Action sensitivity in grammar

Weak vs. strong NPIs. Intervention. Chierchia (2013)

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1 Action sensitivity with polarity sensitive expressions

- Positive Polarity Items (PPIs) cannot scope under negation in (1) where the action is interpreted as intentional, but they can be construed under negation in (2) where the action is interpreted as accidental (Szabolcsi 2004).

(1) I don't want to call someone/eat something. (*not>some)
(2) I don't want to offend someone/break something. (not>some)

- Negative Polarity Items (NPIs) show mixed behaviour. NPIs like *any* are not sensitive to the interpretation of an action: if licensed, *any* is fine with both intentional and accidental actions.

(3) I don't want to call anyone/eat anything.
(4) I don't want to offend anyone/break anything.

- However, other NPIs like *a red cent* show sensitivity to the interpretation of an action. This sensitivity is a mirror image of what we find with PPIs: *a red cent* is natural with intentional actions in (6), but not with accidental actions in (7).

(5) a. I have a red cent. (*idiomatic reading)
b. I don't have a red cent. (idiomatic reading)

(6) I don't want to give a red cent to the beggar.

(7) ??I don't want to win a red cent in this lottery.

2 Weak vs. strong NPIs

- It has long been known that NPIs differ with respect to the strength of negative environment they appear in. *Any* and *ever* are more permissive in this respect and appear in a larger set of negative environments, whereas *in weeks* and punctual *until* are more restricted.[1]

[1]The examples are from @chi13 ch. 4.

(4) a. i. *John watched any game yesterday
ii. *John ever watched a baseball game
b. i. *Mary visited in weeks
ii. *Mary left until her birthday
c. i. John didn't watch any game yesterday
ii. John didn't ever watch a baseball game
d. i. Mary didn't visit in weeks
ii. Mary didn't leave until her birthday

(47) a. *At most five students have seen me in weeks
a'. At most five students had ever heard about linguistics
b. *Fewer than five students left until their birthday
b'. Fewer than five students had ever heard about linguistics
c. ?? Few students left until their birthday[16]
c'. Few students had ever heard about linguistics

- Because *any* and *ever* are felicitous in a larger set of negative environments, they are called *weak* NPIs. More restricted NPIs like *in weeks* and punctual *until* are called *strong* NPIs.
- Since the seminal work by Zwarts (1996), the environments where *any/ever* are acceptable and the environments where *in weeks/until* are acceptable have been characterized using formal properties:
- Environments for *any/ever* are said to be *downward-entaling* (DE):

(8) Downward-entailment (DE)
γ is downward-entailing iff for any α, β, whenever $\alpha \Rightarrow \beta, \gamma(\beta) \Rightarrow \gamma(\alpha)$
($\Rightarrow$ = entailment)

(9) a. Alex ate an apple.
$\Uparrow$
b. Alex ate a red apple.

(10) a. Some student ate an apple.
$\not\Downarrow$
b. Some student ate a red apple.

(11) a. No student ate an apple.
$\Downarrow$
b. No student ate a red apple.

(12) a. At most 5 students ate an apple.
$\Downarrow$
b. At most 5 students ate a red apple.

- Let us do the same for truth-functional connectives $\wedge$ 'and' and $\vee$ 'or' (inclusive). What entails what? And why?

(13) a. Alex ate and Alex drank ??? Alex ate or drank
b. At most 5 students ate and at most 5 students drank ??? At most 5 students ate or drank

- Environments for *in weeks/unil* are said to be *anti-additive* (AA):

(14) Anti-additivity (AA)
γ is anti-additive iff $\gamma(\alpha \vee \beta) \Leftrightarrow \gamma(\alpha) \wedge \gamma(\beta)$ ($\Leftrightarrow$ = mutually entail)

(15) a. At most 5 students eat or drink. (DE but not AA)
$\Downarrow \not\Uparrow$
b. At most 5 students eat and at most 5 students drink.

(16) a. No student eats or drinks. (DE and AA)
$\Downarrow \Uparrow$
b. No student eats and no student drinks.

- Anti-additive environments form a subset of Downward-entailing environments. This explains why weak NPIs *any/ever* are more permissive than strong NPIs *in weeks/until*.
- Let us try other quantifiers: *few* and *every* A B. Are these quantifiers only DE or AA?

- Zwarts' generalization that strong NPIs are licensed in AA environments faces a number of challenges, including an empirical problem with *every*. *Every* is AA on its first argument but it does not license strong NPIs.

(50) a. i. Every red or blue book is on the table
ii. Every red book is on the table and every blue book is on the table
b. i. *Every student who left until his birthday missed many classes
ii. *Every person who has seen Mary in weeks is upset with her

- Gajewski (2011) and following him Chierchia (2013) propose to reformulate Zwarts' generalization. All environments where strong NPIs are not licensed (including the restrictor of *every*) seem to share one property: they have a positive (upward-entailing) presupposition or Scalar Implicature (SI).

(17) a. Few people in the class smoke. ⇓
⇝ Some people smoke. ⇑
b. At most 5 people in the class smoke. ⇓
⇝ Some people smoke. ⇑
c. Everyone who saw Mary was upset with her. ⇓
⇝ Someone saw Mary. ⇑

- They propose that weak NPIs are exhaustified only with respect to the assertion of the utterance, whereas strong NPIs are exhaustified with respect to the assertion *and* presuppositions/SIs of the utterance. But in presuppositions/SIs strong NPIs find themselves in non-DE environments, which means that exhaustification leads to a contradiction. Thus, strong NPIs are not acceptable.

(2)

Weak	Strong
a. No one saw any reason for concern	a'. No one saw Mary in weeks
b. Few people saw any reason for concern	b'. ?? Few people saw Mary in weeks
c. O [**Few people** saw *any reason* for concern]	b'. O [**Few people** saw Mary *in weeks*]

Notations:
O = Exh(aust) = exhaust operator (O is mnemonic for *only*)
σA = scalar alternatives
DA = domain alternatives
ALT = alternatives
[+σ,+D] = weak NPI feature syntactically checked by a weak exhaust operator O_{DA}
[[+σ,+D]] = strong NPI feature syntactically checked by a strong exhaust operator O_{ALT}

- A weak exhaust-operator attaches to a proposition p and returns the same proposition conjoint with the statement that all stronger (i.e., not entailed) alternatives to p are false. The syntactic

part of it is that a weak exhaust-operator checks [+σ,+D] feature on a weak NPI.

(18) Weak exhaustification:
O_{DA} p = p $\wedge \forall$ q $\in$ DA [p $\not\Rightarrow$ q $\rightarrow$ q = 0]

- Scalar Implicatures can be derived using a similar mechanism with $O_{\sigma A}$ and scalar alternatives σA based on Horn scales:

(19) a. <a, many, much, every>
b. <one, two, three. . . >
c. <or, and>
d. <not all, few, none>

(20) Exhaustification for SIs:
$O_{\sigma A}$ p = p $\wedge \forall$ q $\in$ σA [p $\not\Rightarrow$ q $\rightarrow$ q = 0]

(21) a. Few people in the class smoke.
$\rightsquigarrow$ Some people smoke
b. $O_{\sigma A}$ (few people smoke)
c. σA = {not all people smoke, few people smoke, nobody smokes}
d. $O_{\sigma A}$ (few people smoke) = few people smoke $\wedge \neg$ nobody smokes = few people smoke $\wedge$ some people smoke

- Now, let us derive weak NPIs under *few*.

(3) a. $O_{\sigma A}$ O_{DA} [Few $\text{people}_{D1\ [+\sigma,+D]}$ saw any $\text{reason}_{D2\ [+\sigma,\ +D]}$ for concern]
b. O_{DA} [Few people (in D1) saw any reason (in D2) for concern] = 'Few people (in D1) saw any reasons (in D2) for concern' is true and every member of DA not entailed by it is false (true because all members of DAs are entailed by the assertion)
c. $O_{\sigma A}$ O_{DA} [Few people (in D1) saw any reason (in D1) for concern] =
Few people (in D1) saw any reason (in D2) for concern but some did[1]

- A strong exhaust-operator attaches to a proposition p and returns the same proposition conjoint with the statement that all stronger (i.e., not entailed) alternatives to the assertion and presuppositions/SIs of p are false. The syntactic part of it is that a strong exhaust-operator checks [[+σ,+D]] feature on a strong NPI.

(22) Strong exhaustification:
O_{ALT} p = p $\wedge \forall$ q $\in$ ALT [π(p) $\not\Rightarrow$ π(q) $\rightarrow$ π(q) = 0]
where π(p) = assertion of p $\wedge$ presupposition/SI of p

- Now, let us derive strong NPIs under *few* (syntactically well-formed but semantically incoherent):

(4) a. O_{ALT} [Few people$_{D_1\ [+\sigma,+D]}$ saw Mary in weeks $_{+[[\sigma,\ D]]}$]
b. no people$_D$ $\Rightarrow$ few people$_D$
$\Downarrow$ $\Downarrow$
no people$_D$' $\Rightarrow$ few people$_D$'

(63) O_{ALT}(few$_{+D}$ people saw Mary in weeks$_{+D}$) =
few$_D$ people saw Mary in weeks $\wedge$ $\neg$ NO$_{D'}$ in W' (for any D', W')
= few$_D$ people saw Mary in weeks $\wedge$ some$_{D'}$ people saw Mary in W' (for any D', W')

3 Intervention effects

- Intervention is the situation that has the following general schema:

(5) ...DE [...INT [...NPI...]...]...
where: DE = Downward entailing element (or "licensor")
INT = intervening element
NPI = Negative Polarity Item

(1) a. I doubt that John will ever have any problem
b. I doubt that a student of mine/students of mine will ever have any problem
c. ??I doubt that **every student** of mine will *ever* have *any problem*
d. I doubt that every student of mine will have problems

(6) a. I *doubt* that **John** had *any* complaint
b. ?? I *doubt* that **many/most** of the students had *any* complaint
c. I doubt that students had any complaint

(7) a. ??I *never* met **two/twenty** students who had read *any* of my papers
b. I *never* met **one** student who had read *any* of my papers

(8) a. I *doubt* that Theo drank the leftover wine **or** *any* coffee
b. ?? I *doubt* that Theo drank the leftover wine **and** *any* coffee[2]

- As Chierchia observes, interveners form a natural class of elements: they are strong elements of a Horn scale:

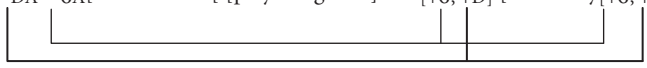
(11) a. <a, many, most, every>
b. <one, two, ..., twenty, ...>
c. <or, and>

- This observation gives us a way to account for intervention effects using an interplay between semantic and syntactic requirements. Intervention occurs when because of Minimality we

need to exhaustify scalar alternatives first. Then exhaustifying domain alternatives will lead to a contradiction similar to what we saw with strong NPIs. The sentence will be syntactically well-formed but semantically deviant.

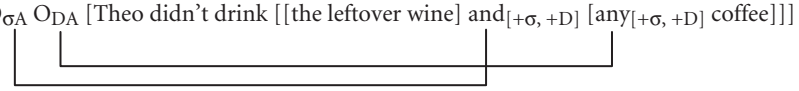
(20) a. Scalar Alternatives first

O_{DA} $O_{\sigma A}$[Theo didn't [[play the guitar] and$_{[+\sigma, +D]}$ [drink any$_{[+\sigma, +D]}$coffee]]]



- Avoiding or skipping somehow exhaustification of scalar alternatives will make a sentence semantically coherent but syntactically ill-formed as this will violate Minimality.

(22) $O_{\sigma A}$ O_{DA} [Theo didn't drink [[the leftover wine] and$_{[+\sigma, +D]}$ [any$_{[+\sigma, +D]}$ coffee]]]



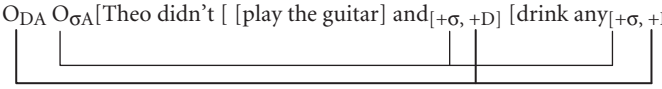
- Base on the notion of Minimality in Rizzi 1990, 2001:

(32) Minimality
  a. O must target the closest potential alternative bearer
  b. A bearer XP of σ/D is closest to O iff:
    i. O asymmetrically C-commands XP
    ii. There is no other bearer YP of the relevant features (σ, D) such that O asymmetrically C-commands YP and YP C-commands XP
  c. A C-commands B = A doesn't dominate B and the first branching node that dominates A dominates B.

- Let us look at a full derivation of an intervention caused by *and*:

(20) a. Scalar Alternatives first

O_{DA} $O_{\sigma A}$[Theo didn't [[play the guitar] and$_{[+\sigma, +D]}$ [drink any$_{[+\sigma, +D]}$coffee]]]



  b. Abbreviations:
  Assertion: $\neg\ \phi$
  First conjunct: p; Second conjunct: $\exists${a,b} assuming a domain with two coffees
  c. i. $\sigma A = \{\neg(p \wedge \exists\{a,b\}), \neg(p \vee \exists\{a,b\})\}$[6]
    ii. $DA = \{\neg p, \neg\exists\{a,b\}, \neg\exists\{a\}, \neg\exists\{b\}, \neg(p \wedge \exists\{a,b\}), \neg(p \wedge \exists\{a\}), \neg(p \wedge \exists\{b\})\}$
  d. $O_{\sigma A}\ [\neg\ \phi] = \neg(p \wedge \exists\{a,b\}) \wedge (p \vee \exists\{a,b\})$
  e. $O_{DA}[\neg(p \wedge \exists\{a,b\}) \wedge (p \vee \exists\{a,b\})] = \neg(p \wedge \exists\{a,b\}) \wedge (p \vee \exists\{a,b\}) \wedge p \wedge \exists\{a,b\}) = \perp$

(21) a. **not** [T [**play the guitar** $\wedge$ **drink any$_{\mathbf{D}}$ coffee**]] $\wedge$ [*T* [*play the guitar* $\vee$ *drink any$_{D}$ coffee*]]

$\Downarrow$ $\Uparrow$

b. ***not** [T [**play the guitar** $\wedge$ **drink any$_{\mathbf{D_j}}$ coffee**]] $\wedge$ [*T* [*play the guitar* $\vee$ *drink any$_{D_j}$ coffee*]]
where $D_j \subset D$

- The beautiful part of this is that we can now have a general approach to strong NPI licensing and intervention effects.

(108) You must factor implicatures and or presuppositions into meaning iff:
i. the NPI lexically requires it, or
ii. exhaustification is not too close

References

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