

A note on exclusive disjunction

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The so-called exclusive reading of disjunction is commonly credited to a scalar implicature. Simons (1998) argues that this analysis does not extend to disjunctions with more than two disjuncts and proposes an alternative account. In contrast, this squib argues that the scalar implicature account naturally extends to cases with any number of disjuncts.

Suppose that a speaker A utters the sentence in (1). A listener B would typically infer from (1) that (2) is false, that is, that Jones does not speak both Spanish and Italian. This is the so-called exclusive interpretation of disjunction.

- (1) Jones speaks Spanish or he speaks Italian.
- (2) Jones speaks Spanish and he speaks Italian.

It is a common view that the exclusive interpretation of disjunction is due to a scalar implicature (e.g. Horn 1972, Gazdar 1979, Ladusaw 1980). In the case at hand, B might reason in a Gricean manner (Grice 1975) as follows: “Since (2) is more informative than (1), and since A is cooperative, if A believed (2) to be true, A would have uttered (2) instead of (1). So I conclude that A does not believe (2) to be true. Assuming that A has an opinion as to the truth-value of (2), A must then believe that (2) is false. Since I consider A reliable, I conclude that (2) is indeed false.” In this way, A comes to believe that Jones doesn’t speak both languages.

The account just given predicts that the exclusive interpretation is absent if the listener has reasons to believe that the speaker is agnostic as to the truth-value of (2). This prediction is known to be correct. Suppose, for example, it is known to B that the A cannot tell Spanish from Italian. Then B might imagine that, if Jones had spoken both Spanish and Italian in the presence of A, A would come to believe (1) without being in a position to exclude the truth of (2). As predicted, A would not conclude that Jones does

not speak both languages. Having illustrated the possibility of so-called implicature cancellation here, I will not discuss it further in the following, as it does not seem central to the main arguments made below.

Scalar implicatures owe their name to the fact that their derivation makes reference to a “scale”, a pair of expression consisting of the utterance under investigation and a more informative alternative to this utterance¹. The derivation of the scalar implicature of (1), for example, assumes that the sentences in (1) and (2) form a scale. A complete theory of scalar implicatures must thus be built on a theory of scales, a theory that determines for any pair of expression, whether or not they form a scale. One evident constraint is that the members of a scale must be distinct and ordered by informativeness. But other, less evident, constraints seem to be needed, as we will see shortly.

Simons (1998) discusses an interesting potential problem for the view that the exclusive readings of disjunctions arise from scalar implicatures in the way illustrated above. The argument is based on three-disjunct cases like example (3).

(3) Jones speaks Spanish or he speaks Italian or he speaks French.

A listener will typically infer from (3) that Jones speaks at most one of the three languages. Can this exclusive reading of (3) be derived in the same way as the exclusive reading of (1)? More specifically, can we find a sentence that together with (3) forms a scale of the kind needed here?

Simons argues that the answer is no. The most obvious potential scale mate of (3) is the sentence in (4), where “and” has been substituted for “or” across the board.

(4) Jones speaks Spanish and he speaks Italian and he speaks French.

¹ Scales have been thought of as sets with possibly more than two members (e.g. Fauconnier 1978), but nothing is lost for the present purposes if scales are more simply construed as pairs of expressions.

Suppose that B infers from A's utterance (3) that (4) is false. This goes some way towards deriving the exclusive reading of (3). But it is not enough. After all, the falsity of (4) is compatible with Jones speaking any two of the languages in question.

Other potential scale mates can be manufactured from (3) by replacing just one occurrence of "or" with "and". Keeping the order of disjuncts fixed, this gives rise to the four cases in (5) to (8), where the intended hierarchical syntactic structures have been marked overtly for transparency.

- (5) [Jones speaks Spanish or he speaks Italian] and he speaks French.
- (6) [Jones speaks Spanish and he speaks Italian] or he speaks French.
- (7) Jones speaks Spanish and [he speaks Italian or he speaks French].
- (8) Jones speaks Spanish or [he speaks Italian and he speaks French].

Suppose B infers that (5) is false. This gets us closer toward deriving the exclusive reading, as B would infer that Jones speaks neither Spanish and French nor Italian and French. Still it leaves open a possibility intuitively excluded, namely the possibility that Jones speaks Spanish and Italian. Next, suppose B infers that (6) is false. This would amount to the inference that Jones does not speak French. This inference is not actually attested, as (3) is intuitively compatible with Jones speaking French. And I leave it to the reader to verify that the potential scale mates of (3) given in (7) and (8) give rise to much the same considerations as (5) and (6), respectively.

To summarize, the sentences (4), (5), and (7) are possible scale mates of (3), but the implicatures they derive are weaker than what is actually attested. On the other hand, if either (6) or (8) could form a scale with (3), we would derive an implicature that is stronger than what is actually attested. Hence (6) and (8) must be excluded as possible scale mates of (3). These findings raises two questions for the analysis of exclusive disjunctions and the theory of scalar implicatures. First, what is the general constraint on scales that excludes (6) and (8) as a possible scale mates of (3)? Second, can we find any

scale mate for (3) that satisfies all the constraints on scales and that derives the attested exclusive reading of (3)?

I will assume that a satisfactory answer to the first question can be found. But since it is not of highest relevance for the present purpose, I will not actually try to formulate such an answer. As for the second question, Simons argues that the answer is no, and concludes that the exclusive reading of a disjunction like (3) is not due to a scalar implicature.

I tend to agree with Simons that the answer to the second question is no.² However, I believe that the exclusive reading of (3) might still be analyzed as a scalar implicature. This belief is based on examples like those in (9) to (11).

- (9) Jones ate some of the cookies.
- (10) Jones ate some of the cookies or he tried the cake.
- (11) Jones ate all of the cookies.

Confronted with the utterance in (9), a listener will typically infer that (11) is false, that is, that Jones did not eat all of the cookies. This is a standard case of a scalar implicature. In (10), the sentence (9) appears as the first part of a disjunction. The relevant observation is that (10) lets the listener infer the falsity of (11) as much as (9) does. In other words, the scalar implicature of one disjunct survives as the scalar implicature of the entire disjunction.

² Of course, a conceivable scale mate for (3) would be the sentence in (i) below, which is more informative than (3) and would derive the desired implicature.

- (i) Jones speaks both Spanish and Italian or he speaks both Spanish and French or he speaks both Italian and French.

However, I suspect that any sufficiently restrictive theory of scales would exclude a scale consisting of (3) and (i). Specifically, it is not clear how (i) could be admitted as a licit scale mate of (3) without also admitting the undesired (6) and (8).

The same point is illustrated again in (12) to (14). An utterance of (12) typically implicates that (14) is false. The same holds for an utterance of (13), where the sentence introducing the implicature appears as the second disjunct.

- (12) Jones tried to cash the check.
- (13) Jones gave the check to his wife or he tried to cash it.
- (14) Jones cashed the check.

It thus appears that the implicature of a sentence is generally inherited by a disjunction in which the sentence appears as a disjunct. For now, let me refer to this generalization as “implicature projection”. Assuming that implicature projection applies to all sorts of scalar implicatures, we expect that it applies in particular to scalar implicatures introduced by disjunctions. Suppose, for example, that (3) has the structure in (15).

- (15) [Jones speaks Spanish or Jones speaks Italian] or Jones speaks French.

Generalizing from the discussion of (1), we arrive at the plausible generalization that for any two sentences ϕ and ψ , “ ϕ and ψ ” is a scale mate of “ ϕ or ψ ”. For now, let me refer to this generalization as the “theory of scales”. The theory of scales predicts that (5) above is a potential scale mate of (15) and hence predicts (15) to implicate that Jones neither speaks Spanish and French nor Italian and French. Moreover, because of implicature projection, we expect that any implicature carried by (1) is also carried by (15). As we have seen, (1) implicates that Jones does not speak Spanish and Italian. Hence implicature projection and the theory of scales jointly derive the exclusive reading of (15). In an analogous way they also derive the exclusive reading of (16).

- (16) Jones speaks Spanish or [Jones speaks Italian or Jones speaks French].

I conclude that the exclusive reading of (3) under any syntactic analysis can be credited to independently motivated generalizations, namely what I have called the theory of scales and implicature projection. The potential problem discovered by Simons seems to

disappear once it is acknowledged that the derivation of the exclusive reading of (3) makes reference to two nested disjunctions and their respective scale mates, rather than just a string of atomic disjuncts (that is, disjuncts that are not themselves disjunctions) and its scale mate.

Simons offers a different solution to the apparent problem posed by cases like (3). She proposes that in a disjunction of the form $X_1 \text{ or } \dots \text{ or } X_n$, each X_i is understood to provide an exhaustive answer to some explicit or implicit question. For example, (3) is likely to be taken to answer the question what languages Jones speaks. Understood as an exhaustive answer, the first clause in (3) states that Jones speaks Spanish and no other language, the second, that Jones speaks Italian and no other language, and the third, that Jones speaks French and no other language. If the disjuncts are so understood, then the disjunction as a whole is expected to be exclusive.

Since there are obvious and well-known connections between the theory of scalar implicatures and the theory of questions and their answers (Groenendijk and Stokhof 1984), the question is whether the analysis of (3) proposed by Simons can be empirically distinguished from the analysis proposed above. I will leave this question as a topic for future research. Let me merely point to a not so evident commonality of the two theories, namely the fact that both theories can cope with sentences hosting any number of atomic disjuncts. The theory by Simons is stated in a way that makes this obvious, as it refers to atomic disjuncts directly, ignoring the way they are organized hierarchically. In the present theory it is slightly less obvious, so let me conclude this squib with an informal proof.

Claim: The claim is that for any $n \geq 2$ and $1 \leq i, j \leq n$ such that $i \neq j$, (17) below implicates that $X_i \text{ and } X_j$ is false, no matter how the disjuncts are organized hierarchically.

(17) $X_1 \text{ or } (\dots \text{ or } X_n$

Proof: The above discussion has shown that the claim is true for $n = 2$ and $n = 3$. We show by induction that the claim holds for any greater n as well. Suppose, then, that the claim holds for $n = m-1$. The task is to show that it holds for $n = m$. Suppose first that (17) has the structure in (18).

$$(18) \quad [X_1 \text{ or } (\dots \text{ or } X_{m-1})] \text{ or } X_m$$

By the induction hypothesis, the bracketed expression in (18) implicates that $X_i \text{ and } X_j$ is false for any $1 \leq i, j \leq m-1$ such that $i \neq j$. By implicature projection, this is also an implicature of (18) as a whole. Moreover, by the theory of scales, (18) implicates that (19) is false.

$$(19) \quad [X_1 \text{ or } (\dots \text{ or } X_{m-1})] \text{ and } X_m$$

This is the case if and only if $X_i \text{ and } X_m$ is false for any $1 \leq i \leq m-1$. Taking everything together, (18) has been shown to implicate that $X_i \text{ and } X_j$ is false for any $1 \leq i, j \leq m$ such that $i \neq j$, which is the desired result. The remaining possible structures of (17) are given in (20) and (21). The case in (20) is fully analogous to (18) and left to the reader.

$$(20) \quad X_1 \text{ or } [X_2 \text{ or } (\dots \text{ or } X_m)]$$

$$(21) \quad [X_1 \text{ or } (\dots \text{ or } X_k)] \text{ or } [X_{k+1} \text{ or } (\dots \text{ or } X_m)]$$

In the case of (21), the induction hypothesis is applied to both bracketed disjuncts to derive the implicature that $X_i \text{ and } X_j$ is false for any $1 \leq i, j \leq k$ and any $k+1 \leq i, j \leq m$ such that $i \neq j$. This implicature is projected. Also, by the theory of scales, we derive the implicature that (22) is false.

$$(22) \quad [X_1 \text{ or } (\dots \text{ or } X_k)] \text{ and } [X_{k+1} \text{ or } (\dots \text{ or } X_m)]$$

This is the case if and only if $X_i \text{ and } X_j$ is false for any $1 \leq i \leq k$ and $k+1 \leq j \leq m$. Taken everything together, (21) also implicates that $X_i \text{ and } X_j$ is false for any $1 \leq i, j \leq m$ such that $i \neq j$, which completes the proof.

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