‘Or’ in context

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This paper is primarily concerned with the following data:

(1) a. It may be here or (else) it may be there.
b. It must be here or (else) it must be there.
c. It may be here or (else) it must be there.
d. ?It must be here or (else) it may be there.

(So as to forestall referential confusion, let us suppose that ‘It’ is the name of a runaway chicken.) The most pressing problem presented by these sentences is that, on one of its readings, (1a) seems to imply both that It may be here and that it may be there (though not both, presumably), whilst (1b) does not license the corresponding inferences; that is, it does not imply that It must be here, nor does it imply that it must be there. Another problem, which is less well-known, is the contrast between (1c) and (1d). It may be that (1c) is less than fully acceptable to some speakers, but everyone agrees that (1d) is a lot worse. This asymmetry is entitled to an explanation, too. Non-epistemic modalities raise analogous problems.

This paper can be seen as an attempt to remedy various problems with Zimmermann’s (2000) theory. The present proposal is indebted to Zimmermann’s in two major respects. First, and most importantly, disjunctions will be analysed as conjunctions of modal propositions. Secondly, I adopt Zimmermann’s idea that the essential contribution of ‘or’ is merely to present a list of alternatives. Any further ingredients in the interpretation of a disjunctive construction (such as exhaustivity) are contributed by extraneous factors; they are not part of the meaning of ‘or’.

I depart from Zimmermann’s original proposal in three ways. First, I reject his premiss that disjunctions are always lists of *epistemic* modals. Intuitively, the function of ‘or’ is just to present alternatives, not to determine their modal status; it is not for ‘or’ to decide whether its arguments are epistemic or deontic or something else, though it may well be that disjunctions are epistemic by default.

The second difference between Zimmermann’s theory and mine concerns the logical form of disjunctive sentences. According to Zimmermann, the logical form of (1a) contains four modal operators: $\Diamond\Diamond A \wedge \Diamond\Diamond B$. I maintain that there

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are just two: the overt modals *fuse* with the modals covertly required by 'or'. Hence, to a first approximation at least, the logical form I propose for (1a) is simply $\Diamond A \wedge \Diamond B$; from which it follows straightaway that $\Diamond A$ and that $\Diamond B$. However, this is just the beginning of my story. For if the same analysis is applied to (1b), for example, what we get is $\Box A \wedge \Box B$; and we don't want (1b) to imply that It must be here *and* there. The solution, I believe, lies in the way modals interact with the context. This context dependence is the fulcrum of my analysis, and the third respect in which I deviate from Zimmermann's model. In the following I develop these ideas in more detail, starting with the last.

It is a familiar observation that the meaning of a modal expression is dependent on contextual factors. This context dependence is manifest in examples like the following:

(2) Your teeth might fall out.

In this example it is perfectly clear what kind of contextual information the sentence requires, at least intuitively speaking: (2) means something like 'If the circumstances were to be such and such, your teeth might fall out', and unless the context determines what 'such and such' stands for, the sentence will be unintelligible.

Simple modal sentences like (2) don't impose overt restrictions on their domains. Such restrictions can be communicated, if need be, by means of an if-clause:

(3) If you don't brush your teeth anymore, they might fall out.

Here it is the if-clause that furnishes the constraints on the modal domain that were previously derived from the context. This is not to say, however, that the if-clause replaces the context altogether, for conditional modals like (3) are context dependent just as simple modals are. For example, if (3) is continued as follows:

(4) ... and if your teeth fall out, you'll be sorry you didn't brush them.

the states of affairs under consideration are those in which the addressee's teeth fall out because she didn't brush them, but the sentence doesn't say so explicitly.

What if a conditional doesn't contain an overt modal element, as in (5a)? There is a popular view, which I will adopt too, that in such cases there is a covert operator, which defaults to epistemic necessity. Hence, all things being equal, (5a) will be equivalent to (5b):

(5) a. If Betty isn't in Lagos, she is in Harare.
    b. If Betty isn't in Lagos, she must be in Harare.

Note that, even though the interpretation of (5a) involves a covert modal, this does not imply that there two modals in (5b), one overt and one covert. Rather, (5b) makes explicit an element of meaning that is left implicit by (5a). This is the rule, but there are exceptions:

(6) a. If you're myopic, you shouldn't use contraceptives.
b. If the Pope is right, you shouldn't use contraceptives.

Suppose that the personal pronouns in these examples are all generic. Then (6a) proclaims a ban of a somewhat peculiar nature, namely, that short-sighted people shouldn't use contraceptives. By contrast, a speaker who utters (6b) doesn't issue a ban of any kind, but rather considers the possibility that a certain norm applies, namely, that contraceptives should not be used (by anyone). So this *is* an instance of double modality, one part of which is overt while the other part is covert.

In order to model the context dependence of modal expressions, I assume that modals are explicitly represented as relations between sets of worlds. For example, the logical form of (2) is A◇B, where A represents the domain of the modal and B stands for the sentence's descriptive content. The linguistic surface form of a sentence like this leaves the domain of the modal quantifier virtually unrestricted, although modal expressions always impose some constraints on their domains, as witness the difference between 'can' and 'may', for example. But it is clear that, in general, the domain of a modal is determined chiefly by the context. In the following I will assume, therefore, that a modal proposition is always interpreted against a given 'background' (i.e. a set of worlds), which depending on the occasion is to be thought of as epistemic, deontic, etc. The domain of a modal quantifier can relate to this background in one of two ways: domain and background may be identical or the former may be a subset of latter. Conversational backgrounds may be thought of as a kind of discourse topics: unless a speaker wants to change the topic, he goes on talking about the same topic or at least part of it.

Generalising Zimmermann's analysis, I assume that the logical form of a sentence 'S_1 or ... or S_n' is a conjunction of propositions of the form $A_i\mathcal{Q}_iB_i$, where $\mathcal{Q}_i$ is a modal quantifier. The lexical meaning of 'or' doesn't say which quantifier $\mathcal{Q}_i$ is, though it may specify that, all things being equal, $\mathcal{Q}_i$ is epistemic and existential. However, in the cases we are concerned with all things are not equal, because the arguments of 'or' are modal propositions, which usually means that $\mathcal{Q}_i$ is determined by the modality of S_i. That is to say, the logical forms of (1a) and (1b) are (7a) and (7b), respectively:

(7) a. $A\Diamond B \wedge A'\Diamond B'$
b. $A\Box B \wedge A'\Box B'$

As in conditionals with modal consequents (cf. (5b)), the modal verbs in (1a) and (1b) make explicit the modal operators covertly required by 'or'. This is the normal case; there are also cases in which overt and covert modals don't fuse:

(8) You may do this or you may do that.

Pace Zimmermann, I maintain that this sentence is ambiguous. On one reading, the speaker grants the addressee permission to do this or that; in which case overt and covert modals fall together, and the logical form of (8) mirrors that of (1a). On the other reading, the speaker doesn't give permission but considers what is permitted. For this reading, I adopt roughly the same logical form as does Zimmermann, according to which each disjunct contains an epistemic modal which has a deontic modal in its scope. The contrast between these two readings is analogous to the contrast between the two sentences in (6).

Again following Zimmermann's lead, I assume that the interpretation of disjunction is usually restricted by constraints other than the meaning of 'or' itself. The two main constraints are the following. Let $A_1\mathcal{Q}_1B_1 \wedge \ldots \wedge A_n\mathcal{Q}_nB_n$ be the logical form of a sentence 'S_1 or ... or S_n' which is interpreted against a contextually given background set C:

Exhaustivity: $C \subseteq (A_1 \cap B_1) \cup \ldots \cup (A_n \cap B_n)$
Disjointness: If $1 \leq i, j \leq n$, then $A_i \cap B_i \cap A_j \cap B_j = \varnothing$

My Exhaustivity constraint is almost identical to Zimmermann's, the main difference being that the background set C is not necessarily epistemic. The Disjointness constraint gives rise to what is generally known as the exclusive interpretation of disjunction. Both constraints can be triggered by a variety of factors: intonation, certain keywords ('either', 'else'), background knowledge, pragmatic inference. It is also plausible to assume, I believe, that these constraints hold by default.

I will now apply this analysis to the examples listed at the outset, starting with (1a). The logical form of (1a) is $A\Diamond B \wedge A'\Diamond B'$, and it is interpreted against an epistemic background C. By default, A and A′ are bound to C, i.e. $A = A' = C$. Thus we get $C \cap B \neq \varnothing$ (from the first disjunct) and $C \cap B' \neq \varnothing$ (from the second disjunct). Hence, it follows more or less directly that It may be here and that It may be there.

Without further constraints, (1a) does not exclude the possibility that It may be neither here nor there. This possibility is ruled out if the Exhaustivity constraint applies, because then it holds that $C \subseteq B \cup B'$. Thus Exhaustivity in effect turns (1a) into the claim that It *must* be here or there—which is perhaps the most natural reading for (1a) to have.

On the account proposed here, (8) is more or less the same as (1a), except of course that (8) is to be interpreted against a deontic background. Furthermore, the tendency to assume that Exhaustivity holds may not be as strong in this case as it is in the previous one, but this is a difference in degree not in kind; for (8) may well be used to convey that the addressee must do either this or that.

The logical form of (1b) is $A\Box B \wedge A'\Box B'$. The main difference between this example and its existential counterpart in (1a) consists in the connections between A and A' on the one hand and the background set C on the other. For if $A = A' = C$, the sentence means that It must be here and there, which is inconsistent with the fact that, as a rule, a chicken cannot be in more than one place at a time. More generally, the Disjointness constraint is violated if either $A = C$ and $A' \subseteq C$ or $A' = C$ and $A \subseteq C$. Therefore, we assume that A and A' need not cover all of C, i.e. $A \subseteq C$ and $A' \subseteq C$. Assuming Exhaustivity, (1b) states that all C-worlds are either B-worlds or B'-worlds, so It must be here or there. And if Disjointness holds, as well, C is partitioned into A and A'. This seems to capture the intended reading of (1b) quite well. In particular, on the present analysis, it does not follow from (1b) that It must be here, nor does it follow that It must be there.

The logical form of (1c) is $A\Diamond B \wedge A'\Box B'$, and in this case it is possible to identify A, though not A', with the epistemic background C; hence $A = C$ and $A' \subseteq C$. Now we get the following:

First disjunct:	$C \cap B \neq \varnothing$	Exhaustivity:	$C \subseteq B \cup A'$
Second disjunct:	$A' \subseteq B'$	Disjointness:	$B \cap A' = \varnothing$

An important difference between this example and the preceding ones lies in the relationship between the modal domains and the background set. In the foregoing, the domain sets A and A' either coincided with C or they determined each other: in (1b) C was partioned by A and A'. In this example, by contrast, the only way to characterise A' in terms of the other sets is as follows: $A' = C - B$; i.e. A' contains all and only the non-B worlds in C. That is, in order to identify the domain of the second disjunct we require the descriptive content of the first. My suggestion is that this explains why (1c) is so much better than (1d). In (1d) the domain of the first modal is dependent on the descriptive content of the second, which is awkward for the same reason that kataphora is, in general, awkward.

The proposed analysis extends in a natural way to other constructions with 'or'. One straightforward extension is to disjunctions of conditionals like the following example, which is due to Woods (1997):

(9) Either he is in Rome, if he is in Italy, or he is in Bordeaux, if he is in France.

Woods observes that this sentence seems to entail that 'he' is in Rome or Bordeaux; which is precisely what we predict if we adopt the modal analysis of conditionals outlined above.

References

Woods, M. 1997: *Conditionals.* Clarendon Press, Oxford.

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