McTaggart's Paradox and Internalism/Externalism in Linguistics and Philosophy

A Reply to Peter Ludlow's Presentist Semantics

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Abstract

J.M.E. McTaggart (1908) introduced a distinction between the view of time as a series in which every moment is either past, present or future (the "A-series") and the view of time as a series in which every moment is either before or after each other moment (the "B-series"), and noted an apparent inconsistency in the former view, now called "McTaggart's paradox." Since 1908, debate between "A-theorists" and "B-theorists" has been active, and accounting for certain semantic observations (e.g., the meaning of tensed verbs and temporal indexicals) has become an important criterion for a successful account of time. The semantic observations cited in the literature have come primarily from philosophy of language, but Ludlow's (1999) defense of the A-series presents an original linguistic theory, complete with syntax and semantics, which he attempts to show resolves McTaggart's paradox by demonstrating that the truth conditions for a statement of the paradox are not inconsistent. The theory also has several auxiliary metaphysical hypotheses, which later facilitate Ludlow's (2003) attempt to resolve a the conflict between language internalism (the view that language is inside the brain) and externalism (the view that it is at least partially outside). But Ludlow's projects face serious problems on two levels. First, his linguistic theory has a number of technical inconsistencies: for example, the lack of formal antecedents in the expressions he analyzes renders his use of the E-type model of anaphora unjustifiable, and his treatment of temporal connectives leads to replication in the metalanguage of at least one infinite subset of the object language. Second, his metaphysical premises are logically problematic: his version of ontological idealism (the view that the nature of reality is completely dependent on the nature of the mind) is circular, and his rejection of scientific realism, as Chomsky (2003) shows, precludes the possibility of explanatory value.

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Chapter 1: Introduction

Questions about time have long been among the most discussed and most perplexing questions in philosophy and in science. What is the nature of time? Is change a necessary feature of time? Is the passage of time from past to future an illusion? From Aristotle to Einstein, as long as these questions have been asked, they have been at the centers of major debates. And as science and philosophy have gradually become separate, disputes about topics which, like time, are central to the sciences but nevertheless raise serious metaphysical questions have served to highlight the boundaries between the two disciplines.

I will address one such dispute: that between the so-called "A-theorists" and "B-theorists" in philosophy of time. One of the most contentious and productive disputes in contemporary metaphysics, it is due in large part to the work of the idealist J. M. E. McTaggart, who by entertaining the questions above developed a distinction between two views of time which has since become probably the primary divide among contemporary philosophers of time.

Owing to the central role time plays in the physical sciences, the debate has involved frequent appeals to physics. Most notably, B-theorists, who maintain that the passage of time from past to future is an illusion, have argued that results from Einstein's special theory of relativity (1905) make any other position untenable. But unlike most of the other debates about time, this one has come to turn on questions of meaning, too: owing to the crucial role tensed language plays in formulating the questions of metaphysics of time, semantic "data," or observations about the meaning of temporal expressions, have been frequently invoked. Most notably, A-theorists, who maintain that the passage of time is a genuine feature of reality, have argued that certain aspects of the meanings of tensed verbs and other temporal indexical expressions are left unaccounted for by the B-theory.

While arguments of the former sort appeal directly to science, those of the latter typically appeal exclusively to the intuition-based paradigms of philosophy of language, citing not empirical observations but personal intuitions and philosophical hypotheses about meaning. It is, I believe, for this reason that the arguments invoking relativity have come to play a role in the broader discussion about the relationship between science and metaphysics while the meaning-based arguments, which make little if any contact with science, have been largely ignored. But perhaps they need not all be ignored: the A-theorist Peter Ludlow's (1999, 2003) semantic argument goes beyond philosophy of language into linguistics proper, extracting both evidence and methodological paradigms from linguistics to support of a complex of metaphysical theses about time and language.

The connection between metaphysics and linguistics is not as evident as that between physics and metaphysics. Most conceptions of linguistics as a science (e.g., Chomsky 1986) presume a kind of scientific continuum according to which linguistics, a cognitive science addressing certain language-related aspects of the brain—a biochemical and ultimately physical system—is essentially just physics at a higher level of abstraction. Ludlow bypasses this approach and instead argues simultaneously for an idealist position according to which the nature of human thought determines the nature of metaphysical reality and for the thesis that human thought is fundamentally linguistic in nature. The resulting view is one according to which the metaphysical nature of reality depends upon the nature of language.

In *Semantics, Tense, and Time* (1999), Ludlow motivates and explores this view, showing how a syntax and semantics for the language of thought (which he supposes to be identical to Chomsky's (1986) "I-language," widely held to be the object of study in linguistics) can be developed alongside it which resolve a critical problem with the A-theorist's position. In a later article, "Referential Semantics for I-Languages?" (2003), he expands this effort and shows how on this same view, the conflict between language internalism, a prevailing doctrine in linguistics, and semantic externalism, a dominant view among philosophers of language, dissolves.

But there are reasons to doubt the feasibility of both solutions. First, the technical apparatus proposed in Ludlow (1999) has a number of internal problems. Second, the auxiliary metaphysical hypotheses which facilitate both projects are inherently problematic. Third, the inferential connection between linguistics and metaphysics itself is highly suspect: as Sklar (1977, 1987, 1992) demonstrates, scientific theories do not have metaphysical consequences—it is only when an interpretation with (possibly implicit) metaphysical presuppositions is paired with a scientific theory that science appears to have implications in metaphysics (for instance, Sklar (1987) shows that crucial (and controversial) theses about verificationism are implicit in arguments from the theory of special relativity to a B-theory metaphysics of time). Ludlow (1999) fails to show that linguistics has metaphysical consequences because his linguistic theory is paired with explicit metaphysical presuppositions. Moreover, even with his presuppositions, Ludlow's position is inherently problematic: first, his syntax and semantics are implausible; and second, his idealism precludes the applicability of linguistics to the metaphysical problem, and worse, it is circular.

To substantiate these claims, I will now:

- Explore the debate in metaphysics of time that Ludlow (1999) attempts to settle, providing some context for his work. (Chapter 2)

- Explore the conflict between language internalism and semantic externalism that Ludlow (2003) attempts to resolve and present his resolution, examining the two auxiliary hypotheses and the resulting idealism which facilitate it. (Chapter 3)

- Present, in detail, the syntax and semantics Ludlow develops in conjunction with his auxiliary hypotheses to resolve the debate between the A-theorists and the B-theorists and describe his resolution. (Chapter 4)

- First, examine some technical problems with Ludlow's (1999) syntax and semantics; second, address some critical inconsistencies in his auxiliary metaphysical hypotheses which render his (2003) reconciliation and his (1999) defense of the A-theory ineffective; and last, show that, inconsistencies aside, these hypotheses by nature prevent Ludlow from deriving metaphysical consequences from linguistic theory. (Chapter 5)

Given the increasing importance of meaning in the debate between the A-theorists and the B-theorists, philosophers interested in bringing science to the dispute will inevitably continue to turn toward semantics. Just as debates over the metaphysical consequences of physical theories have forced physicists to closely examine the purview of physics, similar debates about semantic theories may help to refine the boundaries of semantics. If linguistics is to retain its place among the natural sciences, consequences of linguistic theories in metaphysics and other areas of philosophy must be addressed, even if it is only to establish that there are none.

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Chapter 2: McTaggart's Paradox and the A- and B-Theories of Time

Before examining the current state of the debate between the A-theorists and the B-theorists which Ludlow is concerned to resolve, I will briefly summarize the argument which gave rise to it. This particular debate is rare among those in the metaphysics of time in that it can, in its current incarnation, be definitely traced back to the work of a single philosopher: J.M.E. McTaggart, an early 20th century idealist metaphysician.

McTaggart's "The Unreality of Time," the A- and B-Series, and McTaggart's Paradox

In his essay "The Unreality of Time" (1908), McTaggart describes two distinct conceptions of time, which he calls "the A-series" and "the B-series":

> A-series: "the series of positions running from the far past through the near past to the present, and then from the present to the near future and the far future."

> B-series: "the series of positions which runs from earlier to later."

In other words, the A-series is a temporal series in which every moment is either past, present, or future, while the B-series is one in which each moment is either earlier or later than each other moment. McTaggart notes that while we regularly think of time as possessing the properties of both series, an interesting metaphysical question can be raised: is time more fundamentally an A-series or a B-series? Are the A-properties *past*, *present* and *future* ontologically dependent on the B-properties *earlier* and *later*, or vice versa?[1]

McTaggart also considers change to be an essential feature of time:

> It would, I suppose, be universally admitted that time involves change. A particular thing, indeed, may exist unchanged through any amount of time. But when we ask what we mean by saying that there were different moments of time, or a certain duration of time, through which the thing was the same, we find that we mean that it remained the same while other things were changing. A universe in which nothing whatever changed... would be a timeless universe.

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[1] Markosian (2008):

"An odd but seldom noticed consequence of McTaggart's characterization of the A series and the B series is that, on that characterization, the A series is identical to the B series. For the items that make up the B series (namely, moments of time) are the same items that make up the A series, and the order of the items in the B series is the same as the order of the items in the A series; but there is nothing more to a series than some specific items in a particular order."

And since facts about the B-series are eternal ("if M is ever earlier than N, it is always earlier"), argues McTaggart, it involves no change, and thus cannot be an account of time. Facts about the A-series, on the other hand, are always changing (from "M is future" to "M is present" and "M is past"). For this reason, he argues, a proper account of time must be an account of an A-series.

But he then identifies an apparent contradiction in the A-series from which he sees no escape:

> Past, present, and future are incompatible determinations. Every event must be one or the other, but no event can be more than one. This is essential to the meaning of the terms. . . But every event has them all. If M is past, it has been present and future. If it is future, it will be present and past. If it is present, it has been future and will be past. Thus all the three incompatible terms are predicable of each event which is obviously inconsistent with their being incompatible. . . It may seem that this can easily be explained. Indeed it has been impossible to state the difficulty without almost giving the explanation, since our language has verb-forms for the past, present, and future, but no form that is common to all three. It is never true, the answer will run, that M is present, past and future. It is present, will be past, and has been future. Or it is past, and has been future and present, or again is future and will be present and past. The characteristics are only incompatible when they are simultaneous, and there is no contradiction to this in the fact that each term has all of them successively. But this explanation involves a vicious circle. For it assumes the existence of time in order to account for the way in which moments are past, present and future. Time then must be pre-supposed to account for the A series. But we have already seen that the A series has to be assumed in order to account for time. Accordingly the A series has to be pre-supposed in order to account for the A series. And this is clearly a vicious circle.

Faced with a contradiction in one direction ("M is future and present and past") and an infinite explanatory regress in the other (the "vicious circle" of presupposition), McTaggart concludes that there simply is no consistent account of time. (Since the B-series is constructed based on temporal relations (*earlier* and *later* are relations which can only hold between events or positions in time), and the existence of time is dependent on the existence of the A-series, an inconsistent notion, the B-series too must be inconsistent.) "Our conclusion, then, is that neither time as a whole, nor the A series and B series, really exist."[2]

While McTaggart's radical conclusion has few supporters, the distinction between the A-series and the B-series and the alleged inconsistency in the A-series (henceforth known as "McTaggart's paradox") have become the basis of perhaps the most active debate in contemporary philosophy of time.

The Contemporary A- and B-Theories

McTaggart's work raises a host of fundamental questions. Is time real? Is change a necessary feature of time? Is change something that can be described statically, i.e., in terms of a B-series? Is the A-series consistent? Are properties of time like *past*, *present* and *future* ontologically dependent on properties like *before* and *after*, or vice versa? These questions certainly can't be answered entirely independently of one another. For example, if we hold that change is a necessary feature of time and that it cannot be accounted for by a static B-series description, we are likely to conclude that B-properties are ontologically dependent on A-properties. If we further hold that the A-series is contradictory, we are left with little choice but to conclude, like McTaggart, that time is unreal.

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[2]What then, if not the existence of an A-series or a B-series, is responsible for our perception of time? "It is possible. . ." says McTaggart, "that the realities which we perceive as events in a time-series do really form a non-temporal series. It is also possible, so far as we have yet gone, that they do not form such a series, and that they are in reality no more a series than they are temporal. But I think—though I have no room to go into the question here—that the former view. . . is the more probable."

While relatively few philosophers have gone so far as to question the reality of time (Spinoza, Kant, Hegel and Schopenhauer, according to McTaggart), the other questions have been more popular. The question of the ontological priority of A- and B-properties has gone on to receive the most direct attention, generating a major divide among philosophers of time between those who answer that A-properties are ontologically dependent on B-properties (A-theorists), and those who answer the opposite (B-theorists). Debate between A-theorists and B-theorists has become increasingly active in the last several decades, especially as alleged consequences of each view are identified in areas outside of philosophy (e.g. physics, psychology, and now linguistics). I will briefly examine the characteristic views of each group, consider how their answers to this question might influence and be influenced by their answers to the others, and highlight some of the main developments in the recent debate.

Like McTaggart, typical contemporary A-theorists hold that the temporal aspects of reality cannot be accounted for without the postulation of an A-series. (But unlike him, they maintain that the notion of an A-series is *not* inconsistent.) Typical contemporary B-theorists, on the other hand, hold that all aspects of reality can be accounted for by the existence of a B-series alone. Unlike McTaggart though, they maintain that the B-series is genuinely temporal yet not ontologically dependent on the A-series and, relatedly, that an account of time as a B-series *can* provide a satisfactory account of change.

For instance, B-theorists generally hold that all facts which appear to involve A-properties can be reduced to facts involving only B-properties: for example, *the meeting ended five hours ago* is reducible to *the end of the meeting is[-tenseless] five hours earlier than the time of this statement.* And according to the typical B-theorist (for example, Russell 1903), for something to change is simply for it to be in a certain state at one time and not in that state at a later time (LePoidevin 1998). The B-theorist's position is well-supported by McTaggart's paradox, the burden of resolving which is generally considered to fall on the A-theorist.

One response to the paradox from the A-theorists, due to A.N. Prior and sometimes called "taking tense seriously," is to claim that the tensed expressions which McTaggart claimed begin an infinite regress (e.g., "If it *is* present, it *has been* future and *will be* past") don't actually involve reference to past and future times, but are rather primitive and unanalyzable—true or false simply, not in virtue of facts about any series, temporal or otherwise. But B-theorists are rarely satisfied with this response: to deny tensed verbs their temporal meanings, thus relinquishing among other things so-called "truth value links,"[3] is perhaps to deny the central feature of tense.

Moreover, there is the alleged incompatibility of the A-theory of time with physics. According to special relativity, whether two events are observed to be simultaneous or not depends on the inertial (non-accelerated) reference frame in which the observation is made. For example, two spatially separated events e_1 and e_2 observed to be simultaneous by an observer O will be observed as non-simultaneous by another observer O′ moving at a high speed relative to O: if O′ is moving in the direction of e_2 away from e_1, he will observe e_1 to happen after e_2; if he is moving in the other direction, he will observe the opposite. If special relativity is true, argue some B-theorists, then there can be no such thing as absolute simultaneity (Sklar 1977, IV C), thus no objective facts about the A-properties of events (e_1 may be present for O and future for O′,

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[3]Ludlow (1999, p. 148):

> It can be held that there are important truth-value links between statements about the past and statements about the present, and that. . . A-theorists. . . must provide some alternative account of these links. For example, we routinely make inferences like (2).

> (2)
> I am hungry.
> ———————————————————
> Next Tuesday it will be the case that I was hungry.

> On a B-theory semantic theory. . . it is clear how this sort of inference can be made. If I am hungry now, then there is a time $t =$ now such that I am hungry at t. But then for any date t' later than t it will be true at t' that I was hungry. Since next Tuesday is later than t, next Tuesday it will be true that I was hungry.
> The A-theorist, on the other hand, will need to articulate alternative. . . truth-value links that can be drawn on for these inferences.

or present for O′ and past for O), and hence no objective facts about the A-series (Markosian 2009). Since special relativity is well-confirmed (Sklar 1977, IV B), charge the B-theorists, the A-theory is untenable.[4]

The small but not insignificant group of A-theorists who deny reality to past or future events (or both) face an especially serious challenge in light of this objection. "Growing universe theorists" like C. D. Broad, who deny reality to the future while maintaining the reality of the past and present, are faced with "the relativization of existence"—that what exists at a given time is relative to the inertial reference frame with respect to which existence is being determined—a decidedly extreme view. "Presentists" like A. N. Prior, William Lane Craig and Peter Ludlow, who deny reality to both past and future events, face a yet more extreme version of the relativization of existence, to which they have responded in a variety of ways. (Prior denies special relativity, Craig promotes a reinterpretation of the theory which doesn't entail the loss of absolute simultaneity, and Ludlow accepts the relativization of existence.)

Physical considerations aside, defenses of the A-theory, often formulated as charges of inadequacy against the B-theory, have frequently involved appeals to semantic phenomena. Consider a now-standard objection to the B-theory due to Prior (1959). Prior argues that the content of a statement like "Thank goodness that's over," uttered upon the conclusion of something unpleasant, is impossible to convey using only B-series facts. According to Prior, to do so would be to give it a meaning like *Thank goodness the date of the culmination of that thing is Friday, June 15, 1954*, a fact about which the utterer could be totally impartial—if it was ever true, it was always true—yet we "thank goodness" only when such culminations become *present*. According to the A-theorist, the postulation of an A-series is necessary to characterize the content of this and other tensed utterances.

B-theorists have offered two main responses to Prior's objection. The first, typically associated with Hans Reichenbach, Michael Dummett and D. C. Williams (among others), is to adopt a so-called "token-reflexive" theory of meaning in which the meaning of any temporal indexical expression ("now," "soon," tensed verbs, etc.) makes reference to the utterance event itself. For example (assuming a truth-conditional theory of meaning), an utterance u of "That's over" is true iff *that culminates[-tenseless] at some time earlier than the time of u.* The presence of u in the truth conditions for temporal indexical sentences is supposed to distinguish their meanings from those of non-indexical sentences (e.g., an utterance u of "The date of the culmination of that thing is Friday, June 15, 1954" is true iff *the date of the culmination of that thing is[-tenseless] Friday, June 15, 1954*). While an utterer might be completely indifferent about the second fact, the argument goes, he may not be about the first.

A-theorists, however, have noted that a token-reflexive semantics gives counterintuitive meanings to certain modal expressions about utterances. For instance, a token-reflexive semantics will never allow an utterance of "There are no utterances" to be true: an utterance u at time t of "There are no utterances" is true iff *there are no utterances at time t, the time of utterance u.* Since the truth conditions here can never obtain, then the sentence is necessarily false; but, A-theorists argue, it shouldn't be: it is intuitively possible that there were never any utterances (for example, if no creatures capable of verbal expression ever evolved). Importantly, this objection presumes certain theses about the nature of truth-bearing objects (statements like "There are no utterances"): namely, that they would exist and bear truth (or not) even in a world without utterances. For most linguistic semanticists, this is an unreasonable assumption (for reasons to be explored in Chapter 3), and the token-reflexive approach is satisfactory.

But the assumption that truth and truth-bearing objects exist independently of utterances is not so unreasonable in philosophy, where the B-theorists' next response, sometimes called "the new B-theory" and prompted largely by the above objection,[5] is to admit "that tense is indispensable, and that indeed we rely on it to explain our actions" (Ludlow 1999, p. 95, characterizing the views in Mellor 1981), but maintain that

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[4]Despite Sklar's (1987) demonstration that this argument presupposes certain metaphysical theses, this argument is widely accepted among B-theorists and scientists alike.

[5]Though there is another objection, adopted by Ludlow (1999), due to Yourgrau (1987, note 21):

> The Kaplan-Perry rule for 'now', if put precisely, would be: "For all times t and speakers s, if s employs 'now' correctly at t, he refers to t." Now a rule is no good unless you can use it, but, if you try to employ this rule, it becomes obvious that, in grasping it, you get a handle not on any particular time, but only on a universal

tense is an exclusively psychological phenomenon—not semantic, and not metaphysical. According to this view, "The date of the culmination of that thing is Friday, June 15, 1954" and "That's over" have identical meanings, corresponding to identical facts about the world, but knowing or believing one can still have very different effects on our experience and behavior from knowing or believing the other. The differences, argue the new B-theorists (who include D. H. Mellor, Murray McBeath, Nathan Oaklander, David Lewis and Robin LePoidevin) ought to be explained in a theory of, e.g., belief and knowledge, in psychology perhaps, and ignored by semanticists and metaphysicians both.

While this position is now the standard among B-theorist philosophers, the "old" B-theory position still characterizes much of contemporary semantics, where the meanings of expressions either directly or indirectly make reference to an utterance event. For example, it is fairly typical to render the meaning of an utterance as a function both of the meanings of its constituent words and of certain elements of its context (Heim, 2004):

> [[I'm hungry now]](w, t, x) = True iff x is tired at time t in world w (where w is the world in which the utterance takes place, t is the time of the utterance, and x is the utterer)

Whether or not approaches like this are ultimately acceptable in light of the A-theorists' modal objection depends on whether truth-bearers (utterances, sentences, propositions, etc.) and the various truth-related properties which hold of them are human-dependent, supervenient on language-related properties of the human brain, or human-independent, supervenient on much more general properties of the world, or even of other possible worlds. Among linguists, it is typical to adopt the former view, according to which semantic (and linguistic) objects and properties are completely dependent upon the brains and minds of actual human speakers. On the other hand, philosophers more readily accept the existence of human-independent semantic (and linguistic) entities like propositions and truth. As we will see, disagreement between linguists and philosophers about this and related questions is symptomatic of a larger conflict between linguistics and philosophy.

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conditional on times (and speakers). The problem is that to use the rule to get to a time you must instantiate the universal quantifier, but, to accomplish this instantiation, you must already have a particular time t in mind. But how do you get to have it in mind? By describing it (e.g., as Saturday, 10:00 A.M.)? (This is vigorously denied by Kaplan and Perry.) By taking t to be the present moment-i.e., now? (This is circular; it is the rule itself that was supposed to show how we use 'now' to get to a particular time.) It seems, rather, that Kaplan and Perry have mistaken a necessary constraint on a mode of designation for a particular use of 'now' (that if 'now' is used at t, the mode of designation should determine t) for the mode of designation itself.

One way around this could be to incorporate a more forcefully "demonstrative" expression into the truth conditions:

"That's over" is true iff that culminated at time t earlier than this very utterance

"The meeting starts now" is true iff the meeting starts at the time of this very utterance

But, Ludlow objects, if "this utterance" is a genuine demonstrative, then it should technically refer to the statement of the axiom itself, and if it's not, "then it is not clear how the token-reflexive theorem can be generated" in the first place (p. 90).

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Chapter 3: Externalism and Internalism about Language and Meaning & Ludlow's Auxiliary Hypotheses

For philosophers, the presumption that such entities and properties as propositions and truth have a human-independent existence is not entirely implausible or unjustifiable given the goals of philosophy: to explore these concepts (especially truth) and others (e.g., necessity and possibility) in a more or less universal and abstract way. But for linguists, the assumption has simply not been necessary. In fact, the opposing view—that meaning, truth, and other semantic entities and properties are human-dependent—has been instrumental in shaping the goals and methodology of linguistics as a science.

Language Internalism and Language Externalism

The question whether language is a mental system, completely internal to the minds of its speakers, or a kind of social or mathematical or "Platonic" object, completely or partially external to minds and speakers, has played a crucial role in attempts to establish linguistics as a science. For many linguists, it is the internalist doctrine endorsed by Chomsky with its conception of language as a phenomenon supervenient on the brain— a physical, chemical and biological system as concrete as any studied by other natural sciences—that secures the place of linguistics among the rest of the sciences.

Chomsky (1986) noted that many popular approaches to the study of language took language to be a system or entity independent of the properties of the "mind/brain"[6] of an individual speaker. Saussurean structuralists, for example, considered a language to be a system of sounds and an associated system of concepts (Saussure 1986); Leonard Bloomfield considered a language to be the totality of utterances that can be made in a speech community (Bloomfield 1926); and David Lewis defined a language as a pairing of sentences and meanings (the latter taken to be set-theoretic constructions in terms of possible worlds) (Lewis 1975) (Chomsky 1986, p. 19). To the extent that each of these technical concepts is defined independently of the internal states of an individual speaker's mind, Chomsky considers them to be instances of "externalized" language (E-language). I will call the view that languages are external in this sense *language externalism.*

Chomsky (1986) argued for a major shift in the scientific study of language from E-language to I-language ("internalized language"); a shift "from actual or potential behavior and the products of behavior to the system of knowledge that underlies the use and understanding of language. . . from the study of language regarded as an externalized object to the study of the system of knowledge attained and internally represented in the mind/brain" (p. 24). (I will call the view that languages are internal in this sense can be called *language internalism.*) Chomsky considers the shift from language externalism to language internalism to be a shift toward "realism" and the eventual incorporation of linguistics into the rest of the natural sciences:

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[6]Chomsky presumes that talk about the mind is simply, or can safely be assumed to be, talk about the brain at a certain level of abstraction. This controversial issue will not be explored here.

The technical concept of E-language is a dubious one in at least two respects. In the first place...languages in this sense are not real-world objects, but are artificial, somewhat arbitrary, and perhaps not very interesting constructs. In contrast, the steady state of knowledge [of language] attained and the initial state [of the mind/brain]...are real elements of particular mind/brains, aspects of the physical world, where we understand mental states and representations to be physically encoded in some manner...Statements about I-language...are true or false statements about something real and definite, about actual states of the mind/brain and their components...[T]heories of I-languages...are on a par with scientific theories in other domains; theories of E-languages, if sensible at all, have some different and more obscure status because there is no corresponding real-world object. Linguistics, conceived as the study of I-language...becomes part of psychology, ultimately biology. (pp. 26-27)

This approach to the study of language was widely accepted as Chomsky's views gained influence throughout the latter half of the 20th century and remains the dominant paradigm in contemporary linguistics.

Semantic Externalism and Semantic Internalism

The internalist approach to the study of language has consequences for semantics. Chomsky (1986) argued that since I-language is the only scientifically suitable object of study for linguistics, semantics as the study of the relations between language and the mind-external world has no place in linguistics:

The scope of the shift to a mentalist or conceptualist interpretation, to internalized rather than externalized language...also includes much of what is misleadingly called "the semantics of natural language"...One can speak of "reference"...with some intelligibility if one postulates a domain of mental objects associated with formal entities of language by a relation with many of the properties of reference, but all of this is internal to the theory of mental representations; it is a form of syntax. There seems no obvious sense in populating the extra-mental world with corresponding entities, nor any empirical consequence or gain in explanatory force in doing so. (pp. 44-45)

According to Chomsky, since language is internal to the mind/brain, and meaning is simply a component of language, then meaning must therefore also be internal. For the same reasons that an internalist conception of language anchors linguistics among the natural sciences, so does an internalist approach to the study of meaning ensure its status as science and not just speculation. This view, which I will call *semantic internalism*, contrasts with most of philosophical semantics, in which semantic objects and properties are taken to be human-independent. (I will call this latter view *semantic externalism*.)

Semantic externalism has been energetically defended by a number of philosophers. For example, philosophers like Dretske, Fodor, and Putnam have argued that relations between words and the physical world must be taken into account in order to determine the meanings of expressions (Bezuidenhout 2008).

In the famous "Twin Earth" thought experiment, Putnam (1973, 1975) asks the reader to follow his or her intuitions about reference to the conclusion that changes in the world unaccompanied by any change in the internal state of the mind/brain of the speaker must change the meaning of an expression. The argument is roughly as follows: imagine another planet, Twin Earth, which is exacly like Earth in all respects except for the fact that what we call "water" on Earth—that is, the substance with the chemical makeup H_2O—has a different makeup, X_YZ, on Twin Earth. Twin-Earthlings, however, since the planets are alike in every other respect, nonetheless call the substance "water," use it in all the same ways, etc. Additionally, imagine that both Earth and Twin Earth are at a period in their histories where the the chemical composition of what each community calls "water" has not yet been discovered. Now imagine Earth-Bob and his Twin

Earth analog, Twin-Earth-Bob, each making an utterance about water. They are both in the same mental state—H_2O and X_YZ have precisely the same role in each of their lives, and their knowledge about each substance is identical—yet nevertheless, the semantic externalist argues, their utterances refer to different substances and therefore have different meanings.[7] The semantic externalist concludes that "to determine the semantic properties of words, we have to take account of the external, causal relations that hold between words and the world" (Bezuidenhout 2008).

Additionally, Putnam and Burge have argued not only that facts about the physical world external to the mind play a role in determining meaning, but further that social relations are crucial. For example, Putnam (1975) argues that the words "elm" and "beech" may mean two different things to me, though I may not have any knowledge of the difference on any level; that is, "elm" and "beech" may both invoke the same complex of properties in my mind—being a deciduous tree of a certain size, growing in a certain climate, etc.—but nevertheless have different meanings. In this case, social externalists argue, speakers must defer to other members of the language community, ones with more specialized knowledge (e.g., botanists), to fully determine the meanings of "elm" and "beech," and so in general the meanings of words depend on social factors independent of the mental states of a given speaker.

While these claims and others by semantic externalists have engendered considerable debate in philosophy, where they are considered part of a larger debate about the status of "mental content" (Lau 2008), in linguistics, where internalism remains pervasive, only a few vigorous defenders of the internalist paradigm have paid them much attention. But for philosophers with deep interests in linguistics like Peter Ludlow, the conflict takes on a central role.

Language Internalism vs. Semantic Externalism

Given the two distinctions above, we can envision four distinct views about the nature of language and meaning: one can be a Chomskyan internalist, holding that all aspects of language, including meaning, are internal; one can be a philosophical externalist, holding, like David Lewis, that linguistic expressions and their meanings both are external; or one can have a hybrid view, holding that either expressions are external while meanings are internal, or that expressions are internal while meanings are external. Though all four views are possible in principle, the hybrid views appear less plausible prima facie. First, coupling language externalism with semantic internalism seems absurd: if meaning is a component or attribute of language, then if language is external, so must be meaning. Language internalism and semantic externalism also appear prima facie incompatible (Ludlow 2003):

> The properties of an I-language are therefore (on Chomsky's view) individualistic. . . they are properties that hold of the agent in isolation, like having a particular genetic makeup. The properties of [an externalist] semantics, on the other hand, appear to be anything but individualistic. They are not properties that an agent can have in isolation, since they express relations between linguistic representations and, among other things, aspects of the world external to the agent.

In other words, if meaning is a component or attribute of language, then if language is internal, so must be meaning. For this reason, externalist approaches to semantics are generally rejected by linguists who subscribe to Chomskyan internalism. Most notably, Chomsky himself has argued extensively against semantic externalism in linguistics (Chomsky 1986, 1990(a), 1990(b), 1993, 1995, 2000) (we will examine some of these arguments shortly).

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[7]Chomsky (2000) has responded to this argument by claiming that if Earth-Bob and Twin-Earth-Bob switched places, without being aware of it, nothing would change—nothing would change about their behavior, about the behavior of others toward them, etc.—and thus that there is no reason to presume that when Earth-Bob and Twin-Earth-Bob utter "water" they mean anything different at all. Chomsky also notes that since the notion of reference or extension about which we are asked to follow our intuitions are technical notions, it makes little sense to ask about our "intuitions" about them—about as much sense as it makes for a physicist to ask about our intuitions about the technical concept energy or temperature in physics.

Ludlow's Auxiliary Hypotheses

Semantic inquiry is indispensable in linguistics and philosophy alike, but for different reasons. Internalist semantic inquiry provides scientific grounding to linguistic questions about meaning; externalist semantic inquiry provides philosophers with a framework in which fascinating questions about the universal nature of truth and other semantic properties can be investigated freely. The resulting landscape is one in which internalist linguists and externalist philosophers who share an interest in precisely the same questions ("What do temporal indexicals mean?" "What is the proper semantics for tense?") are engaged in mutually incompatible inquiries. This troubles Ludlow (2003), who sets out to reconcile the two approaches by means of the metaphysical view resulting from the same two auxiliary hypotheses that facilitate his resolution of McTaggart's paradox. I will examine these hypotheses first as a response to the conflict between internalism and externalism, and later as a crucial part of Ludlow's defense of the A-theory.

Ludlow attempts to dissolve the incompatibilities between internalist and externalist theories of language by collapsing the realm of the internal—the mental world in which Chomskyan internalists believe language and meaning are to be found—and the realm of the external—the extra-mental world in which externalist philosophers believe language and meaning reside—into one realm. Following Kant, he accomplishes this by adopting the philosophical thesis according to which the nature of the external is completely dependent upon the internal. Setting aside the question of whether it is actually compatible with Kant's philosophy, let's look at this, the first and most overtly metaphysical of Ludlow's two auxiliary hypotheses. Ludlow claims that, in general, the nature of reality cannot be discovered without some investigation into the nature of thought:

> We can never know things as they are "in themselves," since the mind is actively involved in organizing our experience. The best we can do is elucidate the categories or structure of reason. For example, according to Kant, time was not itself a property of things in themselves; rather, it was imposed upon our experience by the mind. Of course, from this perspective, it would be futile to begin an investigation into the nature of time apart from a consideration of the nature of thought or reason. And indeed, after an investigation into the nature of time as a category of human reason had taken place, there would be little left to do in the way of metaphysics, save perhaps to dot the i's and cross the t's. (p. 4)

In other words, according to Ludlow, metaphysical questions (including the question of the relative priority of the A- and B-series) can be resolved simply by examining the nature of human thought.

Ludlow's second auxiliary hypothesis is an attempt to establish the proposal that "thought is inherently linguistic in nature" and "thus...the proper starting place for [metaphysical] investigation should be the language in which we think" (p. 4). But what exactly is the language of thought, and how is it related to the languages we speak? Following Chomsky (1986), Ludlow makes the distinction between I-language and E-language, arguing, following Chomsky, that E-languages cannot be individuated as "natural objects," and thus that language is a fundamentally internal phenomenon (§1.1). Ludlow thus explicity adopts the language internalist position.

Ludlow then suggests that although the standard view is that language is primarily for communication, given that I-language is a biological endowment like any other, any claims about its purpose are subject to the same controversy that surrounds the "doctrine" of teleological explanation in evolutionary theory—so even if we discover all the details about some function of language, we still can't know for sure what its other or original purposes are (§1.2). This lays the groundwork for the possibility that one of the functions, perhaps the primary function, of language is to serve as the mechanism of thought. Despite its central role in his project, Ludlow offers no argument for this thesis, but for the sake of argument, I'll assume it's true.

Now, what exactly about the language of thought determines the nature of reality? Fundamental aspects of its syntax? The computational principles with which it is implemented? Ludlow assumes that the aspects

of language relevant to substantive conclusions about the nature of thought (and thus the nature of reality) are *semantic*:

> It is only through the theory of meaning that we are able to differentiate the elements of our ontology. . . [C]oncrete questions about the nature of reality can be illuminated by what we know about semantic theory, and. . . important questions in semantic theory may be adjudicated by certain of our metaphysical intuitions about the constitution of reality. (p. 5)

In other words, we can reach metaphysical conclusions simply by examining the semantics of natural language.

Although Ludlow (1999) uses these hypotheses to establish only the connection between temporal language and temporal reality—his primary goals are to give a semantics of temporal indexicality and to resolve McTaggart's paradox—the hypotheses together establish a much stronger connection: not just between temporal language and temporal reality, but between all aspects of language and all aspects of reality. As we will see, it is this stronger claim which facilitates Ludlow's (2003) extension of his (1999) project.

"To Be Is To Be a Semantic Value"

While there is a good amount of controversy over the the hypothesis that I-language is the language of thought, the hypothesis that the nature of reality is dependent on the nature of the mind is the basic tenet of idealism, which has a long and rich history—and some significant controversy, which we'll get to later—of its own.

To exactly what extent does the nature of reality depend on the nature of the mind? There are many possible answers to this question, ranging from "completely" to "partially," that fall under the idealist heading. The sort of idealism characterized by the first answer I will call "ontological idealism" ("ontological" because the claim applies to everything that exists), and the second answer, though characteristic of a variety of views, was most famously elaborated by Kant in his arguments for what is called "transcendental idealism" ("transcendental" because knowledge about the nature of the mind in some sense transcends knowledge about external reality).

Kant (1999) argued that not all of reality depends on the nature of the mind—there are some aspects of reality that are totally mind-independent—but that two of the most basic features of our experience of reality, time and space, are completely generated by the mind. That is, the entities and substances that populate the world have a genuine, mind-independent reality, but their spatiality and temporality—their appearing to us as embedded in space and time—are imposed on them by the mind.

At first, Ludlow appears to adopt transcendental idealism:

> . . . The general idea is broadly Kantian in character. . . . according to Kant, time was not itself a property of things in themselves; rather, it was imposed upon our experience by the mind. . . (p. 4)

But in presenting his theory (e.g., in §4.1), having already presumed the identity of thought and I-language, he explicitly adopts a much stronger view:

> I have suggested that metaphysical consequences can be drawn from semantic theory, but I have said little about *what* features of the semantic theory give rise to metaphysical commitments. The short answer to the question is that we will be committed to whatever objects

serve as semantic values in a correct T-theory [truth-conditional semantic theory] for natural language. . . For example. . .

   (1′) For all x, Val(x, snow) iff x = snow
   . . . (1′) commits us to the existence of snow. . .

   A fairly straightforward claim can be made about the ontological commitments of semantic theories of the form discussed in this book. It is, with apologies to Quine (1953), that *to be is to be a semantic value.*

In other words, it is not just semantic axioms and theorems relating to time and space that have metaphysical consequences, but axioms and theorems about snow and all other types of ordinary substances and entities. Since these axioms directly reflect the nature of reality, by Ludlow's second auxiliary hypothesis, then the nature of snow and all other types of ordinary substances and entities depends upon the nature of the mind—the central claim of ontological idealism.

In order to resolve McTaggart's paradox, transcendental idealism would have been sufficient—as we will see, all that is needed is for semantic values relating to time and space, or perhaps just time, to carry metaphysical commitments. But Ludlow, motivated not only to make presentism consistent, but also to reconcile language internalism with semantic externalism, adopts the stronger view.

Ludlow's Reconciliation of Language Internalism and Semantic Externalism

Ludlow (2003) presents his two auxiliary hypotheses as a response to three of Chomsky's arguments against semantic externalism, hoping to render the arguments ineffective and take the first step toward reconciling the conflict between semantic externalism and language internalism. I will briefly summarize the three arguments—which are all attempts to show that a naïve externalist semantics of the sort commonly seen in philosophy (c.f. Burge & Putnam, above), which gives every expression a referent in the external world, forces us to grant existence to things that clearly don't exist—as they are viewed by Ludlow, and then go on to discuss the apparent resolution that Ludlow's hypotheses provide.

- **The Argument from Implausible Commitments.**   Chomsky first argues that many of the entities required to populate the ontology of a given semantic theory seem manifestly implausible:

    If I say "the flaw in the argument is obvious, but it escaped John's attention," I am not committed to the absurd view that among things in the world are flaws, one of them in the argument in question. Nevertheless, the NP *the flaw in the argument* behaves in all relevant respects in the manner of the truly referential expression *the coat in the closet.* (Chomsky 1981, quoted in Ludlow 2003)

  In other words, an externalist semantics "allegedly commits us to things that we would never acknowledge as existing" (Ludlow 2003 p. 146).

- **The Type Mismatch Argument.**   Chomsky (1995) contends that any externalist semantics which utilizes physical substances or objects as the referents of linguistic expressions "commits us to types of things which are different from the types of things that we ordinarily suppose we are talking about" (Ludlow 2003, p. 246). A typical example centers on what we call "water" and whether or not it is identical to the physical substance H_2O. If we suppose that the word "water" refers directly to H_2O, we find that what it appears we are talking about based upon our use of language doesn't "match up right" with the physical substance: for example, we call the stuff in the Hudson River "water" even though it could hardly be considered H_2O, and there are many substances which chemically approximate H_2O much more closely than the stuff in the Hudson River, like iced tea, but we don't call them "water."

Similarly, if someone added tea leaves to an entire city's water supply so that what came out of sink faucets was chemically identical to iced tea, we would still call it "water." Thus, the argument goes, the sort of thing that the word "water" refers to seems to be unlike any physical substance.

- **The Misbehaving Object Argument.** According to this argument (attributed by Ludlow to Chomsky 1975), the apparent referents of expressions don't line up properly *in time* with physical substances. For instance, "[s]omething may cease to be water even if no internal physical changes have taken place. For example, the same chemical compound [iced tea] is water when it comes from the tap, but ceases to be water when it is served at a restaurant" (Ludlow 2003, p. 150). Such substances "are so unruly that it is wildly implausible to suppose that they could have any counterparts in the physical world. Hence they have no counterparts that a referential [externalist] semantics could utilize as their referents" (Ludlow 2003, pp. 150-151).

These arguments can be taken together as an objection to the sort of naïve externalist semantics that requires every linguistic expression to have a referent in the external (physical) world. According to Ludlow, however, what Chomsky expresses an objection to here is not the thesis that the referents of I-language expressions are part of the external (physical) world, but rather the presumption that the external (physical) world is isomorphic to the set of semantic values: what Ludlow calls the "language/world isomorphism" hypothesis (LWI).

Ludlow's "to be is to be a semantic value" thesis is one form of LWI: if everything which is the semantic value of some expression is real, then the set of semantic values is isomorphic to at least some subset of the world—but not necessarily the entire world. Let's call this one-way claim the "weak" LWI hypothesis. In Appendix P2 (1999) and in "Referential Semantics for I-Languages?" (2003), Ludlow declares that the connection between reality and language is not restricted to the one-way claim that whatever appears in a semantic theory as the semantic value of an expression must be real, arguing further for a strict isomorphism between language and the *entire* world—in other words, for the two-way claim that anything appearing as the semantic value of some expression must be real *and* anything real must appear as the semantic value of some expression. Let's refer to this latter claim, that the set of semantic values is isomorphic to the set of things in the world, as the "strong" LWI hypothesis.

Both hypotheses, when combined with Ludlow's additional claim that I-language is the langauge of thought, result in some form of idealism. The strong LWI hypothesis, when combined, yields ontological idealism, or idealism about everything, while the weak LWI hypothesis yields some form of partial idealism (perhaps along the lines of Kantian transcendental idealism, but perhaps not).

As Ludlow (2003) demonstrates, Chomsky's arguments challenge not LWI alone, but rather the combination of LWI with the presumption that the world is populated by the things that science postulates—i.e., matter and forces, etc., and not flaws, or water that becomes non-water when it is served at a restaurant (iced tea). Ludlow argues that strong LWI can be maintained alongside externalist semantics as long as the world is not populated with such entities, but rather with the very things that would appear as the semantic values of I-language expressions (i.e., implausible, non-physical, misbehaving objects). This redefinition of "the world" as dependent upon the mind dissolves the basis for Chomsky's objection to semantic externalism: forget about the imperative to utilize physical objects and substances as the referents of semantic expressions, in other words, "the sort of stuff that would play a role in a physical theory" (Ludlow 2003, p. 149), and simply allow all the implausible objects (flaws, water that has different physical properties in different circumstances, etc.) into our ontology. "They are clearly not logically absurd entities," says Ludlow, "and it need not be conceded that they are particularly odd entities. In the case of flaws, at least, one might say that they are altogether common in the arguments one runs across, and one might wonder why they should be considered any less real than, say, tables and chairs" (2003, pp. 152-153).

And this is Ludlow's resolution of the internalist/externalist conflict: everything to which language appears to refer exists, no matter whether it is granted existence by physics or any other scientific theory. In other words, Ludlow rejects scientific realism—the view that "physical theory gets to say what's real" (Ludlow 2003, p. 153):

16

But why should we make the assumption that...if we are to have a genuine referential semantics in which the referents are "real" existing entities, then we are stuck with the kinds of entities and substances posited by physical theory[?]...[T]his...makes a strong assumption about scientific realism—one which is controversial to say the least, and most likely false, in my view.

There is a great deal of literature in the philosophy of science (for example van Fraassen 1980) which holds that the entities which science posits do not exist in the same sense as mid-sized, earth-bound objects like tables and chairs. Pursuing this line of thinking, we might say that scientific theories, despite their great interest and utility, are not the arbiters of what is real.

...If we set aside the exclusive claims of the physical sciences on our ontology..., then we may well find that [allegedly implausible] substances are entirely plausible candidates for the referents of a semantic theory. (p. 153)

If the world is full of such substances, then language internalism and semantic externalism are compatible: if the world is populated by entities that precisely reflect our use of language, then those entities can serve as the "external" referents of linguistic expressions which reside completely within the minds of speakers. By adopting strong LWI and therefore ontological idealism, thus rendering the set of real things isomorphic to the set of semantic values, Ludlow effectively collapses the internal and the external into one single domain. With the ontology of the world dependent on the ontology of I-language, internalists can continue doing semantics in what Chomsky suggested was the only scientific way—to treat it as a form of syntax, studying the relationships among certain mental representations—and semantic externalists can continue to operate under the assumption that factors in the "external world" are relevant to semantics. But inasmuch as the mental representations pertaining to meaning studied by language internalists are a direct reflection of external reality, meaning can be truly said to depend on factors external to the mind which houses those representations, and inasmuch as the external factors that semantic externalists claim play a role in determining meaning are a direct reflection of the internal mental representations of a speaker, they can be truly said to have their origin within the mind. Ludlow thus claims to reconcile—by means of the strong LWI hypothesis (the result of combining ontological idealism with the thesis that I-language is the language of thought) and its attendant rejection of scientific realism—this longstanding dispute, while preserving the two doctrines themselves. That presentism is compatible with these broader views, and that these views in fact facilitate Ludlow's demonstration of its consistency, is now just an added benefit. But the success of either project is dependent upon the consistency of his auxiliary hypotheses, which, as we will see in Chapter 5, is dubious.

Chapter 4: Ludlow's Resolution of McTaggart's Paradox

Ludlow's Strategy

Given the strong LWI hypothesis, there are two ways in which McTaggart's paradox can be resolved: either the problematic proposition ("X is past and X is present and X is future") can be proven noncontradictory—since the external world merely reflects the semantics of I-language, such a demonstration would also be a demonstration of the consistency of time itself—or the tensed version of it which McTaggart said launched an infinite regress ("X is past and X was present and X was future," or "X will be past and X is present and X was future," or "X will be past and X will be present and X is future") can be shown not to invoke time, thus avoiding McTaggart's "vicious circle."

Many A-theorists, including Ludlow's fellow presentist A. N. Prior, have pursued the second strategy, adopting the "taking tense seriously" approach mentioned earlier, according to which the tenses in the translation of the problematic proposition do not invoke times but are instead simple and unanalyzable primitives. Ludlow's approach is similar in essence, but instead of stipulating that tensed sentences are verifiable or falsifiable *simply* and not in terms of a temporal series, he provides a fully presentist account of the verification of tensed sentences according to which past- and future-tensed utterances are true or false in virtue of present facts alone, without reference to past or future times:

> (4) Dinosaurs roamed the Earth.
>
> We do not evaluate this sentence by imagining some time earlier than now and determining whether at that time (4) is true. Rather, we evaluate (4) by right now conducting the sort of investigation that is appropriate for past-tense statements like (4). (For example, we might study fossil records.) Likewise for any other past-tense statement. We have certain procedures for determining whether a past-tense proposition is true, and these procedures do not involve the evaluation of a proposition at some time past; rather, we simply evaluate the proposition in a particular way—a way which is independent of how we evaluate present-tense and future-tense propositions.
>
> Consider the future-tense proposition (5).
>
> (5) The economy will recover in the third quarter.
>
> Clearly we do not evaluate such a proposition by picking some time in the third quarter and determining whather it is true at that time that the economy is recovering. Rather, we evaluate it by studying the currently available economic data. Crucially, our evaluation of (5) can proceed without our ever attending to a corresponding present-tense proposition at some future time index. (Ludlow 1999, p. 99)

Since the past tense verbs refer not to past times but only to present states of affairs, Ludlow argues, reformulating the problematic sentence from McTaggart's paradox as a multiply-tensed conjunction (e.g., "X will be past and X is present and X was future") fails to launch McTaggart's infinite regress because its truth or falsehood, and therefore its meaning, can be stated in terms of present facts alone.

But Ludlow notes an insufficiency in this account: how are we to differentiate two past-tense claims from each other, or two future-tense ones from each other (e.g., "X was present and X was future" or "X will be present and X will be past")? What keeps "X was present" from contradicting "X was future"? In other words, how can "taking tense seriously" differentiate between what McTaggart called "the far past" and "the near past," and between "the near future" and "the far future"?

To solve this problem, Ludlow proposes that every tensed sentence is accompanied by an implicit "temporal adjunct clause" which serves to *nonreferentially* describe the circumstances of its truth:
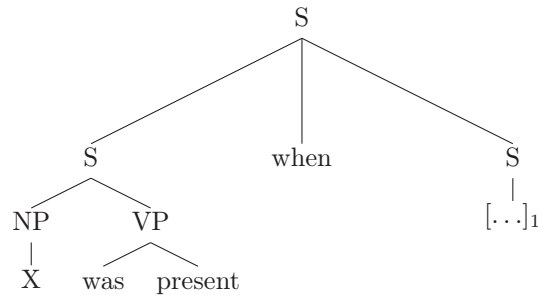
"X was present [when [. . .]$_1$]" is true iff X was present when [. . .]$_1$[8]

Without reference to time, such adjunct clauses ([. . .]) "generally" and "denotatively" establish the distinct circumstances surrounding the truth of the main clause, serving to render "X was present" compatible with "X was future" via the distinct contents of their implicit temporal adjunct clauses:
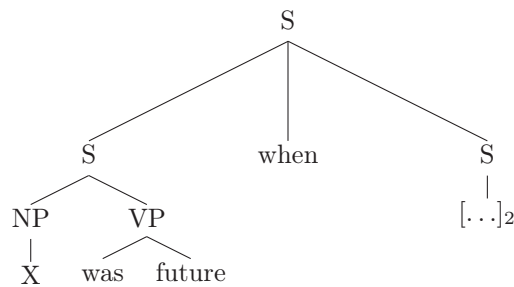
"X was future [when [. . .]$_2$]" is true iff X was present when [. . .]$_2$

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[8]Ludlow presents his theory with ternary branching trees, but notes that it can be converted to a system of exclusive binary branching if necessary:
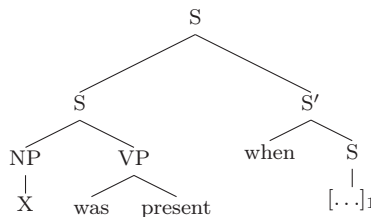
Since these two past-tense sentences have different "circumstances of truth" described by their implicit when-clauses, claims Ludlow, they can't contradict each other.

But how can temporal adjunct clauses establish "circumstances of truth" without invoking the past or future time at which the events described occur? Ludlow emphasizes two distinctions in establishing the nonreferentiality of his "general" and "denotative" temporal adjunct clauses:

- **Singular vs. general propositions.** Singular propositions are propositions about some particular object, e.g., "Bill is tall." General propositions aren't about anything in particular, but are rather general claims about the world, e.g., "No one lives forever." Ludlow's temporal adjunct clauses are supposed to be general propositions (or proposition-like objects).

- **Reference vs. denotation.** In cases of genuine reference, expressions refer directly to individuals: "Fred," "Jane." Denoting expressions instead uniquely determine their referents via description: "the the man who walked into the room," "the king of France." Denoting expressions may refer to a collection of properties that the some entity uniquely satisfies. Ludlow's temporal adjunct clauses are supposed to be denoting and not referring expressions.

On Ludlow's account, depending on the tense of the original sentence, temporal adjunct clauses can be introduced by one of three primitive and unanalyzable "temporal connectives," according to Ludlow: *when*, *before* or *after*. To see how temporal adjunct clauses work, let's take as an example the instance of McTaggart's paradox that Ludlow addresses. (We will see how *before* and *after* allow Ludlow's theory to account for the complex tenses later, but *when* is sufficient for this example.) Taking X to be a past event—Queen Anne's death—the paradox (more accurately, the contradictory sentence which generates the paradox) can be formulated as follows:

"Queen Anne's death is past and Queen Anne's death was present and Queen Anne's death was future."

Ludlow's theory of implicit temporal adjunct clauses ascribes to it the following structure and truth conditions (assuming some mechanism for picking out suitable contents for the implicit adjunct clauses)[9]:

"Queen Anne's death is past [when I am writing this] and Queen Anne's death was present [when Queen Anne's heart stopped beating] and Queen Anne's death was future [when Queen Anne was born]."

---
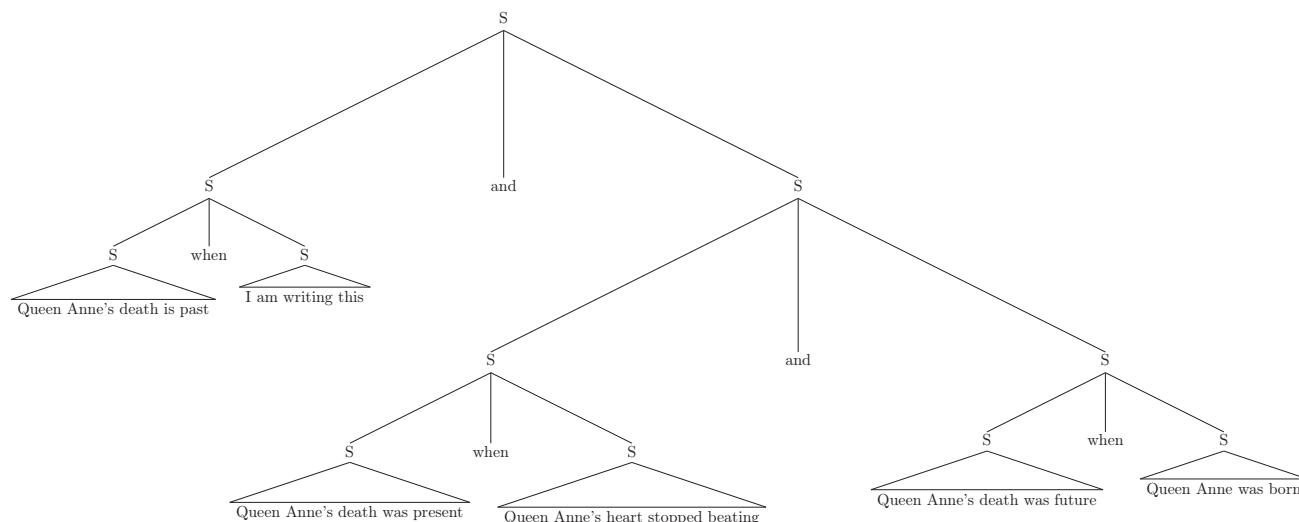
[9]Ludlow provides no such mechanism, nor examples of suitable contents; I have chosen the contents here in keeping with the rest of his theory.

"Queen Anne's death is past [when I am writing this] and Queen Anne's death was present [when Queen Anne's heart stopped beating] and Queen Anne's death was future [when Queen Anne was born]" is true iff Queen Anne's death is past *when* I am writing this and Queen Anne's death was present *when* Queen Anne's heart stopped beating and Queen Anne's death was future *when* Queen Anne was born.

According to Ludlow's semantics, the truth conditions for each of the three tensed sentences, now with their implicit temporal adjunct clauses displayed, are sufficiently distinct to establish the compatibility of the three conjuncts. In other words, the differing contents of the hidden temporal adjunct clauses are sufficient to perform the differentiating function that reference to specific times did in the response McTaggart anticipated, but without reference to past or future times.

Crucially, Ludlow notes, "*when* cannot mean 'at the same time'; it must be taken as a kind of primitive... [it] must be understood as being more fundamental than the B-series conception of simultaneity" (p. 112), lest Ludlow's entire metaphysics be resting on B-theoretical foundations, or invoke a temporal series and launch the infinite regress. This definition of *when* is of central importance to Ludlow's project; whether or not it is legitimate will be explored later. First, I will examine some of the aspects of temporal adjunct clauses for which Ludlow actually does provide a significant amount of technical detail.

E-type Temporal Anaphora

How are the contents of hidden temporal adjunct clauses determined? Motivated in part by this question and in part by apparent inadequacies in a simple operator account of tense, Ludlow acknowledges the empirical need for something like temporal anaphora in his semantics. But since straightforward temporal anaphora requires reference to past and future events, Ludlow adopts the paradigm of nonreferential E-type anaphora from previous linguistic work on the semantics of pronouns.

In the E-type approach to pronominal anaphora, a pronoun, rather than referring directly to the referent of the noun with which it is coindexed, is treated as "standing proxy for" a definite description. The E-type approach was developed in response to so-called "donkey sentences," the meanings of which appear impossible to give under a traditional coreference account of pronouns. Take the original donkey sentence, for example (Geach 1962):

"Every man who owns a donkey beats it."

Taking "every man" as a universally quantified noun phrase and "a donkey" as an existentially quantified one, we get the following logical form:

$\forall x \exists y [(x$ *is a man* $\&$ *y is a donkey* $\&$ *x owns y*$) \rightarrow x$ *beats y*$]$

But the meaning of this is something like 'for every man there is some object y which satisfies the conditional *if y is a donkey and x owns y then the man beats y*'. But if there is an object in the world which is either not a donkey or not owned by the man or both, then it will satisfy the conditional and make the whole sentence true. This clearly doesn't capture its intended meaning.

The solution proposed by Evans (1977), called the "E-type" approach, is to treat "it" above not as an existential quantifier but rather as a definite description in disguise. The logical form of the donkey sentence would then be something like the following:

$\forall x[(x \ is \ a \ man \ \& \ x \ owns \ a \ donkey) \rightarrow x \ beats \ the \ donkey \ he \ owns]$

Adopting the account of definite descriptions according to which the meaning of a definite description is not the individual which it eventually picks out but rather a set of properties which the intended individual uniquely satisfies, "the donkey he owns" refers not directly to the donkey, but to the set of properties *being a donkey* and *being owned by the man*. If a given individual satisfies these properties, then it becomes the referent of the E-type anaphoric pronoun.

Ludlow adopts this general framework for semantic contexts in which temporal anaphora appear to be necessary. Take an example from Partee (1986), hypothetically uttered by someone halfway down the turnpike on their way to work:

"I didn't turn off the stove."

On a typical approach in which both the tense and the negation are taken as operators that can have scope over one another and the past tense operator is taken as an existential quantifier over past times, the sentence has two interpretations, depending on which operator takes wider scope. If the past tense takes scope over the negation, the sentence means something like *There is a time in the past at which I did not turn off the stove.* This sentence is true in almost all circumstances—no one spends their entire life turning off a stove—but "I didn't turn off the stove" seems to be informative under only certain circumstances, e.g., while the utterer is halfway down the turnpike driving to work. If the negation takes scope over the past tense, the sentence means instead something like *It is not the case that at some time in the past I turned off the stove.* But most if not all people who can use this sentence informatively have turned off a stove at least once. Again, the quantifier approach gives this sentence too general a meaning.

Partee's solution is to replace the existential quantification over past times with a mechanism for picking out a specific reference time from context or previous discourse, much as pronouns pick out a specific individual from context or previous discourse (the reference time in this case would be the relevant moment or interval before the utterer left his or her home and started driving to work). Ludlow follows Partee in adopting an anaphoric strategy to solve this problem, but in order to make it consistent with his presentist metaphysics, adds the stipulation that all temporal anaphora must be E-type—that is, general, descriptive, and nonreferential. (Ludlow doesn't offer any details about the logical structure of his temporal adjunct clauses, but assuming the mechanism to be the same as or similar to that of E-type pronominal anaphora, the meaning of a clause like "when Queen Anne was born" would then be the set of properties that are uniquely satisfied by some aspect of the current state of affairs pertaining specifically to the truth of the tensed matrix clause.)

Whether instances of Ludlow's "E-type temporal anaphora" are genuinely E-type is questionable in light of some formal characteristics of the E-type pronominal anaphora to account for which the proposal in Evans (1977) was originally developed; I will return to this issue in Chapter 5.

Before and *After* and Complex Tenses

According to Ludlow's theory, hidden when-clauses account for crucial aspects of the meanings of simply tensed sentences like "I didn't turn off the stove." But what about sentences with so-called complex tenses, like "I had left the house (when it started raining)" or "She will have left (by the time I get there)"? Ludlow

discusses Reichenbach's (1947) proposal[10] at length, noting that the proposal, thoroughly B-theoretical, has been adopted by "legions of linguists in various traditions" (p. 78), but rejects it because it inevitably involves reference to past and future times. Ludlow instead introduces two more "primitive and unanalyzable" temporal connectives: *before* and *after*. In complexly-tensed sentences, he claims, the temporal adjunct clauses are not when-clauses, but before- and after-clauses:

"I had left the house [when it started raining]."

```
                        S
           ┌────────────┼────────────┐
           S          before          S
        ┌──┴──┐                     ┌──┴──┐
       NP     VP                   NP     VP
        │    ╱  ╲                   │    ╱  ╲
        I  left the house          it  started raining
```
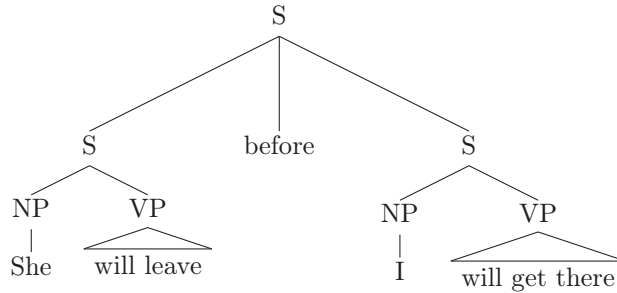
"She will have left [by the time I get there]."[11]

```
                        S
           ┌────────────┼────────────┐
           S          before          S
        ┌──┴──┐                     ┌──┴──┐
       NP     VP                   NP     VP
        │    ╱ ╲                    │    ╱  ╲
       She  will leave              I   will get there
```

<hr/>
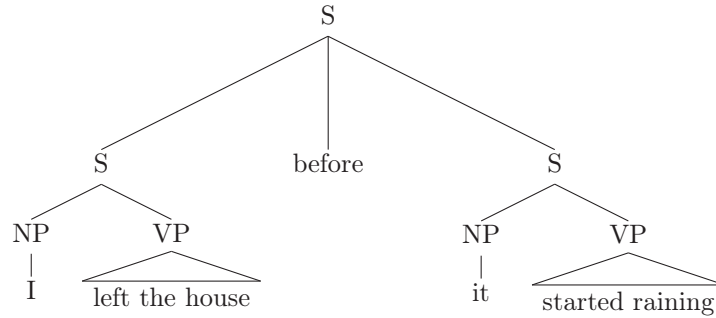
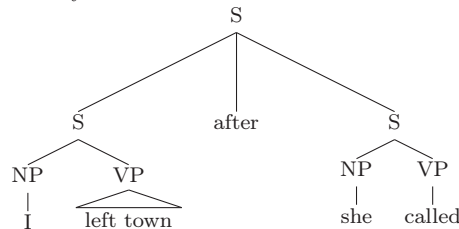[10]To account for complex tenses like past perfect and future perfect, the Reichenbach incorporated a context-supplied reference time, R (using Reichenbach's notation, S = speech time, E = event time). The following formulation is Ludlow's (§5.1) but captures Reichenbach's proposal adequately:

  Present: Val(True, "Fred is hungry", S, R, E) iff S=R and E overlaps with S/R and Fred is hungry at E

  Simple past: Val(True, "Fred was hungry", S, R, E) iff R=E and R/E is before S and Fred is hungry at R/E

  Present perfect: Val(True, "Fred has been hungry", S, R, E) iff S=R and E is before S/R and Fred is hungry at E

  Future: Val(True, "Fred will be hungry", S, R, E) iff R=E and R/E is after S and Fred is hungry at R/E

  Past perfect: Val(True, "Fred had been hungry", S, R, E) iff E is before R and R is before S and Fred is hungry at E

  Future perfect: Val(True, "Fred will have been hungry", S, R, E) iff E is after R and R is after S and Fred is hungry at E

[11]Complex tenses requiring the use of the temporal connective *after*, like so-called future-in-future or future-in-past, arguably don't appear grammatically in English, but would look something like the following if they did:
"I was (going to be) leaving town the next day when she called."

```
                        S
           ┌────────────┼────────────┐
           S           after          S
        ┌──┴──┐                     ┌──┴──┐
       NP     VP                   NP     VP
        │    ╱ ╲                    │      │
        I  left town               she   called
```

The truth conditions of such sentences are nearly identical to those of simply-tensed ones, but instead of *when* feature the primitive connectives *before* and *after*:

"I had left the house [when it started raining]" is true iff *I left the house before it started raining.*

"She will have left [by the time I get there]" is true iff *she will leave before I will get there.*

A Foundational Fragment

Before presenting Ludlow's syntax and semantics in detail, it will help to be familiar with his particular style of syntactic and semantic axiomatization. Let's introduce, in that style, the syntax and semantics for a very basic fragment of English, to which we can later add, and then perform an example derivation.

Syntax

S → S1 and S2

S → S1 or S2

S → it is not the case that S1

S → NP VP

NP → Dick, Sally

VP → leaps, walks

Semantics

Val(x, "Dick") iff x = Dick (where 'Val(x, y)' means 'x is the semantic value of y')

Val(x, "Sally") iff x = Sally

Val(e, "leaps") iff e is a leaping

Val(e, "walks") iff e is a walking

Val(True, [$_S$ NP VP]) iff, for some e, Val(e, VP) and for some x, Val(x, NP) and x is the agent of e

Val(x, [$_\alpha$ β]) iff Val(x, β), where α ranges over categories and β ranges over categories and lexical items

Val(True, [$_S$ S1 and S2]) iff Val(True, S1) and Val(True, S2)

Val(True, [$_S$ S1 or S2]) iff Val(True, S1) or Val(True, S2)

Val(True, [$_S$ it is not the case that S1]) iff it is not the case that Val(True, S1)

Example derivation

"Dick walks and it is not the case that Sally leaps."

```
                            S
            ┌───────────────┼───────────────┐
            S              and               S
        ┌───┴───┐                     ┌──────┴──────┐
       NP       VP                    │             S
        │        │                    │          ┌──┴──┐
      Dick     walks    it is not the case that  NP    VP
                                                  │     │
                                                Sally  leaps
```
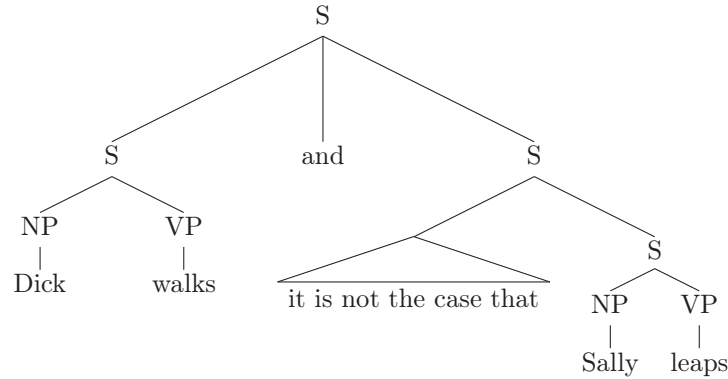
1. "Dick walks and it is not the case that Sally leaps" is true iff Val(True, [$_S$ [$_{NP}$ Dick] [$_{VP}$ walks]) and Val(True, [$_S$ it is not the case that [$_S$ [$_{NP}$ Sally] [$_{VP}$ leaps]]])

2. ... iff for some e_1, Val(e_1, [$_{VP}$ walks]) and for some x, Val(x, [$_{NP}$ Dick]) and x is the agent of e_1 and it is not the case that Val(True, [$_S$ [$_{NP}$ Sally] [$_{VP}$ leaps]])

3. ... iff for some e_1, Val(e_1, "walks") and for some x, Val(x, "Dick") and x is the agent of e_1 and it is not the case that for some e_2, Val(e_2, [$_{VP}$ leaps]) and for some y, Val(y, [$_{NP}$ Sally]) and y is the agent of e_2

4. ... iff for some e_1, e_1 is a walking and Dick is the agent of e_1 and it is not the case that for some e_2, Val(e_2, "leaps") and for some x, Val(x, "Sally") and x is the agent of e_2

5. ... iff for some e_1, e_1 is a walking and Dick is the agent of e_1 and it is not the case that for some e_2, e_2 is a leaping and Sally is the agent of e_2

The Full Theory

Syntax and Semantics for Temporal Adjunct Clauses

Ludlow's proposal involves a significant modification to the structure of the typical sentence: according to his theory, there are no single-clause sentences—every sentence comes either with an explicit or implicit temporal adjunct clause, introduced by a primitive temporal connective like *when*. Ludlow observes that explicit temporal adjunct clauses are always tensed ("I got home before it *started* raining") and that their tense is always "coordinated with the tense of the matrix clause" (never "I got home before it *will start* raining"), and then hypothesizes that implicit temporal adjunct clauses follow precisely the same rules as explicit ones—in other words, Ludlow's "tense system merely recapitulates the structures made available by the system of explicit temporal conjunctions, and inherits the constraints on that system" (p. 124).

For example, a sentence with an explicit temporal adjunct clauses might be given the following structure:
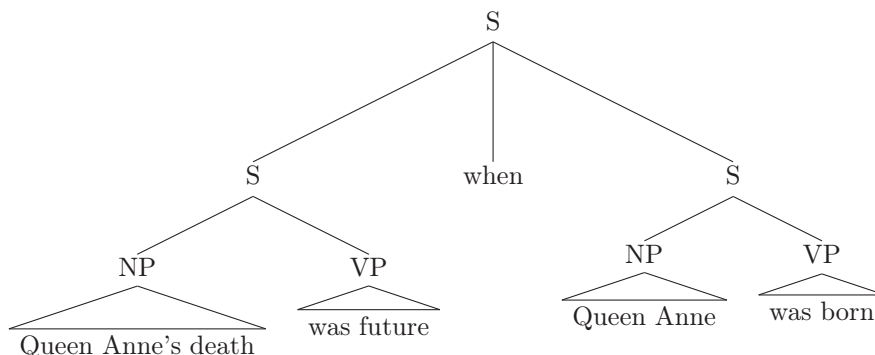
The same sentence with the temporal adjunct clause instead implicit would presumably be given precisely the same structure, but with the added information that the clause is unpronounced.

The basic semantics for Ludlow's temporal adjunct clauses is simple, first because tense is preserved by the semantic evaluation function Val(x,y) (recall that Ludlow is trying to prove the semantics of the language of thought, and therefore temporal reality itself, is tensed), and second because the temporal connective, being primitive and unanalyzable, is also passed directly into the metalanguage:

> "Queen Anne's death was future when Queen Anne was born" is true iff Queen Anne's death *was* future *when* Queen Anne *was* born.

Both of these points are crucial to Ludlow's project. Again, *when* can't mean anything like *at the same time* or *overlapping in a temporal series* otherwise Ludlow's argument would be subject to McTaggart's paradox; and *was true* can't mean anything like *is[-tenseless] true at a past time* for the same reason.

Tense

Ludlow's next step is to add tense to the existing syntax and semantics. He proposes that tenses are "semantic predicates" which take untensed "proposition-like objects" (the 'x's below) as their arguments[12]:

---

[12]He proposes that the appropriate proposition-like objects are interpreted logical forms (ILFs), which he developed extensively in Larson & Ludlow (1993) and discussion of which he also attributes to Higginbotham (1986 & 1991), Segal (1989), and Larson & Segal (1995). According to Ludlow, ILFs are syntactic trees with, instead of a syntactic category label at each node, an ordered pair of that syntactic category label and its semantic value. Each node represents the entire sub-tree which it dominates; thus the syntactic category in the ordered pair is the category of that sub-tree, and the semantic value is the semantic value of the entire sub-tree:
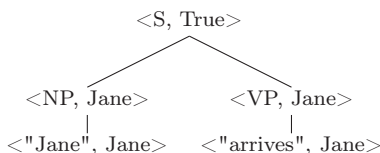
For reasons detailed in Larson & Ludlow (1993) and also in chapter 3 of Ludlow (1999), tensed ILFs are most useful for dealing with problems arising in intensional contexts, but he adopts them as the arguments of tense predicates for reasons that are unclear. Since swapping them out for simple untensed sentences (minus the semantic values) has no relevant consequences on the resulting theory, I will replace ILFs with simple untensed sentences in my presentation of the theory.

New semantic rules:

Val(x, PAST) iff x was true

Val(x, PRES) iff x is true

Val(x, FUT) iff x will be true

Val(True, [$_{TP}$ TNS TP]) iff, for some x, Val(x, TNS) and x = TP

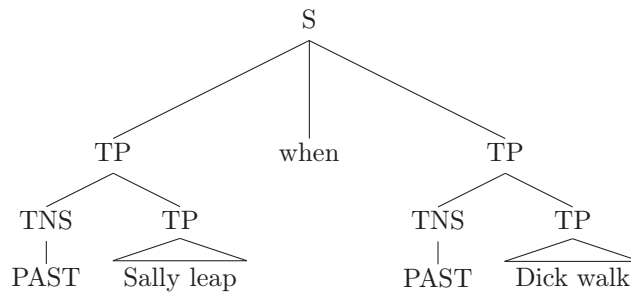**New syntactic rules:**

TP → TNS TP

TNS → PAST, PRES, FUT

S → TP when/before/after TP

Example derivation:

"Sally leapt [when Dick walked]."

1. Val(True, "Sally leapt [when Dick walked]") iff Val(True, [$_{TP}$ [$_{TNS}$ PAST] [$_{TP}$ Sally leap]]) when Val(True, [$_{TP}$ [$_{TNS}$ PAST] [$_{TP}$ Dick walk]])

2. ... iff, for some x, Val(x, PAST) and x = "Sally leap" when, for some y, Val(y, PAST) and y = "Dick walk"

3. ... iff "Sally leap" was true when "Dick walk" was true

Following Ludlow's account of truth evaluation under presentism, this will ultimately be reduced to[13]:

N. ... iff there is some evidence in the world right now that suggests the past existence of a leaping performed by Sally, and there is some evidence in the world right now that suggests the past existence of a walking performed by Dick, and there is also some evidence in the world right now that suggests that the past leaping existed *when* the past walking existed

In order to fully integrate Ludlow's semantics and syntax for tense into the existing theory, yielding something that can be applied directly to McTaggart's paradox, all that remains to be done is to provide rules requiring that all VPs be tenseless (it is assumed, though Ludlow does not provide it, that there exists some sufficient morphological account of how the tenses PAST, PRES and FUT, when adjoined to a tenseless TP, yield the observed verb morphology) and to add some vocabulary. For a full set of rules, see Appendix 1.

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[13]Ludlow actually offers no account of how truth conditions are to be derived past the level represented in (3); I've tried to fill in the blanks as charitably as possible.

Formal Analysis of McTaggart's Paradox

With a full syntactic and semantic theory in place, an instance of McTaggart's paradox can now be analyzed (presuming a set of suitable implicit temporal adjunct clauses):

"Queen Anne's death is past [when I am writing this] and Queen Anne's death was present [when Queen Anne's heart stopped beating] and Queen Anne's death was future [when Queen Anne was born]."

1. Val(True, [$_S$ [$_S$ Queen Anne's death is past when I am writing this] and [$_S$ [$_S$ Queen Anne's death was present when Queen Anne's heart stopped beating and Queen Anne's death was future when Queen Anne was born]]) iff Val(True, [$_S$ [$_{TP}$ Queen Anne's death is past] when [$_{TP}$ I am writing this]]) and Val(True, [$_S$ [$_S$ Queen Anne's death was present when Queen Anne's heart stopped beating] and [$_S$ Queen Anne's death was future when Queen Anne was born]])

(see Appendix 3 for full derivation)

$\vdots$

7. . . . iff "for some e_1, e is a being past and Queen Anne's death is the agent of e_1" is true when "for some e_2, e_2 is a writing of this and I am the agent of e_2" is true and "for some e_3, e_3 is a being present and Queen Anne's death is the agent of e_3" was true when "for some e_4, e_4 is a stopping beating and Queen Anne's heart is the agent of e_4" was true and "for some e_5, e_5 is a being future and Queen Anne's death is the agent of e_5" was true when "for some e_6, e_6 is a being born and Queen Anne is the agent of e_6" was true

Again, glossing over the meanings of statements like *". . . " was true* or *". . . " will be true* according to Ludlow's presentist claims about how we evaluate their truth, we get the following final truth conditions:

N. . . . iff there is some evidence in the world right now that suggests the present existence of the event of Queen Anne's death being past, and there is some evidence in the world right now that suggests the present existence of the event of my writing this, and there is also some evidence that the being past exists *when* the writing this exists; and there is some evidence in the world right now that suggests the past existence of the event of Queen Anne's death being present, and there

is some evidence in the world right now that suggests the past existence of the event of Queen Anne's heart stopping beating, and there is also some evidence that the death existed *when* the stopping beating existed; and there is some evidence in the world right now that suggests the past existence of the event of Queen Anne's death being future, and there is some evidence in the world right now that suggests the past existence of the event of Queen Anne's being born, and there is also some evidence that the being future existed *when* the being born existed.[14]

And thus, Ludlow claims, McTaggart's paradox is resolved, and the consistency of the A-series reclaimed. Ludlow's syntax and semantics (a) prevents the infinite regress by rendering all tensed sentences evaluable based on present facts alone, and (b) establishes the compatibility of the three main clauses by positing implicit, nonreferential temporal adjunct clauses with distinct contents.

Linguistic Evidence

Metaphysical considerations aside, Ludlow's syntax and semantics are linguistically unmotivated at best and linguistically implausible at worst. To remedy this, Ludlow (1999) makes some hasty attempts to show that they are supported by at least some empirical investigations.

For example, he argues that Weist (1986), a study of the acquisition of temporal language in children previously thought to have vindicated Reichenbach's "reference event" account of tense, can be interpreted consistently in the framework of his theory. Instead of the sequence of acquisition events Weist suggests in his analysis[15], Ludlow suggests that children first acquire the rule for the PRES tense morpheme, then the rules for PAST and FUT and temporal adverbs, and finally the rules for when-, before-, and after-clauses.

Ludlow also mentions Cromer (1968) and Keller-Cohen (1974), which both showed that "early uses of 'when' ... are more statements of co-occurring events than statements of genuine simultaneity" (Ludlow 1999, p. 141), suggesting that "perhaps the ability to 'date' an event by a contemporaneous event is more 'primitive' than the notion of serial ordering" (Keller-Cohen 1974, quoted in Ludlow 1999 p. 141).

But what Ludlow offers here are nothing more than suggestions. Moreover, his appeals to empirical linguistic inquiry are blatantly incompatible with his prior rejection of scientific realism: if "science is not the arbiter of what is real" (2003, p. 153), then whether or not scientific investigations support Ludlow's syntax and semantics should be inconsequential.

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[14]Compare this with an example of the truth conditions a standard (B-theoretical) linguistic semantic theory would assign to the sentence "Queen Anne's death is past and Queen Anne's death was present and Queen Anne's death was future":

> An utterance of "Queen Anne's death is past and Queen Anne's death was present and Queen Anne's death was future" at time t_0 is true iff *for some e_1 such that e is the event of Queen Anne's death being past, $At(t_0, e_1)$ and for some time t_1 such that t_1 is before t_0 and for some e_2 such that e_2 is the event of Queen Anne's death being present, $At(t_1, e_2)$ and for some t_2 such that t_2 is before t_1 and for some e_3 such that e_3 is the event of Queen Anne's death and $At(t_2, e_3)$.*

[15]"stage 1: R and E are frozen at S; children can only talk about present events.

stage 2 (age 18–24 months): Children distinguish E from S (using simple tense forms like past and future), but R is frozen at S, so the children cannot talk about events occurring relative to other time points.

stage 3 (age 3 years): R may be distinguished from S, but when it is, E is restricted to R. (For example, a temporal adverb like 'yesterday' might modify R, yet E will still be fixed relative to S.)

stage 4 (age 4 years): R, S, and E can all be at separate times." (Ludlow 1999, p. 140)

Chapter 5: Analysis

Having presented the central claims of Ludlow (1999, 2003) and the technical apparatus of Ludlow (1999), I will now move on to a critique, first examining problems with the latter, and then moving on to more general problems introduced by his auxiliary hypotheses.

Technical Problems

Ludlow's syntax and semantics, especially his account of nonreferentiality in temporal adjunct clauses, has a number of technical problems. First of all, many of the details of the most crucial technical component of the theory, the nonreferential temporal adjunct clause, are left unexplored, and it is not at all clear that there exists an adequate and coherent account of these aspects of the theory. One major uncertainty is the source of the contents of implicit temporal adjunct clauses: exactly how are they derived from previous discourse or context? What determines that such a clause will have one set of relevant contents and not another (for example, "Queen Anne's death was future [when Queen Anne was born]" and not "Queen Anne's death was future [when the Parliament of Great Britain was formed]")? Since the differing contents of the temporal adjunct clauses in Ludlow's rendering of McTaggart's paradox are precisely what prevents the paradox from taking root, it is crucial for Ludlow's argument that there be some coherent account of how these contents are determined. Perhaps such an account exists—I won't prove here that one doesn't—but even if it does, there is a further and insurmountable problem with the E-type account of temporal adjunct clauses, which I will describe after considering two further unsolved (but potentially solvable) problems.

Another question arises when we consider the difference between *when*, *before* and *after* in Ludlow's scheme. He renders these three connectives as primitives, requiring no further explanation, e.g., of the facts in virtue of which "I got home [before it started raining]" is different from "I got home [when it started raining]" and "I got home [after it started raining]." But in assessing the range of linguistic data a semantic theory is accountable for, it becomes clear that there are many more distinctions along these lines that Ludlow will either need to offer a similar account of, introducing primitives like *two minutes before* and *four days after* until the theory contains an infinite number of primitives, or somehow account for otherwise. Again, given the special challenges that presentism introduces, it is not at all clear that there is a coherent account.

Related to this last objection is the observation that Ludlow's system is ill-equipped to deal with quantification over times, something routinely observed in many languages. How, for instance, can Ludlow account for the meaning of "We've been to Paris six times" without making a prohibited invocation of past times or events? The lengths to which Ludlow indicates he is willing to go to work out an account of such instances consistent with presentism, for example positing a metalanguage quantifier over when-clauses (p. 128), each with different contents, is not only ad hoc and lacking independent justification, but it also simply transplants object-language meaning directly into the metalanguage, missing out on important generalizations that represent the core project of compositional semantics.

But even presuming some resolution to all of the above problems, Ludlow's account of nonreferential temporal adjunct clauses is unviable. Consider the the phenomenon of E-type pronominal anaphora of which Evans'

(1977) proposal was meant to be an account. It has been shown since that proposal "that psychological salience of an appropriate function is not sufficient for a pronoun to receive an anaphoric reading; certain formal properties of the preceding text seem to be relevant as well" (Heim 1990). For example, take an illustration of this from Heim (1982):

(1) Every man who has a wife sat next to her.

(2) Every married man sat next to her.

The pronoun in sentence (1) can be interpreted as referring back to "a wife" in an E-type manner: "Every man who has a wife sat next to his wife." But in sentence (2), the only available interpretation is one in which the pronoun refers to some other woman: "Every married man sat next to her (Jane)." A formal antecedent, like "a wife" in (1), thus appears to be a prerequisite for E-type anaphora. But Ludlow's theory regularly posits E-type anaphora in circumstances with no formal antecedents. For example, in the case of the sentence "I forgot to turn off the stove [when I left the house this morning]" uttered out of the blue on the way to work, even assuming some mechanism for deriving the contents of the when-clause from context (à la Partee 1984), there is no formal antecedent at all with which the E-type temporal anaphor in that when-clause can be linked. Thus, the only available interpretations for Ludlow's E-type temporal anaphora should be purely referential interpretations—and this is clearly incompatible with presentism.

Metaphysical Problems

Putting aside these technical problems, Ludlow's theory faces some more general difficulties. Most seriously, the idealist position reflected by the strong LWI hypothesis is circular. According to ontological idealism, the nature of reality depends upon the nature of the mind; but the mind, if we are to speak truly of it and inquire meaningfully about it, must then also be real—a part of that very reality which its nature determines. The ontological idealist is thus trapped in an explanatory loop with no clear way out.

However, many of Ludlow's claims (1999, p. 65, p. 179) suggest that science provides "independent" access to the nature of the mind: "[O]ur approach need not be entirely transcendental. We do have substantial independent knowledge of the language faculty [from linguistics], and we can use that knowledge to gain insight into the nature of reality" (2003, p. 154). But this move is precluded by Ludlow's rejection of scientific realism (2003, p. 153); if "science is not the arbiter of what is real," then knowledge about the nature of the mind derived from linguistics is no more privileged than other forms of speculation.

To emphasize this point, let us turn to Chomsky, who in his (2003) response to Ludlow (2003) argues that Ludlow's attempt to both resolve the conflict between internalism and externalism and retain Chomskyan internalism flatly abandons the very paradigm and methodology in which internalism is useful:

"We can accept [that there exist "implausible" substances like flaws and water which ceases to be water when served at a restaurant] at the level at which we abandon curiosity about language and the mind, about human action and its roots and properties. . . Though sounds are perfectly robust and simple, much more so than books and rivers and flaws, scientists concerned with the sound aspects of language have not been satisfied with such accounts. . . They have sought to discover the internal entities PHON(E) and to determine how they relate to the kinds of mind-external entities that are studied in the sciences, investigating a relation between internal and external events mediated by sensorimotor systems. . . These moves [by Ludlow] should, I think, be understood as registering a lack of interest in the problems. That may be entirely reasonable; no one seeks to study everything. But we should not mislead ourselves into believing that by invoking sounds, flaws, John Doe, attention, escaping, ..., or rivers, water, cities, books, trees, ..., and taking them to be related to pronouns and other words by an invented technical notion

called "reference," we have even begun to investigate, let alone to have solved, the problem of how people use language to refer to things in the world, or any other kind of language-world relation. That's taken for granted in the study of sound, and should be in the study of meaning and referring as well, I think." (p. 290)

Chomsky goes on to offer an analogy to illustrate:

"Consider a Martian scientist M who wants to study humans the way humans study insects. Suppose M is interested in questions of the kind just raised, and is informed by his human subjects that there is no real problem: we can account for everything by invoking the metaphysical thesis that among the things of the world are sounds, flaws, books, ..., saying that words like "it" refer to these things, and so on. True enough, but no help to M, who wants to comprehend what it is we understand, how we achieved this state of mind, and how our linguistic states relate to the outside world... M is just us when we are engaged in naturalistic inquiry; that is, seeking to understand something about the world..." (p. 291)

"...[W]e are choosing to content ourselves with informal talk that would not answer the questions of the Martian scientist or ourselves, as scientists, though as subjects of inquiry we understand this talk very well, just as bees understand the waggle dance; no help to von Frisch.[16]" (p. 293)

In other words, by redefining "existence" to solve a problem—namely the incompatibility between what seems to physically exist and what we appear to be able to refer to using language—Ludlow abandons "naturalistic inquiry," and thus destroying any possible benefit of retaining the doctrine of language internalism which his project was intended to preserve.

Science and Metaphysics

Returning to Sklar's (1992) claim that scientific theories can only have metaphysical consequences when they are interpreted with metaphysical presuppositions, Ludlow (1999) fails to show that his linguistic theory has metaphysical consequences because he pairs an explicitly metaphysical presupposition with his interpretation of his own theory: the "to be is to be a semantic value" position resulting from (1) his ontological idealist views about reality and the mind and (2) his presumption that natural language is the language of thought. Moreover, unlike those who argue from existing scientific theories which themselves have no apparent particular metaphysical end, like special relativity, the very construction of Ludlow's theory is explicitly motivated specifically to have metaphysical consequences: the extensive theoretical apparatus he introduces surrounding E-type temporal anaphora, for example, would be unecessary for any non-presentist.

Furthermore, and even more problematically, presentism is arguably built into Ludlow's assumptions. According to ontological idealism, the nature of the external world, including its temporal aspects, depends upon the nature of our consciousness, especially the temporal aspects of our consciousness; since it is part and parcel of our consciousness that we experience time as flowing from past to future and that of the three times (past, present, and future) we experience the present most directly (one could argue that the present is in fact the only one we experience at all), it is natural to conclude, first, that the flow of time is a genuine feature of reality (A-theory) and, second, that the present must have some kind of elevated ontological status over the past and the future (presentism). Ludlow thus simply shifts the burden of proof from the presentist onto the idealist, and he himself offers no defenses of idealism.

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[16]Karl von Frisch was an Austrian ethologist who decoded the systematic "dance" by which honey bees exchange information with each other about the location and distance of food and water sources (http://en.wikipedia.org/wiki/Karl_von_Frisch).

Thus, Ludlow's two projects each fail on multiple levels. First, his project to defend the A-theory using linguistics fails because the semantics is inadequate—his use of the E-type paradigm is inappropriate, and he thus fails to establish the nonreferentiality of temporal adjunct clauses, a central component of a presentism-consistent semantics. Next, this same project fails because Ludlow's rejection of scientific realism precludes his use of linguistics as a source of information about the mind, and thus reality. Last, putting both of these issues aside, the project fails to derive metaphysical consequences from linguistics because metaphysical hypotheses are presumed. Additionally, the idealist position resulting from these hypotheses is circular. Ludlow's project to reconcile language internalim with semantic externalism also fails: first, because his rejection of scientific realism negates any possible benefits of the reconciliation for science, and second, because the idealist position he adopts is circular.

Chapter 6: Conclusion

Ludlow's work is notable in three ways. First, it is highly ambitious, setting out to simultaneously resolve one of the most formidable debates in metaphysics and dissolve a major foundational incompatibility between two approaches to the study of language. Ludlow attempts to settle the metaphysical debate between the A-theorists, who argue that reality is fundamentally tensed, and the B-theorists, who argue that it isn't—a debate which has been raging unresolved for decades—by repairing an apparently fatal flaw in the A-theorist's position (McTaggart's paradox) via a demonstration that, given the proper analysis of its statement (provided by his syntax and semantics), the paradox really is not paradoxical after all. He attempts to resolve the longstanding foundational dispute between the internalists, who see language and all of its attributes, including meaning, as supervenient on the human brain, and the externalists, who view language and meaning as entities or properties that have human-independent existence, by demonstrating that the realm of the external and the realm of the internal can be made isomorphic (a position which also allows him to make the connection between a statement of McTaggart's paradox and the actual metaphysical problem it represents).

Second, Ludlow's project is highly resourceful. In order to show that a statement of McTaggart's paradox does not have to be self-contradictory (via a demonstration that it need not invoke time), his theory incorporates elements from linguistic semantics (e.g. E-type pronominal anaphora), from syntax (e.g. the postulation of implicit and unpronounced temporal adjunct clauses), and philosophy of language (e.g., the pronouncement that his E-type temporal anaphora are denotational and descriptive rather than referential, and general rather than singular). Ludlow also draws from a long tradition of idealist thought in providing the auxiliary hypotheses that facilitate his reconciliation of internalism and externalism.

Third, and finally, Ludlow's project fails. His syntax and semantics face serious technical difficulties, for example, the inapplicability of the E-type schema (which requires the presence of formal antecedents) to temporal anaphora with no formal antecedents. His metaphysical position is problematic—ontological idealism posits that the nature of reality is dependent on the nature of the mind, but offers no resolution to the circularity introduced by the fact that the mind itself is part of reality—and his stance on scientific realism precludes a potential resolution—since "science is not the arbiter of what is real," it can provide no independent access to the nature of the mind. Finally, Ludlow's project is a clear illustration of the principle presented in Sklar (1992) that scientific theories can only have metaphysical consequences in conjunction with interpretations which themselves have metaphysical presumptions. Ludlow's syntax and semantics may indeed be candidates for explanation of the linguistic phenomena in question, but without the metaphysical interpretation Ludlow provides, the linguistic theory itself can have no conclusive consequences for the nature of metaphysical reality itself.

Despite its failure, Ludlow's argument is noteworthy for its unusual breadth, originality, ambition, and syntheticism. Smith and Jokíc (2003) actually define a new ideal for philosophers attempting to simultaneously address questions about language and questions about metaphysics based on Ludlow (1999):

> Ludlow's book may be regarded as an example of the sort of synthesis whose completeness (or detailed attempt at completeness) is what we are advocating. . . It is not as if metaphysicians of

time have not previously discussed philosophies of language, or as if philosophers of language have not discussed the philosophy of time. They have—but not in the systematic and comprehensive way that Ludlow exhibits in his book... [Ludlow's book] synthesizes in a novel way the conclusions achieved in the two relevant fields (what we will call a *Ludlow-type synthesis*)..." (p. 7)

Indeed, not only does Ludlow set a new standard for philosophers of time for whom language is important, and for philosophers of language dealing with questions of tense and temporal expressions, but also for linguists interested in establishing the inferential boundaries of their discipline. His work not only demands that philosophers acknowledge a rising standard for literacy in contemporary linguistic theory, but also demands that linguists both acknowledge the role that linguistic theories can play in extra-linguistic disputes and address the foundational questions in the study of language that these disputes embody.

Appendix 1: The Full Theory

Syntax[17]

S → S1 and S2

S → S1 or S2

S → it is not the case that S1

S → TP when/before/after TP

TP → TNS TP

TP → NP VP

TNS → PAST, PRES, FUT

NP → Dick, Sally, Queen Anne, Queen Anne's death, Queen Anne's heart, I

VP → leap, walk, be present, be past, be future, be born, stop beating, be writing this

Semantics

Val(x, "Dick") iff x = Dick

Val(x, "Sally") iff x = Sally

Val(x, "Queen Anne") iff x = Queen Anne

Val(x, "Queen Anne's death") iff x = Queen Anne's death

Val(x, "Queen Anne's heart") iff x = Queen Anne's heart

Val(x, "I") iff x = I[18]

Val(e, "leap") iff e is a leaping

Val(e, "walk") iff e is a walking

Val(e, "be present") iff e is a being present

Val(e, "be past") iff e is a being past

Val(e, "be future") iff e is a being future

Val(e, "be born") iff e is a being born

Val(e, "stop beating") iff e is a stopping beating

Val(e, "be writing this") iff e is a being writing this

Val(True, [$_S$ S1 and S2]) iff Val(True, S1) and Val(True, S2)

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[17]I'm adding some rules not given in Ludlow (1999), but constructed in parallel with the ones that are, to deal with sentences about Queen Anne's death. I'm also leaving out Ludlow's syntax and semantics for prepositional phrases, temporal adverbs, and aspect because they are only significant inasmuch as they demonstrate that Ludlow's theory is capable of handling these phenomena. Whether this is the case or not is irrelevant to the present discussion.

[18]Ludlow suggests that non-temporal indexicality, like temporal indexicality, be preserved in the semantics (§3.2); this gives rise to a whole new set of concerns (for example, does the presence of 'I' in the truth conditions imply that I am metaphysically real?). Ludlow doesn't explore the possible metaphysical consequences of this view, and I will simply ignore the issue here.

Val(True, [$_S$ S1 or S2]) iff Val(True, S1) or Val(True, S2)

Val(True, [$_S$ it is not the case that S1]) iff it is not the case that Val(True, S1)

Val(True, [$_S$ TP1 when TP2]) iff Val(True, TP1) when Val(True, TP2)

Val(True, [$_S$ TP1 before TP2]) iff Val(True, TP1) before Val(True, TP2)

Val(True, [$_S$ TP1 after TP2]) iff Val(True, TP1) after Val(True, TP2)

Val(True, [$_{TP}$ TNS TP1]) iff, for some x, Val(x, TNS) and x = TP1

Val(x, PAST) iff x was true

Val(x, PRES) iff x is true

Val(x, FUT) iff x will be true

Val(True, [$_{TP}$ NP VP]) iff, for some e, Val(e, VP) and for some x, Val(x, NP) and x is the agent of e

Val(x, [$_\alpha$ β]) iff Val(x, β), where α ranges over categories and β ranges over categories and lexical items

Appendix 2: Derivation of Truth Conditions for McTaggart's Paradox

"Queen Anne's death is past [when I am writing this] and Queen Anne's death was present [when Queen Anne's heart stopped beating] and Queen Anne's death was future [when Queen Anne was born]."

1. Val(True, [$_S$ [$_S$ Queen Anne's death is past when I am writing this] and [$_S$ [$_S$ Queen Anne's death was present when Queen Anne's heart stopped beating and Queen Anne's death was future when Queen Anne was born]]) iff Val(True, [$_S$ [$_{TP}$ Queen Anne's death is past] when [$_{TP}$ I am writing this]]) and Val(True, [$_S$ [$_S$ Queen Anne's death was present when Queen Anne's heart stopped beating] and [$_S$ Queen Anne's death was future when Queen Anne was born]])

2. . . . iff Val(True, [$_S$ [$_{TNS}$ PRES] [$_S$ Queen Anne's death be past]]) when Val(True, [$_S$ [$_{TNS}$ PAST] [$_S$ I be writing this]]) and Val(True, [$_S$ [$_{TP}$ Queen Anne's death was present] when [$_{TP}$ Queen Anne's heart stopped beating]] and Val(True, [$_S$ [$_{TP}$ Queen Anne's death was future] when [$_{TP}$ Queen Anne was born]])

3. . . . iff "[$_{TP}$ [$_{NP}$ Queen Anne's death] [$_{VP}$ be past]]" is true when "[$_{TP}$ [$_{NP}$ I] [$_{VP}$ be writing this]]" is true and Val(True, [$_{TP}$ [$_{TNS}$PAST] [$_S$ Queen Anne's death be present]]) when Val(True, [$_{TP}$ [$_{TNS}$ PAST] [$_S$ Queen Anne's heart stop beating]]) and Val(True, [$_{TP}$ [$_{TNS}$ PAST] [$_S$ Queen Anne's death be future]]) when Val(True, [$_{TP}$ [$_{TNS}$ PAST] [$_S$ Queen Anne be born]])

4. . . . iff "[$_{TP}$ [$_{NP}$ Queen Anne's death] [$_{VP}$ be past]]" is true when "[$_{TP}$ [$_{NP}$ I] [$_{VP}$ be writing this]]" is true and "[$_{TP}$ [$_{NP}$ Queen Anne's death] [$_{VP}$ be present]]" was true when "[$_{TP}$ [$_{NP}$ Queen

Anne's heart] [$_{\text{VP}}$ stop beating]]" was true and "[$_{\text{TP}}$ [$_{\text{NP}}$ Queen Anne's death] [$_{\text{VP}}$ be future]]" was true when "[$_{\text{TP}}$ [$_{\text{NP}}$ Queen Anne] [$_{\text{VP}}$ be born]]" was true

5. ...iff "for some e, Val(e, [$_{\text{VP}}$ be past]) and for some x, Val(x, [$_{\text{NP}}$ Queen Anne's death]) and x is the agent of e" is true when "for some f, Val(f, [$_{\text{VP}}$ be writing this]) and for some y, Val(y, [$_{\text{NP}}$ I]) and y is the agent of f" is true and "for some g, Val(g, [$_{\text{VP}}$ be present]) and for some z, Val(z, [$_{\text{VP}}$ Queen Anne's death]) and z is the agent of g" was true when "for some h, Val(h, [$_{\text{VP}}$ stop beating]) and for some w, Val(w, [$_{\text{VP}}$ Queen Anne's heart]) and w is the agent of h" was true and "for some i, Val(i, [$_{\text{VP}}$ be future]) and for some v, Val(v, [$_{\text{VP}}$ Queen Anne's death]) and v is the agent of i" was true when "for some j, Val(j, [$_{\text{VP}}$ be born]) and for some u, Val(u, [$_{\text{NP}}$ Queen Anne]) and u is the agent of j" was true

6. ...iff "for some e, Val(e, "be past") and for some x, Val(x, "Queen Anne's death") and x is the agent of e" is true when "for some f, Val(f, "be writing this") and for some y, Val(y, "I") and y is the agent of f" is true and "for some g, Val(g, "be present") and for some z, Val(z, "Queen Anne's death") and z is the agent of g" was true when "for some h, Val(h, "stop beating") and for some w, Val(w, "Queen Anne's heart") and w is the agent of h" was true and "for some i, Val(i, "be future") and for some v, Val(v, "Queen Anne's death") and v is the agent of i" was true when "for some j, Val(j, "be born") and for some u, Val(u, "Queen Anne") and u is the agent of j" was true

7. ...iff "for some e, e is a being past and Queen Anne's death is the agent of e" is true when "for some f, f is a writing of this and I am the agent of f" is true and "for some g, g is a being present and Queen Anne's death is the agent of g" was true when "for some h, h is a stopping beating and Queen Anne's heart is the agent of h" was true and "for some i, i is a being future and Queen Anne's death is the agent of i" was true when "for some j, j is a being born and Queen Anne is the agent of j" was true

Again, glossing over the meanings of statements like *"..." was true* or *"..." will be true* according to Ludlow's presentist claims about how we evaluate their truth, we get the following informal gloss of the truth conditions:

8. ...iff there is some evidence in the world right now that is consistent with the present existence of the event of Queen Anne's death being past, and there is some evidence that is consistent with the present existence of the event of my writing this, and there is some evidence that the first event exists *when* the second event exists; and there is some present evidence that is consistent with the past existence of the event of Queen Anne's death being present, and there is some evidence that is consistent with the event of Queen Anne's heart stopping beating, and there is some evidence that the first event existed *when* the second event existed; and there is some present evidence that is consistent with the past existence of the event of Queen Anne's death being future, and there is some evidence that is consistent with the event of Queen Anne's being born, and there is some evidence that the first event existed *when* the second event existed.

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