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1   Introduction

The core question to be addressed when dealing with the future tense is whether it has a temporal or a modal interpretation. Both answers have been investigated in the literature[1]. In this paper, we argue for treating the future as a modal and more specifically as an *evidential*. Unlike previous approaches, which treat it as a universal quantifier over times or world-time pairs[2], we claim that the future, in Italian, belongs to the category of evidential terms.

There is also no consensus as to whether evidentiality and epistemic modality are two distinct categories. Some authors have claimed that they are distinct categories. They have thus argued that evidentials assert that there is a particular source for the information conveyed by an utterance, while and epistemic modality 'evaluates the evidence and on the basis of this evaluation it assigns a confidence measure to the speaker's utterance' (de Haan, 1999 :85).

However, recent studies on evidentials have shown a much closer connection between evidentiality and epistemic modality. In particular, Squartini (2003) (for Italian *dovere*) and von Fintel and Gillies (2008) have argued that the epistemic modal signals indirect evidence. For example, (1) cannot be felicitously uttered if the speaker has already tasted the kiwi.

(1)   The kiwi must be good

In other words, when using epistemic modals, the speaker marks that s/he has indirect access to the eventuality. Under this view, epistemic modality and evidentiality become one category because epistemic modals mark indirect evidence as the source of the information conveyed by the utterance.

In this paper, we claim that the future signals *indirect access to the eventuality* described by the assertion and that it belongs, in this respect, to the category of epistemic modality. The corollary claim is that the future is not a tense and only contributes inferential meaning (see also Squartini, 2004, Pietrandrea, 2005).

Here we compare the future and epistemic modality and show that the future is an impoverished epistemic modal by virtue of being a morpheme and not a plain

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1. Among the most important accounts of the future as a modal, see Prior, 1957 ; Enç, 1996 ; Bertinetto, 1979 ; Copley, 2002 ; and Condoravdi, 2003. For a recent analysis of the future as a tense, see Kissine, 2008.

2. See e.g. Prior, 1957 ; Condoravdi, 2003 ; Bonomi and Del Prete, 2008.

lexical item like modals in Romance languages. In particular, as it is not able to bear tense and aspect, the future can only set a limited number of the parameters compared with modals, which are fully inflected for tense and aspect. One of the contributions of this paper is to provide a full description of the relevant parameters for future sentences and to cast them in a compositional framework.

An important aspect of this claim is that different uses of the future emerge from two uses of knowledge. In particular, the future has a well-known non-root (2) and temporal (3) interpretation.

(2)   Giovanni sarà malato (non-root interpretation)
        John will be sick

(3)   Giovanni arriverà alle 5 del pomeriggio (temporal interpretation)
        John will arrive at 5 pm

Both interpretations straightforwardly satisfy the requirement that the speaker have indirect access to the event , and in both cases, the future turns out to be an evidential. The purpose of this study is to show how these interpretations are obtained. This is achieved by establishing a distinction between an indexical use of knowledge (see also Papafragou, 2006) and non-indexical use of knowledge (like 'plans'). Furthermore, we return on Lyon's distinction (1977) between subjective and objective knowledge, which we reinterpret in new terms (w.r.t e.g. Nuyts, 2001; Papafragou, 2006; Tancredi, 2007). Existing claims about this distinction state (provided some differences among the theories) that knowledge is objective when it is shared among different participants. Here we state that knowledge is objective when it is based on a realistic modal base. It is subjective when it is based on personal beliefs, no matter whether peculiar to the speaker or shared by various participants. We will show that languages dedicate different expressions to these two types of knowledge.

All these distinctions are couched in a Kratzerian framework (Kratzer, 1981). The paper thus contributes a partial typology of the types of knowledge to which items can be sensitive in Romance languages.

The paper is organized as follows. In section 2 we provide new evidence for an evidential treatment of the future. In section 3, following previous analysis claiming that the future is related to 'subjectivity', we more carefully define this notion by considering various understandings. Our aim here is to settle the parameters to which the future is sensitive and not to define 'subjectivity' *per se*. In section 4 we consider two different uses of subjective knowledge to which the future is sensitive, namely the the indexical and the non-indexical use. We define these notions and argue that these two uses contribute two different times of assessment. We define in section 5 the temporal parameters whose interplay leads to the two distinct interpretations of future sentences and provide a compositional analysis in section 6. In section 7 we compare our account of the modal/evidential nature of the future to previous modal accounts. Section 8 concludes the paper.

2 Evidence for an evidential treatment

2.1 The current generalization

Modals have a root and non-root interpretation. The temporal interpretation of the future corresponds to the root interpretation of modals and the epistemic interpretation of the future parallels the non-root interpretation of modals.

(4)   a.   Gianni partirà domani (temporal)
           Gianni will leave tomorrow
    b.   Gianni può partire domani (root)
           Gianni can leave tomorrow

(5)   a.   Gianni sarà a casa (modal - epistemic)
           Gianni will be at home
    b.   Gianni può essere a casa (epistemic)
           Gianni can be home

These two interpretations have been claimed to correlate with the stative/eventive nature of the embedded predicate (Bertinetto, 1979; Condoravdi, 2001). According to this view, eventives forward-shift the event description, giving rise to the temporal interpretation. The reasons why these two types of eventualities lead to different readings vary with the assumptions that the authors make about the model they adopt.

For Italian, Bertinetto (1979) assumes that the future expresses commitment and that this commitment holds until the action has been realized. He admits that some cases escape generalization. In particular, the author notes that in the simple future, with statives, the beginning of the described states can be forward-shifted by appropriate anchors, as occurs in (6) :

(6)   Domani sarà malato
        Tomorrow he will be sick

Condoravdi (2003), who notes a similar pattern for English, makes the following assumption : any modal expression induces a diversity condition. According to this condition, in the modal base, p and *notp* are true. With statives, the eventuality being settled as occurring in the actual world at the time of the utterance, the only way to satisfy the diversity condition is to trigger an epistemic interpretation. With eventives, in the branching time framework that the author assumes (Thomason, 1984), the diversity condition is achieved by forward-shifting the event into the future, where options are metaphysically unsettled and p and *notp* remain alive options. The metaphysical and the epistemic interpretations are thus obtained in the latter case (provided the event description is forward-shifted).

This description is incomplete for the Italian future. Eventive predicates are compatible with the epistemic interpretation of the future according to specific evidentiality conditions. Before we continue, it is useful to make clear that by 'modal' use of the future, we target the non-root interpretation of the future.

2.2 A new observation

It has never been pointed out that whenever the speaker lacks direct evidence for the truth of his assertion, the future can be used with eventive predicates on a modal interpretation. The three following cases thus point to the facts that (i) the event description is not necessarily forward-shifted with eventive predicates, (ii) in order to obtain a 'modal' interpretation, the speaker has to have indirect evidence for his claim.

The first example is provided in (7). Here the predicate is eventive.

(7) a. Pioverà (uttered in Milano)
         It will rain
     b. Pioverà a Roma (uttered in Milano)
         It will rain in Rome

Assume that (7-a) is uttered in Milano, and is about the weather in Milano. It has a temporal interpretation if the speaker can see the sky and is not behind closed curtains. It receives a modal interpretation if the speaker cannot see the sky. In this case, the event description is not necessarily forward-shifted. If the speaker is instead in Milano and describes an event taking place, at the time of utterance, in Rome, as in (7-b), the event description is also not necessarily forward-shifted.

The following cases are also examples of the lack of forward-shifting of the event description. Assume a scenario in which my husband and I are talking about our son who is at school, where activities are carefully scheduled. The meal, in particular, is always at 11 :30 am. At 11 :30 am, A asks (8-a). In B's reply (8-b), the event is not forward-shifted either.

Here again, B has some indirect evidence : he knows that the meal takes place at 11h30. However, the evidence is indirect, since we cannot see our son eating.

(8) a. A Che cosa farà ?
         What will he do ?
     b. B : Mangerà
         He will eat

As a third example, consider a scenario in which there is noise outside. In answer to A's question (54-a), B can reply (54-b) without the event being forward-shifted (see also Rocci, forthcoming) :

(9) a. A : Che cosa succede ?
         What is going on ?
     b. B : Arriverà Giovanni
         Giovanni might arrive

In view of these cases, we hypothesize that the future is an evidential. We propose the following generalization :

(10)   The future marks that the speaker has indirect access to the event

A proper analysis of evidentials must show to what type of evidence an item

is sensitive and how different types of knowledge contribute to the semantic interpretation of the sentences. In the following sections, we make a distinction between various types of knowledge to which the future is sensitive.

From a terminological point of view, we argue that the future is an *evidential* whose meaning can be precisified (see Pinkal, 1979) either as *modal/epistemic* or as *temporal*.

3 The subjective nature of the future

When an item is claimed to be an evidential, one should make clear the type of sources it relies upon. Here we show that the Italian future, in its modal use, relies on 'subjective' knowledge. This conclusion has been independently reached by various authors (see Pitrandrea, 2004 ; Rocci, forthcoming ; Mari, 2009). Going beyond this generalization, we spell out what 'subjectivity' relates to when the future is concerned, and because the term has been used in a number of ways, we make clear how we use it. As a result, we suggest a new distinction between subjective and objective knowledge.

3.1 Epistemic vs. realistic modal basis : the foundations

In her seminal work, Kratzer (1977, 1981) points that, in language, various expressions set the conversational background, like 'in view of phrases'. She distinguished two major types : 'in view of facts' and 'in view of what is known'. The first expression sets a realistic conversational background, and the second one an epistemic conversational background. Assuming f is the function that assigns to worlds propositions that are true in them, for the first type of background $f(w)$ assigns to every possible world w the set of propositions that are true in it ; for the second type of background, $f(w)$ contains all those propositions that are established knowledge in w -for a group of people, a community etc . . .

From this view, the question about subjectivity - objectivity has developed in various directions. One way to look at the question is to consider whether the distinction pertains to the fact that different members of the community are considered. A second way to look at the question is to acknowledge differences in the reliability of the evidence. A third way to look at the distinction, which we adopt, is to differentiate two types of sources.

In the following section, we consider these distinctions in turn. Various arguments for and against the positions have already been discussed in the literature. Our purpose is not to review and discuss the positions, but simply to set the background for our distinction to understand the types of knowledge to which the Italian future is sensitive and the types of knowledge that are relevant for obtaining its modal and temporal interpretation.

3.2 Subjective-objective distinction : a question of judges

Papafragou (2006) argues that knowledge is 'subjective' if the set of judges includes only the speaker. Indexical knowledge is such that the possible worlds in the

conversational background are restricted to what the speaker knows at the time of the utterance.

Speaker-orientedness is relevant for the future. The first way to found this claim is to compare the use of the future with that of the modal *must* : unlike this modal, the future cannot be used in inferential patterns without obtaining a 'guessing effect,' as is apparent in (12) :

(11)   a. The ball is in A, B or C
        b. It is neither in A nor B
        c. It must be in C

(12)   a. La palla è in A o in B o in C
        b. Non è nè in A, nè in B
        c. #Sarà in C

In the same spirit, the following is a minimal pair showing that the modal interpretation is allowed only when the speaker is subjectively involved in the appreciation of the evidence (15-a). When another judge is appealed to as an external source of information, the future cannot receive a modal interpretation (15-b), and to this aim, the conditional is preferred (15-c).

(13)   a.   Secondo me pioverà a Roma (ok modal, ok temporal)
             In my opinion, it will rain in Rome
        b.   Secondo mia madre pioverà a Roma (*modal, ok temporal)
             According to my mother, it will rain in Rome
        c.   Secondo mia madre pioverebbe a Roma (ok modal)
             According to my mother, it would rain in Rome

Nonetheless, the use of the Italian future does not require that the speaker be the only judge (i.e., it does not require solipsism in the sense described by McFarlane, 2008). The use of the future is compatible with knowledge held by a set of judges, provided the speaker is included in the set [3].

(14)   Secondo noi, pioverà a Roma
        In our opinion, it will rain in Rome

3.3   Subjective-objective distinction : a question of reliability

Kratzer suggests a different way to understand the subjective-objective distinction, which is revealed in the German distinction between 'wird' and 'dürf.' 'Wird' relies on objective knowledge, whereas 'dürf' does not. By 'objective' knowledge, Kratzer means knowledge based on commonly shared assumptions that are grounded in reliable sources ; by 'subjective' knowledge, Kratzer means knowledge grounded in unreliable sources, such as superstition. According to Kratzer, the reliability of different types of knowledge is reflected in the choice of the ordering source rather than in the choice of the modal basis. 'Objective knowledge' ranks worlds along a stereo-

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3. The use of the future is compatible with intersubjectivity, as is suggested by Portner, 2009. See footnote 4.

typical background, whereas subjective knowledge ranks worlds along a 'subjective,' stereotypical background.

As the following contrast illustrates, reliable sources other than the speaker are not compatible with the modal use of the Italian future :

(15)   a.   Secondo me pioverà a Roma (ok modal, ok temporal)
In my opinion, it will rain in Rome

        b.   Secondo la meteo pioverà a Roma (*modal, ok temporal)
According to my mother, it will rain in Rome

        c.   Secondo la meteo pioverebbe a Roma (ok modal)
According to my mother, it would rain in Rome

Again this example shows that the knowledge on which the use of the future rests does not have to involve 'reliable' sources.

3.4   Subjective - objective distinction : a question of sources

In relation to speaker-orientation, the Italian future is compatible with personal beliefs or with a more elaborate reasoning about the world.

This type of reasoning relies on what we call 'objective' knowledge. We assumes that the subjectivity / objectivity distinction relies on two types of backgrounds. Subjective knowledge relies on a truly epistemic background, including a set of beliefs held by (a group including) the the speaker. Objective knowledge relies on a realistic background. Worlds of the realistic modal base are ranked according to 'subjective stereotypicality' : the future operates in the worlds that the speaker believes are the most compatible with the facts expressed in the adjunct [4].

(16)

	subjectivity	objectivity
modal base	beliefs (doxastic modal basis)	facts (realistic modal base)
ordering source	empty	(subjective) stereotypicality

Our distinction between subjectivity and objectivity is revealed in the choice of the adjuncts. Assume a scenario in which Piero is absent from school. The adjunct in (17-a) introduces a subjective modal base. The speaker assumes that in all worlds in which Piero is absent from school, Piero is sick. The speaker could have made a different conjecture and continued with 'o forse non aveva voglia di venire' (*or maybe he did not want to come*). The conjecture reveals a personal belief and is not based on external evidence.

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4. Our distinction here should not be confused with the distinction proposed by Portner (2009). Portner also distinguishes between subjectivity as a modal base ($Subj_{mb}$) and subjectivity as ordering source ($Subj_{mb}$). For him, however, $Subj_{mb}$ contrasts with 'intersubjecivity' and is considered a categorical concept : ' a statement is objective if it is based on knowledge shared within a relevant group : otherwise it is subjective.' In contrast, subjective OS is scalar : a given statement can be more 'objective' or 'subjective' than another. Here the distinction relates to reliability. No matter what the degree of reliability is, a subjective statement is compatible with the Italian future.

The adjunct in (17-b) instead introduces a fact (it is presupposed that Piero played in the rain). Because the speaker knows that playing in the rain can make one sick, the speaker ranks worlds in which Piero is sick as higher than those in which he is not sick.

(17) a. Secondo me, Piero sarà malato
          In my opinion, Piero will be sick
      b. Dato che ha giocato sotto la pioggia, Piero sarà malato
          Since he played under the rain, Piero will be sick

We have argued that the future is an evidential, and along with von Fintel and Gillies (2007) and Matthewson et al. (2007), we assume that evidentials behave like epistemic modals. Assuming for now that the future is a kind of necessity modal, it follows that the future operates in (at least) two types of modal bases and ordering sources.

1. Modal meaning and 'subjective' modal basis (i.e. a doxastic modal basis). For a future sentence represented as $F(p)$, p is human necessity with respect to f_{subj} and an empty ordering source g. Recalling the Kratzerian definition of human necessity, we obtain (18).

(18) The proposition p is a human necessity in a world w with respect to f_{subj}
      and an empty ordering source g iff :
      for all $u \in f_{subj}(w)$, there is a $v \in \cap f_{subj}$ such that :
      (i) $v \leqslant_{g(w)} u$ and
      (ii) for all $z \in \cap f_{subj}$: If $z \leqslant_{g(w)} v$, then $z \in p$.

2. When knowledge is 'objective' (i.e. the modal basis is realistic) and the ordering source ranks worlds according to 'subjective stereotypicality' (i.e., according to what is more likely for the speaker), (19) is obtained. Let f_{obj} be a realistic modal base and $g_{subj-ster}$ a 'subjective stereotypicality' ordering source. $F(p)$ is defined as follows :

(19) The proposition p is a human necessity in a world w with respect to f_{obj}
      and an ordering source $g_{subj-ster}$ iff :
      for all $u \in f_{obj}(w)$, there is a $v \in \cap f_{obj}$ such that :
      (i) $v \leqslant_{g_{subj-ster}(w)} u$ and
      (ii) for all $z \in \cap f_{obj}$: If $z \leqslant_{g_{subj-ster}(w)} v$, then $z \in p$.

Knowledge coded in f (both subjective and objective) can be exploited as indexical and as non-indexical.

4   Indexical and non indexical uses of knowledge and times of assessment

4.1   Indexical and non-indexical uses of knowledge

We consider indexical knowledge to be knowledge **of** a present fact. The available evidence exists in the context of an utterance and allows one to conjecture about

whether something has happened or is happening. For instance, Jim being absent from school can be used as evidence that he is sick ; smoke can be used as evidence that there is a fire ; or chocolate on a boy's lips can be used as evidence that he ate chocolate. Subjective and objective knowledge can be used in an indexical way, as occurs in (20).

(20)   a.   Secondo me, sarà a casa
              In my opinion, he will be at home
        b.   Visto quello che è successo, sarà partito
              In view of what has happened, he will have left

Subjective and objective knowledge can also be used in a non-indexical way, as occurs in (21). In particular, they can be used as knowledge **for** rather than knowledge of a fact. In this case, they are part of a conjecture or a plan. Jim being absent can be used as evidence for his later arrival ; smoke can be used as evidence for the fact that people will need to be evacuated ; and chocolate on a boyÕs lips can be used as evidence that he will get a stomach ache.

(21)   a.   Secondo me, sarà a casa alle 10h00
              In my opinion, he will be at home at 10h00
        b.   Visto quello che è successo, partirà presto
              In view of what has happened, he will leave soon

Non-indexical uses of knowledge (i.e., knowledge 'for' non-present facts) consist of 'plans.' A plan is a set of propositions such that the proposition p, or the goal, relies on the propositions in the plan (e.g., Dowty, 1979 ; Copley, 2002). Proposition p is thus human necessity with respect to propositions constituting a plan. Best worlds are those in which the plan is realized. Letting f_{plan} provide the worlds in which the propositions contained in the plan are true and $g_{plan-sat}$ be an ordering source in which worlds in the realized plan are ranked as best worlds, the following is obtained :

(22)   The proposition p is a human necessity in a world w with respect to f_{plan}
        and an ordering source $g_{plan-sat}$ iff :
        for all $u \in f_{plan}(w)$, there is a $v \in \cap f_{plan}$ such that :
        (i) $v \leqslant_{g_{plan-sat}(w)} u$ and
        (ii) for all $z \in \cap f_{plan}$: If $z \leqslant_{g_{plan-sat}(w)} v$, then $z \in p$.

The definition in (22) covers cases for which a schedule seems to be lacking, as when one looks out of the window and truthfully and felicitously utters (23). At the utterance time, a set of propositions is true in w, such that the event in p occurs at a later time t' following the utterance time. For instance, it is true that the sky is grey, it is true that there are a lot of clouds, and so on ; p follows from this set of premises, which combined with p, constitutes a 'plan.'

(23)   Pioverà tra poco
        It will rain shortly

In contrast with knowledge used indexically, plans can rely on subject-independent knowledge, as occurs in (24).

(24)   Secondo il direttore, Gianni non arriverà oggi
        According to the director, Gianni will not arrive today

As any other type of epistemic modality, in all of these cases, p is considered to be true in worlds that are compatible with what is known at the utterance time.

In both cases, indexical knowledge (defined above) and plans are types of indirect evidence. They differ in providing two different times of assessment, which is the time at which it is *decided* whether the event occurs / occurred / will occur.

As we make clear in the following section, the time of the event and the time of assessment need not coincide.

4.2   Two uses of knowledge and two different times of assessment

We have stated so far that the future is an evidential that indicates indirect access to the event described in the embedded proposition. Its evidential use emerges in both the modal (epistemic) (25-a) and the temporal interpretations (25-b).

(25)   a.   Mario sarà a casa
              Mario will be at home
        b.   Marion partirà domani
              Mario will leave tomorrow

When used as a modal, the time of the event either coincides or precedes the utterance time. The access to this event is indirect because it is based on indirect evidence available at the utterance time.

On this reading, whether the event has occurred / occurs, is settled. In (26-a) it is settled whether it is raining in Rome and in (26-b) it is settled whether he has lost his watch.

(26)   a.   Pioverà a Roma
              It will rain in Rome
        b.   Avrà perso il suo orologio
              He will have lost his watch

As we have shown above, provided the speaker has indirect evidence, the modal interpretation is available with eventive predicates as well. However, because it is always epistemically possible that a past event occurred in an alternative world or is occurring in the present in an alternative world, the availability of the evidence legitimates the assertion (i.e. it satisfies the gricean Maxim of Quality). The speaker asserts what he believes to be true given the evidence he has.

The temporal interpretation of the future satisfies the evidentiality requirement because access to the event is indirect.

Again, it is always possible that something can occur in the future. To guarantee that the sentence is felicitous, it must be grounded in some type of evidence; the

evidence is provided by plans.

While a plan is a set of propositions that hold true at the utterance time, the time of the event, or goal, occurs after the utterance time. The proposition 'Arriverà alle 10h00' is true at the utterance time of 9h00 in the morning if and only if there is a time that is 10 am, such that he arrives at that time.

In the previous section, we claimed that knowledge that holds at the utterance time can be used in two different manners, namely as indexical or non-indexical knowledge (which include plans). Here we claim that these two uses of knowledge provide two different times of assessment. The time of assessment is the time at which it is decided whether p is true in world w (see Condoravdi, 2002).

Our claim is that *indexical knowledge* sets the *time of the assessment at the utterance time*; *plans* set the time of assessment at a *time succeeding the utterance time*. Note, however, that plans as evidence are available at the utterance time.

Why does indexical evidence set the time of assessment at the utterance time? Indexical knowledge sets the time of assessment at the utterance time because it consists of proofs *of* the occurrence of a fact. At the utterance time, whether an event has occurred or a state has been obtained is settled. As such, the event or state can only be relative to a past or present fact that constitute the evidence. Proofs *for* a future event/state can only consist of a plan[5] and are incompatible with the issue being decided at the utterance time[6].

We now turn to defining various temporal locations, whose interplay contributes to the interpretation of future sentences.

5   Setting the stage for the analysis

There is a set of commonly assumed parameters in the analysis of evidential terms. The first parameter is the 'temporal perspective' or 'modal time.' With modal fully fledged for tense and aspect, as in *dovere* (ÔmustÕ) / *potere* (ÔcanÕ), the time of the modal evaluation is provided by tense on the modal. In (27), the imperfect on the modal locates the modal evaluation in the past :

(27)   Gianni Poteva$_{\text{IMPERF}}$ partire domani
        John   could   leave   tomorrow
        He could have left tomorrow

A second parameter in the analysis of evidential is the 'evidence time,' i.e., the time at which evidence is available to the speaker.

A peculiarity of epistemic modality (and evidentials) is that the modal time and the evidence time always coincide (see Hacquard (2006), von Fintel and Gillies (2008), Homer (2009), Mari (2009))[7]

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5. It is impossible to have proofs of a fact if the fact has not yet occurred (this explains why epistemic modals cannot occur in the future).

6. In contrast to previous accounts, we do not consider that the future provides quantification over a circumstantial or a realistic modal base (see section 7

7. This is the case whether the epistemic evaluation occurs in the present or in the past ; for a discussion, see von Fintel and Gillies (2008).

(28)   a.   Da quello che so$_{\text{PRES}}$, deve$_{\text{PRES}}$ essere ammalato
           As far as I know, he must be sick
       b.   Da quello che ne sapevo$_{\text{IMPERF}}$, doveva$_{\text{IMPERF}}$ essere ammalato
           As far as I knew, I had to be sick

Because the future is an evidential that marks indirect access to the event and is legitimated by the availability of the evidence, the modal time coincides with the evidence time. The evidence time is also the utterance time because both indexical and non-indexical knowledge are available at the utterance time.

A third parameter for the analysis of evidentials is the event time. With plain modals, the event time is provided by aspect on the the embedded predicate. If the embedded predicate is in the perfect, the event time is backward-shifted with respect to a reference time (see Kamp and Reyle, 1993). In (29), the event of PieroÕs eating too much occurs before the utterance time or before a time in the future.

(29)   Piero avrà mangiato troppo
       Piero will have eaten too much

A final temporal location is the time of assessment. The time of assessment is the time at which it is decided whether p occurred or is obtained (see in particular Condoravdi, 2002; McFarlane, 2006). As we have explained above, the time of assessment depends on the type of knowledge. *Indexical knowledge* sets the *time of the assessment at the utterance time. Plans* set the time of assessment at a *time succeeding the utterance time.*

The time of assessment functions as the reference time with respect to when the event time is located. If the event time is located before the reference time, then the event is represented as preceding the time of assessment. If the event time is not located before the time of assessment, then the event time and the time of assessment coincide.

Assuming the starting decomposition in (30-a), we can specify ASP in two possible manners, illustrated in (30-b) and (30-c).

(30)   a.   FUT(ASP(p))
       b.   FUT(PRES(p))
       c.   FUT(PERF(p))

The following combinations are available, with the time of assessment being the present on the epistemic (modal) interpretation and as future on the temporal interpretation.

(31)   Piorerà a Roma (sentence is uttered in Milano) - epistemic -
       It will rain in Rome
       FUT(PRES(p))
       Mod-t = Evid-t = Ass-t = Ev-t = present [8]

(32)   Piorerà alle 4 oggi pomeriggio a Milano (uttered in Milano) - temporal -
       It will rain at 4 pm today in Milano

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8. Mod-t = modal time; Evid-t = evidence time; Ass-t = assessment time; Ev-t= event time.

FUT(PRES(p))
Mod-t= Evid-t = present ; Ass-t = Ev-t = 4 pm

(33) Avrà piovuto a Roma - epistemic -
It will have rained in Rome
FUT(PERF(p))
Mod-t= Evid-t = Ass-t = present ; Ev-t = past

(34) Domani avrà piovuto a Roma - temporal -
Tomorrow, it will have rained in Rome
FUT(PERF(p)) Mod-t= Evid-t = present ; Ass-t = future (tomorrow) Ev-t
= past w.r.t. to ÔdomaniÕ

With these combinations, we can now turn to the compositional analysis.

6 Analysis

6.1 Lexical entries

We classically assume that the VP denotes properties of events.

Given an individual constant j and a predicate constant r, the denotation of the VP is given in (35). We specify the denotation with respect to a world of evaluation w and a modal basis f, leaving aside the ordering source g for clarity purposes.

(35) $[\![VP]\!]^{w,f} = \lambda w \lambda e[r(j,e,w)]$

As is usually assumed, aspect is an operator that maps properties of events into properties of times. We use $\tau(e,w)$ to indicate the spatio-temporal trace of e in w (see Krifka, 1992). 'Aspect' not being specified, the relation between the spatio-temporal trace of e in w and the reference time t is unspecified, as REL signals.

(36) $[\![aspect]\!]^{w,f} = \lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e[P(w,e) \wedge \tau(e,w) \ REL \ t]$

Aspect can be specified as perfect. We also follow previous use to consider that aspect provides existential closure over the event (see Kratzer, 1998) and that the perfect backward-shifts the event description to a time t', which precedes a reference time (See Kamp and Reyle, 1993 ; Condoravdi, 2002). As noted by de Swart (2007) and Mari (2010), this effect is obtained in Romance languages with both statives and eventives.

(37) $[\![perfect]\!]^{w,f} = \lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e\exists t'[P(w,e) \wedge t' \prec t \wedge \tau(e,w) \subseteq t]$

When the infinitive is not in the perfect, the relation between the temporal trace of the event and the reference time is determined by the type of the eventuality. It is inclusion if the eventuality is eventive (38-a) and overlap if it is stative (38-b). The denotation of the infinitival in a non-perfect form is as follows in (38).

(38) a. $[\![non-perfect]\!]^{w,f} = \lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e[P(w,e) \wedge \tau(e,w) \subseteq t]$ (if P is eventive)

13

b. $[\![non-perfect]\!]^{w,f} = \lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e[P(w,e)\wedge\tau(e,w)\circ t]$ (if P is stative)

As for FUT, we must note that its quantificational force is unspecified (see Bertinetto, 1979). The future, such as evidentials across languages (see Matthewson *et al.*, 2007), can either behave as an existential or a universal modal (this further pleads for treating the future as an evidential). The context fixes its force. For instance, the future is an existential in (39-a) because of 'maybe' and a universal in (39-b) as the continuation, 'I am sure about it' shows.

(39) a. Piero sarà forse malato $\exists$
           Piero will maybe be sick
      b. Piero sarà malato, ne sono certo $\forall$
           Piero will be sick, I am sure about it

We implement this feature in the same way as Matthewson *et al.* (ibid.) (crediting Klinedienst, 2005), with existential quantification over non-empty sets of worlds. The chosen set of worlds can be a subset or can be equal to the modal base. The larger the set is, the stronger the quantificational force of the future will be. As discussed in section , because knowledge is relative to the speaker (or to a group including the speaker), we add i as a parameter, where i stands for the speaker (or such a group).

(40) $[\![future]\!]^{w,f,i} = \lambda p_{\langle s\langle it\rangle\rangle}\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset \wedge \forall w' \in W(p(w',t))]$

Bringing these pieces together, the four combinations described in (31)-(34) are obtained in the way shown in the following section.

6.2 Composition

We begin by spelling out the underspecified representation associated with a future sentence. In this case, both the time of the event and the time of assessment are unspecified.

(41)

$$\text{FutP}$$
$$\lambda w \lambda t \exists W [W \subseteq f(w) \wedge W \neq \emptyset$$
$$\wedge \forall w' \in W \exists e [r(e, w') \wedge \tau(e, w') \; REL \; t]]$$

$$\text{Fut}$$
$$\lambda p_{\langle s \langle it \rangle \rangle} \lambda w \lambda t \exists W [W \subseteq f(w) \wedge W \neq \emptyset$$
$$\wedge \forall w' \in W (p(w', t))]$$

$$\text{AspP}$$
$$\lambda w \lambda t \exists e [r(e, w)$$
$$\wedge \tau(e, w) REL t]$$

$$\text{Asp}$$
$$\lambda P_{\langle s \langle \epsilon t \rangle \rangle} \lambda w \lambda t \exists e [P(w, e)$$
$$\wedge \tau(e, w) \; REL \; t]$$

$$\text{VP}$$
$$\lambda w \lambda e [r(e, w)]$$
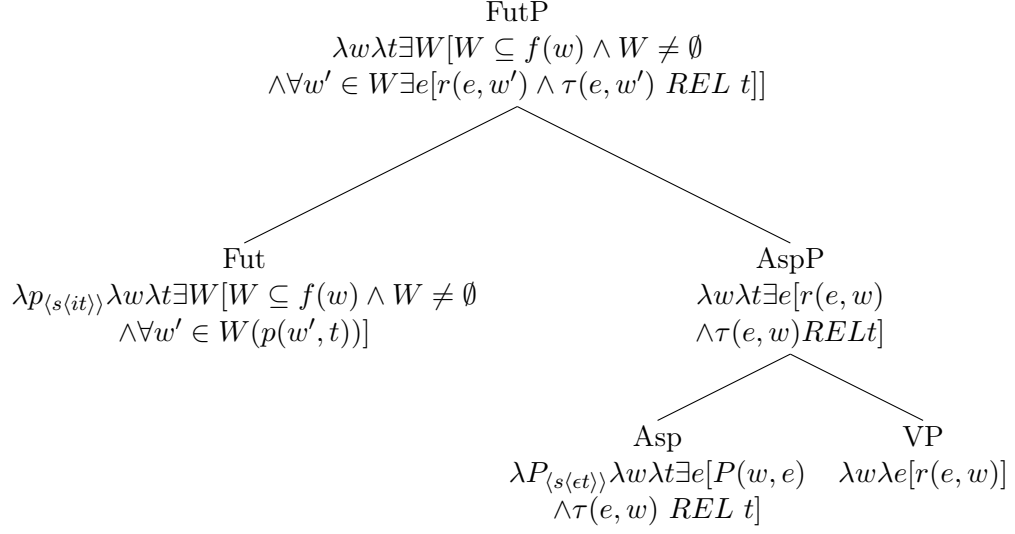
Paraphrase : Given a world w and a time t, there is a nonempty subset of $f(w)$, and for all worlds w of this subset, there is a r event that bears a certain relationship to the temporal trace t.

Indexical and non-indexical knowledge set the time t differently. Similarly, perfective and non-perfective aspect on the embedded predicate instantiate REL differently.

Indexical knowledge base   When the indexical knowledge is chosen, the time of assessment is fixed at the time of the utterance. We distinguish between cases when the infinitive is in the non-perfect and the perfect form. To avoid redundancy, we only consider indexical subjective knowledge, and we leave aside the ordering source on worlds.

1. FUT(PRES(p))

(42)   Pioverà a Roma (sentence is uttered in Milano)
        It will rain in Rome
        Mod-t= Evid-t = Ass-t = Ev-t = present

(43)

FutP
$\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset$
$\wedge\forall w' \in W\exists e[r(e,w') \wedge \tau(e,w') \subseteq t]]$

Fut
$\lambda p_{\langle s\langle it\rangle\rangle}\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset$
$\wedge\forall w' \in W(p(w',t))]$

AspP
$\lambda w\lambda t\exists e[r(e,w) \wedge \tau(e,w) \subseteq t]$

Non-perf
$\lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e[P(w,e)$
$\wedge\tau(e,w) \subseteq t]$

VP
$\lambda w\lambda e[r(e,w)]$
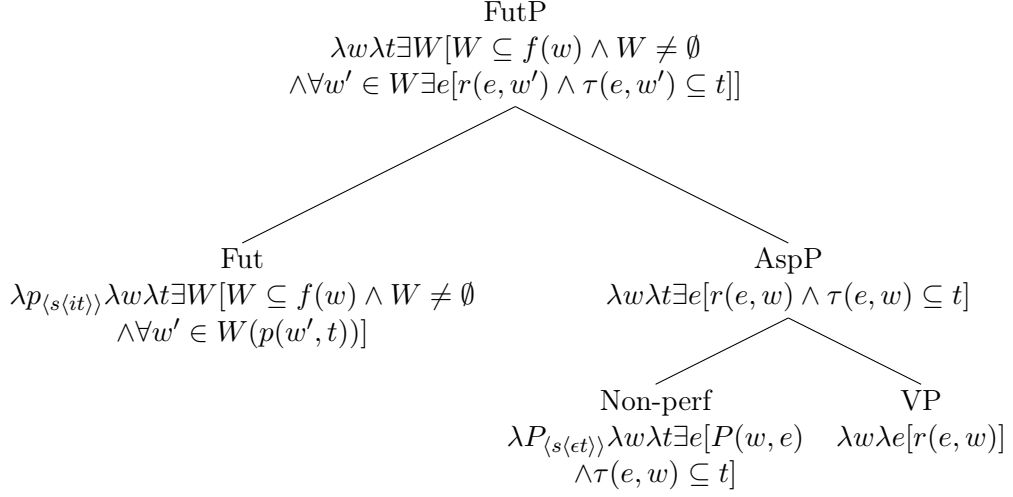
On the assumption that the modal basis is indexical, t is instantiated as the utterance time *now*. The final analysis is thus as in (44).

(44) $\lambda w\exists W[W \subseteq f_{index}(w) \wedge W \neq \emptyset \wedge \forall w' \in W\exists e[r(e,w') \wedge \tau(e,w') \subseteq now]]$
Paraphrase : For a given world w, there is a non empty subset of $f_{subj}(w)$, and for all worlds w' of this subset, there is a r event in w' whose spatio-temporal trace is included in the utterance time.

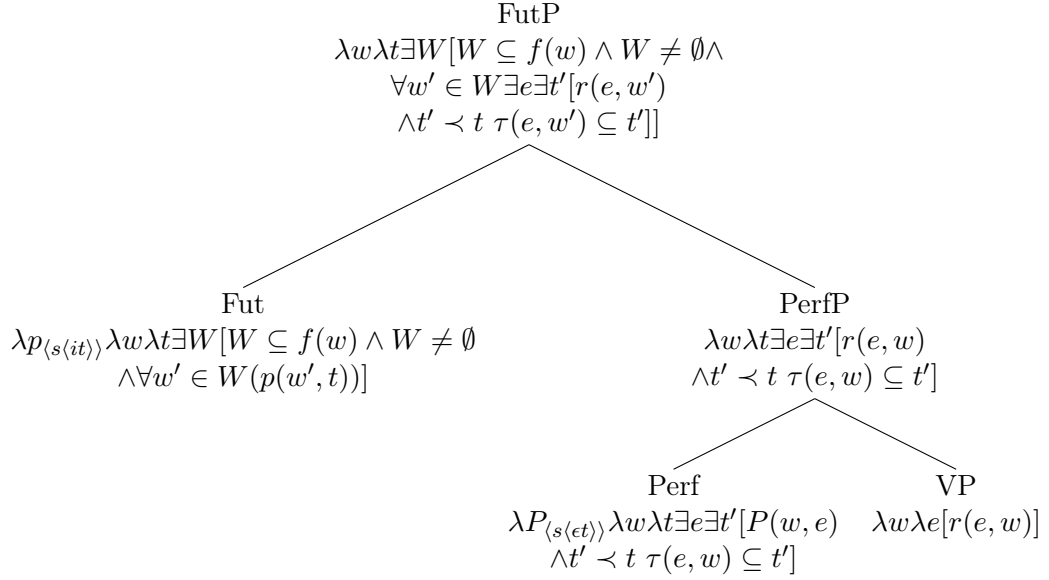Here $f_{index}(w)$ is the set of facts that constitute evidence or post-conditions for events or states that occur at *now* or before *now*.

The same analysis holds for statives, with the spatio-temporal trace of the event and of the reference time overlapping.

2. FUT(PERF(p))

(45)   Avrà piovuto a Roma (uttered in Milano)
It will have rained in Rome
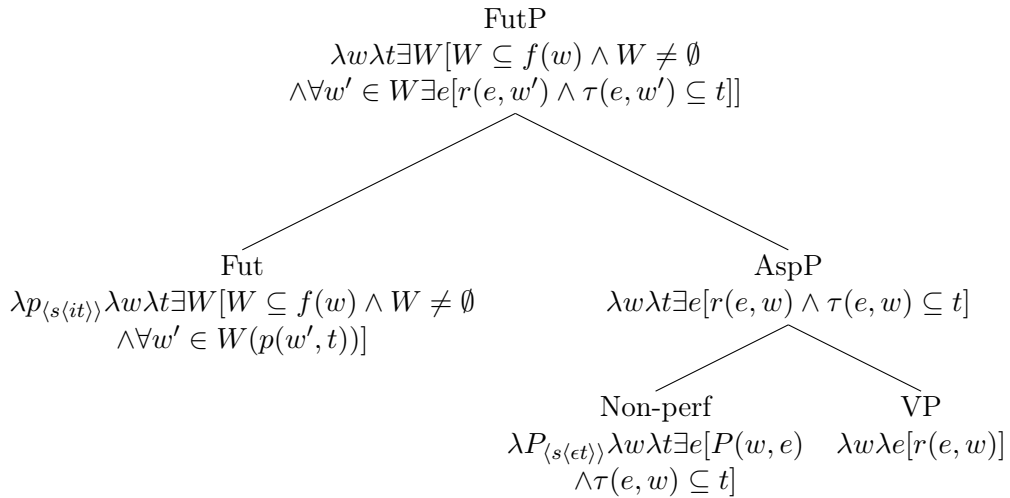Mod-t= Evid-t = Ass-t = present ; Ev-t = past w.r.t. Ass-t

(46)

FutP
$\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset \wedge$
$\forall w' \in W\exists e\exists t'[r(e,w')$
$\wedge t' \prec t\ \tau(e,w') \subseteq t']]$

Fut
$\lambda p_{\langle s\langle it\rangle\rangle}\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset$
$\wedge\forall w' \in W(p(w',t))]$

PerfP
$\lambda w\lambda t\exists e\exists t'[r(e,w)$
$\wedge t' \prec t\ \tau(e,w) \subseteq t']$

Perf
$\lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e\exists t'[P(w,e)$
$\wedge t' \prec t\ \tau(e,w) \subseteq t']$

VP
$\lambda w\lambda e[r(e,w)]$

Setting t at the utterance time t_u, the final analysis is as in (47).

(47) $\lambda w\exists W[W \subseteq f_{index}(w) \wedge W \neq \emptyset\forall w' \in W\exists e\exists t'[r(e,w') \wedge t' \prec t_u\tau(e,w') \subseteq t']]$
Paraphrase : Given a world w, there is a nonempty subset of $f_{index}(w)$, and for all worlds w of this subset, there is a r event that is localized at t', which precedes t_u.

Plans   3. FUT(PRES(p))

(48)   Pioverà alle 4 oggi pomeriggio a Milano (uttered in Milano)
It will rain at 4 pm in Milano today
Mod-t= Evid-t = present ; Ass-t = Ev-t = 4 pm

(49)

FutP
$\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset$
$\wedge\forall w' \in W\exists e[r(e,w') \wedge \tau(e,w') \subseteq t]]$

Fut
$\lambda p_{\langle s\langle it\rangle\rangle}\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset$
$\wedge\forall w' \in W(p(w',t))]$

AspP
$\lambda w\lambda t\exists e[r(e,w) \wedge \tau(e,w) \subseteq t]$

Non-perf
$\lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e[P(w,e)$
$\wedge\tau(e,w) \subseteq t]$

VP
$\lambda w\lambda e[r(e,w)]$

On the assumption that the modal basis consists of a plan, t is instantiated as a time future with respect to t_u. The final analysis is thus as in (50).
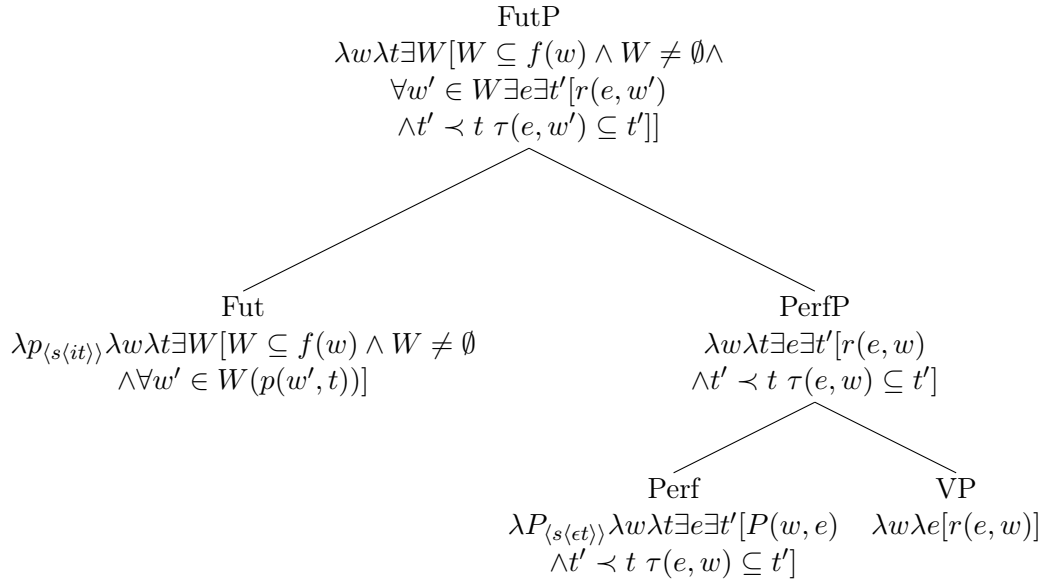
(50) $\lambda w\exists W[W \subseteq f_{plan}(w) \wedge W \neq \emptyset \wedge \forall w' \in W\exists e[r(e,w) \wedge \tau(e,w) \subseteq 4 \text{ pm}]]$
       Paraphrase : For a given world w, there is a non empty subset of $f_{index}(w)$, and for all worlds w' of this subset, there is a r event in w' whose spatio-temporal is included in 4 pm.

Here $f_{plan}(w)$ returns the set of propositions that constitute the plan in w.

4. FUT(PERF(p))

(51)   Domani avrà piovuto a Roma
       Tomorrow it will have rained in Rome
       Mod-t= Evid-t = present ; Ass-t = future (tomorrow) ; Ev-t = past w.r.t. tomorrow

(52)

FutP
$\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset \wedge$
$\forall w' \in W\exists e\exists t'[r(e,w')$
$\wedge t' \prec t\ \tau(e,w') \subseteq t']]$

Fut
$\lambda p_{\langle s\langle it\rangle\rangle}\lambda w\lambda t\exists W[W \subseteq f(w) \wedge W \neq \emptyset$
$\wedge\forall w' \in W(p(w',t))]$

PerfP
$\lambda w\lambda t\exists e\exists t'[r(e,w)$
$\wedge t' \prec t\ \tau(e,w) \subseteq t']$

Perf
$\lambda P_{\langle s\langle \epsilon t\rangle\rangle}\lambda w\lambda t\exists e\exists t'[P(w,e)$
$\wedge t' \prec t\ \tau(e,w) \subseteq t']$

VP
$\lambda w\lambda e[r(e,w)]$

Setting the assessment time to 'tomorrow,' we obtain (53) :

(53) $\lambda w\exists W[W \subseteq f_{plan}(w) \wedge W \neq \emptyset \wedge \forall w' \in W\exists e\exists t'[r(e,w') \wedge t' \prec \text{tomorrow} \tau(e,w') \subseteq t']]$ *Paraphrase* : Given a world w, there is a nonempty subset of $f_{plan}(w)$, and for all worlds w of this subset there is a r event that is localized at t', which precedes 'tomorrow.'

The latter interpretation leaves open the possibility that the event takes place at the time of the utterance. The only requirement is that the event will have taken place before the time of assessment.

7 Comparison with previous modal accounts

The modal account we propose here differs radically from previous ones, especially those based on the priorian notion of settledness. The foundational claim that the future is a modal goes back to Prior (1957), who claims that the future expresses settledness. A future sentence $F(p)$ is true at a certain time t if and only if p turns out to be true at some time $t_1 > t$ in all courses of events compatible with the state of the world at t, i.e. no matter what the future at t is like (*ie* settledness can be considered as a universal quantification over the set of all possible futures, assuming the present state of the world). For 'John will drive the car', uttered in $\langle w, t \rangle$, turns out to be true at 8 am, if and only if John drives a car in all possible continuations of the actual world, from 8 am on.

This account has inspired the recent theory of Bonomi and Del Prete (2008) for the Italian future. Bonomi and del Prete (2008) argue that in Italian, the future can have a 'wait and see interpretation' (54-b) and a 'modalist interpretation' (54-a).

(54)   a.   Secondo la tabella, il treno partirà alle 6 del pomeriggio ('modalist')
            According to the timetable, the train will leave at 6 pm
        b.   Il dado cadrà sul 6 ('wait and see')
            The die will come up 6

The authors argue that the notion of settledness must be relativized to the *context of use*, and to a limited set of assumptions that are relevant to the evaluation of the sentence. According to the authors, the 'wait and see' interpretation 'focuses on the unique state of the world that happens to be actualized. From this point of view, settledness only obtains at the crucial time at which the relevant event occurs'. For (54-b), there is no way to predict what the future will be like and all the branches are not alike.

Under the 'modalist' interpretation, instead, 'we stick to the current assumptions, and check whether the truth or falsehood of the statement at issue is already settled with respect to them' (e.g. for (54-a) there is no need to wait until the train leaves). In (54-a), evidence is available for setting the issue once and for all. One can predict at t_u what the future will be like and all the possible futures are alike. The analysis has nothing to say about the fact that the train might not leave on time.

It seems to us that the distinction is not correctly characterized. Like (54-b), (54-a) cannot be evaluated as true or false until the moment when the train leaves. Compared to (54-b), the prediction is based on 'objective' evidence, but the issue is also not settled until the train departure time. Moreover, (54-b) can only be truthfully uttered by someone (like a magician) who has evidence or reasons to believe that the die will come up six. In the absence of such evidence or reasons, the interpretation is performative. Under a non-performative use, the difference between (54-a) and (54-b) is not between two uses of the future. They only appeal to two different sources of information.

Our analysis accounts for the data in a very different manner from previous studies. While the contrast with previous approaches should be clear insofar as what we have called the 'modal' interpretation is concerned (for which we have given a truly epistemic account), we need to emphasize what the peculiarity of our account

is when it comes to plans.

In our view, when plans are at stake, the sentence asserts that in all worlds compatible with the plan made in w, the event will occur. It is not guaranteed that it will occur in the actual world.

On this view, the two sentences which were considered to reveal what Bonomi and Del Prete (2008) referred to as the 'modalist' and the 'wait and see' interpretations are both considered here to reveal what we have called 'temporal' uses since both rest on 'plans'. In (54-a), the train will leave at 4 pm according to the schedule. The timetable functions as a plan, but nothing guarantees that the train will leave at 4 pm in a realistic modal base. Similarly, we have noted that **??** can be truthfully and legitimately uttered by a magician. In this case, a plan is being called upon relative to the knowledge of the magician.

8   Conclusion

Our analysis treats the future as an evidential and follows a classic modal framework. In all cases, the proposition expressed by a future sentence follows from premises that are available in the context of utterance. In this respect, indirect evidence is provided, and the future is treated as an evidential.

We have studied the types of knowledge the future is sensitive to and which determine the time of assessment. We have argued along the lines of McFarlane (2006) that this time has to be considered in the analysis of evidentiality and epistemic modality, along with the temporal perspective, the time of the event and the time of the evidence. The typology we have established distinguishes between indexical and non-indexical uses of knowledge. For indexical uses of knowledge, our typology has distinguished between subjective and objective knowledge. Epistemic uncertainty can derive from indexing the modal base to a judge (it then contains the worlds compatible with what the judge knows) or from indexing the ordering source to a judge (considering that epistemic uncertainty reveals the judgeÕs appreciation of a likelihood of an event, given a certain state of affairs). We have argued that non-indexical uses of knowledge include plans. The use of a plan does not guarantee that the event will occur in the actual world and thus a plan remains within the realm of epistemic modal bases.

Determining which evidential category (e.g., conditional, future, and modal) is sensitive to which type of knowledge is still an open question to which the present paper has tried to provide a partial answer, at least for the Italian future.

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