A scalar analysis of polarity contrasts between exclusive modifiers

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Exclusives

(1)

a. My cat Gertrude **only** eats kibble.
b. My cat Gertrude **just** eats kibble.
c. My cat Gertrude **merely** eats kibble.
d. My cat Gertrude **exclusively** eats kibble.
e. My cat Gertrude **solely** eats kibble.

→ Gertrude eats kibble

→ Gertrude does not eat alternatives to kibble

… and negative polarity

(2)

a. Gertrude only **ever** eats kibble.
b. # Gertrude just **ever** eats kibble.
c. # Gertrude merely **ever** eats kibble.
d. # Gertrude exclusively **ever** eats kibble.
e. # Gertrude solely **ever** eats kibble.

… and negative polarity

(3)

a. I only(/#just/#merely/#exclusively#solely) thought that Gertrude **ever** ate kibble, not caviar.
b. I only(/#just/#merely/#exclusively/#solely) brought Gertrude to **any** of the cat shows.

Why does *only* license NPIs, but not the other exclusives?

Roadmap

All exclusives exclude alternatives, but they order the alternatives differently.

- *Only* licenses NPIs because it orders the alternatives by **entailment**.
- *Just* and *merely* order the alternatives by **rank**.
- *Exclusively* and *solely* don't order the alternatives at all

Excluding via entailment is necessary to license NPIs!

Exclusives

(4) Lexical entry schema for exclusives (Coppock & Beaver 2014)

a. $\text{MIN}(p) = \lambda w. \exists q \in_{CQ} [q(w) \wedge q \geq p]$
b. $\text{MAX}(p) = \lambda w. \forall q \in_{CQ} [q(w) \rightarrow p \geq q]$
c. $[\![only]\!] = \lambda p \lambda w\text{: } \text{MIN}(p)(w).\text{MAX}(p)(w)$

Intended to unify **complement exclusion** and **scalar** readings.

Exclusives

Variation in the ≥ relation results in different readings.

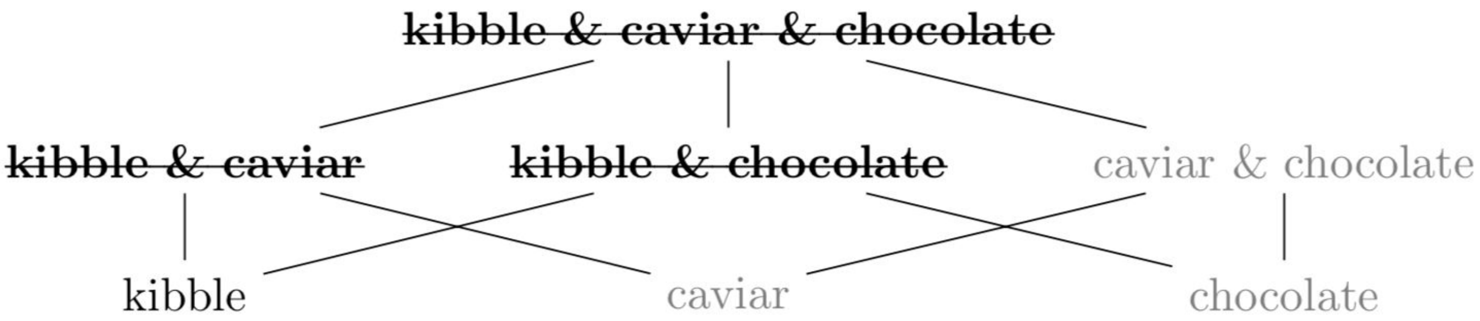
(5) Gertrude **only** eats kibble.

→ Gertrude eats nothing **other** than kibble. // *entailment*(≥)

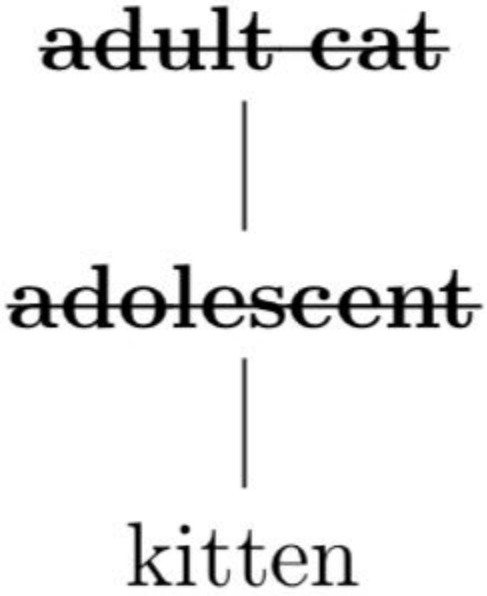
(6) Frederick is **just** a kitten.

→ Frederick is nothing **higher** than a kitten. // *rank*(≥)

Entailment scales



Rank-order scales



Scalar ambiguity

Although, scale structure is not perfectly correlated with entailment: rank-order scales can still include atomic alternatives that entail each other (e.g. Horn scales)

- <*some, many, most, all*> is not a boolean lattice: there is no alternative <*some, all*> that excludes *most*

Scale structure ≠ whether the alternatives entail each other ≠ whether the ordering is specified as entailment.

How absolute are scalar restrictions?

- Horn (2000): *only* orders alternatives by entailment, *just* by rank.
- Coppock & Beaver (2014): exclusives have “soft preferences” for different scales.

Some exclusives are more flexible than others: *only* can have rank-order readings too, *exclusively* and *solely* cannot.

(7) Frederick is **only**/#**exclusively**/#**solely** a kitten.

NPIs disambiguate

(8) *Context: card game*

a. I only/just/merely have a six. → Six is the **highest** card I have
b. Since the game started, I've only/just/merely had a six. → I have had no **higher** card than a six
c. Since the game started, I've only/#just/#merely **ever** had a six. → I have had no **other** card than a six

→ Evidence that NPIs require scales ordered by entailment.

NPIs

Chierchia (2013): NPIs are existential quantifiers associated with maximally wide domains, that trigger exhaustification over domain alternatives.

(9) [[ever]] = $\lambda e. \exists i \subset_{\text{ever}'} [\tau(e) = i]$

(10)

a. *exh*[Gertrude doesn't **ever** eat kibble.]
b. # *exh*[Gertrude ever **eats** kibble.]

NPIs

(11) $[[exh]] = \lambda p \lambda w.p(w) \wedge \forall q \in \text{ALT}(p)[{}^{a}q(w) \rightarrow {}^{a}p \geq {}^{a}q]$

- Exhaustification is **scalar**: sensitive to the same orderings exclusives are.
- This allows a straightforward treatment of rank-order scales.

Proposal

- *Only* orders alternatives by **entailment**.
- *Just/merely* order alternatives by **rank**. (Horn was right!)
- *Exclusively/solely* aren't scalar and do not order the alternatives at all (like the Horn 1969 analysis of *only*).

Entries

(12)

a. $[\![\text{only}]\!] = \lambda p \lambda w : \textsc{min}(p)(w).\textsc{max}(p)(w)$

b. $[\![\text{just/merely}]\!] = \lambda p \lambda w : \textsc{rank}(\geq) \wedge \textsc{min}(p)(w).\textsc{max}(p)(w)$

c. $[\![\text{exclusively/solely}]\!] = \lambda p \lambda w : p(w).\forall q \in \textsc{alt}(p)[p \neq q \rightarrow \neg q(w)]$

What are the alternatives?

- Exclusive's focus alternatives (F-ALT)
- NPI's domain alternatives (D-ALT)
- The propositional F-ALTs will also include NPIs, so we need to include the D-ALTs for each F-ALT too.

$\text{ALT}(p) = \text{F-ALT}(p) \cup \text{D-ALT}(p) \cup \{\text{D-ALT}(q) \mid q \in \text{F-ALT}(p)\}$

Orderings

The scalar exclusives (*only, just, merely*) impose the same ordering ≥ on the entire ALT set.

- ≥ = entailment: D-ALTs are ordered by entailment too
- ≥ = rank: D-ALTs are ordered by rank

Orderings

… however, scalar exclusives (*only, just, merely*) only exclude the F-ALTS.

(13)

a. $\text{MIN}(p) = \lambda w. \exists q \in_{\text{F-ALT}} [q(w) \wedge q \geq p]$

b. $\text{MAX}(p) = \lambda w. \forall q \in_{\text{F-ALT}} [q(w) \rightarrow p \geq q]$

Exhaustification

Exh excludes alternatives to the MAX assertion with narrower D-ALTs.

(14) $\text{ALT}(\text{MAX}(p)) = \{\text{MAX}(q) | q \in \text{D-ALT}(p)\}$

Only ever

MAX reverses strength: if $q \rightarrow p$, then MAX(p) $\rightarrow$ MAX(q).

(15) [[*exh*(Gertrude only ever eats kibble)]]

$= (\exists i \subset_{\mathbf{ever}} [\mathrm{T}(\mathbf{eat}(\mathbf{k})(\mathbf{g})) = i])(\lambda p \lambda w : \mathrm{MIN}(p)(w).\ \mathrm{MAX}(p)(w) \wedge$

$\forall q \in \mathrm{ALT}(\mathrm{MAX}(p))[q(w) \rightarrow (\mathrm{MAX}(p) \rightarrow q)]])$

Only ever

(16)

a. ALT(*p*) = {<*kibble, ever*>, ~~<*kibble & caviar, ever*>~~, ~~<*kibble & chocolate, ever*>~~, <*kibble, sometimes*>, ~~<*kibble & caviar, sometimes*>~~, ~~<*kibble & chocolate, sometimes*>~~, <*kibble, often*>, ~~<*kibble & caviar, often*>~~, ~~<*kibble & chocolate, often*>~~...}

b. ALT(MAX(*p*)) = {MAX(<*kibble, ever*>), MAX(<*kibble, sometimes*>), MAX(<*kibble,*

often>)...}

✓ not a contradiction!

#just ever

MAX does not reverse strength: if $q \geq p$, then $\textsc{max}(q) \geq \textsc{max}(p)$. This means the narrower D-ALTs are still ranked higher than the prejacent.

(17) #[[*exh*(Gertrude just ever eats kibble)]]

$= (\exists i \subset_{\textbf{ever}} [\textsc{t}(\textbf{eat}(\textbf{k})(\textbf{g})) = i])(\lambda p \lambda w : \textsc{min}(p)(w).\ \text{MAX}(p)(w) \wedge \forall q \in \textsc{alt}(\text{MAX}(p))[q(\text{w})$

$\rightarrow \textsc{max}(p) \geq q])$

#just ever

(18)

a. ALT(*p*) = {<*kibble, ever*>, ~~<*caviar, ever*>~~, ~~<*chocolate, ever*>~~, <*kibble, sometimes*>, <*caviar, sometimes*>, <*chocolate, sometimes*>, <*kibble, often*>, <*caviar, often*>, <*chocolate, often*>...}

b. ALT(MAX(*p*)) = {MAX(<*kibble, ever*>), ~~MAX(<*kibble, sometimes*>)~~, ~~MAX(<*kibble, often*>~~)...}

✗ contradiction!

#solely ever

Not scalar: excludes the D-ALTs too.

(19) #[[Gertrude solely ever eats kibble]] = $(\exists i \subset_{\textbf{ever}}[\tau(\textbf{eat}(\textbf{k})(\textbf{g})) = i])(\lambda p \lambda w : p(w). \forall q \in \text{ALT}(p)[p \neq q \rightarrow \neg q(w)])$

#solely ever

(20) ALT(*p*) = {<*kibble, ever*>, ~~<*caviar, ever*>~~, ~~<*chocolate, ever*>~~, ~~<*kibble, sometimes*>~~, ~~<*caviar, sometimes*>~~, ~~<*chocolate, sometimes*>~~, ~~<*kibble, often*>~~, ~~<*caviar, often*>~~, ~~<*chocolate, often*>~~...}

✗ contradiction!

Strawson DE is preserved

Strawson DE (von Fintel 1999) = downward entailment, given the **presuppositions of the consequent.**

- **consequent** = D-ALTs for each excluded F-ALT are false
- **presuppositions** = prejacent's D-ALTs are true

Strawson DE is preserved

- *just/merely*: *exh* excludes the consequent
- *exclusively/solely* exclude the presuppositions of the consequent

✗ neither counts as Strawson DE.

Conclusions

NPIs need entailment scales.

- *Just/merely* order alternatives by rank rather than entailment, failing to reverse logical strength.
- *Exclusively/solely* exclude indiscriminately, canceling the NPI's D-ALTs too.

Conclusions

- We need stricter restrictions on how exclusives order the alternatives: *just/merely* limited to rank, *exclusively/solely* not scalar.

- More broadly: at least sometimes, expressions that impose restrictions on alternatives can also affect other alternative-sensitive expressions in the same sentence.

Thanks!

Chierchia, Gennaro (2013). *Logic in grammar: polarity, free choice, and intervention*. Oxford: Oxford University Press.

Coppock, Elizabeth and David Beaver (2014). "Principles of the exclusive muddle". In: *Journal of Semantics* 31, pp. 371–432.

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Horn, Laurence (2000). "Pick a theory (not just any theory)". In: *Negation and polarity: syntactic and semantic perspectives*. Ed. by Laurence Horn and Yasuhiko Kato. Oxford: Oxford University Press.