Open future and modal interpretation of future tensed sentences

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Preliminaries about tense

- Prior 1967: Past/Present/Future (ternary tense system)

  \[ P(p) \text{ (it has been the case that } p) \text{ is true at } t \text{ iff for some } t' < t \text{ } p \text{ is true at } t' \]
  \[ p \text{ is true at } t \text{ iff } p \text{ is true at } t \]
  \[ F(p) \text{ (it will be the case that } p) \text{ is true at } t \text{ iff for some } t' > t \text{ } p \text{ is true at } t' \]

- Past/Present(Non-Past) (binary tense system: the main tense split in European languages (Comrie 1978))

  Why shouldn’t a language be endowed with a future tense (but only with Past/Non-Past)?

  ➢ Unreality of the future: the future as the realm of what is only possible (and not yet real)
Preliminaries about tense

Not only do speakers talk about the future by using present-tensed forms: sometimes they talk about the past as well by using present-tensed forms.

In either case, they talk strictly-speaking about the present (i.e., they talk about present effects/traces of past events and present mental(attitudinal)/external(anticipatory) signs of future events.

- Future/non-future binary systems (Hua)

- Tenseless languages: Chinese (temporal adverbs), Burmese, Dyirbal (irrealis, realis)
• Reference to the future in language is not so much a question of the existence of a future tense in the language.

   **Present tense** is also a well-known device to refer to the future across languages:

(i) Domani *vado*$_{1SG-PRES}$ al mare.  
(ii) *I go/am going* to the sea tomorrow.

• Present tense in languages like Italian raises the problem of distinguishing between a **tense operator** proper and an **aspectual operator**

  ➢ Italian present tense is presumably to be analysed as a combination of a purely temporal operator PRES + an aspectual operator IMPF

(A too oft neglected fact – e.g. Broekhuis & Verkuyl 2014 for a recent omission – which has induced people to believe that future time reference is an inherent possibility of the present tense operator.)
Imperfective paradox

E mia madre: “Era un viandante. Andava a Palermo e aveva attraversato tutta la Sicilia.”
E io: “Andava a Palermo? Andò a Palermo?”
E mia madre: “Andava, ma non andò. Andò fino a Bivona e lì trovò lavoro in una zolfara.”
[Elio Vittorini, Conversazione in Sicilia]

My mother: “He was a wayfarer. He was going to Palermo and he had crossed Sicily.”
And I: “He was going to Palermo? Did he go to Palermo?”
And my mother: “He was going, but he didn’t go. He went to Bivona and there he found a job in a zolfatara.”
Modal analysis of the imperfective

• Dowty (1979):

(i) John was crossing the street.

\[
[[ (i) ]_{w, t} = 1 \iff \exists t' (t' < t \& \forall w' (w \approx_t w' \supset \exists t'' t' \subseteq_{nf} t'' \& [[ John cross the street ]]_{w', t''} = 1))
\]

• Plausibly the red existential quantification is due to the past tense. The imperfective aspect contributes the green universal quantification over historical alternatives at t’ to the world of evaluation.
Modal analysis of “before”-clauses

(a) John was hit by a car before he crossed the street.

Beaver & Condoravdi 2003:

(a') $\exists t [John\text{-}hit\text{-}by\text{-}car(w_0, t) \land t < earliest(\lambda t'. John\text{-}cross\text{-}the\text{-}street(w_0, t'))]$

The analysis in (a') doesn’t work: the set $\lambda t'. John\text{-}cross\text{-}the\text{-}street(w_0, t')$ is empty! ($w_0$ is the actual world and John doesn’t manage to cross the street in $w_0$)

Beaver & Condoravdi’s 2003 refined analysis:

(a'') $\exists t [John\text{-}hit\text{-}by\text{-}car(w_0, t) \land \forall w' [R(w_0, w', t) \supset t < earliest(\lambda t'. Mozart\text{-}finished\text{-}the\text{-}Requiem(w', t'))]]$
Semantics of future *will*

- Two families of semantic theories in the linguistic literature:
  - **Temporal semantics**: future *will* is a *tense*, i.e., what it uniquely does is to refer to a time (or to quantify over times—according to whether a referential or quantificational analysis of tense is adopted)
  - **Modal semantics**: future *will* is a *modal of necessity*, i.e., it operates on the world of evaluation; secondarily, it influences the time of evaluation
Is the future “tense” actually a modal?
• **Future auxiliary** “will” has been regarded by many as a **modal** (some sort of **necessity**)

(1) I’ll marry you. (I promise to marry you.)
   ➢ In all future worlds in which my promises are fulfilled, I marry you

(2) I’ll do the dishes. (I commit to doing the dishes.)
   ➢ In all future worlds in which my commitments are honoured, I do the dishes

(3) The next Summer Olympics will be held in Tokyo. (The next Summer Olympics are **planned** to be held in Tokyo.)
   ➢ In all future worlds compatible with the current plans, the next Summer Olympics are held in Tokyo

(4) That’ll be the postman at the door. (The person at the door **must** be the postman.)
   ➢ In all future worlds compatible with the speaker’s current evidence, the person at the door is the postman
• Linguistic evidence for the modality of “will”

A. A morphosyntactic behaviour like that of auxiliaries that are unquestionably modals

(5) \[ [\text{NP } \alpha] \text{ must/can/should/may/might/will leave.} \]
(where \( \alpha \) can have \textit{any person} and \textit{number} features)

- Notice that any sentence in (5) has a \textbf{future-oriented} reading (e.g. \textit{I must leave next week}/*last week).

B. A past tensed form “would” which expresses future in the past and is clearly modal

(6) a. [John at 3PM:] “\textbf{I will} go to the movies at 8PM.”
b. John said at 3PM that he \textbf{would} go to the movies at 8PM.

- Notice that (6b) is compatible with the continuation “but he had an accident on his way to the movie theatre, so he didn’t go to the movies in the end.”
C. “Unless”, a **domain subtractor** for **universal NPs** (von Fintel 1991; see [11] below), can act as a domain subtractor for “will” (Condoravdi 2003; see [12] below)

(11) All students are charged tuition *unless they can demonstrate extenuating circumstances.*

\[
\text{ALL}_x(S_x)(P_x), \quad \text{where } S \text{ includes all the students except those who can demonstrate ext. circ.}
\]

(12) He will eat fish *unless there’s steak available.*

\[
\text{ALL}_w(F_w)(\text{he eats fish in } w), \quad \text{where } F \text{ includes all the future worlds except those in which there’s steak available}
\]

(Cf. (13) He ate fish unless there was steak available.)

- In (12) “unless” would work as a domain subtractor for a universal quantifier underlying “will” (cf. (13), in which “unless” would just “qualify the assertion”; Condoravdi 2003)
• Even in languages with a synthetic (i.e., inflectional) future, what would be plausibly described as a “future tense” appears to have modal meanings (see the examples from Italian in [7]-[10] below)

(7) Ti amerò per sempre. [promissory]
   ‘I’ll love you forever.’

(8) Mi occuperò io delle prenotazioni. [commissive]
   ‘I’ll deal with the bookings.’

(9) Le prossime Olimpiadi si terranno a Tokyo. [planning]
   ‘The next Olympics will be held in Tokyo.’

(10) Sarà il postino. [epistemic]
     ‘That will be the postman.’
• OK. Let’s suppose that “will” is a modal, then. (At least some) modals are known to allow for variations in their modal flavour (Kratzer 1991):

(14) a. You **must** help your neighbour.  
    Modal base: the set of worlds in which the normative demands made in the evaluation world are fulfilled

    b. [Given your dripping nose] You **must** have a cold.  
    Modal base: the set of worlds that are compatible with the evidence the speaker has in the evaluation world
• “Will”-sentences too appear to allow for variations in modal flavour

(15)  

a. At high temperature, four hydrogen atoms will fuse into one helium atom. 
   [dispositional]
   Modal base: the set of worlds in which the laws of atomic physics hold true

b. John will be home for vacations now.  
   [epistemic]
   Modal base: the set of worlds that are compatible with the evidence the speaker has in the evaluation world.
• What modal force does “will” have? Prima facie, a good guess is: universal ($\forall$-force)

(16)  a. At high temperature, four hydrogen atoms will fuse into one helium atom.
   ➢ in all future worlds compatible with the laws of atomic physics (and in which temperature has risen above a threshold), four hydrogen atoms fuse into a helium atom.

b. John will be home for vacations now.
   ➢ in all future worlds compatible with the speaker’s current evidence, John is home for vacations at the current time.
• The \( \forall \)-force of “will” in (16a,b) is opposed to the existential force of “may” in (17a,b)

(17) a. At high temperature, four hydrogen atoms may fuse into one helium atom.

in some future world compatible with the laws of atomic physics (and in which temperature has risen above a threshold), four hydrogen atoms fuse into a helium atom.

b. John may be home for vacations now.

in some future world compatible with the speaker’s current evidence, John is home for vacations at the current time.
• Evidence of $\forall$-force of “will” might come from \textit{modal concord} relations (Lyons 1977, Geurts and Huytink 2006)

• Prototypical examples of modal concord:

(nec) You \textit{must obligatorily} return the book by tomorrow.
 $\square$(you return the book by tomorrow)

(pos) You \textit{may permissibly} ask for personal information.
 $\lozenge$(you ask personal information)

• \textbf{Condition on modal concord}: \textit{The modal verb and the modal adverb must agree with each other in modal force and modal flavour} (Geurts and Huytink 2006).

 $\blacktriangleleft$ Cf. “You \textit{may}_{(\exists, \text{epistemic})} \textit{have}_{(\forall, \text{deontic})} to return the book by tomorrow”; this is read as \textbf{doubly modalized}: $\lozenge\square$(you return the book by tomorrow)
• Evidence of ∀-force of “will” from modal concord?

• “Will” indeed likes **universal modal adverbs**: 

(16’) a. At high temperature, four hydrogen atoms will *necessarily* fuse into one helium atom.

   b. John will *certainly* be home for vacations now.

(17’) a. At high temperature, four hydrogen atoms may *possibly* fuse into one helium atom.

   b. John may *possibly* be home for vacations now.
• However, modal concord data are far from settling the issue of will’s modal force unequivocally!

(16”) a. At high temperature, four hydrogen atoms will probably/possibly fuse into one helium atom.

In many/some future worlds compatible with the laws of atomic physics (and in which temperature has risen above a threshold), four hydrogen atoms fuse into a helium atom

b. John will probably/possibly/hardly be home for vacations now.

in many/some/few future worlds compatible with the speaker’s current evidence, John is home for vacations at the current time

➢ These data would rather seem to point to a quantificational variability of “will” (Del Prete 2010, 2014)
• Supporters of the modal view on “will” generally recognize the existence of so-called *plain temporal futures*: “will”-sentences simply *referring to a future time*, with no apparent modal flavour

(18) There will be a sea battle tomorrow.

• Plain temporal futures, too, appear to have \(\forall\)-force, in intuitive contrast with existential “may”-futures

(19) a. There will be a sea battle tomorrow. ??But there will also be none.
    b. There may be a sea battle tomorrow. But there may also be none.
If “will” is a modal even in plain temporal futures, what is its modal base in this case? (Clearly, it is not epistemic, nor dispositional, nor deontic, …)

(18) There will be a sea battle tomorrow.

(18’) All worlds \( w \) such that \( \ldots w \ldots \) are such that there is a sea battle in \( w \)

The **Open Future hypothesis** provides a straightforward answer: it is the set of worlds that are metaphysically possible continuations of the actual world \( @ \) given what has happened in \( @ \) up to the time \( N \) at which (18) is uttered (call these the historical alternatives to the actual world \( @ \) at the time of utterance \( N \))

(18’*) All world-histories \( h \) such that \( h \) is a historical alternative to \( @ \) at \( N \) are such that there is a sea battle which occurs in \( h \) at some moment following \( N \)
The modal view on “will” in formal semantics

• Enç 1996, Condoravdi 2003, Copley 2009 (a.o.)

i. “will” is a necessity modal (propositional) operator

ii. Reference to a time successive to the evaluation time (as observed in plain temporal futures) is due to the semantics of the modal itself:

“Modals uniformly expand the time of evaluation forward” (Abusch 1985, Condoravdi 2003)

(a) John should/must/may come tomorrow/*yesterday.

• \[ [[ \text{WILL}(p) ]]_{M,t,w} = 1 \iff \text{for every } w' \text{ accessible to } w \text{ at } t, [[ p ]]_{M,[t,\infty),w'} = 1 \]
• \[ [[ \text{WILL}(p) ]]^{M}, t, w = 1 \text{ iff for every } w' \text{ accessible to } w \text{ at } t, [[ p ]]^{M}, [t, +\infty), w' = 1 \]

“accessible to \(w\) at \(t\)” allows for the interpretations: “historical alternative to \(w\) at \(t\),” “compatible with what the speaker knows in \(w\) at \(t\),” and possibly others...

• Different clauses for the temporal instantiation of stative vs. eventive propositions (this accounts for different temporal interpretations of That’ll be the postman at the door vs. He’ll go home tomorrow):

a. When \(p_{st}\) contains a stative predicate \(S\):

\[ [[ p_{st} ]]^{M}, t, w = 1 \text{ iff } \exists t^* \text{ s.t. } t^* \cap t \neq \emptyset \& S(t^*, w) \]

b. When \(p_{ev}\) contains an eventive predicate \(E\):

\[ [[ p_{ev} ]]^{M}, t, w = 1 \text{ iff } \exists e E(e, w) \& \tau(e, w) \subset t \quad [\tau = \text{temporal trace function}] \]
Friendly and unfriendly data for the modal view:

Stalnaker’s asymmetry and Karttunen-type discourses
Stalnaker’s asymmetry

• Stalnaker’s dialogue with a modal:

(19) A - President Carter **has to appoint** a woman to the Supreme Court.
    B - Who do you think he has to appoint?
    A - He doesn’t have to appoint any particular woman, he just has to appoint some woman or other.

• Stalnaker’s dialogue with “will”:

(20) A - President Carter **will appoint** a woman to the Supreme Court.
    B - Who do you think he will appoint?
    A - #He won’t appoint any particular woman, he just will appoint some woman or other.
• Notice that “will” patterns with the past tense in Stalnaker-type dialogues

(21) A - President Carter appointed a woman to the Supreme Court.
    B - Who do you think he appointed?
    A - He didn’t appoint any particular woman, he just appointed some woman or other.
(22) Carter has to appoint a woman, but he doesn’t have to appoint any particular woman.

   for every deontic alternative \( w \) of Carter’s to \( @ \), there is a woman \( x \) in \( w \) s.t. Carter appoints \( x \) in \( w \) but there is no woman \( x \) in \( @ \) s.t. for every deontic alternative \( w \) of Carter’s to \( @ \), Carter appoints \( x \) in \( w \)

(23) ??Carter will appoint a woman, but he won’t appoint any particular woman.

   IMPOSSIBLE READING: for every historical alternative \( w \) to \( @ \) at \( N \), there is a woman \( x \) in \( w \) s.t. Carter appoints \( x \) in \( w \) but there is no woman \( x \) in \( @ \) s.t. for every historical alternative \( w \) to \( @ \) at \( N \), Carter appoints \( x \) in \( w \)

• If “will” is a quantifier over modal alternatives in (23), why can’t we interpret “a woman” within the quantifier scope in the left sentence and outside of it in the right sentence (as we do for the minimally different [22])?
• The advice of a defender of the modality of “will”:

“(19) and (20) are mysterious. While A’s response to B’s question in (20) does indeed seem infelicitous, my sense is that A’s first utterance in both (19) and (20) allows for a non-specific interpretation of the indefinite. It may be that this is simply due to speaker ignorance about the identity of the woman but I think there is more to it than that.”

(C. Condoravdi, p.c.)

• Alternatively, one might think that the deviance of (20) rests on the fact that “a woman” is necessarily specific in this context, this in turn being contingent on “will” not having any modal meaning...
(1’) I have promised to marry you, *and I’ll marry you!*
(cf. "and I promise to marry you!"

(2’) I have committed to doing the dishes, *and I’ll do the dishes!*
(cf. "and I commit to doing the dishes!"

(3’) Since the 125th IOC Session, the official plan for the 2020 Summer Olympics has been that Tokyo will be the host city. *Thus, I can tell you with certainty that the next Summer Olympics will be held in Tokyo!*
(cf. "Thus the next S.O. are planned to be held in Tokyo!"

(4’) Given my knowledge of similar situations in the past I infer that the person knocking at the door is the postman, *and that will be the postman! (you will see!)*
(cf. "and the person at the door must be the postman"

30
• If data (1’)-(4’) are sound, they probably show that:

1. the modal paraphrases of the “will”-sentences do not express a modal content inherent to the “will”-sentences themselves

2. those modal paraphrases may rather express the reasons or ground the speaker might have for asserting the “will”-sentences

➤ “Will”-sentences might not have an inherent modal meaning after all...
Karttunen-type sequences

(24) Mary wants to marry a rich man. He must be a banker. [Karttunen 1976]

i. the specific interpretation of “a rich man” correlates with the epistemic interpretation of “must” (‘it is likely that the particular man she wants to marry is a banker’)

ii. the non-specific interpretation of “a rich man” correlates with a teleological interpretation of “must” – let’s call it K-reading (‘it is required that whoever she will marry be a banker’)

• The K-reading is a case of modal subordination (Roberts 1987): the modal base of “must” is included in the modal base of “want” and the “must”-statement elaborates on the previous “want”-statement

➢ ‘Mary wants to marry a rich man. To be eligible to become her husband, the rich man is required (by Mary) to be a banker.’
Mary will marry a rich man. He must be a banker.

- No K-reading of “must” in (25) – not surprising if “will” doesn’t allow for non-specific indefinites in the first place...

- But the K-reading is possible in (26) (B. Copley, p.c.)

Mary will marry a rich man. He will have to be a banker.

(It is required by Mary that whoever she will marry be a banker.)

As in Karttunen’s original example, the teleological modality is associated with a non-specific indefinite.
• Some naturally-occurring data showing the K-reading of “must” after a “will”-sentence (Del Prete 2014):

(27) [I'm looking to bid farewell to my trusty 1997 Audi A4 2.6 Estate which has 200,000km on the clock.] I will be buying a used car and it must be under 6,000 pounds.

(28) When your EP comes out, I will buy a copy. It must be Autographed though!

(29) [We come now to the procedure in causes of beatification and canonization. Any Catholic may petition the bishop to begin the proceedings.] The bishop will appoint a postulator. He must be a priest ordinarily resident in Rome.

[(29) comes from a generic context. It could be argued that in such cases it is the genericity of the context that triggers the non-specific interpretation of the indefinite, independently from “will” – cf. “The bishop will appoint a postulator. He must be a priest ordinarily resident in Rome.” What is the relationship between such cases of “generic” future and other cases of temporal future? See also (31) below.]
• More examples of modal subordination with “should”

“Should” is easily understood as a priority modal which can elaborate on a previous bouletic modal (N. Asher, p.c.):

(30) I am going to take an important decision regarding buying a car in the 50 lakhs rupees [> 90,000 dollars] range and needed some advice. I have never spent such an amount on a car before, so need to be sure. [...] I want the following:

1. It should be subtle and not attract attention, while at the same time being classy and luxurious.
2. It should be a family car and offer safety.
3. [...] It should be decent and should not pollute the environment.
• “Should” can modally elaborate on “will”

(31) The Director of Policy and Research will hire and supervise a Policy and Research Associate. S/he should be comfortable working in a small team environment and partnering with staff members with varying experience and levels.

(32) You will probably only buy a safe once in your life. It should therefore be the best and most secure available.

[(31) comes from a generic context. It could be argued that in such cases it is the genericity of the context that triggers the non-specific interpretation of the indefinite, independently from “will” – cf. “The Bank Council appoints an accountant-auditor for the Bank, he should have a B.A. in accounting.” What is the relationship between such cases of “generic” future and other cases of temporal future?]
So, is “will” a tense or a modal in the end??
The speculative idea I want to put forward today is that “will” is a tense which somehow got to like pluralities:

• Whenever there is a plurality around, “will” is happy to go along with, like a plural definite determiner

• Ignorance typically opens up a plurality of possible worlds and that’s how epistemic “will” comes into the picture

• Indeterminacy of the future is another way for a plurality of possible worlds (histories) to come in, that’s why the Open Future hypothesis is particularly suited to deal with the purely temporal uses of “will”
World as an “open parameter” of the utterance context
(Bonomi and Del Prete 2007)

• Speakers represent the future state of the world as open to themselves, in terms of a plurality of possible futures branching off from the present situation. All these possible futures are equally eligible candidates for the truth-conditional evaluation of a “will”-statement.

• **Contexts:** $c = <c_t, \@>$
  - the world of the context, $\@$, is a plurality of histories $h$, with $c_t \in h$, which represent the possible futures for the speaker of $c$ at the time $c_t$

• **Evaluation function:** $[[ \cdot ]_{c, g, w}$
  - in the case of **denotation-in-context**, the world parameter $w$ of $[[ \cdot ]_{c, g, w}$ is the plurality $\@$; this has modal effects on the interpretation of “will”-statements
An excursus: Non-modality of the future in “narrative” contexts

The claim that the world parameter of $[[ \cdot ]]_{c,e,w}$ may be set in some cases to a particular history $w = h$ (rather than to a plurality of histories) might seem untenable to the strict proponent of Branching Time (e.g. Belnap et al. 2001).

It seems however to correspond to a situation that actually obtains in “narrative” contexts:

(50) 1941 - Richard Cheney is born in Lincoln, Nebraska, on January 30th. He will grow up in Casper, Wyoming, and earn his bachelor’s and master’s of arts degrees from the University of Wyoming.

The purely temporal value of “will” appears clearly from examples of this type, where the narrated events are located in the past (in spite of being reported in the present tense) and the narrator has complete information about the relevant sequence of events (no plurality of possible futures involved in the evaluation of the “will”-sentence).
Previous comparison with plural definite determiner allows us to introduce a central feature: **homogeneity of plural predication** (Križ 2015)

(i) Adam wrote the books.
   true *iff* Adam wrote all the books

(ii) Adam didn’t write the books.
   true *iff* Adam wrote none of the books

There is a gap here: in situations where Adam wrote some, but not all of the books, neither sentence is true.
[In this slide I rely on Križ (2015) PhD thesis.]

• Observation: All distributive predicates in natural language are homogeneous. This has resulted in some attempts to locate the source of homogeneity in the distributivity operator (Schwarzschild 1994, Gajewski 2005).

• Distributive predicates are primitively defined only for atoms; a distributivity operator applies to them in order to make them applicable to pluralities and it adds a presupposition that the plurality is homogeneous:

\[(H) \quad [[ \text{dist} ]] = \lambda P. \lambda x: (\forall x' \in x P(x')) \lor (\forall x' \in x \neg P(x')). \quad \forall x' \in x P(x')\]
• In Bonomi and Del Prete (2007) we proposed a modal analysis of “will” *cum* Settledness Condition:

\[
\text{Settled}(P, t, w) =_{\text{Def}} \forall h \in w \exists z \in h \ [t < z \land P(w)(z)] \lor \forall h \in w \neg \exists z \in h \ [t < z \land P(w)(z)]
\]

\[
[[\text{will}]]_{c, g, w} = \lambda P. \lambda t: \text{Settled}(P, t, w). \forall h \in w \exists z \in h \ [t < z \land P(w)(z)]
\]

• The role of the Settledness Condition was precisely to capture the homogeneity of “will”-statement (*He will come at 3pm *=> in all futures* he comes at 3pm / *He won’t come at 3pm *=> in no futures* does he come at 3pm)
• A different proposal today: **no necessity modal in the semantics!**

Recall:

(16”

  a. At high temperature, four hydrogen atoms *will probably/possibly* fuse into one helium atom.

  In *many/some* future worlds compatible with the laws of atomic physics (and in which temperature has raised above a threshold), four hydrogen atoms fuse into a helium atom

  b. John *will probably/possibly/hardly* be home for vacations now.

  in *many/some/few* future worlds compatible with the speaker’s current evidence, John is home for vacations at the current time
• “Will” has the semantics of a tense: it introduces a temporal variable $s$ whose value is presupposed to be a situation in the future of the utterance situation

$$[[ \text{will}_s ]]_{c, g, h} = \lambda P_{<i, t>}: c_t < g(s, h). P(g(s, h))$$

• “Will” takes a property of situations as argument and yields a truth value, provided that a domain condition is satisfied

• The domain condition $c_t < g(s, h)$ is the presupposition triggered by “will” according to which the value of the temporal variable $s$ has to be in the future of the utterance situation $c_t$ along the history of evaluation $h$
• On top of will’s temporal semantics, a universal quantification over the open possible futures comes into play as a supervaluational strategy to overcome their plurality

$$[[\text{Mary will come }]]_{c, g, @} \Rightarrow (\forall h \in @) \{c_t < g(s, h)\} \text{come}(g(s, h), \text{Mary})$$

• This quantification introduces a modal feature in the interpretation of will

• Since this quantification is not semantically contributed by any linguistic element, it invariantly takes maximum scope (this will be crucial to account for Stalnaker’s asymmetry)

$$[[\text{Mary will not come }]]_{c, g, @} \Rightarrow (\forall h \in @) \{c_t < g(s, h)\} \neg\text{come}(g(s, h), \text{Mary})$$
Interactions with negation

(20) You must not solve all these problems!
    (=> it’s not necessary)

(20') ~□∀x[problem(x) ⊃ solve(you, x)]

(21) You will not solve all these problems!
    (=> it’s necessary that not)

(21') □~∀x[problem(x) ⊃ you solve x]
Back to Stalnaker’s asymmetry

(40) Carter has to appoint a woman to the Supreme Court, but no one in particular.

(40') \( \forall w \ [\text{ALT}_{\text{deontic}}(\@, w, \text{Carter}) \supset \text{appoint}(w, \text{Carter}, f(\text{woman}, w))] \land \neg \exists f^* \forall w \ [\text{ALT}_{\text{deontic}}(\@, w, \text{Carter}) \supset \text{appoint}(w, \text{Carter}, f^*(\text{woman}, \@))] \)

(41) Carter will appoint a woman to the Supreme Court, # but no one in particular.

(41') \( (\forall h \in @) \{c_t < g(s, h)\} \text{appoint}(g(s, h), \text{Carter}, f(\text{woman}, h)) \land (\forall h \in @) \neg \exists f^* \{c_t < g(s, h)\} \text{appoint}(g(s, h), \text{Carter}, f^*(\text{woman}, \@)) \)

- Indefinite object IS non-specific in (41') (f chooses a different woman for each history making up the @-plurality)
- Nevertheless, the continuation “no one in particular” is inconsistent because: (i) the pragmatically-triggered quantification \( \forall h \in @ \) has to take scope over the component \( \neg \exists f^* \) which denies the existence of a choice function selecting a particular @-woman; (ii) for every \( h \in @ \) there has to be a choice function selecting a particular @-woman appointed in h, since h is an integral part of @
(55) I will buy a safe. It should be the best and most secure available.

(56) \( \forall h \in @ \{c_t < g(s, h)\} \exists x [f(safe, g(s, h)) = x \land buy(g(s, h), speaker, x)] \land \forall h \in @ [ALT_{boule}(@, h, speaker) \supset best(f(safe, g(s, h)))] \)
Back to “modal concord”

What are the relative merits of the proposed analysis vis à vis one which treats “will” as a necessity modal in accounting for the interaction with modal adverbs of varying quantificational force?

(16”) a. At high temperature, four hydrogen atoms will probably/possibly fuse into one helium atom.
   b. John will probably/possibly/hardly be home for vacations now.

A possible line of research to be developed: look at the modal adverbs in (16”a,b) as **homogeneity removers** in the sense of Križ 2015.
Homogeneity removers (Križ 2015)

(i) Adam didn’t write the books.
    Homogeneous: true iff $\forall x[\text{book}(x) \Rightarrow \neg \text{wrote}(\text{Adam}, x)]$

(ii) Adam didn’t write all the books.
    Non-homogeneous: true iff $\neg \forall x[\text{book}(x) \Rightarrow \text{wrote}(\text{Adam}, x)]$

(21) You will not solve all these problems!
    Homogeneous: true iff $\Box \neg \forall x[\text{problem}(x) \Rightarrow \text{solve}(\text{you}, x)]$

(21’) You will not necessarily solve all these problems!
    Non-homogeneous: true iff $\neg \Box \forall x[\text{problem}(x) \Rightarrow \text{solve}(\text{you}, x)]$
Suggestion for an implementation

• \([ [ \text{Mary will}_s \text{ come }] ]_{c, g, @} = 1 \iff (\forall h \in @) \{c_t < g(s, h)\} \text{come}(g(s, h), \text{Mary})\)

• \([ [ \text{Mary will}_s [\text{Mod-Adv } \alpha] \text{ come }] ]_{c, g, @} = 1 \iff (\text{for few/some/many/all } h \in @) \{c_t < g(s, h)\} \text{come}(g(s, h), \text{Mary})\)

where \(\alpha = \text{hardly/possibly/probably/necessarily}\)

• Unlike the pragmatically-triggered quantification \((\forall h \in @)\) over the single histories in the @-plurality, the linguistically-triggered quantification \((\text{for few/some/many/all } h \in @)\) is part of the truth-conditional content and can thus interact with negation
Conclusions

• A non-quantificational temporal analysis of “will” in an Open Future framework and an extension of it to plain temporal and modal futures.

• “Will” is not inherently modal; the modality of “will”-sentences is due to the plurality of possible world-histories against which “will”-sentences are evaluated – it’s “Open Future modality”.

• Interaction of “will” with negation and indefinite NPs (Stalnaker’s asymmetry) is explained by assuming a homogeneity condition known to hold of plural predications.
REFERENCES


