I adopt a grammatical view of scalar implicatures that disjunctions give rise to.

- Scalar implicatures are brought about by a covert exhaustification operator EXH (cf. Fox 2007, Chierchia et al. 2012 building on proposals in Groenendijk and Stokhof 1984, Krifka 1995, Landman 1998, and van Rooy 2002)

(14) $\text{EXH}_{\text{ALT}}(p)(w) \Leftrightarrow p(w) \,\&\, \forall q\colon q \in \text{EXCL}_{\text{ALT}}.\, \neg q(w)$,
where EXCL_{ALT} is a subset of ALT containing all and only *innocently excludable alternatives* (see Fox 2007 for a strict definition)

- Exclusivity inferences in unembedded environments are derived straightforwardly:

(15) $\text{EXH}_{\text{ALT}}[P(x) \vee Q(x)] \Leftrightarrow [P(x) \vee Q(x)] \,\&\, \neg[P(x) \& Q(x)]$

- Distributive inferences with disjunctions arise when EXH takes scope over a universal quantifier:

(16) $\text{EXH}_{\text{ALT}}[\forall x\, [P(x) \vee Q(x)]] \Leftrightarrow \forall x\, [P(x) \vee Q(x)] \,\&\, \neg \forall x\, [P(x)] \,\&\, \neg \forall x\, [Q(x)]$

- Free choice permission inferences are brought about by double exhaustification above the existential modal:

(17) a. LF: $\text{EXH}_{\text{ALT2}}\, [\text{EXH}_{\text{ALT1}}\, [\Diamond[P \vee Q]]]$

b. $\text{ALT1} = \{ \Diamond[P \vee Q] , \Diamond P, \Diamond Q, \Diamond[P \& Q] \}$
$\text{EXH}_{\text{ALT1}}[\Diamond[P \vee Q] \Leftrightarrow \Diamond[P \vee Q] \,\&\, \neg\Diamond[P \& Q]$
$\text{ALT2} = \{ \text{EXH}_{\text{ALT1}}\, [\Diamond P], \text{EXH}_{\text{ALT1}}\, [\Diamond Q] \} = \{ \Diamond P \,\&\, \neg\Diamond Q,\ \Diamond Q \,\&\, \neg\Diamond P \}$

c. $\text{EXH}_{\text{ALT2}}\, [\text{EXH}_{\text{ALT1}}\, [\Diamond[P \vee Q]]] \Leftrightarrow \Diamond[P \vee Q] \,\&\, \neg\Diamond[P \& Q] \,\&\, \neg[\Diamond P \,\&\, \neg\Diamond Q] \,\&\, \neg[\Diamond Q \,\&\, \neg\Diamond P] \Leftrightarrow$
$\Leftrightarrow \Diamond[P \vee Q] \,\&\, \neg\Diamond[P \& Q] \,\&\, [\neg\Diamond P \vee \Diamond Q] \,\&\, [\neg\Diamond Q \vee \Diamond P] \Leftrightarrow \Diamond P \,\&\, \Diamond Q$

3. Proposal

Recall that *to li…to li…* and *ne to…ne to…* have some special properties. Let's focus on the following two:

- They do not give rise to Free Choice inferences and ignorance obviation under existential modals.
- They also do not lead to ignorance obviation under universal quantifiers.

Both properties would follow if ignorance inferences associated with *to li…to li…* and *ne to…ne to…* are made obligatory.
Here is a way to formalize this intuition:

(18) Disjunctions *to li…to li…* and *ne to…ne to…* have to appear in the *immediate scope* of some doxastic/epistemic necessity operator, by default, Meyer's (2013) K-operator.

- According to Meyer 2013, every utterance is embedded under K, and ignorance inferences are computed in the grammar via exhaustification above K:

(19) EXH [K (P∨Q)] ⇔ K[P∨Q] & ¬K(P) & ¬K(Q) & ¬K(P&Q)

If *to li…to li…* and *ne to…ne to…* have to appear in the immediate scope of K, obligatory ignorance would follow.

- No Free Choice inferences and ignorance obviation under existential modals:
  Given (18) and the assumption that EXH K must take the highest scope, *to li…to li…/ne to…ne to…* should scope above the existential modal, which would exclude Free Choice and lead to ignorance.

- No ignorance obviation under universal quantifiers: trivially, given (18).

  Interestingly, universal quantifiers seem to be able to scope above EXH K[1]. When they do, we get cases of *distributed ignorance.*

(20) $\forall x$ [EXH [K [P(x)∨Q(x)]]] ⇔ $\forall x$ [K[P(x)∨Q(x)] & ¬K[P(x)] & ¬K[Q(x)]]

(21) Scenario: I am watching a gathering of three boys in the street from my apartment on the 12th floor. I am sure that each of them brought some pet, in each case it looks like either a cat or a dog, but it is hard to see who brought what exactly.

Každyj	mal'čik	prinës	to li	košku,	to li	sobaku / ne to košku, ne to sobaku.
Every	*boy*	*brought*	*TO LI*	*a cat*	*TO LI*	*a dog*

When *to li…to li…* and *ne to…ne to…* appear in the immediate scope of a universal attitude that is different from Meyer's K, ignorance is obligatorily attributed to the attitude holder, so, a sentence like (22) are ambiguous with respect to its ignorance inferences.

[1] Note possible connections to Krifka's (2001) proposal that universal quantifiers can quantify into speech acts.

(22) Bob polagaet, čto Bill prinës to li košku to li sobaku.
Bob believes that Bill brought TO LI a cat TO LI a dog
↪ ¬K[BELIEVE$_{Bob}$ [Bill brought a dog]] & ¬K[BELIEVE$_{Bob}$ [Bill brought a dog]]
- Speaker's Ignorance

Or: ↪ K[¬BELIEVE$_{Bob}$ [Bill brought a dog] & ¬BELIEVE$_{Bob}$ [Bill brought a dog]]
- Attitude Holder's Ignorance

A prediction: no relativized ignorance under existential attitudes:

(23) Bob dopuskaet, čto Bill prinës to li košku to li sobaku.
Bob considers.it.possible that Bill brought TO LI a cat TO LI a dog
↪ ¬K[C.I.P.$_{Bob}$ [Bill brought a dog]] & ¬K[BELIEVE$_{Bob}$ [Bill brought a dog]]
- Speaker's Ignorance

But ↛ K[¬BELIEVE$_{Bob}$ [Bill brought a dog] & ¬BELIEVE$_{Bob}$ [Bill brought a dog]]
*- *Attitude Holder's Ignorance*

4. Summing up

- Some complex disjunctions (specifically, *to li…to li…* and *ne to…ne to…* in Russian) give rise to obligatory, non-cancellable ignorance inferences. This property sets them apart from other known complex and simple disjunctions[2].

- A way to capture this property is to stipulate that they have to appear in the *immediate scope* of some doxastic/epistemic necessity operator, by default, Meyer's (2013) K-operator. Ignorance inferences arise as a result of exhaustification immediately above the operator.

It would be worth exploring the parallels with the behavior of epistemic indefinites (cf. Aloni and Port 2011, Aloni 2012, Alonso-Ovalle and Menéndez-Benito 2003, Fălăuş 2014, Kratzer and Shimoyama 2002, among many others), especially the Russian *–to* series (see Haspelmath 1997, Yanovich 2005), which seems to have a very similar semantic distribution.

[2] The PPI property that is shared by all complex disjunctions including *to li…to li…* and *ne to…ne to…* (see examples (6–9) remains mysterious. While my proposal may be able to explain it for *to li…to li…* and *ne to…ne to…* (given (18)), it cannot be extended to other complex disjunctions. At the same time, the only idea I am aware of, that is, Spector's (2014) proposal that complex disjunctions are special in that they have to be in the scope of EXH, is not quite compatible with Meyer's 2013 claim, which I build upon, that EXH is present in sentences with simple disjunctions as well.

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