

***Will*, scope and modality: a response to Broekhuis and Verkuyl**

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Abstract Kissine (2008) argues that English *will* cannot be treated as a modal without entailing absurd consequences. Broekhuis and Verkuyl (2014) object that this argument rests on faulty scope relations between negation and *will*. In this short squib I argue that holding both that *will* scopes over negation and that *will* is a modal leads to absurd consequences.

Keywords Future tense · Modality · Negation scope

1 Introduction

It is more than customary to find *will* enlisted as one of the English modals. This is so even in cases where, *prima facie*, its only function is to displace temporal reference towards the future, as in (1).

- (1) Mary will sing.

I say ‘*prima facie*’ because in languages with a tripartite past-present-future inflectional tense, such as French, the equivalent of (1) belongs to the tense paradigm:

- (2) Marie chantera.
Mary sing-IND.FUT.3SG

Of course, intuitions about other languages do not necessarily provide conclusive evidence about English. After all, it is possible that while English marks future reference with the help of a modal, French does so through tense morphology. In Kissine (2008) I argued, however, that future temporal reference in English is not expressed

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by a modal verb, because English *will* cannot be analysed as a modal for purely semantic reasons. (The same argument applies to French future tense; see Kissine 2013.) In this short squib, I address a recent objection to this argument by Broekhuis and Verkuyl (2014) who argue that my argument rests on faulty scope relationships between *will* and negation. Broekhuis and Verkuyl's objection concerns the general structure of my argument, and, for this reason, I will not discuss explicitly the kind of epistemic modality they assign to *will*.¹

2 The argument against modal analyses of *will*

Any serious attempt at a modal account needs to posit that *will* is stronger than a possibility operator. If *will* were a possibility operator, conjunctions like (3) shouldn't feel like contradictions.

- (3) [?] Mary will sing and Mary will not sing.

So, in general, *will* is said to both shift the evaluation time towards the future and to be a universal quantifier over a certain modal base (e.g. Enç 1996). If the modal base is left unspecified, then in such theories *will* appears in LFs as $\Box_{t>n}$, where n is utterance time. Let then f be a conversational background that maps w on the set of propositions relevant for determining the modal base of *will* (cf. Kratzer 1991). The modal analysis holds that $will(\varphi)$ is true at the possible world w and at a time n if, and only if, in every possible world w' of the modal base there is some t which is future relative to n , such that φ is true at t .

- (4) $\llbracket \Box_{t>n}(\varphi) \rrbracket_{w,n} = 1$ iff, for $\forall w' \in \bigcap f(w)$, $\exists t > n$ and $\llbracket \varphi \rrbracket_{w',t} = 1$

In order to understand why this very popular analysis is problematic, it is important to think about the logical properties of the modal base of *will*. Let us take an ordinary existential modal, which contents itself with quantifying over possible worlds, staying away from tense matters.

- (5) $\llbracket \Diamond(\varphi) \rrbracket_{w,n} = 1$ iff $\exists w' \in \bigcap f(w)$ such that $\llbracket \varphi \rrbracket_{w,n} = 1$

Let us assume, for the sake of the argument, that the conversational backgrounds in (4) and (5) are identical. The next step then is to negate $will(\varphi)$. The resulting semantics will be:

- (6) $\llbracket \neg \Box_{t>n}(\varphi) \rrbracket_{w,n} = 1$ iff $\exists w' \in \bigcap f(w)$, $\exists t > n$, such that $\llbracket \varphi \rrbracket_{w',t} = 0$

Now, let us embed *not-will*(φ) under \Diamond . What we get now is (7).

- (7) $\llbracket \Diamond \neg \Box_{t>n}(\varphi) \rrbracket_{w,n} = 1$ iff $\exists w' \in \bigcap f(w)$, and $\exists w'' \in \bigcap f(w')$, $\exists t > n$ and $\llbracket \varphi \rrbracket_{w'',t} = 0$

¹Klecha (2014) presents novel arguments for a modal theory of *will* and argues that an analysis of *will* as a historical necessity operator (see Kaufmann 2005) is immune to my (2008) objections. I reserve the detailed discussion this issue deserves for a future paper.

Here comes the first problem. As they stand, (4) and (7) predict that $will(\varphi)$ and it is possible that not- $will(\varphi)$ are compatible. Imagine that every world w' in $\bigcap f(w)$ is a φ -world (at t). Nothing entails that every w'' which belongs $\bigcap f(w')$ should also be a φ -world (at t). This is a clearly unwelcome consequence, as we want our semantics of *will* to rule out as contradictory conjunctions such as (8):

- (8) [?] Mary will sing, and it is possible that it is not the case that she will sing.

The remedy is simple: the worlds that constitute the modal base of *will* ought to be linked by transitive accessibility relations:

- (9) **Transitivity:** $\Box_{t>n}(\varphi) \rightarrow \neg\Diamond\neg\Box_{t>n}(\varphi)$

This is all well and good, but consider now what are the truth-conditions for *it is possible that will*(φ) under a modal account of *will*.

- (10) $\llbracket\Diamond\Box_{t>n}(\varphi)\rrbracket_{w,n} = 1$ iff $\exists w' \in \bigcap f(w)$ and for $\forall w'' \in \bigcap f(w')$, $\exists t > n$ and $\llbracket\varphi\rrbracket_{w'',t} = 1$

The trouble now is that (6) and (10) predict that *not-will*(φ) and *it is possible that will*(φ) are compatible. That there is a possible world w' in $\bigcap f(w)$ where φ is false (at t) does not entail that there are no possible worlds w' in $\bigcap f(w)$, such that every possible world in $\bigcap f(w')$ is an φ -world. This, again, is bad, as we want (11) to be a contradiction.

- (11) [?] It is not the case that Mary will sing, and it is possible that Mary will sing.

The only solution is to argue that, in addition to being transitive, the accessibility relations within the modal base of *will* are Euclidean:

- (12) **Euclideaness:** $\neg\Box_{t>n}(\varphi) \rightarrow \neg\Diamond\Box_{t>n}(\varphi)$

We now reached the final stage of the argument against the modality of *will*. It is easy to see that together **Transitivity** (9) and **Euclideaness** (12) entail **Self-Reflexivity**:

- (13) **Self-Reflexivity:** $\Box_{t>n}(\varphi) \Leftrightarrow \Diamond\Box_{t>n}(\varphi)$

Anyone who endorses (13) should then treat *will*(φ) and *it is possible that will*(φ) as equivalent. Needless to say, this is a rather unpalatable consequence.

3 Negation and will

Broekhuis and Verkuyf (2014) attempt to reject **Self-Reflexivity** (13) by arguing that the truth-functional negation of *Mary will sing* is not *It is not the case that Mary will sing*, but *Mary will not sing*. They claim that the former version is an instance of metalinguistic negation, and assume that, outside such metalinguistic contexts, *will* always takes scope over negation. According to them, then, it is (14c), and not (14b), that is the correct rendering of (14a).

- (14) a. [?] Mary will sing and it is possible that Mary will not sing.
 b. $\Box_{t>n}(\varphi) \wedge \Diamond\neg\Box_{t>n}(\varphi)$
 c. $\Box_{t>n}(\varphi) \wedge \Diamond\Box_{t>n}(\neg\varphi)$

Since (14c) is a contradiction, there is no need to endorse **Transitivity** (9) in order to rule (14a) out. Likewise, if *will*, qua necessity operator, always takes scope over negation, (15a) should be rendered as (15c) and not as (15b).

- (15) a. [?] Mary will not sing and it is possible that Mary will sing.
 b. $\neg\Box_{t>n}(\varphi) \wedge \Diamond\Box_{t>n}(\varphi)$
 c. $\Box_{t>n}(\neg\varphi) \wedge \Diamond\Box_{t>n}(\varphi)$

Again, because (15c) is a contradiction, one does not need to endorse **Euclideaness** (12) to rule (15a) out. To sum up, Broekhuis and Verkuyl's (2014) position is that *will* is a forward-shifting modal which always takes scope over negation. (Their semantics of future is subtler than that, but further details are unessential here.)

Now, to get things straight from the outset, I don't think that *will* ought to be located under negation scope in LF. Most probably it should not—on a temporal semantics of *will*, that is. The issue is rather that anyone who treats $will(\varphi)$ as $\Box_{t>n}(\varphi)$ has to accept that clause-mate negation scopes over $\Box_{t>n}$.

Take (16a), which, on the modal conception of *will* has the logical form in (16b).²

- (16) a. It is impossible that Mary will sing.
 b. $\neg\Diamond\Box_{t>n}[\text{Mary sing}]$

Now, if *will* takes semantic scope over negation within its clause, as Broekhuis and Verkuyl have it, (17a) should be interpreted as (17b).

- (17) a. It is impossible that Mary will not sing.
 b. $\neg\Diamond\Box_{t>n}\neg[\text{Mary sings}]$

The problem is that under this analysis (18a) should not sound like a contradiction, as (18b) is not.

- (18) a. [?] It is impossible that Mary will sing and it is impossible that Mary will not sing.
 b. $\neg\Diamond\Box_{t>n}[\text{Mary sing}] \wedge \neg\Diamond\Box_{t>n}\neg[\text{Mary sings}]$

In fact, the unacceptability of (18a) is a strong indicator that if there were a modal *will*, it shouldn't scope over negation. Compare *will* to deontic *must*. Clearly, (19a) can only be interpreted as (19c); the reading in (19b) is unavailable.

- (19) a. Mary must not sing.
 b. $\neg\Box_{deontic}[\text{Mary sing}]$
 c. $\Box_{deontic}\neg[\text{Mary sings}]$

²Needless to say, it would be extremely implausible to argue here that *will* takes scope over negation. First, this would entail that *will* moves across clause boundaries, and second, that (16a) means that in all possible worlds w (of *will*'s modal base) it is the case at $t > n$ that Mary doesn't sing in all w' epistemically accessible from w , viz. that (16a) means that it will be impossible that Mary sings at $t > n$.

For this reason, unlike (18a), (20a) does not feel like a contradiction: (20b) is the correct logical form.

- (20) a. It is impossible that Mary must sing and it is impossible that Mary must not sing.
 b. $\neg\Diamond\Box_{deontic}[\text{Mary sing}] \wedge \neg\Diamond\Box_{deontic}\neg[\text{Mary sings}]$

At this point, the only option left for the modal theorist of *will* to explain the unacceptability of (18) is to accept that the truth-functional negation of *will*(φ) is $\neg\text{will}(\varphi)$. If so, the correct interpretation of (18a), repeated as (21a), would be the one in (21b).

- (21) a. [?] It is impossible that Mary will sing and it is impossible that Mary will not sing.
 b. $\neg\Diamond\Box_{t>n}[\text{Mary sing}] \wedge \neg\Diamond\neg\Box_{t>n}[\text{Mary sings}]$

However, this also means that one cannot reject **Self-Reflexivity** (13) on the grounds Broekhuis and Verkuyl invoke.

4 Conclusion

The argument I presented in (2008) against modal analyses of *will* can be rejected by arguing that *will* takes scope over clause-mate negation. However, rejecting it on these grounds comes at the price of predicting that conjunctions such as (18a) are non-contradictory. No one will dispute that a decisive test for semantic theories is whether they accurately predict entailment and incompatibility relations. So, if there is a way to keep a modal theory of *will* and to explain sequences of the kind of (18) away in some other manner, finding it remains a serious challenge for modal theorists of *will*.

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