Free choice and distribution over disjunction: the case of free choice ability*

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1 Free choice disjunction

The classical puzzle of free choice permission is that while (1) is not valid in any classical deontic logic, it seems valid for the corresponding natural language sentences, as in (2) (Kamp, 1973).

(1) $\Diamond[p \vee q] \Rightarrow \Diamond p \wedge \Diamond q$

(2) You may pick an apple or a pear
   a. $\Rightarrow$ You may pick an apple
   b. $\Rightarrow$ You may pick a pear.

The effect turns out to be independent of modal flavour (for instance, Zimmermann, 2000) and, in fact, has even been argued to be independent from modality (for instance, Klinedinst, 2007; Fox, 2007). The generality of the phenomenon is one reason why large parts of the literature seek an explanation of the free choice effect in the interaction of existential quantificational force and disjunction. In this squib, I explore the generality of the phenomenon by turning to a particular constraint on free choice inferences that is left implicit in a dominant approach.

2 Distribution over disjunction

There are (roughly) two kinds of approaches to free choice. On the one hand, there are approaches that think the free choice effect is due to lexical semantics, either of disjunction (Zimmermann, 2000; Geurts, 2005) or of the existential operator (Aloni, 2003; Simons, 2005; Barker, 2011). I will have nothing to say about these approaches. Instead, this squib concerns the large strand of literature that treats free choice inferences as an inference resulting from reasoning about *alternatives*.

Reasoning about alternatives is one of the central topics of Semantics and Pragmatics. There are profound disagreements about what exactly such reasoning involves and which level of interpretation it is part of (for instance, Chierchia et al., 2008; Geurts, 2009; Geurts and Pouscoulous, 2009; Geurts, 2011; Chemla and Spector, 2011; Franke, 2009; Frank and Goodman, 2012). Given

*Note: An earlier version of this manuscript was submitted the Journal of Philosophical Logic. Based on the very helpful comments I received there: (i) I decided it was more appropriate to submit this to a more linguistics-oriented journal; (ii) I decided to focus more on pointing out the problem I identified, than on providing a solution. I am grateful to the JPL reviewers and editor and have incorporated all their comments.

these disputes, it is remarkable that there is a peaceful consensus about the mechanism involved in free choice. Despite the vast array of differences in approaches to alternatives and inferences based on them, the core idea of how free choice should be accounted for is the same irrespective of which corner of the field it is implemented in.

The source of this idea can be traced back to Kratzer and Shimoyama (2002). It rests on the following minimal assumptions, put in theory-neutral terms: (i) there are meanings that come about via reasoning about *alternatives*; (ii) The *individual disjuncts* of a disjunction $p \vee q$ are themselves alternatives to that disjunction; and (iii) this type of reasoning can be *iterative*.

Take a proposition like (3) as the conventional meaning of a speaker's utterance:

(3) $\Diamond[p \vee q]$

A hearer may now reason about the speaker's intentions: why did the speaker use a disjunction and not simply one of the disjuncts (*alternatives*)? She then concludes that the speaker didn't convey the simpler message $\Diamond p$ (*individual disjunct*) for one of two reasons: either $\Diamond p$ was false or – and this is the *iterative* aspect – $\Diamond p$ would have lead to the false conclusion by the hearer that $\Diamond p$ was the only permission to be had. In particular, $\Diamond p$ may trigger the reasoning that the alternative $\Diamond q$ is false. So, there are now two possible reasons why $\Diamond p$ was not conveyed: either it is false, or the inference we would draw from it, $\neg\Diamond q$, is false. In other words, the hearer concludes that $\neg\Diamond p \vee \Diamond q$. She does the same for the other disjunct yielding $\neg\Diamond q \vee \Diamond p$. Together, we now have the implicature in (4):

(4) $\Diamond p \leftrightarrow \Diamond q$

If we left things here, we'd predict a pretty strange reading for free choice statements: either both disjuncts are permitted or both are not permitted:

(5) $(\Diamond p \wedge \Diamond q) \ \vee \ (\neg\Diamond p \wedge \neg\Diamond q)$

However, since the assertion in (3) says that at least one of the disjuncts is permitted, it follows from (5) that *both* are permitted. And, so, the free choice inference is accounted for.

This final crucial step is what I want to focus on in the following. I assumed here that (3) entails that either p or q is permitted. This is known as *distribution over disjunction*, which I will abbreviate as DOD:

(6) $\Diamond[p \vee q] \Rightarrow \Diamond p \vee \Diamond q$ DOD

In standard modal logics, distribution over disjunction is a theorem. For instance, in a possible world semantics for modals, (6) follows from its semantics: if there is no accessible p-world and no accessible q-world, then there cannot be an accessible $p \vee q$-world. It is the Kratzer-Shimoyama style reasoning that leads to (5), it is the theorem in (6), DOD, that ultimately permits the strengthening of the combination of (3) and (5) to the free choice inference $\Diamond p \wedge \Diamond q$.[1]

[1]The above description of the mechanism is quite closely implemented in the prominent and widely used theory of Fox (2007), who implements the free choice recipe in a grammatical mechanism for implicature. It straightforwardly inherits the prediction that free choice would not arise without DOD. For the initiated, technically, without DOD the alternatives $\Diamond p$ and $\Diamond q$ are *innocently excludable*, leading to the implicature $\neg\Diamond p \wedge \neg\Diamond q \wedge \neg\Diamond[p \wedge q]$, quite the opposite of free choice.

As I said, Kratzer and Shimoyama's idea has been implemented in strongly opposing theoretical corners.[2] To illustrate, let me go through what the same mechanism looks like in a quite different setup. The account of free choice implicatures in Geurts (2011) is framed differently, but follows a reasoning pattern that is quite similar to that of Kratzer and Shimoyama (2002). The idea is that hearers reason about the intentional state of the speaker. For a sentence $\Diamond[p \vee q]$ the hearer may entertain one of four possibilities: $(i_1)\ \Diamond p \wedge \Diamond q$, $(i_2)\ \Diamond p \wedge \neg\Diamond q$, $(i_3)\ \Diamond q \wedge \neg\Diamond p$, $(i_4)\ \neg\Diamond p \wedge \neg\Diamond q$. That is, here the *alternatives* are not alternative statements, but rather alternative (classes of) states of affairs. These different states vary with respect to whether or not the *individual disjuncts* are possibilities. Given DOD, the hearer may dismiss i_4 straight away since it is not compatible with the speaker's assertion that $\Diamond[p \vee q]$ is true. She then reasons that i_2 and i_3 can also be disregarded, because if the speaker had been in one of these states she would have said something shorter, namely something that simply conveyed $\Diamond p$ or $\Diamond q$, respectively. This way, the hearer arrives at the conclusion that the speaker must be in state i_1, the state where the free choice inference holds. This result crucially relies on the hearer being able to dismiss i_4. If DOD does not hold, only i_2 and i_3 can be excluded, thus leading to the implicature (5). Quite a similar issue arises in Franke (2009, 2011) and van Rooij (2010), since these are also frameworks that rely on dividing up a logical space. Were DOD invalid, it would make the modal statement consistent with more partition cells than if DOD had been valid.

DOD is tacitly assumed for modals in the free choice literature. Because it is a theorem of the standard semantics for existential modals, there is simply no discussion. If the approaches that follow the Kratzer-Shimoyama reasoning are on the right track, then we would expect the occurrence of free choice inferences to rely on whether or not distribution over disjunction holds.

How do we test this prediction? One route would be to look at operators intervening between the existential (modal) quantifier and disjunction that disrupt the validity of DOD. While DOD holds for $\Diamond[p \vee q]$ it does not hold for $\Diamond\Box[p \vee q]$:

(7) $\quad \Diamond\Box[p \vee q] \nRightarrow \Diamond\Box p \vee \Diamond\Box q$

Just imagine a world in which only one other world is accessible, while from that latter world we may access a $p \wedge \neg q$ world and a $q \wedge \neg p$ world. This makes $\Diamond\Box[p \vee q]$ true, but neither $\Diamond\Box p$ nor $\Diamond\Box q$.

Unfortunately, we cannot test directly whether an operator with universal force intervening between existential quantification and disjunction blocks free choice. This is because we know that disjunction readily takes scope wider than surface scope. In fact, it seems immune to any constraint on scope taking. If we did see free choice for a sentence of the surface form $\Diamond > \Box > \vee$ it could simply be that it was interpreted as $\Diamond > \vee > \Box$, for which free choice follows straightforwardly. In order to test the DOD-dependency of free choice we therefore need to turn to lexical combinations of existential and universal force.

3 Ability and distribution over disjunction

As Kenny (1976) famously argued, distribution over disjunction is *invalid* for ability modals. The argument goes as follows. Say, there is a deck of regular playing cards in front if you. The cards are face down, concealing the colours. If you were to pick one of these cards, it will either be red or

[2] For this reason, I am tempted to call this status quo the *pax Kratzer-Shimoyama*.

black. You obviously have the ability to pick a card, so (8) is true. However, if DOD holds, it should follow from that that either (9) or (10) is true. But unless you are a skilled conjuror, you simply won't have the ability to pick a card and predict its color. Whether the card you pick is red or black relies completely on chance.

(8) John can pick a card from the stack.

(9) John can pick a red card from the stack.

(10) John can pick a black card from the stack.

In part due to Kenny's observations there have been many proposals that give a semantics of ability that does not yield distribution over disjunction (for instance, a.m.o. Horty and Belnap 1995; Thomason 2005.) The intuition behind many of these is the following: someone is able to p means that there is some action that will reliably result in p to be true. With such a view of ability, DOD no longer holds. If some action reliably makes $p \vee q$ true, this does not entail that there is an action that reliably brings p about or that there is an action that reliably brings q about. For instance, Brown (1988) uses a semantics that has models made up of a set of worlds W and a function N that maps worlds to propositions (the available actions in that world). Ability is now interpreted as follows:

(11) α has the ability to A in w if and only if $\exists m \in N(w) : \forall w \in m : A(w)$.

Portner (2009) suggests that within a Kratzerian framework there is the option of assigning ability modals like *can* the semantics of *good possibility*, which has this same structure of a combination of existential and universal force.

(12) For a modal base F and an ordering source g: p is a good possibility w.r.t. $\langle F, g \rangle$ if and only if $\exists w \in F\ \forall w'[w >_g w' \rightarrow p(w')]$.

Clearly, $p \vee q$ can be a good possibility even if neither p nor q is a good possibility.

What *good possibility* shares with Brown's action semantics is that it combines existential and universal force. Assuming ability indeed involves such a combination, then DOD is invalid. So the prediction is that there will be no free choice ability. Unfortunately, however, this prediction is not borne out, as is demonstrated by (13), from Geurts (2011).

(13) Betty can balance a fishing rod on her nose or on her chin.

Without a doubt, (13) has a free choice inference: We easily infer from (13) that Betty is capable of balancing a fishing rod on her chin, for instance. We now have an argument that Kratzer/Shimoyama-style approaches to free choice make the problematic prediction that there cannot be free choice ability. As I will show in the remainder of this squib, there are several subtleties muddling this argument.

4 Homogeneity and accidental success

Kenny's argument against the validity of DOD for ability modals was based on the fact that someone's accidental success at bringing something about does not give that person the *ability* to bring this about. For some abilities, however, the idea of accidentally succeeding does not really make

sense. As I will show, this in turn means that for these abilities DOD *is* valid. The best way to see this is to consider negated ability statements. Compare (14) and (15).[3,4]

(14) John can't balance a fishing rod on his nose.

(15) John can't hit the darts board.

We have assumed that *can* involves some combination of existential and universal force. Let's say that $\blacklozenge\blacksquare$[A fishing rod is balancing on John's nose] stands for *there is a way for John to act that reliably makes the fishing rod balance on his nose*. Such an account would say that (14) means that there is no way that reliably makes the fishing rod stand upright on John's nose. This leaves open the option that some actions may result in a balancing fishing rod, just not reliably so. However, we know that if you lack the ability to balance the rod, gravity will make sure that the rod will fall down. Fishing rods don't accidentally stay upright. This is another way of saying that balancing-abilities are *homogeneous*: for any action, if it is the right one it will reliably result in a balancing rod; if it is not, it will reliably result in the rod falling down.

Things are different for (15), however. Imagine this sentence is about John's abilities of playing darts. If you lack the ability to precisely aim a dart at a darts board, then you may still by accident hit the board if you tried. This means that this kind of ability is not homogeneous.

In sum, homogeneity for ability is tied with the absence or presence of *accidental success*: it holds for some cases, but definitely not for all. When homogeneity does hold, it looks like (16). This will allow us to strengthen (17-a) to (17-b), and thus we end up concluding from (14) that any action will reliably cause the rod to fall down.

(16) $\blacksquare[\blacksquare\varphi \vee \blacksquare\neg\varphi]$ homogeneous ability

(17) a. $\neg\blacklozenge\blacksquare p$
b. $\blacksquare\blacksquare\neg p$

Homogeneity also predicts the presence of free choice inferences.[5] According to the Kratzer-Shimoyama recipe we get the inference in (18) for an ability statement interpreted as $\blacklozenge\blacksquare[p \vee q]$.

(18) $(\blacklozenge\blacksquare p \wedge \blacklozenge\blacksquare q) \vee (\neg\blacklozenge\blacksquare p \wedge \neg\blacklozenge\blacksquare q)$

According to (16) this will be strengthened to:

(19) $(\blacklozenge\blacksquare p \wedge \blacklozenge\blacksquare q) \vee (\blacksquare\blacksquare\neg p \wedge \blacksquare\blacksquare\neg q)$

Clearly the second disjunct is incompatible with the statement that $\blacklozenge\blacksquare[p \vee q]$ since both p and q are reliably false after any action, and, consequently, free choice follows. This result will not come as a surprise as soon as we realise that the assumption of homogeneity, as in (16), makes DOD valid. Considering p and q, homogeneity says that $\blacksquare[\blacksquare p \vee \blacksquare\neg p]$ and $\blacksquare[\blacksquare q \vee \blacksquare\neg q]$. If we now consider cases in which $\blacklozenge\blacksquare[p \vee q]$ is true, we see that, from some accessible world, $p \vee q$ can only be true in

[3] I am indebted to an anonymous reviewer for urging me to rethink the discussion below.

[4] The discussion below is inspired by Nickel (2010), who develops an analysis of free choice effects for generic statements. Nickel's semantics for such statements also combines existential and universal force. Although he does not discuss DOD, he does observe that his proposal predicts there to be no free choice inferences. His solution is in some ways parallel to what I will now discuss for ability modals.

[5] Again, see Nickel (2010) for a parallel argument for generic statements.

every subsequently accessible world if p is true in all these worlds or q is true in all these worlds (or both). A situation in which $\blacklozenge\blacksquare[p \vee q]$ is true, but neither $\blacklozenge\blacksquare p$ nor $\blacklozenge\blacksquare q$ is true is simply ruled out, due to homogeneity.

Given the above, we come to predict that the absence or presence of free choice ability inferences depends on the properties of the strand of ability at stake. If ability is homogeneous, i.e. if accidental success is ruled out, DOD is valid and free choice is expected. If there is no homogeneity, there will be no DOD and, expectedly, no free choice. The first of these predictions is borne out: Geurts' fishing rod example, a case where homogeneity and DOD are in place, indeed gives rise to free choice inferences. The second prediction is that there will not be a parallel example involving, for instance, throwing darts. At first sight, this seems right: My feeling is that it is indeed hard to read (20-a) as saying that (at will) John can hit the top half of the board and that he (at will) can hit the bottom half.

(20) a. John can hit the top half or the bottom half of the board. ??FC
b. John can hit bullseye using his left or his right hand. ✓FC

For (20-b), however, it seems to me that the free choice inference once more surfaces. If true, (20-b) says that John is very good at darts, irrespective of which hand he uses. This means that, not only have we found cases of free choice inferences where DOD is valid, but also a case where it is not.

In summary, then, the predicted DOD-dependence of free choice ability is *not* attested. The approaches to free choice I discussed above wrongly predict free choice ability to be limited in a very specific way. That said, I do believe the free choice phenomenon *is* much more restricted for ability than it is for, say, permission. The example in (21) is representative: it lacks a free choice inference and, consequently, is quite infelicitous.

(21) ??My son can walk or talk.

I believe this lack of free choice inferences is actually quite general, but that it has nothing to do with homogeneity / the validity of DOD.[6] Note, in that regard, that walking and talking are both homogeneous abilities. What needs explaining, then, is the difference between (21) and (22)/ (23), which seem genuine examples of free choice ability.

(22) Betty can balance a fishing rod on her nose or on her chin.

(23) John can hit bullseye using his left or his right hand.

I think what is crucial to good examples of ability free choice is that they typically involve two variations of the same ability. If we change the examples slightly, the free choice inference becomes unavailable. It is hard to read (24), for instance, as an overview of John's abilities.[7]

(24) John can balance a fishing rod on his nose or juggle four balls.

[6]The relative unavailability of free choice inferences for ability statements is sometimes masked by the polysemy of *can*, i.e. by its ambiguity with respect to modal flavour. If you are told that "*John can speak English or German*", there is a clear free choice inference on a teleological reading of *can*. I do not think free choice is available on a ability reading of *can*.

[7]Once more, it is fine with free choice when read teleologically. For instance, answering the question *What are the different ways in which John can entertain the guests?*.

Generalising, free choice ability always seems to involves a conjunction of inferences that concern the same general ability. This is obviously not a very precise statement and I have no explanation for this observation, but I do have *this* to say: Whatever accounts for the differences between the example with and those without free choice inferences, it is *not* the absence versus presence of DOD.

5 Conclusion

I have identified two challenges for the semantics and pragmatics of free choice disjunction. First, the dominant Kratzer and Shimoyama-style approaches to how free choice inferences come about need to explain how it is possible ability *can* at times triggers such inferences without distribution over disjunction being a valid theorem. Secondly, there is an empirical challenge. Ability free choice is a limited phenomenon. This is in stark contrast to other model free choice phenomena (though see Eckardt, 2007; Portner, 2010). Right now I see no way of making sense of the constraints that appear to govern it.

A shared idea within the approaches I targeted in this squib is that free choice is triggered simply by the logical interplay of existential quantificational force and disjunction. This is obviously an attractive idea, given that it reduces free choice to a very general pragmatic (or, alternatively, grammatical) process. What I hope to have shown is that the fringes of the landscape of existential operators is a challenging testing ground for this way of thinking. At first glance, the dominant approaches fail the test.

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