4.1.2. Inclusive and exclusive disjunction

The fact that the table above gives φ ∨ ψ the value **T** when both φ and ψ are **T** may raise doubts about its correctness as an account of *or*. For we sometimes say things like

Al will go to France or Germany, or both;

and there are contexts where the expression *and*/*or* seems to capture our meaning better than *or*. But, if φ *or* ψ is already true when both φ and ψ are true, what does the alternative *or both* add? And, if φ *or* ψ is already true when φ *and* ψ is, why does *and/or* seem to differ from *or*?

Considerations like these have led logicians, from the Stoics on, to be interested in a connective with the table below.

φ	ψ	
T	T	F
T	F	T
F	T	T
F	F	F

This is the table of ***exclusive disjunction***—so-called because it excludes the possibility that both components are true> The connective ∨ is known as ***inclusive disjunction*** because it leaves this possibility open. It has often been suggested that the English word *or*, in at least some of its uses, is a sign for exclusive rather than inclusive disjunction. If this were true, it would explain why we add the phrase *or both* or resort to *and*/*or* when we wish to express inclusive disjunction; for a sentence of the form *Both* φ *and* ψ is true in exactly the case in which inclusive and exclusive disjunction differ.

But in spite of this apparent evidence for regarding *or* as a sign of exclusive disjunction, there are strong reasons for thinking that it is always a sign for inclusive disjunction. That is, there are reasons for thinking that φ *or* ψ in English does not imply *Not both* φ *and* ψ (as it would if it were an exclusive disjunction of φ and ψ) but instead has the *not-both* claim an implicature in some contexts. The arguments we will look at touch on three features of a sentence that help to distinguish its implications among its implicatures: the effect of denying the sentence, *yes-no* questions concerning its truth, and the possibility of canceling implicatures.

Let us first look at the denial of the sentence *Al will go to France or Germany*. The most straightforward denial of this is *Al will not go to France or Germany*, but we could just as well say this:

Al will go to neither France nor Germany.

And we can paraphrase the latter as

Al will not go to France, and he will not go to Germany.

Now, we have seen that this sort of sentence can be analyzed as a *not-and-not* form, specifically, as $\neg F \wedge \neg G$ [F: *Al will go to France*; G: *Al will go to Germany*]. And, it seems reasonable to suppose that the denial of φ *or* ψ can always be expressed as *Neither* φ *nor* ψ or, equivalently, as $\neg \varphi \wedge \neg \psi$.

But, if this is so, the word *or* must express inclusive disjunction. For the truth value of φ *or* ψ must be the opposite of the truth value of its denial, and the truth value of its denial is given by the table below.

φ	ψ	$\neg \varphi \wedge \neg \psi$
T	T	F
T	F	F
F	T	F
F	F	T

If, on the other hand, the word *or* indicated exclusive disjunction, there would be two ways for a sentence φ *or* ψ to be false—i.e., when φ and ψ were both false and also when they were both true—and, therefore, two ways for its denial to be true. But the form *Neither* φ *nor* ψ, does not seem to leave open the possibility that both φ and ψ are true. In short, if the possibility that Al will go to both France and Germany must not be ruled out by the disjunction, because it is not left open by the corresponding *neither-nor* sentence.

A second argument concerns questions. Imagine that you intend to visit both France and Germany this summer and are filling out a questionnaire that includes the following:

Will you visit France or Germany this year? ___ Yes ___ No

The correct answer in this case seems to be *yes*. But this means that the sentence *I will visit France or Germany this year* is true if you will visit both.

A final argument concerns the following way of making it clear that Al might visit both France and Germany.

Al will visit France or Germany, and he may visit both.

Notice that instead of hedging the claim (as is done *or both* is added), this sentence uses *and* and thereby adds a second claim *Al may visit both France and Germany*. Now, if *Al will visit France or Germany* implied *Al won't visit both France and Germany*, the sentence displayed above would imply the following:

Al won't visit both France and Germany, but he may visit both.

This sentence may not have fallen into self-contradiction, but it is teetering on the edge. On the other hand, *Al will visit France or Germany, and he may visit both* is neither a self-contradiction nor anything close to one.

If these arguments are correct, when a disjunction φ *or* ψ does convey the idea that φ and ψ are not both true, it does so by means of an implicature rather than an implication. Moreover, it seems possible to cancel any such implicature by adding a phrase like *and maybe both*. This possibility of cancellation is a sign that the implicature is of a special kind that Grice distinguished as a ***conversational implicature***. A conversational implicature does not attach to a particular word as do the special implicatures that come with the use of *even* and *but*. Instead, it is produced by an interaction between the content of the claim being made and the conversational setting in which it is made. Conversational implicatures may be canceled while implicatures attaching to particular words typically cannot be canceled without lapsing into the sort incoherence exhibited by *Even John was laughing, but John always laughs*. Although it is not easy to say exactly how conversational implicatures arise in the case of disjunction, it does seem clear that any suggestion that the alternatives are not both true depends on the setting in which the disjunction is asserted. For example, if it was clear to everyone that the speaker's knowledge of Al's plans was derived from his responses on the kind of questionnaire described above, *Al will visit France or Germany* would carry no suggestion that Al would not visit both.

Of course, to assume that *or* in English always expresses inclusive disjunction is to not claim that exclusive disjunction cannot be expressed in English. We can, of course, always rule out the possibility that two alternatives are both true if we choose to do so. But, if this is to be done through the truth conditions of what we say (rather than through an implicature), we must rule out the possibility explicitly by, for example, saying something of the form φ *or* ψ *but not both*. And, in our notation, we have the following two forms:

Inclusive disjunction	*Exclusive disjunction*
$\varphi \vee \psi$	$(\varphi \vee \psi) \wedge \neg(\varphi \wedge \psi)$
either φ or ψ	both either φ or ψ and not both φ and ψ

But, for the remainder of this text, the term *disjunction* without qualification will always refer to inclusive disjunction—i.e., to the form $\varphi \vee \psi$.

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