

The presumption of settledness

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1 Introduction

The class of conditionals that is often uniformly referred to as “indicative” is not as homogeneous as the label might suggest. In particular, it has been argued that a classification into the two sub-types illustrated in (1a,b), is intuitively justified and empirically significant.

- (1) a. If he submitted his paper to a journal, we won’t include it in our book.
- b. If he submits his paper to a journal, we won’t include it in our book.

While both of (1a,b) are typically used under uncertainty as to the truth value of the antecedent (the denotation of the protasis), they differ in the status of that truth value: In (1a) it is objectively fixed (one way or the other) but the speaker lacks the relevant information, whereas in (1b) it depends on future facts and is not yet fixed at utterance time. I will say that (1a) carries a *presumption of settledness* which is absent from (1b). The first goal of this paper is to give a precise characterization of this notion.

The best empirical arguments for the need to take the distinction seriously are furnished by languages in whose inventory of conditional expressions it is overtly expressed. For instance, Funk (1985) discusses relevant data from Ancient Greek, Latin, and Hungarian. In English, the distinction is not

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reflected in the choice of conditional expressions, but it does correlate with the observation that the protasis of (1a) does and that of (1b) does not retain its interpretation in isolation: (2c) would be used instead of (2b).

- (2) a. He submitted his paper to a journal.
- b. He submits his paper to a journal.
- c. He will submit his paper to a journal.

It is also well-known, however, that (2b), while somewhat marginal, can be used felicitously if the truth of the sentence “has already been decided” (Dowty, 1979), in talking about scripts or schedules (Comrie, 1985), or by the “Almighty” (Edgington, 1997). Despite the differences between these cases, I will for now refer to them summarily as “scheduling” contexts. To give an example, a reading of this sort arises when the sentence is interpreted as a statement about ‘*his*’ agenda. The reference to the contents of the agenda may be supplied implicitly by the context, or explicitly as in (3a).

- (3) a. [*According to his agenda*] he submits his paper to a journal.
- b. If [*according to his agenda*] he submits his paper to a journal, we won’t include it in our book.

Notice that this reading gives rise to a rarely discussed ambiguity in (1b): Aside from its most prominent reading, it has one, made explicit in (3b), on which the question of whether or not ‘we’ will include the paper is already determined at the time of utterance. Read this way, the conditional carries again the presumption of settledness. Thus the presumption is not tied to past morphology or reference to past facts.

To summarize, while the presumption is always present in past-tense protases such as (1a), it is optionally available in predictive conditionals like (1b). Furthermore, just those protases that are presumed settled can felicitously be used in isolation. This is generally the case with past reference, but only under special conditions (the “scheduling” reading) with predictions. These facts suggest that the notions of “settledness” and “scheduling” share a common semantic element, one whose presence is related to temporal reference and which determines the felicity of the sentence outside the conditional. The second goal of this paper is to clarify this commonality and propose a pragmatic account of assertability.

Finally, the fact that (2b) must have a scheduling reading whereas the protasis of (1b) is not subject to this condition has led some authors to conclude that the protasis of (1b) is really (2c). The third goal of this paper is to propose an alternative account of these facts. I will argue that the protasis of (1b) is in fact (2b) and that the absence of the special requirement on its use is explained pragmatically by the fact that in the context of the conditional, unlike in isolation, the sentence is not asserted.

2 Settledness

As a first step towards a useful definition of the notion of settledness, we need a clearer idea of the intuitive difference between the conditionals in (1a) and (1b). A good paraphrase is given by Funk (1985):

In the case of [1b] the uncertainty is largely due to the fact that the state-of-affairs described and predicated does not yet exist, i.e., is still subject to manifestation (so that it cannot be affirmed or denied—it is unverifiable) at the moment of the sentence being uttered. In [1a], however, the state-of-affairs *does* exist at the time of speaking (either in the positive or negative sense—it is ‘manifested’ and could thus be verified), but the speaker has not got enough information (or is otherwise not disposed) to be sure about it and hence to affirm or deny it. Accordingly, the meaning of the conditioning frame can be said to vary from “if it happens that ...” to “if it is true that ...” (pp. 375–376)

My proposal largely agrees with these remarks, but Funk’s terminology calls for clarification. What is the difference between something “happening” and it being “true”? If an interpretation in terms of quantification over those worlds at which the antecedent is *true* is to apply to both types, then those antecedents that (merely) “happen” cannot be taken to lack a truth value. In this section I will relate the intuitive difference to distinctions familiar from the logic of time and uncertainty and submit that technically, Funk’s distinction is that between truth simpliciter and settledness, respectively.

2.1 Truth and settledness

Aristotle (On Interpretation 1:9) noted that the past is “fixed” in a way in which the future is not. Whatever has been, cannot (now) have been otherwise. Consequently, any statement about past facts is unequivocally true or false, regardless of whether its truth value is known or not.

The same is not the case with statements about the future. At any time, multiple future courses of events are real possibilities, not all of which do in fact materialize. Thus both the claim that there will be a sea battle tomorrow and its negation have a certain chance of turning out true. In this sense, therefore, both have the same logical status.

Aristotle considered the question of whether this shows that the logical laws of Excluded Middle (for each sentence, either it or its negation must be true) and Non-contradiction (a sentence and its negation cannot both be true) do not apply to sentences about the future. His conclusion is that there is no way to defend such a position in view of the fact that the future course of events will inevitably make one false and the other true. Thus it is *already* either true or false that there is a sea battle tomorrow. The uncertainty arises because it is impossible to tell ahead of time which course of events is the actual one, not because the actual course of events is such that the sentence does not have a determinate truth value.

Modal logics of time usually follow this notion of uncertainty about the future as the inability to distinguish the actual course of events from its possible alternatives (Prior, 1967; Thomason, 1970, 1984; Burgess, 1979). The distinction between *settledness* and *truth* is employed in this context to account for the asymmetry between an immutable past and an open future.¹

In this section I am going to explain in informal terms a variant of what Thomason (1984) called “ $T \times W$ -frames.” Definitions are in the appendix. T is a set of moments in time, linearly ordered by an ‘*earlier than*’-relation ‘ $<$ ’. W is a set of worlds, represented as trajectories through time—sequences of “snapshots,” as it were. Each such snapshot is a state the world is in at the corresponding time, characterized by an assignment of truth values

¹I should point out right away a difference between the way the term is used in that tradition and my use of it: Traditionally, for a sentence to be “settled” is for it to be settled that it is true. Instead, I take settledness to be a property not of sentences, but of the question of their truth. This, I think, is more in accordance with the everyday use of the word ‘*settled*’, which after all is used in talking about questions, not sentences. In addition, this use allows me to say that a sentence is settled “one way or the other.”

to sentences of the language. A *possible history* may be represented as a function h from times to sets of worlds such that $h(t') \subseteq h(t)$ whenever $t < t'$. Thus in h the objective accumulation of facts over time is modeled as the progressive loss of alternative continuations.

The asymmetry between past and future follows from a condition imposed on admissible truth assignments: At each time t , the worlds in $h(t)$ must be mutually indistinguishable (by atomic sentences of the language) at all times up to and including t ; they may come apart at later times. Thus for each t , $h(t)$ embodies a fixed initial segment of history together with its diverging possible continuations. The worlds in $h(t)$ are each other's *historical alternatives* (at t). Assuming that the actual world is somewhere in $h(t)$, its history up to t is determined. However, given only this initial segment of its history, it is impossible to tell which of the alternatives in $h(t)$ it is.

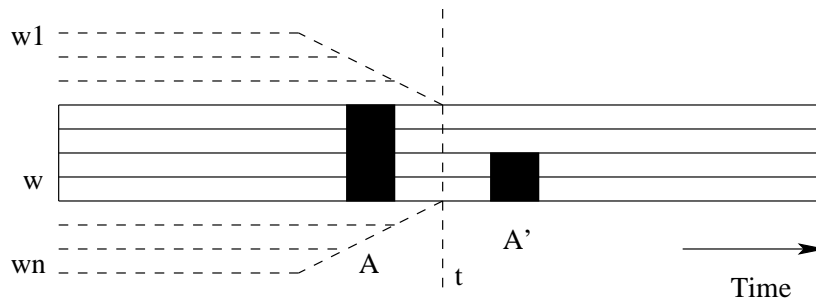


Figure 1: Asymmetry between past and future

The *truth* of sentences is defined at individual worlds relative to times. The definition of *settledness* makes reference not only to worlds, but in addition to their historical alternatives. A sentence is settled at $w \in h(t)$ iff it is true not only at w but at *all* worlds in $h(t)$. In the picture, both A and A' are true at world w and time t , but only A is settled. Generally, truth implies settledness for sentences whose truth value only depends on past and present facts. True futurate sentences, on the other hand, are not settled unless their truth is already objectively inevitable.

2.2 Knowledge and the presumption of settledness

The above captures the objective side of settledness. Now the inhabitants of worlds like ours typically only have knowledge of some but not all of the facts accumulated throughout history. Thus the worlds that for all we *know* might be the actual one may differ with respect to past facts as well as future ones.

Knowledge changes over time, and the *epistemic history* of an agent can be defined similarly to objective histories. For present purposes, however, there is no need to refer to this dynamic aspect. Thus the knowledge entertained by the speaker at time t is simply encoded as a set K_t of worlds, subject to the following constraints:

- i. The agent knows that she lives in a possible world (K_t is non-empty);
- ii. she is not able to presage history (there is no h such that $h(t) \cap K_t$ is a non-empty proper subset of $h(t)$).

The latter embodies the intuition that what we can possibly know at any given time is limited to what is settled at that time. The set K_t is an equivalence class of *epistemic alternatives*. These are worlds which agree with respect to what is known. (For present purposes, we may assume that our uncertainty only concerns the objective facts, not our own knowledge.) Knowledge relative to K_t is the epistemic analog of settledness: A sentence is *known* at $w \in K_t$ iff it is true at all worlds in K_t .

Finally, condition (ii) above, which stated that K_t cannot “cut across” objective histories, implies that K_t is partitioned into equivalence classes of historical alternatives, representing ways of filling in the historical blanks. The truth of a sentence is *presumed settled* in K_t iff it is known that it is settled *one way or the other*, i.e., iff its truth value is constant “locally” within each $h(t) \subseteq K_t$.

3 Truth and assertion

With this formal background, I now return to the data introduced at the beginning; for ease of reference, (1) and (2) are repeated here as (4) and (5).

- (4) a. If he submitted his paper to a journal, we won’t include it in our book.

- b. If he submits his paper to a journal, we won't include it in our book.
 - c. If he will submit his paper to a journal, we won't include it in our book.
- (5)
- a. He submitted his paper to a journal.
 - b. He submits his paper to a journal.
 - c. He will submit his paper to a journal.

I will address the contrasts observed in Section 1 individually below. By way of preview, the central idea is this: There is no truth-conditional difference between the protases in (4) and the corresponding sentences in (5). The special felicity conditions on the use of the latter are due to the fact that they are *asserted* while the protases in (4) are not. To assert a sentence is to claim that it is true, but its truth is not sufficient for the assertion to be felicitous; it must in addition be *assertable*. Let me first clarify this notion of assertability and its relation to truth in the case of simple sentences such as those in (5).

The truth of a sentence is a timeless property of total worlds. The truth value at w and t of a futurate sentence like (5b), which refers to a later time t' , is determined with reference to future facts at w , specifically those at t' . Most importantly, it is irrelevant to the truth of the sentence whether the facts of w up to t make it likely or foreseeable that it will turn out true. What matters is only whether the world *in its entirety* is such that in it, he submits the paper at the relevant time. Thus truth is defined from a perspective of omniscience.

In contrast, whether a sentence is assertable or not is determined from the limited perspective of inhabitants of the world at a given time. Suppose the sentence is in fact true at w but not yet settled at t . Then even an idealized epistemic agent who knows the entire history of w up to t but is unable to "look ahead" cannot possibly tell whether the world he inhabits is w or one of its historical alternatives; for recall that all of those alternatives share the same history. Thus even though (5b) is true, he is not in a position to know or claim that it is.

Formally, assertability is defined pointwise at worlds, like truth. Unlike the definition of truth, however, that of assertability involves reference to historical alternatives. How exactly these alternatives are taken into account is the subject of the following subsections.

3.1 The naked present

The special felicity conditions on the use of (5b) in isolation are accounted for if we hypothesize that for it to be assertable, it must not only be true but also settled at evaluation time, that is, true at *all* historical alternatives.

Nothing that has not yet materialized is physically inevitable. There is always a slight chance that things might not turn out the way we are now sure they will. We can assume that there always are historical alternatives, however unlikely, that make the use of the naked present infelicitous—except, of course, in the special circumstances mentioned in which the truth of the sentence “has already been decided” (Dowty, 1979, p. 160).

The “scheduling” reading (Comrie, 1985) is sometimes considered an anomaly of sorts. In fact, however, it fits naturally into the present proposal. Borrowing some ideas on modality from Kratzer (1977, 1991), an assertion of a sentence like (5b) about a schedule or script is interpreted as implicitly prefixed with a relativizing expression like ‘*In view of what the schedule (script) says . . .*’. This qualification makes it irrelevant to the interpretation which courses of history are physically possible. Instead, it introduces as a “modal base” a different set of alternatives (possibly, but not necessarily a proper subset of the historical ones) comprising those worlds that are compatible with what the schedule provides. But of course, there is already no uncertainty as to whether the schedule says or doesn’t say that he submits his paper.

It might be tempting to suppose that such a special modal base (one that makes the actual historical alternatives irrelevant) is involved in all uses of the naked present. However, this is not the case, as observed by (Dowty, 1979, p. 160): (6) is an unrelativized claim about the facts of the world.

- (6) Oh, number five wins the competition. His performance was unquestionably better than the others’.

The other kind of such special circumstances, the use by the “Almighty” (Edgington, 1997), is easily accounted for in a similar way: The Almighty possesses just the kind of omniscience that is unavailable to the world’s inhabitants and whose unavailability makes the naked present so hard to use for us. The Almighty knows all the facts, is free to “look ahead” in history and able to make statements that mean in effect ‘*This world is such that (5b)*’.

The assumption that (5b) requires settledness to be assertable can be extended to (5a). Recall that for past sentences, truth implies settledness, hence, under the current hypothesis, assertability. This explains why unlike with (5b), truth does seem sufficient for assertability in the past sentence (5a). Thus we can generalize to (7).

- (7) A non-modalized sentence is assertable at w, t if and only if it is settled at w, t .

According to (7), a world either does or does not support the assertion of a sentence. This seems appropriate for (5a,b), but I propose a different treatment for (5c) in order to account for the role of the modal ‘will’.

3.2 The modal ‘will’

The “naked present” asserts that the sentence is not only true but settled, hence its use is restricted to those contexts in which the requisite degree of certainty is available. In contrast, the assertability of a sentence including the modal ‘will’, such as (5c), is not regimented as strictly: The modal may be used instead of the naked present in cases where the latter cannot be asserted.

This does not mean, however, that for such modalized sentences truth is sufficient for assertability. It is obviously not: If it were, it would follow that in case a sentence like (5c) merely *happens* to turn out true, it has always been assertable, regardless of how likely or unlikely its truth was at earlier times. Instead, the assertability of such sentences appears to depend on some measure of *inductive support*, i.e., the likelihood that the sentence will turn out true, given the facts of past and present. Thus Lyons (1977) remarks that “[f]uturity is never a purely temporal concept; it necessarily includes an element of prediction or some related notion” (p. 677).

Inductive support is a matter of degree: The sentence is assertable “to the extent” that its truth is to be expected. Here, as with the naked present, reference to historical alternatives is required to establish assertability. Unlike the naked present, however, ‘will’ does not require that the truth of the sentence be settled, but only that it be close to it. For present purposes, we may take “close to settled” to mean that ‘most’, ‘almost all’, or ‘virtually all’ historical alternatives are such that he submits the paper. (The full story includes a probabilistic analysis which I don’t discuss in detail here, exploiting the fact that a sentence may have probability 1 without being settled;

cf. Lewis, 1980; McGee, 1994). Under this assumption, it is not surprising that (5c) may be “true enough” for its assertion to be justified in contexts in which (5b) is not assertable.

3.3 Protases

The observations on the protases of (4) are explained as follows. In line with the idea, inspired by the Ramsey Test, that the interpretation of conditionals involves quantification over possible worlds, their protases are used to identify the domain of the quantifier. For the sentences in (4a–c), this domain comprises those possible worlds at which the corresponding sentences (5a–c) are *true*.

Since the protases are not asserted, assertability is irrelevant to their use. Therefore the asymmetry between immutable past and open future, which is responsible for the special felicity conditions on the naked present, does not arise in this case: Both of the protases in (4a,b) identify the set of those worlds at which he did or does submit the paper, respectively; it does not matter what the historical alternatives of those worlds are. This is intuitively as it should be, given that the assertion of the conditionals does not imply anything about the truth of their antecedents (except, arguably, that they are *possibly* true, hence that the domain of the quantifier is not empty, in the indicative case).

As a consequence of the structure of the model, those worlds in which the protasis of (4a) is true are also guaranteed to support the assertion of (5a), since truth implies settledness, hence assertability, for past sentences. Accordingly, no difference is felt between the protasis of (4a) and (5b). In contrast, the worlds identified by the protasis of (4b) typically do not support the assertion of (5b) for the reasons discussed in Sections 3.1 and 3.2.

I will deal with the protasis of (4c) in the following section.

3.4 The presumption of settledness

Recall the intuition appealed to by Funk (1985) and others, that in conditionals like (4a) the uncertainty regarding the truth value of the antecedent is only subjective, whereas in conditionals like (4b) it is objective (i.e., the truth value of the antecedent is not yet settled and therefore cannot possibly be known). Recast in the terms I have been using, the protasis of a conditional is *presumed settled* if the speaker’s uncertainty as to its truth is only

subjective.

This must be the case in a protasis with past reference, such as (4a), given that its truth value is of necessity objectively settled at evaluation time. Here the fact that the protasis is *presumed* settled follows from the fact that it *is* settled, which itself is merely a consequence of its past reference and the structure of time.

In contrast, the futurate protasis of (4b) exhibits a genuine ambiguity, albeit with one reading far more prominent than the other in the absence of contextual clues. The two readings differ precisely in whether the protasis is presumed settled or not; on the most prominent reading, it is not. We can now state in terms of the model what it takes for a sentence like (4b) to carry the presumption: It does so if and only if the truth or falsehood of its protasis (5b) is settled at evaluation time; thus equivalently, if and only if the conditional can be paraphrased as ‘*if (5b) is assertable then ...*’. The distinction is purely semantic, without reflexes in the form of the sentence, in English; however, as mentioned above, it determines the choice of the conditional construction in other languages.

Finally, while (4b) is ambiguous in this way, (4c) is not: It is invariably paraphraseable as ‘*if (5c) is assertable then ...*’. This suggests that the reference to historical alternatives, which in non-modalized sentences affects only assertability but not truth, is part of the truth-conditional meaning of the modalized sentence (4c). This is not surprising, given that modals are generally interpreted in terms of quantification over possible worlds.

In the present context, this fact that the truth of the modalized sentence depends on historical alternatives helps explain what may appear paradoxical at first: While the assertability conditions of (5c) are *weaker* than those of (5b) (it is sufficient that the sentence be ‘*almost*’ settled), its truth conditions are *stronger* ((4c) disambiguates (4b)). In light of the previous paragraph, this is explained by the fact that the the sentence with ‘*will*’ may be *assertable* when the naked present is not (5b,c), whereas at the same time the latter may be *true* while the former is not (4b,c).

4 Conclusion

I would like to use the remaining space for some clarification regarding the terminology I have used.

Firstly, I have not said what a “presumption” is, although I hope it has

become clear what I mean by it. My main reason for using the label that I do not think the phenomenon is properly described using established terms such as “presupposition” or “implicature,” although they do seem applicable in some of the examples. Thus the fact that the assertion of the naked present in (5b) is infelicitous unless the sentence is presumed settled would justify treating the “presumption” as a presupposition. Likewise, the fact that (5b) in fact *conveys* that the sentence is settled justifies calling it an implicature. However, this does not generalize to the conditional in (4b): It is neither a prerequisite for felicitous use nor conveyed by the the sentence that the truth value of its protasis is settled. Instead, here the term is no more than a convenient label for one reading of an ambiguous expression, similarly to others like “wide scope” or “specific.” The term is to be understood as no more than that.

The other term I have used without proper introduction is “assertability.” This one I have chosen specifically for its history in the philosophical literature on conditionals, although I define it differently and use it for different purposes. It originated with Jackson’s (1979; 1984; 1987) probabilistic refinement of the Gricean account of conditionals (Grice, 1989, Chapter 4). Jackson’s proposal is problematic because according to it, the probability that measures the assertability of a conditional (for reasons I won’t get into, Jackson calls it *assertibility*) is not the probability that it is true (cf. Edgington, 1995). This problem does not arise with my use of the term as applied only to non-conditional sentences, and I hope to have convinced the reader that the distinction between truth and assertability that I have proposed is indispensable in a unified and compositional account of indicative conditionals and the naked present.

Appendix

Definition 1 ($T \times W$ -frames (Thomason, 1984))

A $T \times W$ -frame is a quadruple $\langle W, T, <, \approx \rangle$, where

1. W and T are disjoint nonempty sets,
2. $<$ is a transitive relation on T which is also
 - (a) irreflexive: for all $t \in T$, $t \not< t$; and
 - (b) linear: for all $t, t' \in T$, either $t < t'$ or $t' < t$ or $t = t'$;

3. \approx is a three-place relation in $T \times W \times W$, such that
- (a) for all t , \approx_t is an equivalence relation; i.e., it is
 - reflexive: for all $w \in W$, $w \approx_t w$;
 - transitive: for all $w, w', w'' \in W$, if $w \approx_t w'$ and $w' \approx_t w''$, then $w \approx_t w''$; and
 - symmetric: for all $w, w' \in W$, if $w \approx_t w'$, then $w' \approx_t w$;
 - (b) for all $w, w' \in W$ and $t, t' \in T$, if $w \approx_t w'$ and $t' < t$, then $w \approx_{t'} w'$.

Definition 2 (Language $\mathcal{L}_{\mathcal{A}}$)

Let \mathcal{A} be a set of propositional letters. The language $\mathcal{L}_{\mathcal{A}}$ is the smallest set containing \mathcal{A} and such that for all $\varphi, \psi \in \mathcal{L}_{\mathcal{A}}$ and $t \in T$, φ^t , $\overline{\varphi}$, $\varphi\psi$, $\mathbf{P}\varphi$, $\mathbf{F}\varphi$, $\mathbf{L}\varphi \in \mathcal{L}_{\mathcal{A}}$.

Definition 3 (Truth assignment)

A truth assignment to propositional letters in \mathcal{A} in a model $\langle W, T, <, \approx \rangle$ is a function $V : \mathcal{A} \mapsto (T \mapsto (W \mapsto \{0, 1\}))$ such that for all $\varphi \in \mathcal{A}$, $t \in T$ and $w, w' \in W$, if $w \approx_t w'$ then $V(\varphi)(t)(w) = V(\varphi)(t)(w')$.

Definition 4 (Interpretation for $\mathcal{L}_{\mathcal{A}}$)

A truth assignment V for \mathcal{A} is extended to $\mathcal{L}_{\mathcal{A}}$ as follows:

$$\begin{aligned}
 V(\neg\varphi)(t)(w) &= 1 - V(\varphi)(t)(w) \\
 V(\varphi\psi)(t)(w) &= V(\varphi)(t)(w) \cdot V(\psi)(t)(w) \\
 V(\varphi^t)(t)(w) &= V(\varphi)(t')(w) \\
 V(\mathbf{P}\varphi)(t)(w) &= 1 \text{ iff for some } t' \text{ s.t. } t' < t, V(\varphi)(t')(w) = 1 \\
 V(\mathbf{F}\varphi)(t)(w) &= 1 \text{ iff for some } t' \text{ s.t. } t < t', V(\varphi)(t')(w) = 1 \\
 V(\mathbf{L}\varphi)(t)(w) &= 1 \text{ iff for all } w' \text{ s.t. } w \approx_t w', V(\varphi)(t)(w') = 1
 \end{aligned}$$

Definition 5 (Epistemic model)

An epistemic model is a structure $\langle W, T, <, \approx, V, K_t \rangle$, where $\langle W, T, <, \approx \rangle$ is a $T \times W$ -frame (cf. Def. 1), V is an interpretation of $\mathcal{L}_{\mathcal{A}}$ (cf. Def. 4), and K_t is a non-empty subset of W such that for all $w, w' \in W$, if $w \in K_t$ and $w \approx_t w'$ then $w' \in K_t$.

Definition 6 (Knowledge)

A sentence φ is known at K_t (written $K_t \models \varphi$) if and only if for all $w \in K_t$, $V(\varphi)(t)(w) = 1$.

Definition 7 (Presumption of settledness)

A sentence φ is presumed settled in K_t if and only if $K_t \models \varphi \supset \mathbf{L}\varphi$.

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