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Either/Or¹

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1 Introduction

It is known that English disjunctions A or B are scopally ambiguous (Rooth and Partee (1982)), and that their scopal properties are conditioned by the scope-marking word either (Larson (1985)). These authors and others, including Vainikka in her (1987), have observed numerous cases in which disjunction gives rise to conjunctive interpretations, as in the interpretation of (1) parenthetically indicated:

- (1) John plays chess or checkers (so he'll play whichever you please)

Assuming these discussions as a background, I will argue that the following three premises, taken together, explain all of the scopal and interpretive properties of disjunction in English:

- (i) Every or is an either/or; i.e., part of a larger constituent headed by either or its interrogative counterpart whether.

- (ii) The word either, like any, is systematically

1. Versions of this paper have been presented at MIT, Princeton University, McGill University, the Oxford Linguistics Circle, and the University of Venice. I am grateful to the audiences at these presentations for comments and discussion, and to particular persons as noted below.

ambiguous as between a negative polarity item (an existential) and a "free-choice" item (a universal).

- (iii) When either is not phonologically realized, it is substantially free in its existential interpretation (subject to island conditions), but remains restricted in its universal interpretation, needing like free-choice any a modal or generic environment. The environments for universal either extend also to questions, and are the source of so-called alternative questions in English.

Consider first the implications of (i) alone for the interpretation of (2):

- (2) John thinks Mary went swimming or dancing

As there are two sites for either, namely the matrix and complement CPs, there are two scopal possibilities, which we may indicate roughly by (3):

- (3)(a) [For either swimming=X or dancing=X] John thinks Mary went X
 (3)(b) John thinks [[For either swimming=X or dancing=X], Mary went X]

These scopes correspond to the respective reductions (4)(a) and (4)(b):

- (4)(a) John thinks Mary went swimming or John thinks Mary went dancing
 (4)(b) John thinks [Mary went swimming or Mary went dancing]

For these examples, the interpretive mechanism is simple: the position of either shows where the reduction is to be taken.

For the above and other examples cited in Rooth and Partee and in Larson, we need not suppose that either has any meaning of its own. On the other hand, nothing prevents assigning it an existential meaning E, with the appropriate variable supplied by the disjunctive constituent. The variable is not restricted as to category. Even parts of words can appear disjoined, as in (5):

- (5) In most languages that concept is rendered by a pre- or post-position

From (i) alone, however, we obtain for (1) only the meaning shown in (6):

- (6) [Ex: x=chess or x=checkers] John plays x

i.e., "John plays chess or he plays checkers." However, (1) also has an interpretation equivalent to "John plays chess and he plays checkers." Manipulations of scopes cannot reveal this second meaning. The ambiguity remains when either is overt, as in (7):

(7) John plays either chess or checkers

I therefore turn to the examination of either in isolation.

Besides either/or constructions, there are constructions with either itself as the sole quantifier, as in (8) and (9):

(8) Mary didn't like either of them

(9) John could have read either book

In syntactic behavior, either behaves like every, each, and other quantifiers that occur only with singular count nouns, and freely in the partitive construction. The range of a quantification with either is to comprise two and only two things; thus if I am the speaker of (8), and I demonstrate some books, to which my utterance of the pronoun them refers, there had better be just two.

Turning now to the support for (ii) above, It is easy to show that either without or has the distribution of any. Here are some elementary data for comparison:²

(10) Any/Either of them will work

(11) *Any/Either of them worked³

(12) John plays any/either game

(13) *John played any/either game

(14) I don't know any/either of them

(15) *I know any/either of them

The simple NP either N differs from any N only in imposing the requirement that its range of quantification comprises just two things. As a negative polarity item, it is existential, as in (14); as a free-choice item, it is universal, as in (10) and (12).

2. These data are folkloric, as far as I know. For discussion that helped me to see them clearly, I am indebted to Barry Schein.

3. Strictly speaking, (11) is not ungrammatical, but has uniquely an interpretation as a generic in the past tense, as in "In those days, any/either of them worked;" similarly for (13).

Putting together the observations thus far set forth, the further conjecture seems inevitable that the ambiguity of (1) flows from its containing a hidden either, which like overt either admits a free-choice or universal interpretation A; this is part of (iii) above. Besides (6), then, we have (16) for (1):

(16) [Ax: x=chess or x=checkers] John plays x

But (16) is equivalent to (17):

(17) John plays chess and John plays checkers

Hence the "conjunctive" interpretation of (1).

The logical law that underwrites the equivalence of (16) and (17) is (18):

(18) $p_1 \vee p_2 \vee \dots \vee p_n \rightarrow q$ iff
 $p_1 \rightarrow q \ \& \ p_2 \rightarrow q \ \& \ \dots \ \& \ p_n \rightarrow q$

Conjunctive interpretations of disjunction arise both from free-choice either and from existential either. Examples like (19) are intuitively equivalent to conjunctions as in (20)

(19) If you (either) marry her or don't marry her, you will regret it

(20) If you marry her, you will regret it, and if you don't marry her, you will regret that too⁴

The general equivalence of If A or B, then C to If A then C and if B then C in natural language is not evident, and some theories of the conditional do not validate it; even these theories, however, must reckon with many intuitive equivalences of this nature. When conditionals are strictly universal; i.e., when

If A then B

is understood as

In any (relevant) circumstance in which A, B

the equivalence holds by ordinary logic.

More generally, when a disjunction is contained within a universal quantifier we will have a conjunctive equivalent, as in the simple example (21)-(22):

4. Example due to S. Kierkegaard.

- (21) Everyone who went to Paris or London had a good time
 (22) Everyone who went to Paris had a good time, and everyone who went to London had a good time

If the analysis in this paper is correct, then disjunction or never means and; but the ambiguity of either, and logical equivalences, conspire to produce the appearance of conjunctive interpretation of disjunction. There are, moreover, at least two distinct ways of producing the effect, namely by free-choice either and by existential either within universal quantification.

The remainder of this article is devoted to a series of applications of the view just expressed, and the propositions (i)-(iii) that imply it. In section 2 I will consider examples with existential either, and in sections 3 and 4 examples where free-choice or universal either is at work.

2 Disjunctions Within Universals

Consider the data in (23)-(24)

- (23) John left before Mary or Bill (ambiguous)
 (24) John left after Mary or Bill (unambiguous)

On one interpretation, (23) is equivalent to (25):

- (25) John left before Mary and John left before Bill

But the source of the ambiguity of (23) must be absent in (24).

In Higginbotham (1988), I proposed that the asymmetry of before and after responsible for the distribution of any in pairs like (26)-(27) arose from the fact that the clausal (or clausally understood) complement of before involved a tacit universal quantification, and that of after a tacit existential quantification, over events, understood as forming part of the thematic structure of verbal heads:

- (26) John left before anyone else
 (27) *John left after anyone else

Thus (28) is understood as in (29), but (30) comes out as in (31):

- (28) John left before Mary (did)
 (29) [Ee: leave(John,e)] [Ae': leave(Mary,e')] e before e'
 (30) Mary left after John (did)
 (31) [Ee: leave(Mary,e)] [Ee': leave(John,e')] e before e'

My proposal is supported, independently of the distribution of any, by such facts as the following. First, (32), but not (33), is a contradiction:⁵

- (32) I went there before you did and you went there before I did
 (33) You went there after I did and I went there after you did

Second, (34) but not (35) implies the truth of John learned Spanish:

- (34) John visited Mexico after he learned Spanish
 (35) John visited Mexico before he learned Spanish

Third, before but not after governs modal *irrealis* complements as in (36):

- (36) The ice cream melted before/*after I could eat it

All of these facts follow from the hypotheses governing quantification in complements to before and after, given that the converse relations these words express are linear orderings of individual events. With these hypotheses in place, I return to the problem of (26)-(27).

We owe to Ladusaw (1979) the discovery that the environments licensing English any, even, and other negative polarity items are those that are in his sense downward entailing. The restricted universal quantifier is downward entailing in its restriction (the position occupied by the N it governs), inasmuch as the premises of (37) imply the conclusion:

- (37) All *F* are *G*
 All *H* are *F*; therefore,
 All *H* are *G*

The restriction in All *F* are *G* is *F*; and if *H* is contained in *F*, as the second premise has it, then we can pass to the conclusion All *H* are *G*, which lies "downward" from the first premise in the sense that it replaces a predicate by another whose extension lies within it. Indeed, negative polarity items occur freely in the restrictions of universal quantifiers, as in Ross's example (38):

- (38) Everyone who knew anything about the subject attended

The ambiguity of (23) now follows as well. Besides the expected reduction of (23) to (39), given in the present system by allowing a tacit either with matrix scope, we may take it with scope

5. This observation is due to Anscombe (1964).

interior to the tacit universal quantifier appearing with before, obtaining (40):

- (39) John left before Mary, or John left before Bill
 (40) [$\exists e$: leave(John,e)] [$\exists e'$: [Either for x =Mary
 or for x =Bill] leave(x,e')] e before e'

Taking either in (40) as the existential quantifier, and exploiting the logical equivalence of (41) to (42), the equivalence of (40) to (25) follows.

- (41) [$\exists e'$: [Either for x =Mary or for x =Bill]
 leave(x,e')] e before e'
 (42) [$\exists e'$: leave(Mary, e')] e before e' &
 [$\exists e'$: leave(Bill, e')] e before e'

Larson (1988) has observed that the hypothesis that English comparative constructions involve tacit universal quantification accounts for the possibility of understanding the disjunctive (43) as implying the conjunction (44)

- (43) John is taller than Mary or Bill
 (44) John is taller than Mary and John is taller than Bill

The universal quantification, associated with the complement of than, yields for (43) what I give informally here as (45):

- (45) Every degree of height δ that belongs to Mary or to Bill
 is such that John is taller than δ

(44) then follows.

Summing up this section, we can use the distribution of disjunction along with negative-polarity items as a diagnostic for unapparent semantic structure.

3 Free-Choice Permission

The paradox of free-choice permission, or Ross's paradox after Alf Ross (1941), constitutes a puzzle in the important and fruitful analogy between deontic concepts and the concepts of metaphysical or logical modality. According to the analogy, the concept of moral or other obligation is likened to that of necessity, and the concept of permission to that of possibility. The familiar duality of necessity and possibility is then apparently preserved: just as the necessary is that whose contradictory is impossible, and the possible that whose contradictory is not necessary, so the obligatory is that which it

is not permissible to omit (i.e., whose contradictory is not permissible), and the permissible is that which it is not obligatory to refrain from

The paradox is this. In the realm of logical or metaphysical modality, there is an implication from the possibility of anything to the possibility of anything logically weaker than it; so in particular from premise to conclusion in (46):

(46) $\Diamond p$; therefore, $\Diamond(p \vee q)$

If permission P is comparable to metaphysical possibility, there should be a comparable implication from premise to conclusion in (47)

(47) $P(p)$; therefore, $P(p \vee q)$

But (48) is an instance of (47) in ordinary language:

(48) It is permitted that you mail the letter; therefore, it is permitted that you mail the letter or destroy it

and the argument (48) is absurd. What is in fact implied by the premise of (48) is the conjunction (49)

(49) It is permitted that you mail the letter, and it is permitted that you destroy it

Ross's paradox led von Wright (1968) to propose complicating deontic logic so that the central notions of obligation and permission were interpreted as two-place modal operators. Hintikka (1979) and Vainikka (1987) have urged pragmatics-based solutions.⁶ I believe that the views developed here show that the paradox admits a simple semantic response, one that leaves the fundamental analogy between the deontic and metaphysical modalities intact.

The mistaken assumption that leads to Ross's paradox is the assumption that (48) is an instance of (47). On the contrary, because words like permitted and the modal verbs license only free-choice or universal either, the conclusion of (48) is an instance not of

$P(p \vee q)$

but rather of

6. I give some arguments against Hintikka's solution in the review Higginbotham (1986).

[$A\alpha: \alpha=p \vee \alpha=q$] $P(\alpha)$

The paradox then dissolves.

The above solution to Ross's paradox can be supported further by the reflection that besides the deontic the epistemic and metaphysical interpretations of modality are also a source of paradoxical examples. Thus we can understand (50) as implying (51):

- (50) The fugitive may be in Paris or London
 (51) The fugitive may be in Paris and he may be in London

Certain asymmetries between the deontic and the metaphysical case remain, however; thus one can I believe understand (52) as not implying (53):

- (52) It is possible John mailed the letter or destroyed it
 (53) It is possible that John mailed the letter

The adjectives possible and permitted therefore differ, in that only the latter requires that disjunction be given a free-choice interpretation.

4 Alternative Questions

Consider the alternative question (54), said by steward to passenger in an airline setting:

- (54) Would you like coffee or tea?

These direct questions are neither yes-no questions, nor disjunctions of questions. If they were the former, then the silly answer "Yes" would be in order, and if they were the latter then a sufficient response would consist in a declaration pro or con either tea or coffee; but whereas the response, "Coffee, please" is in order, the response "No tea, thank you" is not.⁷

-
7. I am assuming here an interpretation of disjoined interrogatives given in Higginbotham (1991), according to which an answer to the disjunctive question

?p or ?q

is anything that is an answer to either disjunct. See also Groenendijk and Stokhof (1989). If these sources are right, then the meanings of alternative questions cannot be a simple

Direct alternative questions presuppose that at most one, and sometimes also at least one, of the presented alternatives is true. As with other uses of or, any categories can be linked; an adequate theory must apply to examples like (55) and (56):

- (55) Did she go to Harvard, Vassar, or MIT?
 (56) Did he die of natural causes, or was he shot?

Indirect alternative questions include (the relevant interpretation of) (57):

- (57) John wonders whether she went to Harvard, Vassar, or MIT

The presupposition is that John believes she went to one and only one of these schools.⁸

My proposal is that alternative questions represent universal or free-choice whether, overt or tacit, in construction with or, and taking scope over the interrogative. If this is right, then (54) as an alternative question is as in (58):

- (58) [Ax: x=coffee \vee x=tea] ?(You would like x)

Now, universal quantification into a question, as in one interpretation of (59) and the like, produces a complex question any answers to which must be answers to each of the questions given by choosing an object satisfying the restriction on the quantifier.

- (59) What did everybody say?

 matter of the scope of disjunction. Independently of the abstract account of the meanings of questions, the fact that Finnish for example uses a distinct form of disjunction in alternative questions argues strongly against any account in terms of scope; see Vainikka (1987).

8. Interestingly, we do not have examples like (i) as alternative questions:

- (i) ??John wonders whether he died of natural causes or he was shot

The desired interpretation, the indirect counterpart of (56), comes only by conjoining the VPs, as in (ii):

- (ii) John wonders whether he died of natural causes or was shot

The pertinent representation is (60):

(60) [Ax: person(x)] [WHy] ?x said y

which expresses for each person a the question what a said. We need not go further into the details of the semantics (for my view of which see Higginbotham (1991)). It is sufficient to note that adequate answers to (59) with wide-scope everybody take the form "John said so-and-so and Mary said such-and-such, and, ...," running through all the persons in the contextual domain. Anything less is a less than adequate answer, and no more is required by the meaning of the question. Applying this general picture to (58), we conclude that it expresses for each thing among coffee and tea the yes-no question whether you would like that thing. An adequate answer must therefore be an answer to each of those questions, for instance, "Neither," or "I would like coffee, but I wouldn't like tea."

But alternative questions carry the presupposition that at most one alternative is true. Hence (61) is an adequate answer:

(61) Coffee, please

More generally, a single positive instance among any number of alternatives is an adequate answer to the alternative question ranging over them. Negative instances, however, are not adequate answers; thus (62) leaves the steward in the lurch about the coffee:

(62) No tea, thank you

This consequence supports the proposal above. Notice that long-winded responses to (54) such as "I would not like tea, but I would like coffee" are quite in order. The crucial point is that abbreviations are possible.⁹

Examples like (55) and (56) are analyzed along the lines just given for (54). In the case of (56), where disjunction appears between clauses, we have the representation (63):

(63) [A Φ : Φ =he died of natural causes \vee Φ =he was shot] ? Φ

9. As Scott Soames pointed out to me, it is possible to respond to (54) with "No, thank you," as well as the explicit "Neither, thank you." Note, however, that the response "No" is clearly out of order in response to (56). I take this as evidence that the respondent, in the context of polite discourse, is treating (54) as if it were a yes-no question.

In effect, two yes-no questions are being posed simultaneously. Because of the associated presupposition, a correct answer to either implies the correct answer to the other.

Vainikka (1987) points out that in Finnish verbal inflection for number affects the possibilities for interpreting interrogatives with disjunction in subject position. Analogous facts obtain also in English, as shown by the difference in interpretation of (64) and (65):

(64) Do 12 or 14 exceed the sum of their divisors?

(65) Does 12 or 14 exceed the sum of its divisors?

These data suggest that in (65) the wide-scope quantification is explicitly represented at LF. At this level, (65) would have a singular subject, an individual variable, with which the anaphor it agrees in number.

5 Conclusion

In this paper I have attempted to reduce the apparent ambiguity of disjunction to the ambiguity of a sometimes overt and sometimes tacit quantifier either. Assuming the general outlines of this view, a number of residual issues, both syntactic and semantic, remain to be explored. Among these, one that remains an outstanding puzzle is the possibility of lexical alternation in meaning such as either and any both exhibit in English. It is also unclear why free-choice either but not any is permitted in questions. In any case, the general thesis that English or always expresses disjunction, and that ambiguities arise from other sources, is supported by the semantic evidence.

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