

Class #10 - The B-Theory
Smart, "The Space-Time World"

I. Tenses and Tenselessness

We are examining A-theories and B-theories of time.

Smart doesn't use the term 'B-theory'.

He calls it the tenseless theory or four-dimensionalism.

Zimmerman's defense of presentism, a version of the A-theory, relies on his intuitions about the importance of the present, contrasted with past and future events and objects.

When some thing or event passes from the present into the past, we ordinarily believe that it disappears, that it becomes unreal, that we lose it.

Intuitively, we think of yesterday's breakfast as something which no longer exists, next Thursday's dinner as something which is yet to exist, and these words you are reading as existing now.

As I mentioned in the last set of notes, the strength of our appeals to intuition are a controversial topic.

If we give up our intuitions about the phenomenology of time as evidence for our beliefs about reality, then we have to ask what sorts of evidence will suffice.

Smart believes that the only evidence is scientific evidence.

Further, he believes that the most fundamental scientific theories are best understood tenselessly.

Mathematics contains no references to time.

Physics takes time as a variable, but prefers no particular time.

Indeed, the physical laws are indifferent to the direction of time, even though time seems to move only forward.

Smart concludes that we should prefer a theory of time which is tenseless.

The tenseless and minimally token-reflexive language enables us to see the world, in Spinoza's phrase, *sub specie aeternitatis* (Smart 101).

Let's see how we can make a language tenseless.

Here are three tensed sentences.

1. Bonnie bopped Bobby at 4pm yesterday.
2. Bonnie is bopping Bobby right now.
3. Bonnie will bop Bobby tomorrow at noon.

Smart attributes one way of rendering tensed sentences tenseless, the token-reflexive approach, to Reichenbach.

According to the token-reflexive view, we can make 1-3 logically tenseless by replacing all their verbs with grammatically present-tense versions, and make references to time relative to particular utterances.

- TR1. There is a time t such that Bonnie bops Bobby at t and t is earlier than the utterance of 1 (by some measure of temporal distance between 4pm yesterday and the utterance of 1, in arbitrary units).
- TR2. Bonnie bops Bobby simultaneously with the utterance of 2.
- TR3. There is a time t , such that Bonnie bops Bobby at t , and t is earlier than the utterance of 3 (by some measure of temporal distance between the utterance of 3 and noon tomorrow, in arbitrary units).

Note that all references to time are rendered in terms of 'earlier than', 'simultaneous with', or 'later than'. Those terms are all available to the B-theorist.

No uses of 'past', 'present', or 'future' are required for the characterization of times.

Further, no uses of tenses, other than the present tense, are used by the tenseless theory.

Present-tense verbs like those found in TR1-TR3 are to be understood tenselessly.

When we say that two plus two *equals* four we do not mean that two plus two equals four at the present moment. Nor do we mean that two plus two always equaled four in the past, equals four now, and will always equal four in the future (94-5).

It is an artifact of our grammar that verbs must have some tense.

We should not infer that all claims make some essential reference to time or temporal progress.

Smart is urging a four-dimensional view.

This view is sometimes called the block theory (in contrast to the A-theorist's growing-block theory).

The idea is that there is a static block, the entire temporal history of the world, past through future.

We imagine ourselves peering from apart at that block, describing all that happens within it.

The block theory underlies time-travel fiction.

On that conceit, we can move among different portions of the block.

We need, from a grammatical standpoint, some tenses for our verbs.

But, we think of them as mere grammatical artifacts, indicating nothing about time.

Verbs are grammatically present-tense, but logically tenseless.

One problem with the token-reflexive view, the translations TR1-TR3, is that time seems to outrun all possible utterances.

We might want to say meaningful things about events in the future that are not simultaneous with any utterance at all.

We can measure their temporal distance from a current utterance.

But, we can not say anything about utterances simultaneous with such events.

Consider, as Smart does elsewhere, a sentence about a supernova.

SN The sun's becoming a supernova is future, will be present and then will be past.

We can imagine three kinds of utterances one might want to make regarding the sun's becoming a supernova.

SN1 The sun will become a supernova, in the future.

SN2 The sun is becoming a supernova, now.

SN3 The sun became a supernova, in the past.

On the token reflexive approach we might understand SN1-3 as SNTR1-SNTR3.

SNTR1. There is a time t such that the sun becomes a supernova at t and t is later than the utterance of SN1 (by some arbitrary measure of temporal distance).

SNTR2. The sun becomes a supernova simultaneously with the utterance of SN2.

SNTR3. There is a time t , such that the sun becomes a supernova at t , and t is earlier than the utterance of 3 (by some arbitrary measure of temporal distance).

SNTR1 is fine.

But SNTR2-3 are false because there are no persons or utterances at the time of or after the supernova. If we measure time in terms of relations to utterances, we are liable to run into problems about times that are simultaneous to no utterances at all.

One solution to the problem raised by SN seems to be to relativize all temporal claims to some claim, whether an utterance or an instance of a sentence, in the present.

In other words, we stick to measurements like SNTR1.

That means that Smart is not just translating A-theory sentences into B-theory sentences.

Some A-theory sentences will have to be eliminated altogether.

I'll put aside this problem for the token reflexive theory.

The central claim of the B-theory is that we can do away with appeals to 'past', 'present', and 'future'.

Zimmerman's presentist relies on claims about the exceptional nature of the present moment.

The A-theorist claims that sentences about the past and future are legitimate because 'past', 'present', and 'future' refer to intrinsic properties of events in respect of which events change.

The A-theorist sees SN as ordinary and obvious.

The B-theorist denies that there is any such exception; see TR2.

For the tenseless theory, the present is just one moment among many.

The tenseless theory is indifferent to any particular time and avoids parochial egocentrism.

The B-theorist sees SN as ill-formed or nonsensical.

II. Change and the B-Theory

One consideration which might help to differentiate the A-theory and the B-theory concerns the nature of change.

For the A-theory, objects undergo changes as they become real by moving into the present.

They become unreal by moving into the past.

Thus, the A-theorist does not see an object as enduring through time.

Objects are only real at the present moment.

Smart believes that this aspect of the presentist view is implausible.

A man or stone or star is commonly regarded as a three-dimensional object which nevertheless *endures* through time. This enduring through time clearly brings a fourth dimension into the matter... (94).

Unfortunately for Smart, the B-theorist's view of change may not be any more plausible.

Change is ordinarily thought of as an active process.

But, the B-theorist's view of change is static.

All of the spatio-temporal realm is taken as a single, static block.

Our notion of time as flowing, the transitory aspect of time..., is an illusion which prevents us seeing the world as it really is (94).

The B-theorist must understand what we ordinarily take to be change as the comparison of different temporal slices of four-dimensional objects.

When we think four-dimensionally...we replace the notions of change and staying the same by the notions of the similarity or dissimilarity of time slices of four-dimensional solids (95).

This static notion of change does not appear to be the ordinary notion, but Smart believes that it is better.

The inability to translate talk of events changing in respect of pastness, presentness, and futurity into our tenseless language can be taken simply as a proof of the concealed token reflexivity of tenses and of words such as 'past', 'present', and 'future'.

Moreover, once we introduce change over time, we can start asking uncomfortable questions about the rate at which time passes.

Can time speed up or slow down?

Such questions, Smart believes, lead to an unintelligible infinite regress.

We should need to postulate a hyper-time with reference to which our advance in time could be measured (seconds per hyper-seconds)... Moreover, anyone who thought that time-flow was necessary for time would presumably want to say that hyper-time-flow was necessary for hyper-time. He would therefore be driven to postulate a hyper-hyper-time, and so on without end (97).

Smart admits that the theory of relativity makes simultaneity dependent on the choice of an arbitrary frame of reference.

Events which are simultaneous from one perspective are not from others.

Still, that consideration affects both the A-theorist, since 'now' becomes a suspect term, and the B-theorist, who invokes temporal relations 'earlier', 'later', and 'simultaneous'.

III. Economy and Plausibility

We want to know whether to be an A-theorist (perhaps a presentist) or a B-theorist.

On the side of Zimmerman and the A-theorist, we have our intuitions about the asymmetry of our access to the present moment and to past and future moments.

We have the 'thank-goodness-that's-over' feeling.

On the side of Smart and the B-theorist, we have the claim that the laws of physics express the ultimate nature of reality.

In contrast, according to Smart, the terms of the A-theory are biased.

The concepts of past, present, and future have significance relative only to human thought and utterance and do not apply to the universe as such. They contain a hidden anthropocentricity. So also do tenses. On the other hand, the concepts of 'earlier', 'simultaneous', and 'later' are impeccably non-anthropocentric" (94).

Where Zimmerman relies on the intuitive plausibility of the 'thank goodness it's over' feeling, Smart urges that privileging the present is inconsistent.

Every event is 'now' at some time or another, and so the notion of 'now' cannot be that of an objective property in nature which singles out some events from others (96).

Smart urges us to translate away the A-theorists's uses of 'past', 'present', and 'future', by using constructions such as TR1-TR3.

But translations work in two directions.

One could try to reduce the B-relations to A-properties just as easily as we turn sentences referring to A-properties into ones invoking B-relations.

To counter that attempt, Smart introduces his fable of the king.

In the imagined kingdom, the people recognize three classes of entities, alphas, betas, and gammas, where alphas are numbers less than the king's age, betas are numbers equal to the king's age, and gammas are numbers greater than the king's age.

Every year, betas become alphas and gammas become betas.

They take alphas, betas, and gammas as primitive terms, though they can define our term 'number' as anything that is either an alpha, a beta, or a gamma.

Would this show that the notion of number had anything to do with the age of the king? It has indeed been introduced by reference to notions that have to do with the age of the king, but in such a way that this kingly reference 'cancels out' (98).

Similarly, Smart believes that our ability to define the B-terms in by using the A-terms does not show that the A-terms, like the king, have anything to do with the ultimate nature of time.

We must choose the scientific view.

I advocate my way, because it fits our ordinary way of talking much more closely to our scientific way of looking at the world and it avoids unnecessary mystification (99).