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NON-PERSISTENT TRUTHS

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Abstract. I start from Evans' criticism of temporalism, based on the claim that it does not 'provide for the stable evaluation of utterances'. So, I try to show that, with suitable qualifications, assuming the possibility of evaluations yielding different truth values at different times is not an "eccentric" move (as suggested by Evans).

I briefly consider Prior's metaphysical arguments in favour of the asymmetry between past and future and I suggest that, *independently* of these arguments, there are *linguistic* reasons in support of such an assumption. In particular, there are some *future oriented* statements which (unlike past oriented statements) are conceived of by speakers as intrinsically *revisable* and which require a non-monotonic characterization of the changing backgrounds of information selected by the time flow. As shown by some peculiar uses of phase adverbs like 'still' and 'no longer', variability in terms of truth-value assignation is a distinctive feature of this kind of statement.

But another kind of variability of truth value assignation is detectable in the case of present or past oriented statements: in general, by refining the notion of context, it is possible to individuate different types of propositional contents, *depending on which contextual parameters are abstracted over* in order to account for different needs in communicative exchanges. Thus, in the final section of the paper, a more articulated notion of context allows for a richer (preliminary) description of the propositional contents that can be associated to utterances by abstracting over the relevant parameters.

1. An eccentric proposal?

In his criticism of Prior's tense logic, Evans (1985: 347) defines radical temporalism as a semantic theory according to which 'the evaluation of particular utterances must change as the world changes'. More exactly, he associates this form of temporalism with the following characterization:

(RT) $\forall S \forall u \forall t [\text{Of}(S, u) \rightarrow [\text{Correct-at-}t(u) \leftrightarrow \text{TRUE}_t(S)]]$

where S is a variable for sentences, u for utterances and t for times. According to Evans, the problem, with such a characterization, is that it does not 'provide for the stable evaluation of utterances as correct or incorrect': while all the utterances of S express the *same* proposition, the evaluation of an utterance as such is not fixed once and for all, because the proposition it expresses can have *different* truth-values at different times.

This kind of temporalism 'is such a *strange position* that it is difficult to believe that anyone has ever held it.' Indeed, according to Evans' reconstruction, what is not acceptable in (RT) is the fact that the evaluation of an utterance as correct or incorrect does not depend upon when the utterance is made, but may depend upon the evaluation time t , *whatever* t may be. This independence of the evaluation time with respect to the circumstance in which the utterance occurs would be the original sin of temporalism, because for the advocates of tense logic 'to know what assertion is being made by an utterance all you need to know is *which* tensed sentence was uttered; you do not need further information to tie the tensed sentence down to a particular time [...]. It would follow that that such an "assertion" would not admit of a *stable* evaluation as correct or incorrect.' (Evans, 1985: 349)

In this passage, Evans endorses a stability principle which can be generically expressed as follows:

- (SP) Let u be an utterance of a sentence¹ S and t_u the utterance time.
 u must be evaluated as correct or incorrect at t_u .
 If u is evaluated as correct (incorrect) at t_u , then u must be evaluated as correct (incorrect) at any moment $t \geq t_u$.

In what follows, I will try to show that, with suitable qualifications, there are linguistic data showing that the stability principle (SP) is not always applicable and that a flexible notion of propositional content can help to account for the cases in which it fails.

2. Stability forever ...

One way to get rid of the original sin described by Evans and to preserve the spirit (if not the letter) of the stability principle without resorting to eternal propositions is to assume that the "correctness" of an utterance u , in Evans's sense, depends on the truth-value that its content receives with respect to a *privileged* time of evaluation. And since any utterance u takes place at the utterance time t_u , the natural solution is to say that t_u itself is the time span to which the evaluation of u as correct or incorrect must be anchored *once and for all*. Such a strategy would allow us to preserve the idea that a proposition (the content expressed by an utterance in the given context) can have different truth-values at different times, while the reference to a privileged time (t_u itself), *and to the world in which u occurs*, ensures stability in evaluating an utterance as correct or incorrect (or simply true or false²). As a matter of fact, in order to evaluate an utterance u , at t_u , of Geach's example (discussed by Prior and Evans)

- (1) Socrates is sitting

what you have to do is simply to check whether the tensed proposition that Socrates is sitting is true at the utterance time t_u and in the utterance world w_u . If he is, the utterance is correct and will remain correct at any time $t > t_u$.

In principle, nothing changes if we consider utterances of sentences such as

- (2) Socrates was sitting
 or
 (3) Socrates will be sitting.

As before, the correctness of these utterances must be evaluated with respect to t_u itself. The only difference is that *other* times, besides t_u , are involved: a time earlier than t_u , in the case of (2), and a time later than t_u , in the case of (3). So, an utterance of (2) is correct if Socrates is sitting at some time earlier than t_u , while an utterance of (3) is correct if Socrates is sitting at some time later than t_u . Far from being a problem, the fact that propositions have different truth-values at different times allows for a non "eccentric" way to deal with time and tense. This is possible because on such an approach the correctness of an utterance is evaluated, once and for all, with respect to the utterance time itself. Thanks to this anchoring effect, the utterance seems to admit of a *stable* evaluation as correct or incorrect, because, independently of the time flow, the evaluation time for the utterance remains fixed at the utterance time itself. Truth (or correctness), for an utterance, coincides with *truth in context*: this is the way in which "eccentricity" is avoided in Kaplan's semantics for tensed sentences.

Assuming for the sake of simplicity that the context c , for an utterance u , is represented by the time and the world at which u takes place (that is, $c = \langle t_u, w_u \rangle$) the definition of correctness (or simply truth) for an utterance u of a sentence S can now be expressed as follows (where $[S]^c$ is the

¹ The implicit assumption, here, is that S is no *deviant* sentence, in any plausible sense of the term.

² See footnote 25 for a justification of this way of speaking.

proposition or intension expressed by S in context c, i.e. a function from pairs of times and worlds to truth-values):

$$(MT) \quad \forall S \forall u [Of(S, u) \rightarrow [Correct(u) \leftrightarrow \llbracket S \rrbracket^c(\langle t_u, w_u \rangle) = 1]].$$

On this analysis, the evaluation of a given utterance in context c as correct or incorrect does *not* change in function of the time flow, even though the proposition it expresses in context c may have different truth-values at different times. Stability is ensured since such an evaluation is anchored once and for all to the utterance time itself³.

The rest of the paper is organized as follows. I will briefly consider Prior's metaphysical arguments in favour of the asymmetry between past and future. I will then try to show that, *independently* of these arguments, there are *linguistic* reasons in support of such an assumption. Pace Lewis, the existence of open alternatives toward the future, but not toward the past, is not simply motivated by epistemic factors (our ignorance about future events), but is seen by speakers as a characterizing feature of the way temporal determinations are semantically processed. This is why there are future oriented statements which (unlike past oriented statements) are conceived of as *intrinsically revisable* and which require a non-monotonic characterization of the alternative backgrounds of information selected by the time flow. As shown by some peculiar uses of phase adverbs like 'still' and 'no longer', variability in terms of truth-value assignation is a distinctive feature of some typical future oriented statements and justifies the idea of an *evolving* context of utterance which inspires the semantics presented here. Depending on which contextual parameters are abstracted over, *different kinds of propositional contents can be individuated in order to account for the variety of conversational situations in which we refer to what is expressed by an utterance.*

3. The utterance world(s)

It should be noticed that (MT) can work only if w_u contains *all* the necessary information with respect to *whatever* time may be involved by the tense in S. If, for instance, S is a future-tensed sentence like 'It will be the case that ϕ ' we have:

$$(4) \quad \text{'It will be the case that } \phi \text{' is true at } \langle t_u, w_u \rangle \text{ iff there is a time } t \text{ such that } t > t_u \text{ and } \phi \text{ is true at } \langle t, w_u \rangle.$$

The point is that the temporal transition from t_u to t , in (4), has no effect on the choice of the relevant world, for just one single world (that is *the* utterance world w_u), with a single past and a single future, is associated to t_u . To evaluate the statement expressed by the utterance at issue, just look at what happens at some time in *this* world, exactly as you refer to some place in *this* world when a spatial location is involved.

This is exactly what is questioned by indeterminists like Prior. If the future, unlike the past, is open, evaluating an utterance of a future-tensed sentence at t_u involves a plurality of worlds or courses of events: those worlds that are all alike with respect to past and present events, while differing from

³ Actually, this kind of solution à la Kaplan in order to preserve the Stability Principle is not accepted by Evans. As pointed out by Kölbel (2009), 'Evans believes that the semantic values assigned by a semantic theory to sentences in context should *immediately* and *as part of the semantic theory* yield evaluations of utterances as correct or incorrect'. In particular, according to Kölbel, Evans rejects the following Kaplanian "bridge principle":

An utterance of a sentence is *true* just if the content (intension) expressed by the sentence in the context of the utterance assigns the value true to the circumstance of evaluation *of* the context.

I will not go deeper into such issues, concerning the adequacy of Kaplan's approach as a way to preserve the Stability Principle, for the main goal of the present paper is to show that, *at least for a particular class of utterances, there is no reason to assume that principle.*

each other with respect to the future (that is the worlds that are *metaphysically*⁴ possible at the utterance time t_u , considering the events occurring at t_u and before t_u).

Prior's idea of the asymmetry between past and future can be illustrated by his reflection on what I called the multiple-choice paradox⁵:

(MCP) Suppose A and B are being pushed towards the edge of a cliff, and there will be no stopping this process until there is only room for one of them. Then we may be able to say truly that it will definitely be the case that A or B will fall over, even though we cannot say truly that A will definitely fall or that B will definitely fall over. (Prior, 1957: 85.)

Independently of the plausibility of this kind of example (a point on which I will return when discussing the role of the background of information in evaluating future oriented statements), it is instructive to follow Prior's argument.

The problem, here, concerns *contingent* future events (such as being pushed towards the edge of a cliff and falling over), and Prior suggests to consider the *present* state of affairs as an appropriate criterion to distinguish, among the future-oriented statements, those that are *definitely* true (at the utterance time) from those that are not. As we have just seen, in his example this point is illustrated by the statement:

(5) A or B will fall over

which, according to Prior, turns out to be definitely true in the circumstances described above, whilst *neither*

(7a) A will fall over

nor

(7b) B will fall over

is definitely true in those circumstances. (This is the apparent paradox.)

In other words, in the above passage Prior's assumption is that the evaluation of future-oriented statements as definitely true or false depends on *present* facts or circumstances⁶. A statement like 'It will be the case that ϕ ' is true, at time t , if the truth, in the future, of ϕ is already *settled* at t .

One way to flesh out this notion of settledness is proposed in Thomason (1970): a proposition ϕ is settled, at time t , if ϕ is true in *every* course of events which is metaphysically (or historically, as he says) possible at t . Thus, in particular, 'It will be the case that ϕ ' is settled at t if in each of those course of events there is a time $t' > t$ such that ϕ is true at t' . Let us call *settledness* condition such a requirement.

It is also clear, from Prior's example, that settledness is a property of statements that *depends on time* in this sense: what is not settled at time t can *become* settled at a later time t' in view of new facts. (In the original example: at the beginning of the process, that A or B will fall over is not settled, but it *becomes* settled at some point in the process.) This point is made explicit, in connection with the so-called Peircean approach, in Prior (1967: 129): "Will" here means "will definitely": "It will be that p " is not true *until* it is in some sense settled that it will be the case, and

⁴ In the sense of Condoravdi, 2001.

⁵ I use this term because Prior's example is a future-tensed version of the "multiple-choice paradox" discussed in Bonomi (1997: 181-184) with respect to the progressive. Unfortunately, at that time I was convinced that this kind of argument should not apply to the future tense since I was not considering its modal import.

⁶ In Øhrstrøm and Hasle (1995: 265) Prior's point of view is associated to the following principle (where 'F' is a "metric" future operator):

(P) The proposition $F(n)p$ is true now if and only if there exist now facts which make it true (i. e. which will make it true in due course).

“It will be that not p ” is not true *until* it is in some sense settled that not- p will be the case.’ (Italics mine.).

The problem, at this point, is to know what makes the truth of a proposition *settled*.

We have just seen that, on Prior's analysis, settledness rests on a *metaphysical* basis. Due to indeterminism, any moment t is associated to a multiplicity of future courses of events that are compatible with the events occurring at t or before t : settledness, for a proposition p , at a given moment t , means truth at all historical alternatives. The idea is that the future occurrence of the relevant event is, as he says, *unpreventable* at t .

One might challenge, of course, the plausibility of this analysis with respect to the semantics of future-tensed statements in natural language, for the obvious question is: what makes a future event now-unpreventable when we speak, for example, of planned⁷ events like a conference, a travel, an appointment or, simply, my next breakfast? If settledness is defined in terms of the metaphysical notion of "being unpreventable" in Prior's sense, then it can hardly represent a plausible necessary condition for the truth of future-oriented assertions, at least in a speaker's intuitions. What is missing here is the role that a background of information plays in determining what is settled at a given time.

Thus, after discussing some linguistic data, in the next sections a more flexible notion of settledness will be adopted in order to account for the role of the background of information in fixing the appropriate truth-conditions.

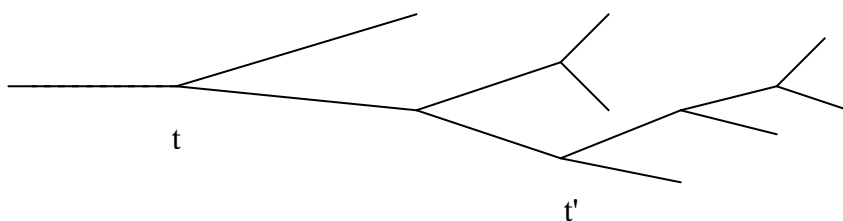
4. Monotonicity

As we have just seen, on Prior's analysis settledness depends on time, for the truth of a statement may be unsettled at time t , but settled at a time $t' > t$. The reverse is not possible, of course: the truth of a statement cannot be settled at t but unsettled at t' , if $t' > t$.

In Thomason's formalization, such an approach is still conservative enough to meet the following requirement of stability: *if* the statement expressed by an utterance of sentence S is settled as true (false) at any time t , then it is settled as true (false) at every time $t' > t$. Let us see why.

As shown in fig. 1, in the branching time (BT) framework associated to this analysis of tensed statements the past moments, but *not* the future ones, are linearly ordered: given any moment t , there is only one course of events stemming from t towards the past, whilst there is a plurality of courses of events stemming from u towards the future.

Fig. 1



This is so because when you proceed from t toward the future, i. e. when you pass from t to a moment $t' > t$, new information gets available: which means that the metaphysical alternatives decrease (the "branches" stemming from t' are fewer than those stemming from t). In other terms, a BT model à la Thomason is monotonic in this sense:

$$(Mon) t < t' \rightarrow H_{t'} \subset H_t$$

⁷ Such situations are extensively analyzed in Copley (2009).

where, for any moment x , H_x is the set of courses of events passing through x , that is the set of courses of events that are "metaphysically" possible at x .

An immediate consequence of (Mon) is that in such a framework stability of evaluation is respected in the following (weak) sense:

- (WSP) (i) An utterance of a sentence S may fail to be evaluated as correct or incorrect (or simply true or false, as specified above) at the utterance time t_u or later.
(ii) But once it has been evaluated as correct (incorrect) at a given moment t , it must be evaluated as correct (incorrect) at any moment $t' > t$.

This characteristic is inherited by the semantic system adopted in MacFarlane (2003, 2008), where the only possible transition is from neither true nor false to true (or false), but not from true to false or from false to true. (Actually, as far as I can judge, this kind of semantics is not designed to provide a unified treatment of the multiple interpretations that the future tense has in a natural language like English. The epistemic reading is just an example.) As in Thomason's approach, settledness, for future-oriented statements, is defined in terms of what happens in all the historical alternatives that are live options at the time of evaluation (or assessment). Once more, thanks to the monotonicity of the model, stability of evaluation is not questioned (starting from the moment at which an evaluation is possible).

5. Non-persistent truths: what we know about the future

Let us pause for a while.

We have seen that, *under the assumption of the stability of evaluation*, Evans' criticism raises a problem for temporalism, according to which the content expressed by an utterance is a tensed proposition, in the sense that it is temporally neutral. We have also seen that a possible way out is to anchor the evaluation of this propositional content to a particular world (with a single past and a single future) and a particular time: the world and the time at which that utterance occurs. But such a solution, based on Kaplan's characterization of *truth in context*, is hardly compatible with indeterminism, i. e. a metaphysical orientation which has often represented one of the main theoretical motivations for temporalism and which associates an utterance event with a plurality of worlds (as far as the future is concerned). So, a natural alternative, at this point, is to accept the stability principle in a revised form (as stated in (WSP)), which is compatible with the fact that the evaluation of an utterance may be unsettled *until* the relevant conditions are fulfilled. Starting from this point, thanks to monotonicity, the evaluation of that utterance as correct or incorrect is stable, as desired.

This solution (which in Thomason's formalization is essentially based on a supervaluational approach) is an attractive way to cope with the issues raised by the adoption of an indeterminist point of view and to preserve (a revised formulation of) the stability principle, that is (WSP). Yet, *independently of our attitude toward indeterminism*, there is a preliminary question which should be addressed if we are concerned with the semantics of the temporal markers in natural languages (of the future tense, in particular).

Are we justified in assuming that the evaluation of an utterance is stable (even in the weak sense stated in (WSP))? Does such an assumption conform to the intuitions (if any) of the speakers?

As a first step, consider the following example, inspired by a true story.

Sandro (a good friend of mine) asks me whether it is *true* that I will leave tomorrow morning with the 6.45 train. My answer is that it is *true* (After all, I've already bought the ticket, made a reservation, packed my stuff, and so on.) So, since he *knows* that I'm leaving with the 6.45 train, and since he is a generous man, Sandro promises to take me to the station.

Unfortunately, when he sets the alarm-clock, he makes a mistake.

Conclusion: I miss the train.

My comment is:

- (8) You *knew* that I would leave with the 6.45 train.
(You had to be more careful...)

The problem, in this case, is that, intuitively speaking, (8) is true at time t if there is a time t' such that $t' > t$ and the following statement is true at t' :

- (9) Sandro knows that I will leave with the 6.45 train.

On the other hand, it is an uncontroversial assumption that 'know' is a factive verb which entails the truth of the propositional complement. So, what Sandro knows at t' cannot be *false*... But how is this possible, considering the fact that I did not leave with the 6.45 train?

To answer this question, take the following sequence of sentences:

- (10) Leo knew that Lea would leave with the night train.
(11) So, he ran to the station and convinced her to leave with the morning train.
(12) Theo knows that Lea didn't leave with the night train.

The subordinate sentence in (10) is a further illustration of the future in the past (which in languages like French or Italian can be expressed by an imperfective form or by a past conditional⁸). As before, a necessary condition for the correctness (or simple truth) of an utterance of (10) is that there is a moment t such that t is earlier than the utterance time and it is true at t that Leo knows that Lea will leave with the night train. (Assume, for instance, that she has already bought the ticket for this train, that she is on the right platform, etc.) Once more, this seems to be a very natural use of the verb 'know' and, under the assumption that 'know' is a factive verb, we must conclude that, if at time t Leo utters the sentence

- (13) Lea will leave with the night train

the statement made by this utterance must be evaluated as true, *at t itself*.

On the other hand, because of the factivity of 'know', (12) entails that Lea did not leave with the night train: which seems to be in contrast with the correctness of Leo's utterance of (13). So, intuitively speaking, the same utterance must be evaluated as correct (to use Evans' terminology) at the utterance time t , but incorrect at the present moment: which is incompatible with the stability principle for utterances (even in its weaker version, based on monotonicity).

A possible objection to this kind of argument is that we cannot truthfully say that Leo knows, at t , that Lea will leave with the night train if Lea does not really leave with that train. For the same reason, the statement made by an utterance of (13), occurring at t , cannot be evaluated as true, at t itself, if the relevant event does not take place at the intended time. Thus, according to this objection, (9) and (10) instantiate an improper use of the verb 'to know', and the argument at issue should be rejected, while the stability principle can be preserved.

⁸ A similar example, taken from a French magazine, is the following:

(K) DSK savait qu'il quittait les Etats Unis [DSK knew that he would quit the United States].

In this case, the future in the past is expressed by an imperfective form ('quittait'). Once more, the problem is the apparent contrast between the truth of (K) (which is genuinely asserted by the speaker) and the fact that the speaker herself is perfectly aware that Strauss-Kahn did *not* quit the United States, for he was arrested before leaving.

The natural answer to this objection is that it does *not* mirror the real behaviour of the speakers (and the corresponding intuitions) and the way future tensed sentences are used and evaluated (as true or false) in the appropriate circumstances⁹.

As a further illustration of this point, imagine the following scenario.

- (i) On June 27 the Republican National Convention nominates Sarah Palin the official candidate for the 2012 Presidential Election.
- (ii) On July 27 Sarah Palin is forced to give up because of her last hunting fiasco (she shot 285 times at a wandering caribou and missed).
- (iii) On October 27, at the end of a new Republican Convention, Michael Moore is nominated the official candidate (and wins the Presidential Election).

Now consider the following sentences:

(14a) The person who will run for President in the 2012 Election is a woman (uttered on June 28)

(14b) The person who will run for President in the 2012 Election is *no longer* a woman (uttered on October 28).

From an intuitive point of view, (14a) would be judged as simply *true*, at the utterance moment *u*, by any competent speaker. This is so because, at *u*, the definite description 'the person who will run for President' refers to Sarah Palin, not to Michael Moore. The obvious idea is that in such cases truth and reference do not depend upon the way the world will *actually* be, but upon the current (appropriate) information, for instance, about the relevant nominations.

The point is that this kind of information can change over time: this is why an utterance of (14b) does not mean, of course, that the candidate has changed sex (as predicted by the usual interpretation of 'no longer'), but that something that was true in the past is no longer true at the utterance moment.

As for definite descriptions in particular, there is a clear asymmetry between past and future, for the reference of a future-oriented definite description can change over time, as shown by the fact that by uttering (14a) on June 28 we would make a true statement, whilst by uttering it on October 28 we would make a false one. On the contrary, the only natural interpretation of a statement like (14c) is that this statement entails a change of sex, not a change of truth value:

(14c) The person who ran for President in the 2008 Election is *no longer* a woman.

This contrast between past and future as concerns definite descriptions can be expressed by the following generalizations¹⁰.

(RefVar) It may happen that the referent of a future-oriented definite description (like 'The person who will run for President in the 2012 Election') turns out to be the individual *x* at a given time *t* and the individual *y* ($y \neq x$) at a time $t' > t$.

⁹ If Theo asks me :

Is it *true* that Lea will leave with the train night?

and I reply:

Ask Leo, he knows the truth

what I mean is not that he has improbable divinatory capacities and that he can read into the future, but, more plausibly, that he is provided with the right information about a planned course of events.

¹⁰ The obvious assumption, here, is that the referent of the definite description does not depend on the presence of indexical expressions, for in such cases a past oriented definite description can have different referents at different times. (Think of a definite description like 'The person who bought me a drink yesterday night' which can designate individual *a* at moment *m* and individual *b* at moment *m'*.)

Crucially, the contrast between (14b) and (14c) concerns definite descriptions whose referents are fixed by dates.

(RefStab) If, at moment t , x is the referent of a past-oriented definite description (like 'The person who ran for President in the 2008 Election'), then x is the referent of that description at any moment t' such that $t' > t$.

Notice that, *independently* of our philosophical assumptions about indeterminism, this contrast between an open future and a closed past as concerns truth and reference seems to mirror the way the future is conceptualized by the speakers when they use a sentence like (13) or (14a). It is the reference to a background of information about plans, motivated intentions, programs, etc., that explains why an utterance of (13) made at moment t can be evaluated as correct (true) at t itself, whilst it can be evaluated as incorrect (false) at $t' > t$, in view of new available information. Since the future, unlike the past, is (seen as) open, what is settled as true at t may not be settled as true at a time t' later than t , as shown by the fact that a sequence like (10)-(12) makes perfectly sense.

6. The future in the past

A crucial assumption, in the above argument, is that a statement like (10) - which illustrates the so-called future in the past - is characterized by two important features: (i) the past tense takes us back to a past a moment t (that is $t > u$, where u is the utterance time); (ii) the relevant set of alternative futures is determined against a background of information *which holds at t itself*, not at the utterance time u . That is why, in the given scenario, statements like (10) and (12) are perfectly consistent.

This backward shift of the point of view involved by the future-in-the-past phenomenon is independently observed in other situations.

As an illustration, consider the following Italian sentences (uttered at a given moment u):

- (15) Leo potrebbe (present conditional) partire domani mattina o domani sera (visto che ha fatto entrambe le prenotazioni). [Leo might leave tomorrow morning or tomorrow night (since he made both reservations).]
- (16) Ma partirà domani sera. (Così incontrerà Lea a pranzo.) [But he will leave tomorrow night. (So he will meet Lea at lunch.)]

According to a natural interpretation of (15), what the speaker means in this context is that, at the utterance time, there are aspects of reality, i. e. facts, which in principle make two alternative events possible. Thus, making a prediction on *contingent* issues (as in (16)) - a prediction based for instance on a given planning, a program, a reliable intention etc. - is perfectly consistent with the awareness that a different course of events (with respect to that prediction) cannot be ruled out, as stated in (15). To put it in a slightly different way, the speaker seems to refer here to two distinct criteria to determine the intended universe of possibilities: (i) in (15) what is relevant is the universe of possible courses of events that are compatible with the way the world is at the present moment (the *metaphysical* possibilities, in the terminology adopted here, which are still open); (ii) in (16) this universe is restricted to the courses of events that are compatible with some extra assumptions about a planned course of events (so that only a part of those metaphysical alternatives are preserved).

Notice that the existence of the alternative options referred to by uttering (15) is seen by the speaker as *independent* of her epistemic preferences, according to which (witness (16)) only one option is to be selected.

But take these other sentences (uttered at u):

- (17) Leo potrebbe (present conditional) essere partito ieri mattina o ieri sera [Leo might have left yesterday morning or yesterday night.]

(18) ??? Ma è partito ieri sera. (Così ha incontrato Lea a pranzo.) [But he left yesterday night (So he met Lea at lunch.)]

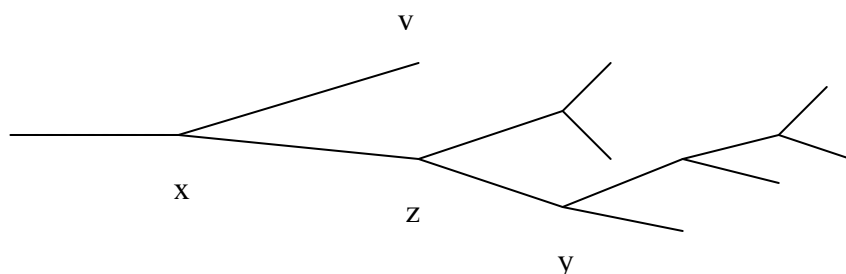
Why does this sequence sound odd in Italian¹¹?

Assuming an asymmetry between past and future in the way temporal information is encoded by the speakers, here is a possible explanation of the contrast between the acceptability of (15)-(16) and the absurdity of (17)-(18).

Given the present tense of the modal in (17), the reference time coincides with the utterance moment *u*. Under the hypothesis that, according to the speaker's intuition, what happened in the past (*unlike what will happen in the future*) is a *settled* issue, only one of the two alternatives mentioned in (17) is compatible with the current state of the world: in terms of metaphysical possibilities (Condoravdi, 2001), only one option is open. Thus, the only plausible reading of the modal in (17) is the *epistemic* one: whether Leo left yesterday morning or yesterday night is a settled issue at the present moment, but I am unable to say what really happened. This is why, for all I know, *two* options are open. The problem is that this epistemic reading of (17) is not compatible with the statement made by (18), which presents one of the two options as definitely true. Hence the absurdity of the sequence.

To see this, consider fig. 2. Suppose that the utterance time is located at *y* and that *z* represents a state of the world in which Leo leaves in the evening, whilst *v* represents the alternative state of the world, in which Leo leaves in the morning. The past, unlike the future, is represented by a *single* path starting from *y* and this path includes only one of these alternatives, that is *z*. In other terms, *v* is no longer available as a "metaphysical" option from a perspective point located at *y* and can only be considered as an epistemic option. And since the epistemic reading of the modal in (17) is inconsistent with statement (18), there is no plausible interpretation of the sequence.

Fig. 2



Notice that, if in (17) the present tense of the modal verb is replaced by the past tense, the resulting combination is perfectly acceptable:

¹¹ Interestingly enough, the English sentence 'Leo might have left yesterday morning or yesterday night', which is the natural translation of (17), is perfectly acceptable in this context, where it is followed by the sentence 'But he left yesterday night'. This is so, because 'might' is compatible with a backward shifting of the perspective point from which *future* possibilities are considered. (See, on this point, Mondadori, 1978 and Condoravdi, 2001: in particular, her analysis of the ambiguity of a statement like 'He might have won the game'.) Thus two metaphysical possibilities can be presented as live options.

But in Italian the *present* tense of 'potere' rules out such a shifting, since the perspective point can only be located at the utterance time. The only possible interpretation of 'potrebbe', in a sentence like (17), is the epistemic reading, but this reading is not compatible with (18), as shown in the text. That is why (17)-(18) sounds odd in Italian. (Indeed, such a sequence can be used to illustrate a sort of Moore's paradox: admitting that, as far as I know, I cannot rule out the hypothesis that Leo left yesterday night, is not consistent with the assertion that he left yesterday morning.)

- (19) Leo avrebbe potuto (past conditional) partire ieri mattina o ieri sera. [Leo might have left yesterday morning or yesterday night.]
- (20) Ma è partito ieri sera.
[But he left yesterday night.]

In this case, thanks to the *time shift* determined by the past tense of the modal verb, the perspective point is located at a moment which is in the past of the utterance time y , namely x , and at that time it *was* still possible that Leo would leave in the morning, even if such a possibility has not been actualized in the end. More exactly, in this case v , as a live metaphysical¹² option, is “accessible” from x , the time made relevant once the perspective point has been shifted: as a consequence the modal in (19) is not forced to express an epistemic possibility (which would be incompatible with (20)), and the oddity disappears.

Conclusion: from a perspective point located at the utterance time u , open alternatives (“metaphysical” possibilities, to use Condoravdi’s terminology) are available in the case of the future (as shown by the acceptability of (15)-(16)), but not in the case of the past (as shown by the oddness of (17)-(18)). In this case only epistemic alternatives are admitted. In order to make metaphysical possibilities available for the past, the perspective point is to be shifted to some moment in the past, so that the *future* of that moment is involved (witness the acceptability of (19)-(20)). Thus, if *the speaker’s intuitions* are taken into account, there seems to be a difference between the kinds of possibilities which can be associated, respectively, to the future and to the past: a plurality of metaphysical possibilities are admitted in the former case, but just a single metaphysical possibility is admitted in the latter case. As shown by (19)-(20), assuming a plurality of future alternatives, with respect to a given point in time, *is independent of an alleged state of ignorance*: after all (witness (20)), the speaker is provided with the right information about the actual course of events ...

This idea of a branching future and a linear past is a kind of asymmetry which does not depend on philosophical assumptions about indeterminism (so that we can stay neutral on this point), but seems to rest on a distinction underlying the semantic processing of tensed statements, whatever we may conjecture about the nature of time.

As for the issue raised by Evans, since the open alternatives that are *contextually* relevant to evaluating future oriented statements are sensitive to the time flow, the evaluation of a future oriented statement can change as the world (with the associated expectations) changes, as we will see in the next section.

7. No longer true ...

According to the program of the tomorrow concert, Bill Evans will play in a duo with Jim Hall. Leo, who has heard some vague rumours, asks:

- (21) What about the tomorrow concert? Is it *true* that Bill Evans is playing with Jim Hall?

Since Lea is well informed, she promptly answers:

- (22)
- (a) Yes, it is *true*.
- (b) Tomorrow Bill Evans is playing with Jim Hall.

¹² According to Abusch (forthcoming), in such cases we should speak of “circumstantial” possibilities (in Kratzer’s sense) and not of “metaphysical” possibilities. I leave this issue open for what I want to stress here is the need for a *backward shift* of the perspective point, independently of the nature of the possibilities associated to it.

As we have already seen, there is no doubt that such an answer testifies a quite intuitive use of the predicate 'true' as applied to future-oriented statements and that it would be unnatural to object that, if the event at issue does not take place in the end, such a predicate is misplaced here. Once more, using this predicate in relation with a background of *current* information concerning a *planned* sequence of events (in the sense analyzed in Copley, 2009) is a fact that seems to mirror the speaker's intuitions, *independently* of philosophical speculations about the future and the debate on indeterminism.

Indeed, suppose that tomorrow, before the concert, the program is modified because of some unexpected events. According to the new program, Bill Evans will play with his trio. So, at this point Leo (who has been informed by the organizers of the concert) can call Lea before the concert and say¹³:

(23) Bill Evans is *no longer* playing with Jim Hall.

This is a very peculiar use of the phase adverb 'no longer'.

In a different, and more familiar, kind of context an utterance of (23) would presuppose the existence of a *past* time at which an *event*¹⁴ of Bill Evans' playing with Jim Hall was going on, and would assert that such an event is not going on at the present time.

But, since *no past event* of Bill Evan's playing with Jim Hall is involved in the scenario described above, what does Lea's utterance of (23) presuppose here? And what does it assert?

Roughly speaking, the idea is that this utterance of (23) presupposes that a *planning* about a certain kind of event was in force at some point in the past, whilst it asserts that such a planning is not in force at the utterance time.

The point is that there is an interesting relationship between (22b) and (23). Indeed, (23) can be analyzed as follows:

(i) *presupposition* (triggered by 'no longer'):

the proposition expressed by Lea's utterance of (22b) [i.e. the proposition that Bill Evans will play with Jim Hall tomorrow night] *was true until* some moment in the past; it was true, in particular, at the moment of Lea's utterance (in the light of the original program);

(ii) *assertion*: this proposition is *not* true at the present moment (considering the new program).

Intuitively, the reason why the statement made by Lea's utterance of (22b) is true at the utterance moment u but false at a moment $t > u$ (witness the truth of (23)) is that these two moments are associated to two different backgrounds of information (based, respectively, on the original program and the modified program). In other words, the adverb 'no longer' signals a change of the truth value which is to be assigned to the statement made by the utterance at issue, *depending on the moment* at which this statement is evaluated. The idea is that what is asserted by an utterance of a given sentence can be evaluated not only at the utterance moment itself, but at different moments, in function of the time flow. And since a transition from truth to falsehood (and vice versa) is always possible in the case of future oriented statements, there is no reason to stick to the stability principle (not only in its stronger version, but also in the weaker one, according to which the only admissible transition is from neither-true-nor-false to a definite truth-value).

As a matter of fact, the content expressed by an utterance of (23) might also be expressed by an utterance of:

(23') It is no longer true that Bill Evans will play with Jim Hall

¹³ As I recall below, this kind of example is discussed in Dummett (2004). See Del Prete (2010) for a similar discussion about examples suggested by B. de Cornulier and O. Percus (p. c.).

¹⁴ Or series of events, on the habitual reading.

where it is evident that what we are evaluating *now* is the statement made by uttering (22b) at some past moment. So a non-trivial consequence of this short excursus through the no-longer clauses is that the statement we make by uttering a sentence like (22b) in a given context is susceptible of evaluation not only in that context, but in a plurality of *changing* contexts. and that, as concerns *future-oriented* statements, there are clear cases of *variable* truth-values:

(TruthVar) It may happen that the statement made, in an appropriate context¹⁵, by uttering a future-tensed sentence turns out to be true (false) at a given time t , but no longer true (false) at a time $t' > t$.

This is what happens with statement (22b), witness (23) (or (23')).

Significantly, nothing similar happens with past-tensed sentences, as stated by the following principle:

(TruthStab) It cannot happen that the statement made, in an appropriate context, by uttering a past-tensed sentence turns out to be *true* at a given time t , but *no longer* true at a later time $t' > t$.

As an illustration, consider a statement about the last week's concert like:

(24) ? Bill Evans did no longer play with Jim Hall.

As you recall, the natural interpretation of the future oriented statement (23) is that it was true, at a past time t , that Bill Evans will play tomorrow with Jim Hall, and that this is no longer true at the present moment. But what about (24)? Of course, there is no possible interpretation of this past-oriented statement according to which, in analogy with the above interpretation of (23), it was true, yesterday, that in the last week's concert Evans played with Jim Hall, and that this is no longer true at the present moment¹⁶. And this seems to be an important asymmetry between past oriented statements and future oriented statements.

8. ... still true

The moral we can draw from the examples we have just discussed is that the stability principle makes sense for statements about the past, but not for statements about the future. As remarked by Dummett in *Truth and the Past*, this conclusion about future-tensed sentences *does not depend on philosophical premises*, but is motivated by observation: 'Independently of metaphysics, we incontrovertibly have a use of future-tense statements under which they are rendered true or false by how things stand in the present. This is exemplified by [...] a statement "They were going to be married, but they are not going to *any longer*".' (2004, italics mine.)

The existence of situations in which the evaluation of a future oriented statement depends on "how things stand in the present" and, as a consequence, yields different results at different times, can explain some typical uses of *still*-phrases, which are so to speak "symmetrical" with respect to *no-longer*-phrases, as shown by the following example:

¹⁵ The assumption, here, is that there are no gaps in the information which is contextually required and that all the contextual coordinates have been fixed. For example, in the case of (23), or (23'), it must be clear from the context that we are speaking of the tomorrow concert. This point will be made clear in sect. 12.

¹⁶ Dummett (2004) discusses the absurd content expressed by uttering the sentence 'She then married Edward in 1825 but did not now do so'.

(25)

- A: Bill Evans might play with his usual trio tomorrow night and not with Jim Hall. I've heard that some of the organizers wanted to change the program.
- B: Yes, they discussed about a possible change, but, for practical reasons, the program has never been modified. *So, Bill Evans will still play with Jim Hall.*

In this scenario the statement made by an utterance of a sentence such as

(26) Bill Evans will play with Jim Hall

is true at the utterance moment u and confirmed as true at a further moment $t > u$ in the light of the most recent developments. On the other hand, this kind of confirmation, expressed by (25B), makes sense only if we assume that evaluating the content of an utterance of (26) can yield different results in function of the time flow, depending on the background of information which is made relevant by facts *and* assumptions about planned events.

Intuitively, the semantics which has often been associated with 'still' is the following:

(Still)

- (i) if uttered at time t , 'still P' entails that P is true at t ;
- (ii) presupposes that P was true at some salient time t' before t ;
- (iii) and that P has been true at all the times in between t and t' . (Katz, 2003; Krifka, 2000).

As for (25B) such truth-conditions entail that the statement that Bill Evans will play with Jim Hall is true at the present moment, and presuppose that it has always been true, in the above scenario, even though such a possibility could sound problematic at some point.

More in general, phase adverbs like 'still', 'no longer', etc., in this very peculiar use, can occur in a sentence in order to signal the effects of a change of the background of information on the evaluation of a given propositional content: roughly speaking, one presupposes the existence of a given background X, and one specifies what happens (in terms of validation/invalidation) to that propositional content after a transition to the background Y.

This peculiarity can be intuitively explained as follows: on the familiar interpretation, one concentrates on the effects of a *temporal* transition (i. e. when passing from moment t to moment t') in terms of the continuation/termination of a given *event* or *state*; on the interpretation under discussion one concentrates on a change in the background of information to see its effects on the evaluation of a given statement.

This is a general phenomenon which does not concern only temporality. For example, take a situation in which we are considering the possible changes of a fictional character (e. g. Major Amberson) when passing from a particular background of information (Booth Tarkington's original story: *The Magnificent Ambersons*) to another one (Orson Welles's film with the same title). In this case the following statements:

(TS) Major Amberson is no longer an arrogant man

(WS) Major Amberson is still an arrogant man (but at the same time he has a very visible side that renders him considerably more sympathetic¹⁷)

are perfectly acceptable in order to mean that what is true (about this character and his arrogance) with respect to the background of information provided by the original story is no longer (still) true with respect to a *different background*, represented by Welles' film. This interpretation of 'no

¹⁷ Thanks to O. Percus for suggesting a modified version of this example.

longer', for example, is quite different from the (more familiar) interpretation according to which in the novel *itself* Major Amberson is arrogant until moment *t* and no longer arrogant after moment *t*.

Going back to tensed sentences, examples such as (23) and (25B) show that, unlike past oriented statements, future oriented statements are conceived of by speakers as *intrinsically revisable*, depending on the changes which may occur in the flow of information about the world. The idea is that, in such contexts, a no-longer-phrase signals a change of truth value due to a modification of the relevant background of information, whilst a still-phrase signals a persistence of truth value. But both phrases make sense, in these scenarios, only under a *defeasibility assumption* concerning the relevant proposition (the proposition that Bill Evans will play with Jim Hall in the tomorrow concert).

Such a defeasibility assumption may even be part of the explicit content expressed by an utterance of a future oriented sentence, as shown by the following example:

(26) Next year the Olympic Games will take place in China. But in an emergency, the Games will be cancelled.

Indeed, it is not difficult to imagine a scenario in which (26) would be perfectly acceptable. On the contrary, there is *no* plausible situation in which (27) would turn out to be consistent.

(27) ? Last year the Olympic Games took place in China. But in an emergency, the Games were cancelled.

A reasonable explanation for the contrast between these two discourses is based on a particular kind of transition concerning the representation of the open possibilities. When she evaluates the first sentence in (26), the hearer is invited to consider a restricted set of open alternatives: those which are compatible with the relevant contextual assumptions (e. g. the CIO's decisions). However, when she comes to the second sentence in (26) and processes the phrase 'in an emergency', she shifts to a different set of alternatives (those in which something unexpected has occurred) and evaluates the sentence 'The Games will be cancelled' relative to this shifted domain. This *change* in the domain of available alternatives explains why the second sentence of (26) does not contradict the first one. But in the case of the past-tensed discourse (27) such a mechanism of transition cannot apply, because there is only one course of events relevant to evaluating past-tensed sentences, no alternative is available. If it turns out that the Olympic Games took place in China in the unique past available, then the possibility that the Olympic Games did not take place is not an open option. That is why (27) turns out to be inconsistent.

It is worth noticing that, if in (27) the reference to the past is replaced by the reference to a *future* in the past, what we get is a perfectly acceptable statement:

(28) Last year the Olympic Games took place in China. But in an emergency, the Games would have been cancelled.

What changes when passing from (27) to (28)? The idea is that, by replacing a simple past with a past *conditional*, one makes the future-in-the-past interpretation available: one refers to a past moment *t* in the *future* of which *alternative* courses of events stemming from *t* are relevant. This is why a transition between different sets of open alternatives is possible here, as in the case of (26). One often suggests that there is no difference, in principle, between future oriented and past oriented statements as regards the way they are semantically processed. The illusory asymmetry which associates the future, but not the past, to a plurality of alternative options is to be explained in terms of *epistemic ignorance*. Semantically speaking, this is the conclusion, there is just a single future exactly as there is just a single past. As D. Lewis warns us, 'the trouble with branching

exactly is that it conflicts with our ordinary presupposition that we have a single future. If two futures are equally mine, one with a sea fight tomorrow and one without, it is nonsense to wonder which way it will be – it will be both ways – and yet I do wonder. [...] Our future is the one that is part of the same world as ourselves.’ (Lewis, 1986: 207-208.) Plurality of options, one suggests, is begat by ignorance: it is only because we cannot have epistemic access to this single future that we treat it as "open" and that a multitude of possibilities is associated with it. So, there is no intrinsic difference, this is the conclusion, between the single past involved by past-oriented statements and the single future involved by future-tensed statements.

A moment's reflection is sufficient to show that the data we have discussed so far suggest a more articulated view. The case of the future in the past, illustrated by (28), is particularly interesting in this connection, because the existence of open alternatives, toward the future, at a past moment *t*, is not due to lack of information (the speaker knows what happened), but is seen as a characterizing feature of *that* moment. Symmetrically, the lack of alternatives, toward the past, is seen as a characterizing feature of the *present* moment.

In other terms, the contrast between (27) and (28) seems to suggest that, if we stick to the way temporal information is encoded in a natural language like Italian or English, the past, but not the future, of a given time *t*, is inherently associated to the idea of a single course of events stemming from *t*¹⁸. As in the case of the contrast, discussed above, between sequence (15)-(16) and sequence (17)-(18), the idea is that the indeterminacy of the past can be justified only in terms of an epistemic failure, whilst the indeterminacy of the future does *not* coincide with a simple lack of information and is hardly compatible with the alleged "presupposition that we have a single future".

9. Evaluating utterances in a changing world: a first approximation

The linguistic evidence we have discussed so far seems to suggest the following conclusions:

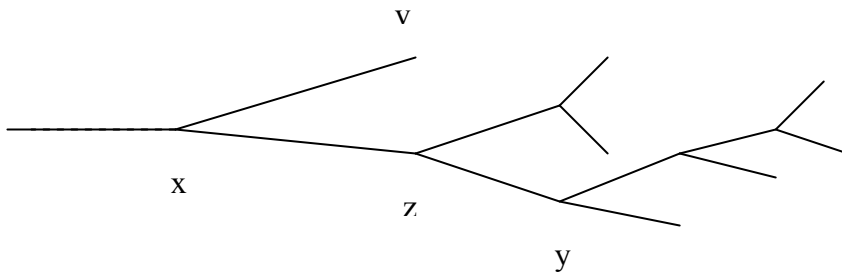
- (i) As shown by the way the predicate 'true' is used by speakers in relation to some future-oriented statements, the statement made by an utterance of a sentence like (13), (22b) or (26) is evaluated as true, *at the utterance moment u*, by referring to a relevant background of information (let us call it VIEW for brevity), whatever course of events may be actualized in the end.
- (ii) There is an asymmetry between past and future, in the sense that while a single course of events is referred to for the evaluation of a past-oriented statement, in the case of a future-oriented statement a plurality of alternative courses of events is made relevant: it is the set of courses of events that are compatible with VIEW. As shown by the future-in-the-past phenomena and by some uses of epistemic modals, this asymmetry is seen by speakers as a constitutive feature of their representation of time and not as a simple product of our ignorance about future events.
- (iii) Some peculiar uses of phase adverbs like 'no longer' and 'still' show that the statement made by uttering a future-tensed sentence can be evaluated not only at the utterance time *u*, but at any moment later than *u* and that different evaluations are possible at different moments (because of the variability of VIEW). In other terms, this kind of statement is intrinsically *defeasible*, for the variability in truth value is not limited to the transition from an indefinite truth value to a definite one, but allows for the transition from truth to falsehood (and viceversa).

The problem, at this point, is how to flesh out such requirements in a suitable formal framework.

¹⁸ An important qualification is in order here. Insisting on this kind of asymmetry between past and future in the light of the data provided by examples like (27)-(28), (15)-(16) or (17)-(18), does not entail that such an asymmetry characterizes the structure of the time as such, but that it characterizes the way temporal information is processed by speakers in the production and interpretation of utterances.

As a first approximation consider fig. 2 once again:

Fig. 2



In this kind of representation, moments such as x , y , z ... have a *double* role to play, according to whether we consider the tree on which they are located (A) on the vertical axis or (B) on the horizontal axis.

(A) A moment in the tree is a point which is alternative to other points in a *logical* space. (For example, in fig. 2 v and z are alternative outcomes of the node x that precedes them.) An important characteristic of these points is that *each* of them can be *uniquely* associated to a *plurality* of histories. More exactly, for any moment m , let H_m be the set of histories passing through m : i. e. the histories that coincide up to m and diverge starting from that point. Thus, in what follows, when I intend to stress this aspect, I will refer to a moment m as a *world* or a *world state* (Prior) with a single past and a set of alternative futures¹⁹ (corresponding to the different histories in H_m).

(B) But, of course, a moment m is also associated to *temporal* information and can be seen as a particular time, which precedes or follows other times. For example, in fig. 2 z is earlier than y ($z < y$).

In this theoretical framework, if other contextual features are ignored, it is possible to consider a context as involving a pair of moments $\langle u, v \rangle$, where u and v play distinct roles, because they are associated to the utterance time and to the utterance world (in the sense clarified in (A)), respectively. (An interesting illustration of this point is the pair $\langle u, u \rangle$, where the same moment plays these two roles. Let us call it *the canonical context*.)

To grasp the intuition underlying such an approach, suppose that a sentence ϕ is uttered at moment u . Thus, the utterance time is fixed once and for all: it is u itself. But what about “the world” of the utterance? Surely, at moment u , u itself can be considered as a world in which the utterance event can be located, i. e. as the world of the context (with a single past and the alternative futures in H_u). This is the *canonical context* $\langle u, u \rangle$. Yet, as time goes by, *other* worlds become available: for example world z (or, alternatively, world v), because the utterance event at issue belongs to *this* world in the following sense.

An event e is said to belong to world x if e occurs at some point in the path up to and including x ²⁰.

An obvious *principle of persistence* can be stated in this connection:

¹⁹ Formally speaking, I will identify the world (corresponding to) m as the particular subtree branching after m but linearly ordered up to m , i. e. as a cluster of temporally complete courses of events

²⁰ The reader is referred to Bonomi and Del Prete (2010) for a more accurate representation of events in a BT framework, which is not in the scope of the present paper.

(PP) For any event e and for any moments x and y : if e belongs to world x and $x \leq y$, then e belongs to world y .
(Intuitively speaking: in a changing world a fact remains a fact.)

Thus, whilst the utterance time remains fixed, different worlds (in the sense relevant here, e. g. u itself, or v , or z , and so on) can in turn be considered “worlds of the utterance”. Crucially, since principle (PP) guarantees that the utterance event (with the agent, the place, etc. of that event) belongs not only to u , but to any x such that $u \leq x$, referring to a standard definition of *proper* context is sufficient to state the following *Conservativity Principle* (CP).

Let a *proper context* for an utterance event e be a quadruple $\langle t, s, p, m \rangle$ such that e belongs to world m (the world of e), s (the speaker of e) is located at p (the place of e) at the time t (the time of e). (See Kaplan 1977: 509.) For any context c , let $c(w)$ the world of c . In the light of these definitions, it is immediate to see that (PP) entails (CP).

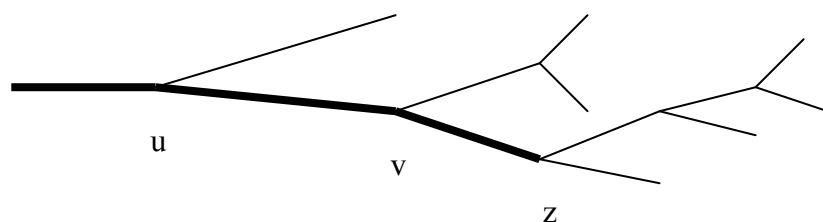
(CP) If e is an utterance event and c is a proper context for e , then c' is a proper context for e , too, where $c = c'$ except that $c(w) \leq c'(w)$.

In other terms, if in a proper context for an utterance event e the world of the context $c(w)$ is replaced by a “development” of $c(w)$, what we obtain is still a proper context for e . This fact will play an important role in the analysis which will be developed in the next sections and which is based on the idea that *a family of contexts should be associated to the utterance at issue*, depending on which world is made relevant by the time flow.

To see this, for the sake of simplicity let us temporarily consider contexts as ordered pairs of type $\langle u, v \rangle$, where u plays the role of the utterance time and v the role of the utterance world, respectively (do not forget that, in such an analysis, the same kind of entity can play two distinct roles, as shown by the canonical context $\langle u, u \rangle$).

Fig. 3 can be helpful to illustrate this point.

Fig. 3



u, v, z are "worlds" to which the utterance event belongs and $\langle u, u \rangle$, $\langle u, v \rangle$, $\langle u, z \rangle$ are possible contexts for that utterance

Suppose that a sentence S is uttered at u , which means that one feature of the context is fixed once and for all: it is u itself. But u is also available in order to fix the second feature of the context: as a consequence, a first admissible context is represented by the pair $\langle u, u \rangle$, *the canonical context*. Yet, in the light of principle (CP), *other* admissible contexts become available as time goes by, for instance $\langle u, v \rangle$, or $\langle u, z \rangle$ and so on.

This seems to be a very natural way of characterizing the notion of an *evolving* context of utterance, for it is quite intuitive to think that an utterance, like any other event, has effects which stretch along

the time line(s). In particular, whenever an utterance entails a reference to a background of assumptions, it comes as no surprise if different states of information are involved in function of the time flow.

To sum up, let us survey the main features characterizing this tentative analysis.

- (i) The parameters composing a context are the *usual* ones (utterance time and utterance world, in the simplified and provisional version I have just sketched).
- (ii) As suggested by the adoption of branching structures, a world is represented not by a single history, but by a moment x , *seen as a cluster of histories* (i. e. the histories passing through x).
- (iii) The utterance time is uniquely fixed.
- (iv) The utterance world is *not* uniquely fixed.
- (v) Because of (iv), an utterance is associated not to a single context, but to a plurality of admissible contexts. More exactly, for any utterance event e and moment u such that u is the utterance time of e , the class of *admissible contexts* for e is the set of pairs $\langle u, x \rangle$, where x can be replaced by any v such that $u \leq v$.

10. More articulated contexts

Crucially, on this tentative analysis, an utterance context is conceived of as a dynamic reality which is sensitive to the time flow. When passing from x to y (where $y > x$) there is a contraction in the set of metaphysical possibilities that are still open.

Unfortunately, as we saw above, this kind of context variance is sufficient to account for a kind of evaluation according to which (the statement made by) an utterance may turn out to be neither true nor false at moment x and true (or false) at moment $y > x$, but is not sufficient to account for situations where we pass from truth to falsehood (and vice versa). But this is what may happen to the statement made by an utterance of a future-oriented sentence, which involves a background of information, as we saw when discussing the relevant examples.

To account for such situations we have to associate, to any utterance u , not only the set of metaphysical possibilities open at u (corresponding to the histories in H_u), but also different backgrounds of information (what we called VIEW), in function of the time flow. In what follows the interaction between H_u and VIEW will be reconstructed by referring to a “system of spheres” which is a modification²¹ of the one introduced by Lewis (1973) and which will cope with *non-monotonic changes of information*, as required by the possible transition from a definite truth value to its opposite.

Here are the formal definitions.

Branching time models.

a BT model²² is a structure $M = \langle T, \leq, D, F \rangle$ where:

²¹ This version of Lewis’s system is presented in Grove (1988) in a different theoretical framework. In what follows I will consider systems of spheres centred on H_u , which is the universe of possibilities originally associated to the utterance time. Alternative choices are possible in other cases (for example to account for other modal operators).

²² See Belnap et al. (2001) for the formal and philosophical aspects of this modelling.

- (i) T is a non empty set, the domain of *moments*, assimilated here not only to points in a temporal grid, but also to points (situations or *world-states* in Prior's sense) in a logical space. (See the discussion at the end of the previous section.)
- (ii) \leq is a partial order over T (i.e. it is a reflexive, transitive and anti-symmetrical relation over T); \leq is forward branching but not backward branching (i.e., it is branching towards the future but not towards the past), as required by the following postulate:

$$\forall m_0, m_1, m_2 [[m_0 \leq m_2 \wedge m_1 \leq m_2] \rightarrow [m_0 \leq m_1 \vee m_1 \leq m_0]];$$

- (iii) D is a domain of individuals.
- (iv) F is the interpretation function mapping predicates to their denotations relative to moments in T.

A *history* is a maximal \leq -chain on T. This mean that a set $X \subseteq T$ is a history in T if X satisfies the following conditions:

- (i) $\forall m_0, m_1 \in X [m_0 \leq m_1 \vee m_1 \leq m_0]$
- (ii) $\forall Y \subseteq T \forall m_0, m_1 \in Y [[m_0 \leq m_1 \vee m_1 \leq m_0] \wedge X \subseteq Y \rightarrow X = Y]$.

Intuitively speaking, histories are temporally complete linear paths, each of which can be seen as a deterministic course of events.

For any moment $m \in T$, H_m is the set of histories containing m.

Systems of spheres.

Let H be the set of all histories in a structure $M = \langle T, \leq, D, F \rangle$ and, given a moment u, let H_u be the set of histories passing through u.

A collection S of subsets of H is a *system of spheres* centred on H_u if it satisfies the following conditions:

- (i) S is totally ordered by \subseteq
- (ii) $H \in S$ (as a consequence, H is the largest element in S)
- (iii) $H_u \in S$ and, for any B in S, $H_u \subseteq B$ (i. e. H_u is the \subseteq -minimum of S)
- (iv) For any non-empty set of histories p there is a smallest sphere B' such that $B' \cap p \neq \emptyset$. (This is the limit assumption discussed by Lewis²³.)

In virtue of (i) – (iv), a system of spheres S centred on H_u can be associated with a function π_u which maps any non-empty set p of histories to a set of histories defined as follows:

²³ This assumption, which is made here for the sake of simplicity, is rejected by Lewis (1973) as incompatible with his interpretation of the spheres. A system of spheres, in his original proposal, is centred on a single world @. As a consequence, if any given sphere B is chosen as the smallest sphere X such that $X \cap p \neq \emptyset$, it is possible to find worlds that are closer to @ than those in B: which contradicts this choice. As a partial justification for accepting the limit assumption one might argue that a system of spheres is centred here on a set of histories selected by a background of information and that worlds which are too finely individuated to be discernible with respect to this background might be treated as equally “close” to the centre of the system. (See Bonomi, 2006.)

$\pi_u(p) = E \cap p$, where E is the smallest sphere in S such that $E \cap p \neq \emptyset$.

Intuitive meaning. Suppose that u is the utterance moment. Thus, the smallest sphere H_u (on which the system is centred) is the set of histories that are metaphysically possible at u . In a sense, H_u "sets the scene" *by determining the horizon of possibilities with which different backgrounds of information can interact in order to select the relevant alternatives.*

Given two histories h and h' , if there is a sphere B such that B contains h but not h' , we can say that h is "closer" to H_u than h' , i. e. closer to the idea of what is metaphysically possible at u . For any non-empty set of histories X , $\pi_u(X)$ is the set of histories in X which are "maximally" close to H_u . As we will see in a moment, moving from the centre to the outer spheres, in combination with function π_u , will serve to account for the progressive availability of different backgrounds of information at different moments, starting from u . These new scenarios are determined by suitable *revisions* of the relevant information and are located at different levels of closeness to the original scenario. As desired, the structure is non-monotonic in the following sense: for any two moments x and y such that $x < y$, it may happen that $\pi_u(Y) \not\subset \pi_u(X)$ even if $H_y \subset H_x$, where X and Y are the informational backgrounds associated to x and y , respectively. (The idea is that, for any moment v , the background of information contextually selected for v is determined not only by the way the world is at v , but by a relevant set of assumptions.)

Contexts.

In order to focus on the core of the present proposal, I will ignore the features that are not relevant here by reducing a context c , for an utterance event e occurring at moment u , to the triple $c = \langle u, TT_c, VIEW_u \rangle$, where:

u is the *utterance moment*;

TT_c is the time which is spoken about (a notion that will be discussed later on);

$VIEW_u$ is the *reference time function*²⁴: for any moment v such that $u \leq v$, $VIEW_u(v) = \langle p_v, S_u \rangle$, where p_v is the relevant background of information holding at v (or, more exactly, the set of histories in H that are compatible with such a background) and S_u is a system of spheres centred on H_u .

Thus, for any moment v such that $u \leq v$, $VIEW_u(v)$ can be associated to a particular set of histories, i. e. the set $\pi_u(p_v)$, where π_u is the function associated to S_u described above. We will denote by ' $VIEW_u(v)$ ' this set (that is, ' $VIEW_u(v) = \pi_u(p_v)$ ', where $VIEW_u(v) = \langle p_v, S_u \rangle$). Intuitively speaking, $VIEW_u(v)$ is the set of histories which, *in the background of information holding at v* , come closest to idea of what is metaphysically possible at the utterance moment u . As we have just specified, $VIEW_u(v)$ is determined not only by the way the world is at v , but also by such a background (which might include the reference to plans concerning future courses of events, for example). Because of this changing informational content, it may happen that $VIEW_u(t') \not\subset VIEW_u(t)$, even though $t < t'$ and $H_{t'} \subset H_t$. As we shall see in a moment, thanks to this lack of monotonicity concerning the set of possibilities associated to different moments, a future oriented statement can be evaluated as true (false) at a moment t but false (true) at a moment $t' > t$.

²⁴ To simplify things, given the examples under discussion, in the present context the reference time function applies to moments coinciding with the utterance time u or following it. But in an extended theoretical framework nothing prevents it from being associated to moments preceding u .

Notice that, due to the presence of the reference time *function* VIEW_u , an utterance context c has an inherently *dynamic* character. Indeed, for any context $c = \langle u, \text{TT}_c, \text{VIEW}_u \rangle$, the utterance time is fixed once and for all, and is represented by u , which is the moment of the utterance event. But what about function VIEW_u , which selects the relevant background of information? Surely, the moment u itself can play the role of evaluation moment to which VIEW_u applies. This means that $\text{VIEW}_u(u)$ is associated to a particular observation point. Yet, as time goes by, *other* moments become available as moments which feed function VIEW : for example moment v , or, later on, moment z , and so on, so that, by suitable *revisions*, other backgrounds of information can become available in the same utterance context. As we saw above, the intuition, here, is that, once an utterance event e has taken place, *the effects of this event stretch far along the time line*, as pictured in fig. 3, where u, v, z, \dots , are ideally associated to different world states and to different backgrounds of information²⁵: as a consequence, the new perspective points may involve possible courses of events that were previously ruled out. (While the metaphysical possibilities decrease when passing from time t to time $t' > t$, the universe of possibilities associated to $\text{VIEW}_u(t')$ is not necessarily included in the universe associated to $\text{VIEW}_u(t)$.)

11. Back to non-persistent truths: the utterance world as a world in progress

After presenting the idea of an *evolving* context of utterance, in which different observation points can be referred to at different moments and the change of informational background is non-monotonic, we are in a position to fix the truth-conditions of a statement made by an utterance of a future-tensed sentence²⁶ and to show how the evaluation of such a statement may *not* obey the stability principle discussed at the outset. (For brevity, from now on I will speak of the truth of an utterance²⁷. This should capture the idea of "correctness" that Evans discusses in connection with utterances.)

Let a context c be the triple $\langle u, \text{TT}_c, \text{VIEW}_u \rangle$ as defined above, where, in particular, for any v such that $u \leq v$, $\text{VIEW}_u(v) = \langle p_v, S_u \rangle$, so that $\text{VIEW}_u(v) = \pi_u(p_v)$. Let \mathbf{F} be a sentential operator and v a moment in T . The truth of an utterance of a future-tensed sentence ' $\mathbf{F}\phi$ ', in the context c , relative to moment v (and assignation g) is defined as follows:

²⁵ What Kratzer (2012) writes about modalized sentences seems to apply to the treatment of future oriented sentences proposed in this paper: 'We might wonder why there should be a unique conversational background for a modalized sentence to express a proposition. This seems too strong. More often than not, conversational backgrounds for modal remain genuinely *underdetermined* and what speakers intend to convey is compatible with several choices of conversational backgrounds.' (Kratzer, 2012: 323. Italics mine.) In the case of the future tense, I suggest to speak of a sort of *announced indeterminacy* as concerns the background of information which is to be fixed by the context, in the sense that, as time goes by, *different* backgrounds can be associated to *different* moments in the *same* utterance context.

²⁶ In what follows the future tense is associated to a sentential operator along the lines of traditional Priorean treatments. This choice makes a comparison with those treatments easier. Actually, the main idea developed in the present paper (and based on a "dynamic" characterization of the utterance context) is compatible with (or even more attuned to) other choices, in particular with a referential treatment of tenses in the spirit of Partee (1973) and Heim (1994). It is in this referential framework that future-tensed sentences are dealt with in Bonomi (2010), where a full compositional semantics is based on a richer notion of *utterance context* (involving not only a coordinate for the perspective point associated to VIEW_u , but also a coordinate for the target time). Del Prete (2010) proposes a modelling in which the future per se has no quantificational force: 'a bare future sentence is interpreted by default in such a way as to have the temporal variable instantiated on every accessible future. The default interpretation of a future sentence is thus a universal quantification over a domain of accessible futures'. For the sake of simplicity, I will ignore these possible refinements and I will stick to the Priorean approach.

²⁷ Given an utterance of a sentence S in a context c (which includes the utterance moment u), it is possible to speak of the truth of that utterance (where Evans speaks of "correctness") *with respect to a moment* v in the following sense: the content (the proposition) expressed by that utterance in context c is true at v , that is $[[S]]^{c,g}(v) = 1$. After all, such a definition of truth (correctness) for an utterance comes as no surprise with respect to a familiar kind of intensional semantics, where the truth of an utterance, in a context c , is relative to a circumstance of evaluation (world and time). What's new, here, is the fact that c does not associate a single background of information to that utterance, but makes it depend on the evaluation time (as required by some peculiar uses of phase adverbs).

(TCF)

$[\mathbf{F}\varphi]^{c,g,v} = 1$ iff $u \leq v$ and $\forall h' \in (\mathbf{VIEW}_u(v)) \exists v' \in h'(u < v' \wedge [\varphi]^{c,g,v'} = 1)$

$[\mathbf{F}\varphi]^{c,g,v} = 0$ iff $u \leq v$ and $\forall h' \in (\mathbf{VIEW}_u(v)) \exists v' \in h'(u < v' \wedge [\varphi]^{c,g,v'} = 0)$

otherwise $[\mathbf{F}\varphi]^{c,v}$ is undefined.

Suppose that an utterance of ' $\mathbf{F}\varphi$ ' occurs at moment u , where u is a coordinate of context c .

According to (TCF), this utterance is true at a moment v (coinciding with u or later than u) iff φ is true at some moment v' later than u in all the histories which are compatible with the background of assumptions holding at v and which are “maximally” close to H_u .

To see how the truth conditions in (TCF) allow for non-persistent truths, let us go back to example (22b):

(22b) (Tomorrow) Bill Evans is playing with Jim Hall.

As we saw when discussing this example, the statement made by an utterance of (22b) can be true if evaluated at the utterance moment u , in view of the original program for the concert, but false at a moment v , such that $u < v$ and v is later than the moment at which the program is modified (but earlier than the time at which the concert takes place). That is why

(23) Bill Evans is *no longer* playing with Jim Hall

or

(23') It is no longer true that Bill Evans will play with Jim Hall

can be truthfully uttered at v .

On the proposal under discussion, we would say that this is possible because there is a *change* of perspective when passing from moment u to moment v , and such a change is formally accounted for by the fact that function \mathbf{VIEW} can associate different backgrounds of information to u and v , respectively. In other words, to account for the change of evaluation expressed by (23) or (23') we can simply say that the proposition expressed by (22b) *in the given utterance context c* turns out to be true at u , but false at v :

(24) $[(22b)]^{c,g,u} = 1$
 $[(22b)]^{c,g,v} = 0$.

We can have different truth values because the intended proposition $[(22b)]^{c,g}$ is evaluated relative to different moments (u and v , respectively), which in turn correspond to different backgrounds of information. As I have just recalled, in the formal framework under discussion this peculiarity is accounted for by associating the reference time with a *function*, which picks out different backgrounds depending on the time flow. More exactly, given an utterance context $c = \langle u, TT_c, \mathbf{VIEW}_u \rangle$, this task is achieved by its third coordinate, function \mathbf{VIEW}_u , which represents the dynamic side of c , for it makes different moments available in order to evaluate the propositional content *with respect to that utterance context*. The point is that such a context determines not only the temporal location of the utterance event itself (which is fixed once and for all by the first coordinate), but also, thanks to function \mathbf{VIEW}_u , the alternative moments or world states (with the associated backgrounds of information) which are relevant to the evaluation process. For the reasons discussed above (in connection with the conservativity principle) each of these moments is to be considered as a world of the utterance at issue or, if you prefer, a single world is involved here, but a changing one.

Specifically, the change of perspective justifying the contrast between (22b) and (23) is explained as follows:

(26) $\mathbf{VIEW}_u(u) \neq \mathbf{VIEW}_u(v)$

where $\mathbf{VIEW}_u(u)$ is the set of histories compatible with the original program for the concert (which is *still* valid at u), while this program is *no longer* valid at v , so that $\mathbf{VIEW}_u(v)$ selects the histories in which Bill Evans does not play with Jim Hall but with his trio.

Thus, we have detected an important source of contextual dependency, because the truth of an *utterance* is relative to the background of information selected by the reference time function \mathbf{VIEW}_u . *Stretching the utterance world* in order to cover different temporal positions makes new backgrounds of information relevant to evaluating the content of that utterance and allows for a principled explanation of the transition from a definite truth value to its opposite, even if this kind of transition concerns a *restricted* class of utterances, namely the utterances expressing a future-oriented proposition.

As for Evans' criticism, the kind of variability discussed here is at the same time restrained (because it affects only the contents of a circumscribed type of utterances, i. e. the utterances involving a reference to future courses of events) and systematic (for it is not confined to the transition from indefinite to definite truth-values, but allows for transitions from truth to falsehood and vice versa).

12. Time, tense and contexts

This is just a provisional conclusion, for a more careful account of the role of time in fixing the relevant truth-conditions is in order at this point.

As an illustration, consider two possible utterances of a by now familiar example, repeated here as (27):

(27) Bill Evans is playing with Jim Hall.

In the first scenario, (27) is a very natural answer to a question (concerning the identity of Bill Evans' partner) asked by a person during a concert at the Montreux Jazz Festival. What is involved here is an event *which is occurring at the utterance moment*.

But, as we saw above, (27) can be used in a different context, in order to speak of a *planned* event, whose occurrence is located in the *future* of the present moment.

Now the question is: how is time involved in determining the appropriate truth-conditions in such scenarios? At least two roles can be detected here. One of them is quite familiar: when we speak of the *evaluation time*, we mean for instance that by uttering (27) at time u , in the first scenario, the speaker says something true because *at that very moment* there is an event in progress of Bill Evans' playing with Jim Hall. In this case the evaluation time coincides with the utterance time.

But there is also *the time we are speaking about*, which coincides with the utterance time (and the evaluation time) in the first scenario, but not in the second scenario, where the situation is more complex: once more, evaluation time and utterance time coincide (for it is at this very moment that we want to judge the statement at issue as true or false, if it is used, for instance, as an answer to a question like '*Is it true that ...?*'), but they do *not* coincide with the time which is spoken about (the time of the tomorrow concert).

This kind of implicit reference can be fixed by contextual factors such as a previous discourse (in the case of an anaphoric link, as suggested by the second scenario) or current evidence (our presence at the concert, in the first scenario). Intuitively speaking, the idea is that an utterance of a sentence like (27) *concerns* a particular temporal situation, which can be located in the present, the past or the future of the utterance moment. This *time which is spoken about*²⁸ (a point or interval in

²⁸ This is *the time we aim at* in order to locate an event *from a given perspective point*, which is also temporally located. For the present purposes there is no need to make this notion more precise, e. g. by resorting to the classical distinction between event time and reference time (Reichenbach). Klein defines the *topic time* as 'the time span to which the

a branching structure, according to the formal framework adopted here) has a crucial role to play in defining the content of an utterance.

This is the role Frege has in mind when in a famous passage he explains how the utterance time contributes to determining the time we refer to by using a tensed sentence: 'If a time indication is needed by the present tense, one must know when the sentence was uttered to apprehend the thought correctly. Therefore, *the time of utterance is part of the expression of the thought*. If someone wants to say the same today as he expressed yesterday using the word "today", he must replace this word by "yesterday" [...] The mere wording, as it is given in writing, is not the complete expression of the thought, but the knowledge of certain accompanying conditions of utterance, *which are used as a means of expressing the thought*, are needed for its correct apprehension'. (Frege, 1918: 24; italics mine.) So, the "complete" expression of a thought or proposition must contain a specification of the time the statement at issue is about, and thanks to such a specification (made possible by the - possibly implicit - reference to the utterance moment) the evaluation of the thought or proposition at issue is fixed once and for all. And the stability of evaluation, to use Evans' wording, follows ...

The contrast, here, is between a complete expression of the thought or proposition and an incomplete one. But, and this is the characterizing feature of eternalism, the latter has *no* semantic relevance. There is no intermediate entity, namely a temporally *neutral* proposition, which accounts for the dependency of evaluation on a temporal parameter. This is so for the simple reason that such a parameter is *incorporated* into the expression of the thought.

I will not address here Kaplan's well-known argument against this line of thought, an argument based on the role of temporal operators: applying these operators, so runs the objection, to propositions where the temporal information is completely specified would be tantamount to using them vacuously²⁹. I will turn instead to the role that Prior attributes to temporally neutral propositions to account for some peculiar uses of tensed sentences.

Interestingly enough, his starting point is the same as Frege's: the time a proposition *is about* (which in many cases coincides with the utterance time) is an essential ingredient to determine the full content expressed by an utterance event: '[A tensed language] *implicitly refers* to the time of utterance, and by tensing what is implicitly said of the time of utterance it can indirectly characterise other times also [...]. In at least the most elementary tensed languages instants or times are not mentioned, but tensed propositions are understood as directly or indirectly characterising the *unmentioned* time of utterance.' (Prior and Fine, 1977: 30.) So, on this account, the time which is spoken about, with its anchoring effect, plays a crucial role in determining the full content expressed by an utterance. Still, we can insist that there are plausible reasons to isolate a notion of content which is *independent* of that kind of anchoring.

To see this, consider the following situation³⁰.

On November 27, 2011, Leo, a famous economist, says in an interview:

(28) Italy is facing a severe crisis.

As everyone knows, this a true statement.

One year later, after reading the old interview, he comments:

speaker's claim is confined" (Klein 1994: 4). I spoken elsewhere (Bonomi, 2010) of a *target time*, by resorting to a metaphorical distinction between an aiming device and the target aimed at by that device. In what follows, I will use the rather generic term 'time which is spoken about' to avoid a theoretical commitment which is not required in the present context.

²⁹ See Recanati (2007) for a reconstruction of the debate between eternalists and temporalists.

³⁰ This example is reminiscent of Prior's 'Thank Goodnes, it's over'. Notice that the situation depicted by a sequence like (28)-(29) can be more complex. Imagine two economists, A and B, who speak different languages. For example, one of them utters (28), whilst the other, who speaks Italian, utters 'L'Italia sta attraversando una crisi molto seria'. Supposing that these utterance events take place at the same time, one year later an observer C might comment: 'Thank Goodness, what A and B said one year ago is no longer true'.

(29) Thank Goodness, what I said one year ago is no longer true.
(Italy is out of the crisis.)

Now, consider (28) and suppose that, as required by the kind of temporal anchoring suggested by Evans in order to get "eternal" propositions, the time which is spoken about (*and which coincides with the utterance time in this case*) is incorporated into the content expressed by Leo's utterance. If the expression 'what I said one year ago' refers to this kind of content, by uttering (29) Leo states something absurd, because, under this assumption, what he means is that it is no longer true that Italy was facing a severe crisis on November 27, 2011.

If we look at the content expressed by Leo when he utters (28) to speak of the Italian crisis, we observe the following:

(Profile 1) *utterance time = evaluation time = time which is spoken about* (TT).

It is the utterance time that Leo has in mind when he utters (28) in order to locate the relevant event or state (Italy's crisis) and it is with respect to this very moment that his utterance is to be evaluated as true or false. But if it is true, of the utterance moment u , that Italy is facing a severe crisis, then there is *no* moment t , such that: $t \geq u$ and it is false at t that Italy is facing a severe crisis at u . No variability of truth value over time is admissible if we stick to the original utterance time as the temporal situation Leo's statement refers to: which means that there is no way to explain why (29) does make sense.

Indeed, the comment made by uttering (29) can be plausible (and true) only by associating the expression 'what I said' to a proposition which is *not* anchored to the utterance time of (28), and which includes a *shiftable* component. In other terms, we have to isolate a temporally neutral content that can be obtained by abstracting over the parameter represented by the utterance time of (28), which coincides with the evaluation time and with TT.

The point is that, by uttering (29), Leo does *not* intend to *revise* his original statement, which was, is and will be true: the expression 'what I said', in (29), denotes a content that is not temporally anchored to the time which is spoken about in (28), i. e. the utterance time of (28). More exactly, such a content can only be obtained by *abstracting over* that contextual parameter (which coincides with TT), for there is a sense in which (29) might be paraphrased as follows:

(29') If I should now say what I said one year ago, I would say something false

where the propositional content referred to by the expression 'what I said' is not anchored to the situation Leo had in mind when he uttered (28).

Similar remarks apply to the Sarah Palin's case discussed above. But there are some interesting differences.

When, on June 28, Leo utters:

(30) A woman will run for President

he says something intuitively true.

But, on October 28, after Sarah Palin's withdrawal and Michael Moore's nomination, he might comment:

(31) What I said three months ago is no longer true.
(A man will run for President.)

There is a strong similarity, of course, between (29) and (31), because both of them raise a problem of truth-value variability (whatever you think of this issue). But the Sarah Palin story has a peculiarity which deserves a short reflection.

What distinguishes the sequence (30)-(31) from (28)-(29) is that the expression 'what I said', in (31), denotes a content temporally *anchored* to the time which is spoken about in (30): as shown by the second sentence in (31), the speaker is still referring to the time of the next Presidential election. What he means, by uttering (31), is that the *anchored* proposition associated to the utterance of (30) is no longer true at the new evaluation time. In other terms, the evaluation time, which coincides with the utterance time, is made shiftable by abstraction, but the time which is spoken about (i. e. the time of the Presidential Election) remains *unchanged*.

The difference, with respect to (28)-(29), is that (30), unlike (28), has the following profile:

(Profile 2) *utterance time = evaluation time ≠ time which is spoken about* (TT).

That is why we can speak of a *revisable* statement made by uttering (30): what the speaker said *about* a given time located in the future is judged to be true at the evaluation time *t*, but no longer true at the evaluation time *t'*.

This peculiarity of future oriented statements comes as no surprise in the theoretical framework adopted here: the passing of time modifies not only the state of the world, but also the state of the relevant information, which is an essential ingredient of the truth conditions for this kind of statements.

To conclude these informal remarks about the variability of truth values, let us sum up the main points of the above discussion.

First of all there is *the time which is spoken about* (TT) when a tensed sentence is uttered. For example, we have just seen that in the case of (27), repeated here,

(27) Bill Evans is playing with Jim Hall

depending on the context, the time at issue can be the utterance time (if, for example, the speaker intends to identify Evans' partner on the stage during a concert) or a future time (if she is speaking of the tomorrow concert). In general, the content which can be associated to an utterance event can be seen as a content *anchored* to the relevant TT or *independent* of it. And we have considered, with Prior, the need for the second kind of content (temporally neutral propositions) in order to account for the feeling of relief expressed thanks to a statement like (29) by a speaker *located in time*. To go back to a familiar example, saying that the proposition associated to an utterance of a sentence like 'Socrates is sitting' can be true at time *t*, but false at time *t'* is just a way to recall us that there are situations in which it can be relevant to isolate what remains of an anchored content once a contextual feature has been stripped off. If X says 'Socrates is sitting' at moment *t*, and Y says 'Socrates is sitting' at moment *t'*, there is a sense in which we can state that they say the same thing, but there is also a sense in which we can state that they say different things, for the simple reason that *the times which are spoken about are different*.

Stability of evaluation (in terms of truth values) may be guaranteed by keeping TT fixed. Indeed, this kind of anchoring puts severe restrictions on the role of the *evaluation time*. To see this, suppose, for instance, that someone asks Leo what Lea did yesterday at 3 p. m. and that he answers:

(A) She went to the doctor's.

Now, if yesterday at three p. m. Lea went to the doctor's and if what Leo says is anchored to the relevant TT (yesterday, three p. m.), it is quite natural to suggest that what he says is true at the utterance time *u* and at *any* evaluation time *t*, such that $u \leq t$. And the same holds of 'Socrates is

sitting', once the content has been *anchored* to the time which is spoken about (and which coincides with the utterance time). Changing the utterance time (and, as a consequence, changing the evaluation time) has no effect *if the time which is spoken about remains unchanged*. This is true of statements in the past or present tense³¹. But what about future oriented statements? What may happen, in such cases, is that *although* TT is kept unchanged, different truth values can be associated to different evaluation times, witness a statement like:

(29) It is no longer true that Bill Evans is playing with Jim Hall [in the tomorrow concert].

To sum up, there is a first level of truth-value variability: it concerns the content of an utterance when this content is individuated *independently* of the time which is spoken about (and which in many cases coincides with the utterance time). We might speak of "floating" propositions in such cases, and they can have a theoretical role to play, for instance, in order to account for intentional states of mind³². At a second level of analysis there are "anchored" propositions. They can be seen as ordered pairs consisting of a proposition of the first type *and* the time which is spoken about: *their evaluation is stable, unless their anchoring involves a future time*. This means that, unlike other types of statements, future oriented statements, at least in some cases, are *revisable*, for they involve truth-value variability in a deeper sense: due to the non-monotonicity of the sequence of relevant states of information, the anchored proposition we get in such cases by keeping TT constant may turn out to be true (false) at time t , but false (true) at time t' , where $t < t'$.

This kind of revisability raises an interesting problem of theoretical adequacy, for a complete context of utterance (where all the necessary indexical information is specified) makes a plurality of evaluation times relevant to define the notion of truth in *that* utterance context. The point is that, unlike Kaplan's framework, the kind of analysis developed here does *not* associate a context of utterance to a *single* evaluation moment in order to define the notion of truth in context, since the utterance event is seen as belonging to a world in progress where possibly different states of information may follow each other as times goes by. And since these states of information can be associated to different moments in a non-monotonic way, truth-value variability follows.

As specified above, given a context $c = \langle u, TT_c, VIEW_u \rangle$, the dynamic side of this context is represented by *function* $VIEW_u$, which maps moments to states of information. More exactly, for any moment t , $VIEW_u(t)$ is the background of information which is relevant at t .

So, on this proposal, contextual dependency manifests itself in a twofold way:

- (i) by narrowing down the location of the time span which *is spoken about* (TT_c);
- (ii) by narrowing down (thanks to $VIEW$) the temporal location at which the relevant background of information must be associated.

Given a context c , by abstracting from the time fixed in (i), which often coincides with the utterance time, one gets "floating" propositions, whose theoretical relevance has been proposed by temporalists à la Prior. But even when an "anchored" proposition is determined by keeping TT fixed, truth-value variability is possible, because of the functional nature of $VIEW_u$. From an

³¹ 'One of the big differences between the past and the future is that once something has become past, it is, as it were, out of our reach - once a thing has happened, nothing we can do can make it not to have happened. But the future is to some extent, even though it is only to a very small extent, something we can make for ourselves. And this is a distinction which a tenseless logic is unable to express. In my own logic with tenses I would express it this way: We can lay it down as a law that whatever *now is* the case *will always have been* the case; but we can't interchange past and future here and lay it down that whatever *now is* the case *has always been going to be* the case - I don't think that's a logical law at all.' (Prior, 1996)

³² Indeed, a philosophical justification for this two-layered analysis might be the following: propositions are *intentional* entities involving an object (the time which is spoken about), and they can be considered independently of or in relation with such an object.

intuitive point of view, this means that a *plurality* of temporal situations, instead of a single one, is available to define the notion of truth in *that* context.

This is why a person who, at time u , utters a future-oriented sentence like (27) is prepared to revise her statement at a time $t > u$, in the presence of a new background of information. To put it in a slightly different way, it might also be said that there is here a sort of *announced indeterminacy* as concerns the evaluation time which is selected by the utterance context or that a plurality of contexts should be associated to the utterance event at issue.

13. Conclusions

a. Towards a cartography of propositional contents

In the theoretical framework under discussion different ways of determining the content that can be associated to an utterance are available. To see this in a simplified form, let us assume that function $VIEW_u$ (which fixes a relevant background of information for any evaluation moment) is *implicitly* provided by the context (see sect. 10 for the explicit version), so that a context c is a pair of moments $\langle u, v \rangle$, where moment u is the utterance time and moment v is the time which is spoken about.

It should be kept in mind that, as suggested in sect. 9, on this approach moments in the tree can be seen as situations or world-states (Prior), which represent different alternatives both in a temporal grid *and* in a logical space. Anyway, in order to preserve a more familiar terminology, I will continue to use expressions like "utterance *time*" or "evaluation *time*".

To go back to our examples, with this simplification in mind the evaluation of (30) ("A woman will run for president"), relative to the two scenarios described above, can be stated as follows:

$$\llbracket (30) \rrbracket^{\langle u, x \rangle, g, u} = 1 \quad \text{where } u = \text{sit}_1 \\ \text{and } g(x) = \text{sit}_3 \text{ (presupposition)}$$

$$\llbracket (30) \rrbracket^{\langle u', x \rangle, g, u'} = 0 \quad \text{where } u' = \text{sit}_2 \\ \text{and } g(x) = \text{sit}_3 \text{ (presupposition)}$$

Here sit_1 , which plays the role of utterance time *and* evaluation time in the first scenario, is the temporal situation corresponding to the first Republican Convention
 sit_2 , which plays the role of utterance time *and* evaluation time in the second scenario, is the temporal situation corresponding to the second Republican Convention
 sit_3 (the time which is spoken about in *both* scenarios) is the temporal situation corresponding to the intended Presidential Election.

As we saw, the idea is that TT does not change when passing from the first utterance context to the second one (in both cases it is the time of the next Presidential Election). This is why the expression 'what I said', in (31), denotes a content *temporally anchored to the time which is spoken about* in (30): as shown by the second sentence in (31), the speaker is *still* referring to the time of the next Presidential election. What he means, by uttering (31), is that the *anchored* proposition associated to the utterance of (30) is no longer true at the new evaluation time. In other terms, the evaluation time (which coincides with the utterance time) is shifted, but TT remains *unchanged*.

This means that if, by lambda abstraction, we want to determine an appropriate content, the value which should be assigned to variable x is NOT shiftable and that, unlike the utterance time (which coincides with the evaluation time), it cannot be λ -bound. So, what we get is the following proposition:

$$(A) \lambda v \llbracket (30) \rrbracket^{\langle v, x \rangle, g, v} \quad [g(x) = \text{sit}_3 \text{ (presupposition)}]$$

which, applied to the relevant situations, yields the intended result:

$$\begin{aligned} \lambda_V[(30)]^{<v,x>,g,v}(\text{sit}_1) &= 1 & [g(x) = \text{sit}_3 \text{ (presupposition)}] \\ \lambda_V[(30)]^{<v,x>,g,v}(\text{sit}_2) &= 0 & [g(x) = \text{sit}_3 \text{ (presupposition)}]. \end{aligned}$$

We also noticed that the case of the economist's example is different: the time which is spoken about *does change* when passing from the first utterance context to the second one, for it coincides with the utterance time. So the appropriate content can be represented as the following proposition, where the time which is spoken about is shiftable (is λ -bound):

$$(B) \lambda_V[(28)]^{<v,v>,g,v}$$

Indeed, as shown by the discussion about (28)-(29), the comment made by uttering (29) ['What I said one year ago is no longer true'] can be plausible (and true) only by associating the expression 'what I said' to a proposition which is *not* anchored to the time which is originally spoken about and which includes a *shiftable* component. We have here a *temporally neutral* content that can be applied to different temporal situations.

This proposition, applied to the relevant temporal situations, yields the intended result:

$$\begin{aligned} \lambda_V[(28)]^{<v,v>,g,v}(\text{sit}_1) &= 1 \\ \lambda_V[(28)]^{<v,v>,g,v}(\text{sit}_2) &= 0 \end{aligned}$$

where sit_1 is the temporal situation corresponding to the interview

sit_2 is the temporal situation in which the economist comments his old statement.

The proposition in (B) is the kind of content (associated to the utterance of (28)) that the temporalist proposes in order to account for the comment made by uttering (29).

But what happens if we *stick to the time which is originally spoken about* when (28) is uttered (and which coincides with the utterance time and the evaluation time)? In this case no parameter is abstracted over and what we get is *eternalism*:

$$(C) \lambda_V[(28)]^{<x,x>,g,x} \text{ where } g(x) = \text{the situation corresponding to the utterance time (presupposition).}$$

This is a constant function (proposition), since, for any situation s , such that $g(x) \leq s$:

$$\lambda_V[(28)]^{<x,x>,g,x}(s) = 1 \text{ where } g(x) = \text{sit}_1 \text{ (the temporal situation corresponding to the interview).}$$

By sticking to the time which is originally spoken about (= the utterance time) we get a proposition whose truth value is fixed once and for all, for any s it applies to.

The moral we can draw is that different propositional contents are available here, depending on the different scenarios.

If, for instance, we are interested in the correctness of the Leo's utterance *with respect to the situation he referred to*, (C) is the content we should appeal to: as we have just said, it is a constant proposition which yields the same truth value at any time (starting from the utterance time).

On the contrary, (B) is the natural candidate if, by *abstracting from* the time which is originally spoken about (and which coincides with the utterance time), we look at the intentional states of agents *located in time*. This is what justifies the feeling of *relief* associated to the utterance of (30), exactly as in Prior's original Thank-Goodness example.

As for the kind of proposition sketched in (A), it occupies an intermediate position, for TT stays fixed, while the utterance time (which coincides with the evaluation time, but not with the time

which is spoken about) is abstracted over. This is the case of future-oriented statements like (27) and (30), whose evaluation depends on *changing* backgrounds of information.

To sum up:

(i) The examples involving Sarah Palin and Bill Evans show that, *even by keeping the TT parameter fixed* (condition S) there are contents of utterances (propositions) of type (A) which can change truth value over time. It is the case of (some) **future-oriented** statements, which illustrate a *first type of non-persistence*.

(ii) In the case of past (or present) tensed sentences it is possible to get "non-persistent" propositions of type (B) *only* by relaxing condition S. This means that we have to abstract over the TT parameter by identifying it with a varying utterance time: what we get is a *second type of non-persistence*.

b. A first look

It is not in the scope of the present paper to start a systematic scrutiny of the *propositional profiles* that can be individuated along these lines. But a preliminary look might be instructive.

Let us start from the familiar cases.

1. "Eternal" propositions (constant functions): $\lambda v[\phi]^{<x,x>,g,x}$

(= case C above)

The truth value is fixed once and for all, independently of the temporal situation this function applies to (starting from the utterance moment), that is $\lambda v[\phi]^{<x,x>,g,x}(t) = \lambda v[\phi]^{<x,x>,g,x}(t')$ for any t and $t' \geq g(x)$.

Example (discussed above): ϕ is the sentence 'Italy is facing a severe crisis', and $g(x)$ = the time at which Leo utters this sentence.

Possible comment (one year later): I've just checked all the relevant data. *What Leo said* last year is (was) true: Italy was really facing a severe crisis at that time. (Notice that both the present tense and the past tense can be associated to the truth predicate.)

2. (Totally) "diagonal" propositions: $\lambda v[\phi]^{<v,v>,g,v}$

(= case B above)

The utterance moment coincides with the time which is spoken about and with the evaluation time. We can have different truth values at different times.

Example (discussed above): ϕ is the sentence 'Italy is facing a severe crisis'.

Possible comment: Thank Goodness, *what Leo said* one year ago is *no longer* true.

(Italy is out of the crisis.)

Or:

If Leo should now say what he said one year ago, he would say something false.

Question: since in such cases phase adverbs like 'no longer' or 'still' may involve propositions that are obtained by abstracting over contextual parameters, should their behaviour be qualified as "monstrous" according to Kaplanian standards?

3. (Partially) "diagonal" propositions: $\lambda v[\phi]^{<v,z>,g,v}$

(= case A above)

The utterance moment coincides with the evaluation time but not with the time which is spoken about (TT). TT is contextually fixed.

We can have different truth-values at different moments (even if the time which is spoken about does *not* change.)

In particular, this is the case of future oriented statements.

Example (discussed above): ϕ is the sentence 'A woman will run for President'.

Possible comment (on October 28): *What Leo said* after the first Convention is *no longer* true. (The person who will run for President is *no longer* a woman.)

Question: the same raised in the case of totally diagonal propositions.

4. Variable evaluation time: $\lambda v[\phi]^{<u,z>,g,v}$

The utterance time and TT are contextually fixed.

We can have different truth-values at different moments (even if the time which is spoken about does *not* change.)

Example: ϕ is the sentence 'There will be a sea-battle'.

(As an answer to the question: What will happen tomorrow at 3 p. m. ?)

TT = tomorrow, 3 p. m.

According to a familiar interpretation (MacFarlane 2003, 2008), this proposition is neither true nor false when evaluated at the utterance time itself, but can be evaluated as true at a later moment (e. g. when the battle has just started).

A possible comment (during the battle): *What Leo said* yesterday was true.

5. Variable TT: $\lambda v[\phi]^{<u,v>,g,v}$

The time which is spoken about (and which coincides with the evaluation time) is abstracted over.

We can have different truth values at different moments.

Example.

Imagine that Leo, the computer engineer of our department, has just found out that the anti-virus system in the LAN of the Students Room is not regularly updated. There are situations in which the system is updated, but in other situations it isn't. So, he gathers all the students and says:

(A) Connecting a computer might be dangerous here.

Now suppose that at moment t the system is updated and that Lea knows that. Thus, she connects her computer because she knows that (A) *is not true in that particular situation*, i. e. at moment t . But suppose also that at moment t' ($t < t'$) the system is *not* updated and that Theo knows that. As a consequence, he does not connect his computer for he knows that (A) *is true in that particular situation*.

Lea's comment: I'm lucky. *What Leo said* is not true in my case.

6. Variable evaluation time: $\lambda v[\phi]^{<z,z>,g,v}$

TT coincides with the utterance time.

Example: ϕ is the sentence 'Italy is facing a severe crisis', where TT (which coincides with the utterance time) is contextually fixed. The evaluation does not change for any v such that $g(z) \leq v$.

A possible comment:

I've just checked out the data. *What Leo said* one year ago [about that situation] is (was) true.

7. Another kind of "eternal" proposition: $\lambda v[\phi]^{<z,x>,g,z}$

The evaluation time coincides with the utterance time but not with TT.

Example (of the type discussed in Partee, 1973, assuming that TT is i the past of the utterance time):

ϕ is the sentence 'I turned on the alarm system' (as an answer to the question 'What did you do when you left?'). The truth value is fixed once and for all at the utterance moment z and does not change across time.

A possible comment: I've just checked the videotape. *What Leo said* is true.

8. Variable TT: $\lambda v[\phi]^{<z,v>,g,z}$

The time which is spoken about is abstracted over whilst the other contextual parameters stay fixed.

As an example, consider the following exchange (original TT = this week).

A: What did you do this week for the course of logic?

B: I proved at least five theorems in the exercises booklet.

A: I don't think so. *What you said* is true of the last week, not of this week.

The moral to be drawn, after this short excursus, is that there is no propositional profile (be it ascribable to eternalism or temporalism, or whatever) that can be associated to utterances *in general*, because:

- (i) there are kinds of utterances that can be associated to some kinds of propositional profile but not to others (think, for instance, of the contrast between past oriented and future oriented statements);
- (ii) the same utterance can be associated to different propositional profiles, depending on which contextual parameters stay fixed and which are abstracted over.

This is clear, as we have just seen, in the case of the utterance of (28) discussed above:

(28) Italy is facing a severe crisis.

Indeed, this utterance event can be associated to an "eternal" proposition (of type $\lambda v[\phi]^{<x,x>.g,x}$) if we are concerned with what Leo, the famous economist, said *about a given temporal situation* (November 2011). But it can also be associated to a non-persistent proposition (of type $\lambda v[\phi]^{<v,v>.g,v}$) if we abstract from (by abstracting over...) that temporal location and we focus on alternative time spans, as shown by the comment 'Thank Goodness...!'

In these cases multiple propositional contents are available for the same utterance event, since *what we abstract from* in order to determine *what was said* depends on the conversational situations we are engaged in when we talk about that event.

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