A brief remark on formal alternatives to, and scalar implicatures of, sentences with multiple scalar items

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1 Overgeneration, not undergeneration

There appears to be some consensus that sentence (1a) gives rise to inference (1c) (e.g., Romoli 2012, Trinh & Haida 2015). This claim has recently also received some experimental support (Gotzner & Romoli 2016).

(1) a. No boy read every book.
b. $\rightsquigarrow$ Some boy read some book.
c. $\rightsquigarrow$ Every boy read some book.

This brief squib makes the minor point that inference (1c) is not problematic for Fox's (2007) constraint on formal alternatives, given in (2) (fn. 35 in his paper). Although Fox does not explicitly attend to inference patterns like (1a)-(1c) when introducing the constraint, the constraint turns out to correctly admit inferences like (1c).

(2) Alt(S) is the smallest set such that
i. S $\in$ Alt(S)
ii. If S' $\in$ Alt(S) and S" can be derived from S' by replacement of a single scalar item with an alternative, and S' does not entail S", S" $\in$ Alt(S).

Specifically, there is a parse of the sentence in (1a) that gives rise to (1c) and that respects the constraint in (2). This means that Fox's theory coupled with the constraint in (2) does not 'undergenerate'. Rather, what is problematic for assuming (only) the constraint in (2) is that it also admits the inference of (3c) from (3a) (of course, this is problematic to the extent that the inference in (3c) is not in fact observable).

(3) a. Some boy read every book.
b. $\rightsquigarrow$ $\neg$Every boy read every book.
c. $\not\rightsquigarrow$ $\neg$Every boy read some book.

2 Correct prediction

Consider the parse of the sentence in (1a) with recursive exhaustification at the matrix level (I ignore the contribution of the context to the domain restriction of *exh*):

(4) a. No boy read every book.
b. exh(exh(not some boy read every book))

The alternatives on which the embedded *exh* operates are provided in (5); they respect the constraint in (2). The prejacent of the matrix *exh* is computed in (6).

(5) Alt(not some boy read every book) =
{not some boy read every book, not some boy read some book}

(6) exh(not some boy read every book) =
not some boy read every book $\wedge$ $\neg$(not some boy read some book) =
not some boy read every book $\wedge$ some boy read some book

The alternatives on which the matrix *exh* operates in (4) are provided in (7). The alternatives are derived from the top one to the bottom one by replacing one scalar item by its alternative in each step. The alternatives respect the constraint in (2) (i.e., the alternative in the first line does not entail the alternative in the second line, and the alternative in the second line does not entail the alternative in the third line).

(7) Alt(exh(not some boy read every book))
= {exh(not some boy read every book),
exh(not some boy read some book)
exh(not every boy read some book)}
= {not some boy read every book $\wedge$ some boy read some book,
not some boy read some book,
not every boy read some book $\wedge$ some boy read some book}

For completeness, and in order to further highlight Fox's assumption about formal alternatives, let us look in more detail at the final alternative in the set in (7). The alternatives on which *exh* operates are provided in (8) (note that the set of alternatives that the lower *exh* operates on in (4) is thus not constant across the alternatives). As in (5), there is only one alternative to the prejacent that respects Fox's constraint, provided in (8b). Since this alternative is excludable, it can be negated by *exh*, yielding (8c).

(8)
a. exh(not every boy read some book)
b. Alt(not every boy read some book) =
{not every boy read some book, not some boy read some book}
c. not every boy read some book $\wedge$ some boy read some book

Given these alternatives, the resulting meaning of the sentence is the one provided in (9), which is a desirable prediction for the sentence since it entails the inference (1c).

(9) exh(exh(not some boy read every book)) =
not some boy read every book $\wedge$ some boy read some book $\wedge$ $\neg$(not every boy read some book $\wedge$ some boy read some book) =
not some boy read every book $\wedge$ some boy read some book $\wedge$ every boy read some book

We have thus seen that the sentence in (1a) may well convey the meaning in (1c) – even on the assumption of constraint (2). The crucial ingredient for this is the availability of recursive exhaustification – without it, one would not be able to obtain the right alternatives whose negation would yield the observed reading.

3 Speculation about the strength of inferences

Fox's (2007) constraint coupled with a variant of Chemla & Spector's (2011) processing assumption (roughly stated: the more parses of a sentence from which an inference follows there are, the stronger the inference is for that sentence) may predict a difference in the strength of (10b) vs. (11b), namely, that (10b) will be stronger: while there is only one parse of (11a) on which (11b) is generated (the one described in the preceding section), there are two parses of (10a) on which (10b) is generated (the embedded exhaustification one, on which *exh* occurs in the scope of *every boy*; and the one parallel to the discussion in the preceding section, elaborated on below). Interestingly, Gotzner & Romoli (2016) indeed observed a difference between the two inferences that goes in this direction, though it is only of marginal significance.

(10) a. Every boy read some book.
b. $\rightsquigarrow$ No boy read every book.

(11) a. No boy read every book.
b. $\rightsquigarrow$ Every boy read some book.

More to the point, in addition to the embedded exhaustification construal, the sentence in (10a) may give rise to the embedded strengthening reading of the sentence on the parse in (12) (I again ignore the set of contextually relevant alternatives).

(12) exh(exh(every boy read some book))

The alternatives on which the embedded *exh* operates are provided in (13). The prejacent of the matrix *exh* is computed in (14).

(13) Alt(every boy read some book) =
{every boy read some book, every boy read every book}

(14) exh(every boy read some book) =
every boy read some book $\wedge$ $\neg$(every boy read every book)

The alternatives on which the matrix *exh* operates in (12) are provided in (15). The alternatives are derived from the top one to the bottom one by replacing one scalar item by its alternative in each step. The alternatives respect the constraint in (2).

(15) Alt(exh(every boy read some book))
= {exh(every boy read some book)
exh(every boy read every book),
exh(some boy read every book)}
= {every boy read some book $\wedge$ $\neg$(every boy read every book)
every boy read every book,
some boy read every book $\wedge$ $\neg$(every boy read every book)}

The resulting meaning of the sentence is the one provided in (16), which corresponds to the embedded exhaustification construal of the sentence.

(16) exh(exh(every boy read some book)) =
every boy read some book $\wedge$ $\neg$(every boy read every book) $\wedge$ $\neg$(some boy read every book $\wedge$ $\neg$(every boy read every book)) =
every boy read some book $\wedge$ $\neg$(some boy read every book)

4 Incorrect prediction

Finally, sentence (17a) is (incorrectly) predicted to (potentially) induce (17b).

(17) a. Some boy read every book.
b. $\not\rightsquigarrow$ ¬Every boy read some book.

Assume that (17a) has the parse in (18). The prejacent of the matrix *exh* is in (19).

(18) exh(exh(some boy read every book))

(19) exh(some boy read every book) =
some boy read every book ∧ ¬(every boy read every book)

The alternatives on which the matrix *exh* operates are provided in (20). The alternatives are derived from the top one to the bottom one by replacing one scalar item by its alternative in each step. The alternatives respect the constraint in (2).

(20) Alt(exh(some boy read every book))
= {exh(some boy read every book),
exh(every boy read every book)
exh(every boy read some book)}
= {some boy read every book ∧ ¬(every boy read every book),
every boy read every book,
every boy read some book ∧ ¬(every boy read every book)}

The resulting meaning of the sentence is the one provided in (21), which is not observed.

(21) exh(exh(some boy read every book)) =
some boy read every book ∧ ¬(every boy read every book) ∧ ¬(every boy read some book ∧ ¬(every boy read every book)) =
some boy read every book ∧ ¬(every boy read some book)

It is worth noting that it does not matter whether the most deeply embedded scalar item, *every* in (17), is replaced first, or the higher scalar item is, *some* in (17) – the alternatives will respect the condition in (2). This makes a potential amendment of the constraint by adding the assumption that first the most embedded scalar item should be replaced insufficient. A different amendment is needed.

References

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