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Abstract. We consider sentences in which "now" occurs in initial position and show that the meaning they convey differs from the meaning of sentences that are otherwise identical except for "now" occurring in final position. We argue that the occurrence of "now" in initial position triggers a particular kind of modal reading for the sentence to which the adverb is prefixed. A general notion of modal forcing is proposed to provide a uniform account of this kind of reading. Armed with this account, we offer a solution to two tense-modal puzzles, which have to do with fatalism and the possibility of a changing past.

1 Two little puzzles

It is September 13, 2017. Paris has just been declared host city of the 2024 Olympic Games by the International Olympic Committee. Right after the declaration, you can felicitously and truthfully utter (1):

(1)   Now Paris will host the 2024 Olympic Games.

Let t be the time of your utterance. By uttering (1) at t, it seems that you convey the implicature that (2) was false at some time preceding t:[1]

(2)   Paris will host the 2024 Olympic Games.

Let us observe, however, that (1) entails (2). As a consequence, (2) must also be true at t. From this, assuming the platitudes (P_1) and (P_2) about the meaning of (2) and the natural ordering of times, we can conclude that (2) was true at any time before t.

(P_1)   Sentence (2) (considered at time t) says that Paris hosts the 2024 Olympic Games at some time in the future (relative to t).

(P_2)   If a time is in the future of t, then it is in the future of any time preceding t.

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[1] When we speak of a sentence as being true or false at a time, we only mean to say that the sentence is true or false *as evaluated* at that time. All we say is meant to be consistent with a tenseless conception of (propositional) truth.

Therefore, your utterance of (1) at t both implicates that (2) was sometimes false before t *and* entails that (2) was always true before t. In other terms, what your utterance implicates clashes with what your utterance entails.

Notice that this clash should make your utterance of (1) infelicitous, for essentially the same reason that (3) sounds infelicitous:

(3) $^{??}$Mary has two children. She has given birth to one boy and two girls.

Arguably, what is wrong with the discourse (3) is that one of its implicatures (the scalar implicature that Mary has *exactly* two children) is at odds with something that (3) entails (that Mary has at least three children). In contrast, your utterance of (1) is perfectly felicitous. How is this possible?

A similar puzzle arises with a sentence about the past. Consider the following scenario. An *ex post facto* law $\mathscr{L}$ is enforced at t; $\mathscr{L}$ classifies certain actions as criminal, while the same kind of actions were previously regarded as lawful. Moreover, Bill had performed such an action on a certain day d, before t. At t, as law $\mathscr{L}$ is enforced, you can felicitously and truthfully utter (4):

(4)   Now Bill committed a crime on day d.

Your utterance of (4) entails (5):

(5)   Bill committed a crime on day d.

Therefore, (5) must also be true at t. From this, assuming the platitudes (P_3) and (P_4) about the meaning of (5) and the natural ordering of times, we can conclude that (5) was true at any time between day d and t.

(P_3)   Sentence (5) (considered at time t) says that Bill commits a crime at some time in the past (relative to t), which falls within day d.

(P_4)   If a time t' is in the past of t, then it is in the past of any time between t' and t.

Moreover, your utterance of (4) at t conveys the implicature that (5) was false at some time between day d and t. Therefore, your utterance of (4) has an entailment and an implicature that contradict each other. This should make your utterance infelicitous, contrary to the facts. Again, how is this possible?

We believe that the puzzle about the future has a very natural solution – so natural that it was often anticipated by our audiences at previous presentations of this work. The solution is based on the following observation: sentences about the future sometimes have a reading involving some planning (a *plan reading*, for short), that is, they are used to talk about events that are expected to occur in

the future given certain present plans. Prototypical examples of such sentences are the so-called "futurates" (see, e.g., Dowty 1979, Copley 2009), such as:

(6)   Paris hosts the 2024 Olympic Games.

(7)   Paris is hosting the 2024 Olympic Games.

However, the existence in English of dedicated tense-aspect forms to express a plan reading, as in (6)–(7), does not exclude that future tense sentences like (2) can occasionally convey the same kind of reading. Now, if (2) does convey a plan reading in the context of (1), what (2) says in that context can be expressed as in (2′):

(2′)   There is an official plan according to which Paris is to host the 2024 Olympic Games.

Clearly, (2′) can be false at t even if there is a time following t at which Paris hosts the 2024 Olympic Games.[2] What your utterance of (1) implicates, in the plan reading of its component sentence (2), is that (2′) (and not the proposition that (2) expresses according to (P_1)) was false at some time before t. In other words, your utterance of (1) at t implicates that at some time t_0 before t it was false that there was a (then valid) official plan according to which Paris was to host the 2024 Olympic Games. Importantly, this implicature is perfectly consistent with (2) being true at t_0 in the reading given in (P_1), for if (2) was true at t_0 in *this* reading, then at t_0 it was true that Paris would host the 2024 Olympic Games – although this may have been unknown to everybody at the time.

   Now, the puzzle about the past cannot be solved in exactly the same way as the puzzle about the future, since it makes no sense to invoke plan readings for sentences about the past. Still, we believe that the two puzzles have the same *kind* of solution. The idea is as follows. What (5) says in the context of (4) is not what (P_3) states that it says; instead, what (5) says in that context can be expressed as in (5′):

(5′)   There is an institutional frame according to which Bill committed a crime on day d.

Assuming this reading of (5) (call it *institutional reading*, for short), what your utterance of (4) at t implicates, in the institutional reading of its component sentence (5), is that (5′) (and not the proposition that (5) expresses according to (P_3)) was false at some time between day d and t. In other words, your utterance of (4) at t implicates that at some time t_0 before t it was false that there was a

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[2]It can be added that (2′) can be true at t even if there is no time following t at which Paris hosts the 2024 Olympic Games. See, e.g., Bonomi and Del Prete (2007).

(then valid) institutional frame according to which Bill had committed a crime on day d. Notice that this implicature is perfectly consistent with (5) being true at t_0 in the reading given in (P$_3$): at t_0 it was true that Bill had committed a crime on day d.

2   Forcing readings and "now"-initial sentences

The general idea we pursue in this section is that plan readings and institutional readings are just a special case of a more general kind, which we call *forcing readings*. The fundamental notion is that of a *forcing relation* holding between a state s and an event e: a relation of determination, whereby e occurring at some time is necessitated by s holding at another time. Next we consider some linguistic data with the aim of showing that sentences in which "now" contributes to the expression of a forcing reading – like (1) and (4) from section 1 – share a particular syntactic property, formally signaling that "now" is playing a different role here from that of a regular temporal adverb (i.e., one which locates an eventuality in time).

2.1   Linguistic properties of "now"-initial sentences

If one looks at dialogic contexts in which the addressee denies what the speaker has just said, it is clear that the syntactic position of "now" can make an important difference to the interpretation of an utterance, and consequently to the coherence of a dialogue. An example of this is the contrast between (8) and (9):

(8)   [Context: A and B are watching the 2011 World Championships in Athletics. A believes that Yohan Blake will run in a moment.]

    A: Yohan Blake will win (right) now.

    B: No, that's false. He'll run tomorrow afternoon. / $^{??}$Walter Dix could make it as well.

(9)   [Context: A and B are watching the 2011 World Championships in Athletics. They start talking just after Usain Bolt has been disqualified for a false start.]

    A: Now Yohan Blake will win.

    B: No, that's false. Walter Dix could make it as well. / $^{??}$He'll run tomorrow afternoon.

In dialogue (9), unlike in (8), the mere *possibility* that Yohan Blake does not win is sufficient for B to deny A's statement. That would be unexpected unless A's statement was understood as having a necessity modal force (viz., in accordance

with the forcing reading of the prejacent of "now"). The contrast between (8) and (9) shows that the syntactic position of "now" in the sentence matters for the interpretation: when it contributes to expressing a forcing reading, "now" typically occurs in sentence-initial position.[3] In what follows, we shall refer to sentences such as (1), (4) and A's statement in dialogue (9) as *"now"-initial sentences*.[4]

It has been observed by many that "now" has a contrastive value (at least when used with predicates that can be true of extended intervals – e.g., with stative predicates; see Hunter 2010, Altshuler 2016, Recanati 2004, among others). Mostly, this has been observed for occurrences in which "now" functions as a regular temporal adverb modifying a verb phrase. For instance, an utterance of the sentence "I am tired now" implicates that the speaker was not tired before her utterance.[5] In line with this widespread observation, we notice that "now"-initial sentences have a contrastive flavour: sentence (10) implicates that, at a previous time, no wedding plan existed, which forced the event of John and Mary getting married in April.

(10)   [Said in January, just after the couple's wedding plan has changed.]
         Now John and Mary are getting married in April.

Analogously, (11) implicates that a previous literary setting forced the event that Holmes died in the Reichenbach falls:

(11)   [Said after Holmes 'resuscitated' in *The Adventure of the Empty House*.]
         Now Sherlock Holmes didn't die in the Reichenbach falls.

Analogously, again, A's statement in dialogue (9) above implicates that, at a time preceding Usain Bolt's disqualification, there was no state that causally forced the event of Yohan Blake winning.

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[3]It can also occur in sentence-final position, although in this position one needs the right intonation in order to make it clear that the adverb is not being used as a modifier of the verb phrase (hence, as a regular time adverb).

[4]The semantic relevance of the position of time adverbs in the linear order of the sentence, in particular the emergence of modal meanings with pre-verbal occurrences, is a well-known phenomenon, one which has been described and amply documented in the linguistic literature (Traugott and Dasher 2001, among many others).

[5]Such implications presumably arise via pragmatic inference – possibly exploiting Grice's maxim of quantity – and are not limited to "now": it seems safe to say that the use of any time adverb to specify the temporal location at which a certain eventuality E holds triggers the inference that E does not hold at other locations, e.g., the sentence "The shop is closed today", without further indications, suggests that the shop was not closed yesterday and will not be closed tomorrow. Said this, we think that there likely is something special to the contrastive implications that "now" gives rise to in "now"-initial sentences, as we discuss in greater detail in section 2.3.

2.2   Varieties of forcing

The discussion so far should have made it clear that forcing relations come in many varieties. The kind of forcing involved in (1), and in (10) as well, we shall call *forcing from plans*. A relation of forcing from plans obtains between the state of a certain plan being effective and the events that must obtain if the plan is realized. The kind of forcing involved in (4), we shall call *institutional forcing*. Yet another kind of forcing, at play in the interpretation of A's statement in dialogue (9) above, is *causal-historical forcing*: this obtains between a state s and an event e if s causally necessitates e, given certain historical conditions (Thomason 1984). In both causal-historical forcing and forcing from plans, the temporal ordering between s and e is such that s precedes e (causes precede effects, plans precede the events that they intend). But it is also possible that the temporal relation between e and s is reversed, as it may happen with institutional forcing.[6]

2.3   Analysis of "now"-initial sentences

We propose that "now" in the "now"-initial sentences considered above is best modelled as a modal operator N with the following semantic and pragmatic properties:

Stative Anchor: N is anchored to a state s^* which obtains at reference time t_R. State s^* can be described by a *that*-clause argument of "now"[7] and is presupposed (i.e., it is common knowledge that s^* obtains at t_R).

Forcing: N triggers a forcing reading for its prejacent, whereby a contextually relevant forcing relation $\mathscr{R}$ is required to hold between s and the event e described by the prejacent. (A relation $\mathscr{R}$ holding between a state s and an event e in a world w at a time t is a *forcing relation* when e occurs in every alternative to w at t which is compatible with s.)

Change of State: The evaluation of an utterance of $\ulcorner$now (that S_1), $S_2\urcorner$ at t_R generates an implicature concerning the behaviour of the forcing relation $\mathscr{R}$ at alternative times t' for t_R, to the effect that $\mathscr{R}$ does not hold between any state obtaining at t' and the event e.

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[6]The kind of forcing involved in (11) seems to be different from all the others considered in the main text: in this case, it is not clear whether s and e can be said to be related via a temporal relation.

[7]The possibility to describe the underlying state via a *that*-clause attached to "now" is exemplified by the more verbose variant of (1) given in (i):

(i)   Now *that the International Olympic Committee has made its plan*, Paris will host the 2024 Olympic Games.

See Carter and Altshuler (2017).

This analysis predicts that (1) is true in the context described at the beginning of the paper at the condition that an event of Paris hosting the Olympic Games occurs in the future of September 13, 2017 in every world compatible with a presupposed state s^*, where s^* is a state in which the International Olympic Committee has made its relevant plan. In this case, the variable $\mathscr{R}$ refers to the particular kind of forcing exerted by plans. A completely parallel calculation can be provided for the truth conditions of (4) (understood as "now *that the relevant law is in force* Bill committed a crime on day d"), but in this case $\mathscr{R}$ will refer to institutional forcing.

Let us comment on the Stative Anchor and Change of State properties formulated above. Concerning Stative Anchor, we note that the state s^* which is mentioned in it is typically established in surrounding discourse, as in the following example (from a newspaper article):

(12)   [Paris] deputy mayor Bruno Julliard announced that glass panels will replace the grills that are currently weighed down by hundreds of thousands of padlocks. [...] As in many other cities, couples lock their padlocks to bridges and monuments, symbolizing their union. Recently, cities like Melbourne and New York have removed locks from their bridges, and *now Paris will join them*.

The sentence in italics in (12) is understood as "now that glass panels will replace the grills in question (as announced by the deputy mayor), Paris will join those other cities," where the material in the *that*-clause is clearly related to a previous stretch of discourse.

Turning to Change of State, we note that this property mentions *alternative times* for t_R, which are moreover claimed to be *in the past* of t_R. Thinking about the contrastive value of "now" (which was mentioned above) more broadly – for instance, thinking about the implications of contrast of a sentence like "I am hungry now" – one may wonder whether the alternative times for t_R must necessarily be *in the past* or can in some cases be *in the future* of t_R. We think that the specific operator N found in "now"-initial sentences is lexically specified in such a way that the alternatives for t_R are times *preceding t_R*. Notice that a different operator N^* exists in English, which is built with "now" but is more complex than the plain "now" considered so far, and N^* is such that the alternatives for t_R relevant for the interpretation of sentences containing N^* are times *following t_R*. The operator in question is syntactically realized as "for now". An example of it is given in (13), which sharply contrasts with (14) in its implications:

(13)   For now I have no job.

(14)   Now I have no job.

On the one hand, (14) implies that the speaker has become unemployed, that is, a state holds at the present time t which makes it the case that the speaker is unemployed at t but no state held at any time preceding t which made it the case that the speaker was unemployed then. On the other hand, (13) implies that the speaker may end up getting a job. We contend that both prefixes "for now" and "now" in (13) and (14) above use alternative times (for the reference time t_R), and they both require that some relation does not hold at those alternative times. The difference between those two prefixes is that "for now" *looks forward in time* to find its alternatives, while "now" *looks backward*; from these opposite temporal orientations of the two operators, the different implications of (13) and (14) follow: simplifying somewhat, (13) implies that the speaker does not have a job at present but could be no longer jobless in the future, while (14) implies that the speaker does not have a job at present but was not jobless in the past. In what follows we will not elaborate on this difference of temporal orientation between the modal operator "now" (of "now"-initial sentences) and linguistically related operators.[8]

In the next section we show that our analysis allows for a treatment of two philosophical puzzles involving time and necessity: the fatalistic argument, first discussed by Aristotle, and a more recent argument concluding to the possibility of changing the past, presented in Barlassina and Del Prete (2015).

3   Two puzzles

3.1   The fatalistic puzzle

There are a few philosophical arguments that allow one, starting from *prima facie* plausible premises, to draw the fatalist conclusion that the future is settled, that is, historically necessary. These arguments have puzzled generations of philosophers over the centuries and still today keep their grip on the minds of those who seek to defuse them. Puzzlement stems from two sources: first, fatalism in itself is a nearly incredible doctrine; second, it is surprising to see that fatalism can be justified on purely logico-linguistic grounds. Here we shall focus on a very simple argument, which Aristotle discusses in his *De Interpretatione* (19a23-25) (see Whitaker 2002: for an alternative reconstruction of the argument).

Consider the following sentence, which intuitively concerns a contingent eventuality:

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[8]These remarks highlight the importance of taking temporal orientation into account in order to develop a semantic theory of "now" and related modal operators; moreover, they help framing the discussion of the relevant uses of "now" within the broader context of temporal orientation of modals in natural language (Condoravdi 2002).

(15)   There will be a sea battle tomorrow.

By the principle of bivalence, (15) is either true or false. Let us start by assuming that (15) is true. If so, then (15) is true *now*, that is:

(16)   Now it is true that there will be a sea battle tomorrow.

But if it is already true now that there will be a sea battle tomorrow, then the battle is fated, that is, inevitable – it is always too late to change the present. Moreover, what is inevitable is not contingent. Therefore,

(17)   It is not contingent that there will be a sea battle tomorrow.

We run into a similar conclusion if we assume that (15) is false. Since this argument does not rely on any specific feature of the example chosen, it can be generalized. The conclusion is that everything is either inevitable or impossible: fatalism is true.

Many philosophers accept the step from (15) to (16) as valid and reject the step from (16) to (17) as invalid – this is Ockham (1978)'s solution to the fatalistic argument (see also Braüner et al. 2000, Øhrstrøm 2009, Malpass and Wawer 2012). Our analysis of *now*-initial sentences strongly suggests the opposite stance: the step from (16) to (17) is valid, and the invalid step is the one from (15) to (16) (see Tooley 1997 for a similar diagnosis). It is natural to think that, if a sentence of the form ⌜Now P⌝ receives a forcing reading in a certain context, then also the corresponding sentence ⌜Now it is true that P⌝ receives a forcing reading in that context.[9] But if (15) does not validly entail (16), then, for the very same reason, (15) does not validly entail the following:

(18)   Now there will be a sea battle tomorrow.

Indeed, as uttered in the relevant context, (18) entails that a causal forcing relation exists between some present state and the future event of a sea battle tomorrow. Nothing similar holds for (15).

Before considering our second puzzle, let us note that a perfectly respectable version of the fatalistic argument can be obtained by replacing (18) with a sentence in which "now" does not occur in initial position, for instance:

(19)   It is true now that there will be a sea battle tomorrow.

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[9]Strictly speaking, it is the prejacent of "now" which receives a forcing reading. We can also speak – in a derivative sense – of 'forcing reading' of a "now"-initial sentence, in those cases in which the prejacent receives a forcing reading.

Moreover, and perhaps more importantly, it is easy to envisage a variant of the fatalistic argument in which the role of (18) is taken by a past-tensed truth ascription, for instance:

(20)   Yesterday it was already true that there would be a sea battle tomorrow.

If our solution to the fatalistic puzzle is correct, the existence of these alternative arguments suggests that forcing readings can be triggered by a wide array of linguistic constructions, which include but are not limited to "now"-initial sentences. In turn, if this conclusion is correct, our approach to forcing is in wait of substantial generalization. We shall briefly discuss this prospective generalization in section 4.

3.2   The puzzle of the changing past

The second puzzle that we wish to consider is related to an argument proposed by Barlassina and Del Prete (2015), calling into question the view that the past cannot change. One way to present this argument is by making use of sentence (21),[10] uttered in the real-world context described below:

(21)   [Context: On July 23, 2000, being the rider with the lowest overall time at the end of the last stage, Lance Armstrong had been declared the winner of the Tour de France by Union du Cyclisme Internationale (UCI). It is now October 22, 2012: having discovered that Armstrong made use of banned substances, UCI withdraws all of Armstrong's wins at the Tour de France.]
Armstrong has no longer won the 2000 Tour de France.

Barlassina and Del Prete remark that (21) is a true sentence about the past, moreover, for (21) to be a true sentence about the past, it must be the case that both (i) and (ii) hold true:

(i)   at some t before now, the past was such that Armstrong won the 2000 Tour de France;

(ii)   now the past is such that Armstrong did not win the 2000 Tour de France.

The conjunction of (i) and (ii) entails that the past has changed in the passage from t to now and so sounds puzzling, since common sense is strongly at odds with the view that the past can ever change.

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[10]Barlassina and Del Prete's main argument is actually based on an intuition about the change of truth value of the context-insensitive sentence about the past "Lance Armstrong won the Tour de France in 2000" across two subsequent real-world contexts.

If our analysis of "now"-initial sentences is correct, we have a principled way out of this puzzle. First of all, observe that (21) essentially conveys the same content as:

(22)   Now Armstrong has not won the 2000 Tour de France.

Both (21) and (22) naturally receive a forcing reading. In other words, both say that a presently obtaining state (i.e., the state containing the presently effective declarations by UCI) institutionally forces the eventuality that Armstrong did not win the 2000 Tour de France. Moreover, both (21) and (22) imply that things were different in the past as regards Armstrong not having won the 2000 Tour de France. But if our analysis is on the right track, this implication can be dealt with without assuming that the past has actually changed: we only have to recognize that (a) an institutional event (such as an event of winning the Tour de France) depends on the assignment of a status function by a competent authority (Searle 1995, Thomasson 2003, Ali Khalidi 2013), and (b) a state obtained at some time in the past, which institutionally forced the event of Armstrong winning the 2000 Tour de France.

4 Perspectives for future work

In this paper, we presented a specific linguistic phenomenon, the forcing reading of "now"-initial sentences, for which we briefly and informally described a possible treatment. In our proposal, a "now"-initial sentence says that some presupposed state s^*, obtaining at reference time t_R (usually, the present), forces a certain event e, the relation of forcing $\mathscr{R}$ being one of a number of possible relations of determination. Moreover, such a sentence implicates that, for some alternative time t' (typically before t_R), $\mathscr{R}$ does not hold between any state obtaining at t' and the event e. In the last part of the paper, we put our treatment at work on two philosophical puzzles. We are aware that a lot of things remain to be done in this area. In this final section we hint at some perspectives for future work. In passing, we also address some natural perplexities that this too-brief presentation might raise.

Firstly, of course, we have not provided any formal definition of our proposal. We are pretty sure, however, that this can be done, and we plan to offer a formal semantic-pragmatic analysis of forcing sentences in the future (stay tuned!).

Secondly, we mentioned that forcing readings can also be conveyed by sentences involving the truth predicate, such as "It is true now that there will be a sea battle tomorrow". It is interesting to observe that, by using the truth predicate or related constructions, we can produce forcing statements about *past* or *future* presupposed states. For instance, consider (18) again ("Now there will be a sea

battle tomorrow") and assume it was uttered yesterday at 3pm. Now suppose that today, in the midst of the battle, you want to reassert the same content – including the implied condition that the prejacent of "now" was false at some previous time. You could not say:

(23)   *Yesterday at 3pm there would be a sea battle today.

Arguably, the best you could do is to say something along the following lines:

(24)   a.   Yesterday at 3pm it was already true that there would be a sea battle today.
         b.   Yesterday before 3pm it became true that there would be a sea battle today.
         c.   Yesterday at 3pm it was already the case that there would be a sea battle today.

A similar strategy applies to all "now"-initial sentences. Therefore, it should be possible to generalize the proposal carried out here (or, better, a suitable formalization thereof) to forcing sentences involving past or future presupposed states. Again, this generalization is left for future work.

We hope to have shown both the philosophical and the linguistic interest of the phenomenon that we have highlighted and of the proposed treatment. The phenomenon supports the view that modality in natural language is a pervasive feature, affecting the interpretation in context of utterances of linguistic structures of which, *a priori*, one would not think they are modal. In particular, no one of our "now"-initial sentences contain overt modal verbs (with the only possible exception of (1), if the future tense auxiliary "will" is to be regarded as a modal verb). The phenomenon also confirms the importance of syntactic structure for the emergence of modal meanings: we have shown that the occurrence of "now" in initial position is a structural pre-condition for "now" to be promoted from the status of regular time adverb (syntactically, a VP modifier; semantically locating an event in time) to the status of a complex presuppositional modal operator. Our data and analysis connect with recent and ongoing researches on dyadic uses of "now" and the importance of presupposed underlying states in the interpretation of natural language (Carter and Altshuler 2017, Schwarzschild 2017).

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