The (pragmatic) power of unspecificity*

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Abstract. Unspecific modal statements often seem to imply that various more specific statements are true as well. Notoriously, *you may have beer or wine* suggests that you may have beer and that you may have wine. *Electrical items may be carried in hand luggage* suggests that computers, cameras, and phones are allowed, although perhaps not tasers; *the bag might contain an electrical item* suggests that there are various electrical items the bag might contain. I argue that a plural interpretation of modals together with basic ideas from dynamic semantics allows for a simple explanation of these "Free Choice" type phenomena as ordinary scalar implicatures.

1 Paradoxes of Free Choice

Georg Henrik von Wright observed a now famous "perplexity" [1967: 137] about disjunctive permission. *You may have beer or wine*, for example, seems to entail that you may have beer and also that you may have wine. This is odd, because *having beer* is more specific than *having beer or wine*: any act of having beer is also an act of having beer or wine. One might have expected, in line with standard deontic logic, that if a certain type of act A is permitted, and performing A entails performing B, then B must also be permitted. (In other words, permission contexts should be monotonic.) So the permissibility of having beer should entail the permissibility of having beer or wine. But then the permissibility of having beer or wine can't entail the permissibility of having wine – for *you may have beer* certainly does not entail *you may have wine*.

Following [Wright 1968], this puzzle has come to be known as the *paradox of free choice permission*. (The disjunctive permission allows you to "freely choose" between beer and wine.) The name obscures the fact that the same phenomenon arises with other modalities. *She might bring beer or wine* seems to imply that she might bring beer and that she might bring wine. This clashes with the attractive idea that if A is epistemically possible, and A entails B, then B should also be possible. Similarly, *she could have brought beer or wine* seems to imply that she could have brought beer and that she could have brought wine; and *I can bring beer or wine* seems to imply that I can bring beer and that I can bring wine.

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So the puzzle is not just about permission. Nor is it about disjunction. If a range of cookies is on display, then *you may have a cookie* suggests that you can choose a cookie from the whole range; *you may have wine* suggests that you may have red wine and you may have white wine, provided both are available. *She might be in one of the bars on campus* suggests that various bars are possible locations. *The generator can produce sine waves between 5 and 500 Hz* suggests that the generator can produce wavelengths from across the entire interval. These apparent entailments again clash with the monotonicity of the relevant contexts. By monotonicity, *you may have red wine* entails *you may have wine*; if *you may have wine* entails *you may have white wine*, we could validly reason from *you may have white whine* to *you may have red wine*.

Roughly speaking, the general phenomenon is that whenever a "possibility statement" (involving *may*, *might*, *could*, *can* etc.) is in a certain sense *unspecific*, then it seems to entail various more specific possibility statements. The disjunction *having beer or wine* is unspecific, encompassing the more specific possibilities *having beer* and *having wine*. But *having wine* is still unspecific with respect to whether the wine is white wine or red wine. I will use the label *Free Choice* for this general phenomenon, even in cases where it has nothing to do with anybody's freedom to choose.

The present characterization is exceedingly vague. What exactly is a "possibility statement"? More pressingly, what makes a statement "unspecific" and what counts as a resolution of the unspecificity? *Having white wine* is a more specific way of *having wine*, but so is *having wine while burning down the house*. Yet we don't normally take a permission to have wine to cover this particular way of having a wine. In other words, *having white wine* is a legitimate "specification" of *having wine*, while *having wine while burning down the house* is not. A satisfactory theory of Free Choice should have more to say on this distinction. Let's call this the *problem of specificiations*.

The picture is further complicated by the fact that unspecific possibility claims sometimes don't convey that such-and-such particular specifications are possible, but merely that there is a range of (legitimate) specifications that are possible. For example, consider an utterance of *Third-year students may take an extra module*. This would normally suggest that the students can choose from a range of modules: the unspecific *may take an extra module* implies that various specific modules may be chosen. But neither speaker nor hearer may know which modules fall in this range – either because they don't know what modules are taught at the relevant department in the first place, or because they don't know which of these modules are eligible as extra modules for third-year students. Similarly, *she might have lost something* suggests that there are various things she might have lost, but there needn't be any particular thing (her keys, her phone) of which it suggests that she might have lost *it*. This, too, is something a theory of Free Choice should explain.

I will not attempt to give a precise characterization of Free Choice at this stage.

Identifying a linguistic phenomenon often goes hand in hand with understanding it. I will present an account of Free Choice that correctly predicts all the phenomena I have mentioned, along with several others. What ultimately unifies all these cases is that they have the same explanation.

The explanation I will offer is that the apparent entailment from *you may have beer or wine* to *you may have beer* is in fact a scalar implicature that can be explained along standard neo-Gricean lines. The idea is not new. There are well-known reasons for thinking that Free Choice phenomena are due to scalar implicatures. But there are also difficult challenges to any such treatment. In the next section, I will review these issues. The rest of the paper will present my solution.

2 Semantics or Pragmatics?

One reason against the view that Free Choice is a simple matter of truth-conditional entailment is the puzzle with which I began. Somewhat more explicitly, the argument is based on the assumptions that (i) *S may do A* is true iff *S* is not forbidden to do *A*, and (ii) doing something that entails doing something forbidden *is* doing something forbidden. For example, if drinking wine is forbidden then presumably drinking red wine is also forbidden. By (i), it follows that *you may have red wine* entails *you may have wine*. And then *you may have wine* had better not entail *you may have white wine*, since one can't infer *you may have white whine* from *you may have red wine*.

A related argument starts from the assumption that permission contexts are insensitive to logical form, meaning that if *S may do A* is true, and *A* is logically equivalent to *B*, then *S may do B* is true as well. Given the equivalence between A and $(A \wedge B) \vee (A \wedge \neg B)$, Free Choice would then allow us to reason from *you may do A via you may do (A and B) or (A and not-B)* to *you may do A and B* – from *you may have a cookie* to *you may have a cookie and burn down the house*.

A more revealing argument against a direct semantic account of Free Choice inference looks at their contraposition. If *you may have beer or wine* entails *you may have wine*, then the negation of the conclusion should entail the negation of the premise. *You may not have wine* should entail *you may not have beer or wine*. Likewise, *you may not have white wine* should entail *you may not have wine*; *I can't bring white wine* should entail *I can't bring wine*, and so on. But these inferences don't look good at all. *You may not have beer or wine* clearly seems to say that beer and wine are *both* forbidden, which doesn't follow from the mere fact that wine is forbidden.

So the Free Choice effects disappear under negation. They also disappear in other downward entailing environments. For example, if *S may have beer or wine* entails *S may have beer* and *S may have wine*, then *no student may have beer or wine* – no student is an *S* such that *S* may have beer or wine – should be true as long as either beer or

wine is forbidden for every student. In fact the statement means that both beer and wine are forbidden for every student.

This interaction with downward entailing environments is a hallmark of scalar implicatures. Compare the textbook example of scalar implicatures, the inference from *some* to *not all*. If we are told that *some students passed the test*, it is often reasonable to infer that not all students passed. Arguably, this inference is not licensed by the truth-conditional content of the uttered sentence. On the (neo-)Gricean model of implicatures, it rather relies on further assumptions about the conversational context – in particular about the speaker's state of mind. The reasoning might be regimented as an instance of the following argument.

1. The speaker uttered S (*some students passed*) rather than the stronger alternative S' (*all students passed*).
2. As a cooperative informant, the speaker would have uttered S' rather than S if she had known S' to be true.
3. So the speaker doesn't know that S' is true.
4. But the speaker is well-informed about the subject matter.
5. So S' (*all students passed*) is false while S (*some students passed*) is true.

This Gricean account is attractive not only because it allows us preserve traditional views about the meaning of *some* and *all*, but also because it correctly predicts that the apparent entailment depends on the contextual background assumptions 2 and 4, and that it reverses in downward entailing environments, because what is more informative on its own becomes less informative in downward entailing environments. Thus *not all students passed* normally conveys that at least some students passed, and *I doubt that some students passed* normally conveys a suspicion that no student passed, rather than a suspicion that either no or all students passed.

We can also witness reversal in the case of Free Choice. Consider the Free Choice inference from *you may have wine* to *you may have white wine*. When the conclusion is negated – *you may not have white wine* – we wouldn't infer that we may not have wine, as the validity of free choice predicts. On the contrary, we would infer that we're *allowed* to have wine, just not white wine.

We can further verify the importance of assumptions 2 and 4. Suppose I utter (1) while explaining a board game.

(1) At the beginning of round two, you may draw a red card or a green card, depending on how many of these you already have.

This does not suggest that both types of card are permissible options. Or suppose I say (2), indicating that I don't know which options are permissible.

(2) I'm not sure what happens at the beginning of round two. I think you may draw a red card or a green card.

Again, this does not suggest that you are free to choose between a red card and a green card. Similarly, one could say *you may have beer or wine, I forgot which*, or *you may have beer or wine, I won't tell you which.* Neither of these would make sense if *you may have beer or wine* already settled that you may have beer and you may have wine. Even direct cancellations of Free Choice effects are often possible: *you may have wine, but only red wine* might be slightly odd, but it is not a contradiction. (It is not as bad as *you may have red wine, but no wine.*) Similarly, *she might be in one of the bars on campus, although not in any of the new ones.* [1]

The hypothesis that Free Choice effects are scalar implicatures also has the promise to answer the problem of specifications. The reason is that any plausible theory of scalar implicatures must postulate restrictions on the alternatives S' to an uttered sentence S that can enter into the algorithm for computing implicatures. Return to the case where we are told that *some students passed.* On the neo-Gricean account outlined above, we can infer that not all students passed because the speaker didn't choose the stronger alternative *all students passed.* But there are countless other alternatives that could in principle be considered, including *some but not all students passed* and *some students passed and I don't want a cookie.* With these alternatives in place of S', the neo-Gricean argument would lead, respectively, to the conclusions that all students passed and that the speaker wants a cookie. Without substantive restrictions on the alternatives S', the neo-Gricean story therefore predicts not only implicatures that actually arise, but also a plethora of implicatures that do not arise.

So what should count as an alternative S' to a given sentence S for the purpose of computing scalar implicatures? A popular strategy is to define a base class of *formal alternatives* which is then restricted by conversational context and a condition of *innocent excludability*, which ensures that one can consistently deny all the alternatives while accepting the original sentence S (see [Fox 2007]). The precise characterization of the formal alternatives is an open problem. According to [Katzir 2007], the formal alternatives to a sentence S are defined syntactically by (roughly) substituting constituents of S with either an element of the lexicon or another sub-constituent of S (see also [Fox and

1 Speakers who utter *may* or *might* sentences typically know about the relevant modal facts. Not so for *can* sentences in which the grammatical subject is not the speaker. This might partly explain why Free Choice effects are comparatively rare for that construction. For example, while *she might speak French or Spanish* suggests that she might speak French and she might speak Spanish, *she can speak French or Spanish* normally doesn't convey that she can speak both languages. The more natural interpretation here is that the speaker is uncertain about which of the two languages she can speak. (Another part of the explanation is presumably that the conjunctive *she can speak French* and *Spanish* is conventionally used to convey that she can speak both languages; choice of the weaker disjunctive form therefore suggests that the stronger statement is not known to be true.)

Katzir 2011]). For our purpose, the details are not really important. What's important is that if Free Choice effects are scalar implicatures, then it is clear why only some specifications are "legitimate": they are the ones that correspond to genuine alternatives for the computation of scalar implicatures.

I will return to this point in section 5. First we need to recapitulate why an account of Free Choice in terms of scalar implicatures is not as easy as one might have hoped.

Consider again our first example.

(3) You may have beer or wine.

The most salient alternatives to (3) are (4) and (5).

(4) You may have beer.

(5) You may have wine.

Both are simpler and stronger than (3), they naturally come to mind as alternative things the speaker could have said, and they qualify as formal alternatives by the rules of [Katzir 2007]. Unfortunately, they are not innocently excludable: we can't assume that (4) and (5) are both false while (3) is true. In any case, this would be the opposite of what we want. We want to infer that the alternatives are *true*, not *false*! How is that supposed to work?

It is sometimes argued that although Free Choice may not fit the standard account of scalar implicatures, it can nevertheless be explained along broadly Gricean lines (see e.g. [Geurts 2010: ch.6]). The basic idea is this. For a well-informed and cooperative speaker, (4) would be the right thing to say if only beer is allowed, and (5) if only wine is allowed. If the speaker chose neither of those sentences, we can infer that neither condition is met. This leaves two possibilities: either beer and wine are both allowed or both forbidden. The actual statement (3) entails that they are not both forbidden. The only remaining possibility is that they are both allowed.

But this doesn't explain why (3) is a reasonable choice of words for expressing that both beer and wine are allowed, if its literal meaning is that either beer or wine is allowed. Shouldn't we rather expect those words to be used in cases where the speaker is not fully informed (or secretive) about the relevant permissions? After all, why would the speaker choose (3) over the strictly *simpler and more informative* (4)? Isn't the most obvious explanation that she is not in a position to assert the simpler and stronger alternative?

Compare the case of ordinary disjunction. Suppose someone utters (6).

(6) Alice gave her number to Bob or Claire.

There are two obvious alternatives, (7) and (8).

(7) Alice gave her number to Bob.

(8) Alice gave her number to Claire.

For a well-informed an cooperative speaker, (7) would be the right thing to say if Alice gave her number only to Bob, and (8) if she gave it only to Claire. Since the speaker chose neither of those sentences, one might infer that Alice either gave her number to both Bob and Claire or to neither. The latter is incompatible with the literal content of (6), so the only remaining possibility is that Alice gave her number to both Bob and Claire. — This is clearly not a sensible interpretation of the utterance. Nobody would understand (6) as asserting that Alice gave her number to both Bob and Claire. A much better explanation for why the speaker chose the comparatively weak and complex (6) is that she wasn't in a position to assert (7) and (8): she doesn't know (or doesn't want to tell) whether Alice gave her number to Bob or Claire.

This reasoning, from the utterance of (6) to the conclusion that the speaker doesn't know (or doesn't want to tell) which of (7) and (8) is true, fits the above Gricean schema, except that it halts after step 3. This is sometimes called a *primary (scalar) implicature*, in contrast to a full (*secondary*) implicature that goes all the way to 5. Even if we had initially thought the speaker well-informed and cooperative (premise 4), the utterance of (6) would convince us that she is not. The question is why this doesn't happen with (3).

3 Beyond modality

The modal constructions ('may', 'might', 'can', etc.) that trigger Free Choice effects are often analyzed as existential quantifiers over accessible possibilities. A natural question is therefore whether similar effects occur with constructions that instead quantify over times or individuals. As Klinedinst [2007] observes, the answer is yes. Thus *sometimes she brought beer or wine* suggests that sometimes she brought beer and sometimes she brought wine; *Some guests brought beer or wine* suggests that some guests brought beer and some brought wine. These implications are just as puzzling as Free Choice implications for *may* or *might* or *can*.

Consider *some guests brought beer or wine*. First of all, there are good reasons to think that *some guests did so-and-so* is monotonic: if some guests did A, and doing A entails doing B, then surely some guests did B. Thus *some guests brought beer* should entail *some guests brought beer or wine*. If the latter entails *some guests brought wine*, we could infer *some guests brought wine* from *some guests brought beer*, which may be plausible in a given context, but certainly isn't necessarily truth-preserving.

Here, too, the effect is not limited to disjunction. *Some guests brought musical instruments* suggests that the guests who brought instruments didn't all bring, say, tubas. *Some guests arrived between 5 and 7* suggests that the relevant guests didn't all arrive at exactly 6.30.

Once again the effect displays characteristic features of scalar implicatures. For example, it goes away under negation: *no guest brought beer* does not at all seem to entail *no guest brought beer or wine*. And it can be cancelled: *some guests brought beer or wine, I forgot which*. But as before the effect is hard to explain along standard neo-Gricean lines. What alternative to *some guests brought beer or wine* could we negate to infer that some guests brought beer?

(Klinedinst also points out the Free Choice effect only seems to arise if the existential quantifier is plural. *Once she brought beer or wine* does not suggests that once she brought beer and once wine. *Some guest brought beer or wine* does not suggest that some guest brought beer and some guest wine. This provides an interesting test for theories of Free Choice: several proposals in the literature predict that it should make no difference to the generation of Free Choice effects whether the quantifier is singular or plural (see [Klinedinst 2007: sec.1.5]).)

To understand what's going on here it might help to look at superficially similar cases involving plural *definites*, where the same effects can be observed. For example, *the best things in life are illegal, immoral or fattening* suggests that some of the best things are illegal, some immoral and some fattening. *The guests arrived between 5 and 7* suggests that some of the guests arrived not long after 5 and some not long before 7. *The children drew animals* suggests that the children didn't all draw the same kind of animal, say giraffes. In each case, the attribution of an unspecific property to the plurality triggers what Klinedinst calls a *diversity implicature* to the effect that different more specific properties are instantiated among the plurality.

These diversity implicatures are easily explained as standard scalar implicatures. Consider (9).

(9) The guests arrived between 5 and 7.

Arguably (9) is literally true if all guests actually arrived between 5 and 6. But in that case a well-informed and cooperative speaker would probably have chosen the more informative *the guests arrived between 5 and 6*. If she didn't, we can infer that the guests didn't all arrive between 5 and 6. For parallel reasons, we can infer they didn't all arrive between 6 and 7, or between 5:55 and 6:05. Thus we get the diversity implicature that the arrival times are spread out over the given interval.

Now return to the indefinite (10).

(10) Some guests arrived between 5 and 7.

Why does the explanation for (9) not work for (10)? Suppose there is a plurality G of guests whose arrival times are spread out over the interval from 5 to 7. Then some members of G arrived between 5 and 6. The problem is that this makes the more informative alternatives (11) and (12) *true*.

(11) Some guests arrived between 5 and 6.

(12) Some guests arrived between 6 and 7.

These are verified not by the original plurality G, but by certain sub-pluralities of G. In the case of (9), we could negate both *the guests arrived between 5 and 6* and *the guests arrived between 6 and 7* to derive the diversity implicature. With (10), we can't consistently deny both (11) and (12) while accepting (10) – and in any case what we want to infer is that (11) and (12) are true, not false.

From this perspective, the problem is the existential quantifier in *some guests*. When we consider alternatives to (9), *the guests* always picks out the same fixed plurality. By contrast, when we consider alternatives to (10), different alternatives can be made true by different pluralities. To derive the Free Choice type diversity implicature, we would have to hold fixed the plurality.

The same kind of problem arises for singular indefinites. Consider (13).

(13) A gambler lost some of his savings. Another lost all of his.

There is an implicature here that the first gambler, unlike the second, didn't lose all his savings. How does this implicature arise?

On the standard account, we should consider certain alternatives to the uttered sentences. In particular, the speaker could have used the stronger (14) instead of *A gambler lost some of his savings*.

(14) A gambler lost all of his savings.

Since the speaker chose the weaker sentence, we can infer that she wasn't in a position to assert (14). Assuming she is well-informed, we can further infer that the alternative is false.

The problem is that in the context of (13), this explanation makes no sense. For the second sentence in (13) entails that (14) is in fact true: the speaker knows that some gambler lost all of his savings. So we can hardly assume that she wasn't in a position to assert (14).[2]

Now here is a modest proposal: whatever explains the implicature in (13) also explains the implicature in (10); and whatever explains the implicature in (10) also explains Free Choice as a scalar implicature. Let's try to put some flesh on this.

2 One might suggest that we should consider not just alternatives to the individual sentences in (13), but to (13) as a whole. If the speaker had known that both gamblers lost all of their savings, she would have chosen *two gamblers lost all of their savings* instead of the weaker (and more complex?) (13). Since she didn't, we can infer that only one of the gamblers lost all their savings. I don't think this explanation will do as a general solution though. For example, it seems to me that even the first sentence of (13) on its own does not suggest that there is no gambler who lost all of his savings.

4 Discourse referents

When we compute the implicature in (13), we seem to hold fixed the relevant gambler. Informally, the reasoning might be spelled out as follows. "The speaker said of some gambler that he lost some of his savings; it would have been more informative to say that he lost all of his savings; so the speaker probably doesn't think that this is true; since she is well-informed, the gambler probably didn't lose all of his savings."

To make this fit the neo-Gricean account of scalar implicatures, we have to read the indefinite *a gambler* more like a referring expression than a traditional quantifier, so that we can hold fixed its reference when considering alternatives. Fortunately, this idea is independently motivated by the study of anaphora. Consider (15).

(15) A gambler lost some of his money. He got upset.

Here the first sentence seems to introduce a particular gambler, which is subsequently picked out by *he*. Following [Kamp 1981] and [Heim 1982], we might analyze this effect by assuming that the logical form of *A gambler lost some of his savings* is something like (16), where x is a free variable that gets existentially closed only on the level of discourse.

(16) $\mathit{Gambler}(x) \wedge \mathit{Lost\text{-}some\text{-}of\text{-}his\text{-}savings}(x)$.

The second sentence in (15) can then involve the same free variable x.

In this dynamical framework, it is plausible that when scalar implicatures are computed, the alternatives S' to a sentence S should involve the same variable. Thus a salient alternative to (16) is (17).

(17) $\mathit{Gambler}(x) \wedge \mathit{Lost\text{-}all\text{-}of\text{-}his\text{-}savings}(x)$.

This is what the speaker could have asserted by saying *A gambler lost all of his savings*. Since she didn't actually assert it, we may infer that (17) is false, while (16) is true. It follows that x is a gambler who lost some but not all of his savings.

I have used the account of [Kamp 1981] and [Heim 1982] mainly for the sake of concreteness. The basic explanation doesn't require free variables and discourse-level existential quantification. What's important is that indefinites such as *a gambler* in (13) or (15) introduce a new "discourse referent" (modelled as a new variable, a new stack position, or whatever) whose interpretation is constrained through the remaining discourse. It is then plausible that Gricean mechanisms apply to these constraining moves, no matter whether they occur in a separate sentence (as in (18)) or not.

(18) A gambler came in. He lost some of his savings.

In a sense, the Gricean mechanisms thereby apply *locally* in the scope of the existential quantification. But we don't need to postulate *lexicalized* or *grammticalized* implicatures

in the sense of [Chierchia 2004], [Fox 2007] or [Chierchia et al. forthcoming] – implicatures that are automatically triggered by certain (perhaps silent) lexical items in arbitrary syntactial embeddings. [Klinedinst 2007] offers an account of Free Choice based on such a postulation. Here I hope to achieve the same goals with fewer controversial resources. My explanation is compatible with a neo-Gricean picture on which implicatures are computed by asking why the speaker made a particular move in the language game rather than certain alternatives. From a dynamic semantics perspective, a truly *global* application of Gricean principles would have to wait until the end of the entire discourse, which is evidently not very practical.

The explanation for (10), *some guests arrived between 5 and 7*, is completely analogous. Here *some guests* introduces a plural discourse referent. As before, let's model this (somewhat naively) by assuming that *some guests* introduces a plural variable X, so that the relevant logical form of (10) might be rendered as (19).

(19) $\mathit{Guests}(X) \wedge \mathit{Arrived\text{-}between}(X, 5, 7)$.

The diversity implicature then arises in the same straightforward way as it did for (9), *the guests arrived between 5 and 7*: salient alternatives to (19) are

(20) $\mathit{Guests}(X) \wedge \mathit{Arrived\text{-}between}(X, 5, 6)$.

and

(21) $\mathit{Guests}(X) \wedge \mathit{Arrived\text{-}between}(X, 6, 7)$.

By the cumulative meaning of *Arrived-between*, the negation of (20) entails that if the Xs are guests, then some of them didn't arrive between 5 and 6.[3] Likewise, the negation of (21) entails that if the Xs are guests, then some of them didn't arrive between 6 and 7. Together with (19), we can infer that the Xs are guests some of which arrived between 5 and 6 and others between 6 and 7.

Informally, one might render the inference as follows. "The speaker said of some guests that they arrived between 5 and 7; it would have been more informative to say that they arrived between 5 and 6, or between 6 and 7; since the speaker chose the less informative expression, these alternatives are probably false; so the arrival times of the relevant guests lie partly between 5 and 6 and partly between 6 and 7."

Now let's work back to modality, stopping briefly at the temporal case. Following Klinedinst, we noted that (22) suggests that sometimes Alice brought beer and sometimes she brought wine.

(22) Sometimes Alice brought beer or wine.

3 A predicate F is *cumulative* if $F(a) \wedge F(b)$ entails $F(a$ and $b)$. In the present case, the assumption that all individuals in X arrived between 5 and 6 entails that the Xs arrived between 5 and 6. Conversely, if the Xs didn't arrive between 5 and 6, then some of them individually didn't arrive between 5 and 6.

Why is that? Arguably, *sometimes* here functions as a plural indefinite, serving to pick out a plurality of times. Just as in the case of (10), the diversity implicature is explained by assuming that the relevant plurality is held fixed when considering alternatives. Given that *Alice brought beer or wine* can be understood as a cumulative predicate of times, *Alice-brought-beer-or-wine-at*(X), combined with the negation of the alternatives *Alice-brought-beer-at*(X) and *Alice-brought-wine-at*(X), entails that some of the times in X are only *beer* times and others only *wine* times.

The same story works for our original modal cases.

(23) Alice might bring beer or wine.

Assume the logical form of (23) is something like (24).[4]

(24) *Epistemically-accessible*(X) $\wedge$ *Alice-brings-beer-or-wine-at*(X).

Relevant alternatives are (25) and (26).

(25) *Epistemically-accessible*(X) $\wedge$ *Alice-brings-beer-at*(X).

(26) *Epistemically-accessible*(X) $\wedge$ *Alice-brings-wine-at*(X).

Conjoining (24) with the negation of (25) and (26) yields the Free Choice implication that some of the epistemically accessible situation X are *beer* situations and others are *wine* situations.

Informally, the reasoning might be rendered as follows. "The speaker described some accessible worlds as *Beer or Wine* worlds; it would have been more informative to describe them as *Beer* worlds or as *Wine* worlds; so it's probably not true that the relevant worlds are (all) *Beer* worlds or that they are (all) *Wine* worlds; so some of them are only *Beer* worlds and some only *Wine* worlds."

This account requires that *might* and other modals range not over individual worlds but over pluralities of worlds – otherwise we couldn't get a diversity implicature. This is not a very serious departure from the traditional view, especially if we remember that plurals generally apply to singulars as a special case. (*No students came to the party* is false if exactly one student came.) So we can still allow for possibility statements are verified by a single possible world, such as *it could be that everything is just as it actually is*.

4 Here and henceforth I pretend that *might* is a sentence operator. Arguably, a more adequate account would interpret modal auxiliaries as picking out a plurality of accessible *centred worlds*, or *individual possibilities* in the sense of [Lewis 1986: ch.4]. (23) would then say that some epistemically accessible possibilities concerning Alice are *bringing beer or bringing wine* possibilities. As far as I can tell, this won't affect any of the arguments in this paper, so I will stick to the more familiar conception of modals as sentence operators.

There are independent reasons to assume a plural interpretation of modals. For example, [Schlenker 2003] argues that *if*-clauses are plural definite descriptions. Given the close connection between conditionals and modals, this suggests a corresponding plural treatment of modals. We can also observe that existential modals introduce plural (modal) discourse referents, as in (27).

(27) Alice might bring beer or wine. Then Bob would be happy.

Here the second sentence refers back to the possibilities introduced in the first. Moreover, it refers to a plurality of possibilities: (27) conveys that Bob is expected to be happy in (pretty much) *all* relevant worlds where Alice brings beer or wine.

The second assumption in the above account is that when we consider alternatives to *Alice might bring beer or wine*, we hold fixed the relevant plurality. In the temporal and nominal cases, I suggested that this can be made to fit the standard account of scalar implicatures by assuming that the existential closure of the relevant plural construction takes place on level of discourse. Given the kind of dynamic semantics envisaged for temporal and nominals, and the fact that anaphoric reference to possibilities is just as possible as reference to times and individuals, it is natural to assume that the same grammatical mechanisms are in place.[5]

5 Alternatives and specifications

On the proposal I've outlined, Free Choice effects are computed by conjoining the asserted $\mathit{Accessible}(X) \wedge A(X)$ with the negation of its scalar alternatives $\mathit{Accessible}(X) \wedge A'(X)$. If A is a disjunction – *having beer or wine* – the individual disjuncts generate scalar alternatives, which predicts that both disjuncts are implied as possibilities. This is true no matter how many disjuncts are in the disjunction. For example, (28) implicates that Alice might be in any of the four bars.

(28) Alice might be in *bar 1* or *bar 2* or *bar 3* or *bar 4*.

The (plausible) explanation is that if, say, *bar 4* could be ruled out, the speaker should have characterized the relevant possibilities more simply and strongly as *bar 1 or bar 2 or bar 3* possibilities.

The implicature is arguably weaker in (29).

(29) Alice might be in one of the bars on campus.

5 Further support for a treatment of modals as plural indefinites might come from languages in which modals aren't marked for quantificational force ([Rullmann et al. 2008]) and languages in which the same anaphoric elements are used in nominal, temporal and modal contexts ([Schlenker 2012]).

Here it would have been simpler and more informative to characterize the relevant possibilities as *bar 1* possibilities, or as *bar 2* possibilities, etc. Hence we do get the implicature that there are at least two different bars where Alice might be. On the other hand, *being in bar 1 or bar 2 or bar 3* normally doesn't count as a salient scalar alternative to *being in one of the bars on campus*. This is why (29), unlike (28), doesn't obviously suggest that each bar is a possible location. The implicature is merely that there are several bars where Alice might be.

We can also explain why *you may have wine* normally implies *you may have red wine*, but not *you may have wine and burn down the house*. The former is due to the fact that *you may have white wine* ($\mathit{Accessible}(X) \wedge \mathit{White\text{-}wine}(X)$) is a reasonable scalar alternative to *you may have wine* ($\mathit{Accessible}(X) \wedge \mathit{Wine}(X)$) – as witnessed by the fact that in a suitable context, *the guests had wine* can implicate that some of the guests had red wine and others white wine. By contrast, it would be very unusual for *the guests had wine* to implicate that some of the guests had wine while burning down the house.

In general, the present account predicts that the relevant specifications for Free Choice coincide with the eligible scalar alternatives in corresponding diversity implicatures with plural definites. This prediction at least seems to be on the right track. For example, consider the fact that *the guests brought instruments* normally suggests that the guests brought different kinds of instruments, while *the guests brought guitars* normally doesn't suggest that they brought different kinds of guitars. This is mirrored by the fact that *Alice might bring an instrument* normally suggests that there are different instruments Alice might bring, while *Alice might bring a guitar* doesn't suggest (or at least not as strongly) that there are different kinds of guitars she might bring. In both cases, the explanation is that the relevant alternatives to *instrument* (*guitar*, *clarinet*, etc.) are normally more salient than the relevant alternatives to *guitar* (*electric guitar*, *acoustic guitar*, etc.). The implicature can still arise if the utterance context makes it important what kind of guitar(s) Alice or the guests might bring. Something like this is common in permission contexts. If you're only allowed to bring six-string acoustic guitars, it would normally be unhelpful and misleading (but true) to say *you may bring a guitar*. If the permission statement takes place in a context where the speaker doesn't know what kinds of guitar you might want to bring, it is highly relevant just which of these possibilities are allowed.

Here is another plausible prediction of our proposal. I mentioned in passing that straight assertions of unspecific statements often trigger *primary* implicatures to the effect that the speaker is not in a position to assert the stronger alternatives. For example, an assertion of (30) typically implicates that the speaker doesn't know whether Alice brought beer or whether she brought wine.

(30) Alice brought beer or wine.

On the neo-Gricean account of implicatures, this effect is computed by the same rules as full (secondary) scalar implicatures, except that the computation ends in the middle: since *Alice brought beer* and *Alice brought wine* would have been simpler and stronger than (30), we can infer that the speaker isn't in a position to assert these alternatives. We can't further conclude that the speaker, being well-informed, actually knows that the alternatives are false, as that would contradict her actual assertion.

Now the present account of Free Choice predicts that the Free Choice inferences triggered by *might A* statements mirror the primary implicatures triggered by corresponding assertions of A, especially in contexts where *might* expresses epistemic possibility for the speaker. Again this looks plausible. For instance, *Alice is in one of the bars on campus* typically suggests that the speaker doesn't know in which bar Alice is, just as *Alice might be in one of the bars on campus* suggests that there are several bars where she might be. On the other hand, in a context where it wouldn't be helpful to name a specific bar (because it would be irrelevant to the conversation, or because the addressee doesn't know any bars on campus), both implicatures go away.

6 Extensions

Free Choice type effects seem to arise not only for unspecific possibility statements, but also for some disjunctions of possibility statements and in the antecedent of conditionals. An example of the first phenomenon is (31), which can suggest that both beer and wine are allowed.

(31) You may have beer or you may have wine.

On the account I have proposed, the first disjunct (*you may have beer*) introduces a plurality of possibilities X of which it claims that they are (a) deontically accessible, and (b) possibilities in which you have beer. To explain the Free Choice interpretation of (31), we could assume that the second disjunct, rather than introducing a new discourse referent Y, picks up the previous discourse referent X, so that (31) involves a kind of modal subordination. The logical form of (31) would amount to something like (32).

(32) $\mathit{Accessible}(X) \wedge (\mathit{Beer}(X) \vee \mathit{Wine}(X))$

But why does this trigger a diversity implicature?

It may help to look again at nominal analogues, such as (33).

(33) Some passengers had to leave here; they got sick or they had trouble breathing.

This has a natural reading on which it says that some of the passengers who had to leave got sick and some had trouble breathing. It's as if *they* denotes not all the passengers

who had to leave but a random yet homogeneous subset. Then one has to use *or* because one doesn't know to which camp the subset belongs.

Another possible extension of the present account concerns the antecedent of conditionals.

(34) If Alice or Bob had come to the party, it would have been fun.

(34) seems to imply that if Alice had come, it would have been fun and if Bob had come, it would have been fun. Like the Free Choice effects we have studies, this phenomenon extends beyond disjunctions. For example, (35) suggests that you would have won no matter where your dart had hit the board.

(35) If you had hit the dart board, you would have won the game.

The same effect occurs in constructions like (36) where an *if* (or *when*) clause serves as a restrictor.

(36) Alice is usually happy if/when she is in the mountains or at the beach.

(36) can suggest that Alice is usually happy if she is in the mountains, even if she is more often at the beach than in the mountains. Unsurprisingly, the effect also arises for restrictors in the nominal domain, as in (37).

(37) Some flights departing between 20 May and 6 April have been cancelled.

(37) suggests that among the cancelled flights some were scheduled to depart on 20 May. In each case, the inference is not validated by otherwise attractive interpretations of the relevant constructions, and it appears to be optional and cancellable. All this makes a unified explanation of Free Choice and the present phenomena very desirable.

Here is one line of thought we might try to pursue. A conditional *if A then B* can be understood as attributing B to a class of A situations. Typically, this class does not contain absolutely all A-situations. Let's say it only contains situations that are in some sense live possibilities in the conversational context. In cases where the live possibilities do not contain any A-situations, the context must be updated to accommodate the presupposition that the antecedent is not impossible. That is, there is a pragmatic rule that the class of live possibilities must be adjusted so that *some of them* verify the antecedent A. The same effect could normally be achieved by uttering *it might be/could have been the case that A*. The present account predicts that due to a scalar implicature, the contextual sphere of live possibilities should then typically encompass possibilities for various specifications of A. This explains the disjunctive antecedent effect for quasi-conditionals with modal subordination, such as (27) (which generally replace conditionals in languages without *if*-clauses).

(27) Alice might bring beer or wine. Then Bob would be happy.

In the context of (27), the second sentence seems to have the same truth-conditions as the conditional *if Alice were to bring beer or wine, Bob would be happy.* The first sentence ensures that the contextual set of live possibilities contains both possibilities where Alice brings beer and possibilities where she brings wine. The second sentence says that Bob is happy in all those possibilities.

hFrom this perspective, we could explain Free Choice-type effects for conditionals by assuming that the relevant scalar implicature is triggered when processing the presupposition that the antecedent worlds are possible. I leave further investigation of these ideas to another occasion.

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