The aim of this essay is to develop a framework in terms of which some perennial puzzles about time and the temporal aspects might be resolved. The treatment is dialectical, consists, that is, in an attempt to fit standard ‘positions’ on the topics discussed into a sustained argument having the logical structure, if not the literary form, of a dialogue in which the participants develop and modify their views under the impact of the discussion. That the present essay falls far short of the ideal suggested by this description will be clear to anyone who ventures to begin it. It fails abjectly if construed as a comprehensive dialogue which begins in unreflective common sense and ends with all relevant puzzles resolved. It has, I hope, greater merit if viewed as an abstract of a series of excerpts from such a dialogue, a series which breaks into the discussion after it has long been under way and breaks off where it does because the dialogue is still going on.

The argument begins with some familiar puzzles about truth and time. The reader may well see through these puzzles at a glance. I hope he does, for they serve the purpose of introducing as directly and as simply as I know how the major themes which it is the purpose of this essay to explore, some of which are as baffling as any philosophy has to offer. I have “taken time seriously” since I cut my philosophical teeth on McTaggart’s well-known paper on the unreality of time and the attempts of Broad and others to refute him. I soon discovered that the ‘problem of time’ is rivaled only by the ‘mind-body problem’ in the extent to which it inexorably brings into play all the major concerns of philosophy. Here, if anywhere, analysis without synopsis must be blind.

Among the topics I propose to discuss are the connections between truth, confirmability, and determinism; the philosophical and scientific significance of the three-valued logics; the relative priority of things and events; the status of time in the common-sense world, and of space-time
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in macromechanics; the meaning of existence statements about episodes and things and the sense in which even existence statements about abstract entities have a tense; the objectivity of becoming (with some remarks on the significance, in this connection, of the relativity of simultaneity). As is implied by the dialectical character of the treatment, these topics make multiple appearances, and the ‘conclusions’ of one section are often radically recast in another.

I. FACTS, EPISODES, AND THINGS

1. Truths about Other Times

Suppose that the following statements, made today (1958), are all true:

(1) $S$ was $\Phi_1$ (in 1957).
(2) $S$ is $\Phi_2$ today (1958).
(3) $S$ will be $\Phi_3$ (in 1959).

According to one version of the correspondence theory of truth—a version which it is my purpose to criticize at a later stage of my argument—the above statements are true because each of them corresponds to a fact. Thus, (1) corresponds to the fact that $S$ was $\Phi_1$ in 1957; (2) to the fact that $S$ is $\Phi_2$ today; and (3) to the fact that $S$ will be $\Phi_3$ in 1959. And, indeed, if these statements are true, it is a fact that $S$ was $\Phi_1$ in 1957; it is a fact that $S$ is $\Phi_2$ today; it is a fact that $S$ will be $\Phi_3$ in 1959.

Notice that in mentioning each of these facts, whether the fact about the past, the fact about the present, or the fact about the future, I wrote in each case, “It is a fact that . . .” We say of an episode that it took place, is taking place, or will take place. But if something is a fact, it is a fact, even if the verb in the that-clause is in the past or future tense. Having written this, I must at once qualify it, for it would be a mistake to suppose that we never use locutions of the form “It was a fact that . . .” or “It will be a fact that . . .” Consider, for example,

(4) It was a fact (in 1957) that $S$ would be $\Phi_2$ in 1958.

But it is important to appreciate the kind of context in which statements of this sort are appropriate. They can be typified by the following:

(5) (In 1957) Jones thought (said, wrote, etc.) that $S$ would be $\Phi_2$ in 1958; and it was a fact that $S$ would be $\Phi_2$ in 1958.

In other words, the kind of context in which we use such locutions as

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“(In 1957) it was a fact that . . .” and “(In 1959) it will be a fact that . . .” are those in which we are viewing someone (it may be ourselves) as thinking or asserting something at a time other than the present and evaluating this thought or assertion. In the absence of concern for what someone thought or said, or might have thought or said, at a prior time, we should say, not

(6) (In 1957) it was a fact that $S$ was $\Phi_1$ in 1957

or

(7) (In 1959) it will be a fact that $S$ will be $\Phi_3$ in 1959

but, supposing the context to call for a fact statement at all,

(8) It is a fact that $S$ was $\Phi_1$ in 1957

and

(9) It is a fact that $S$ will be $\Phi_3$ in 1959.

II

When a fact statement is appropriate, and when the only temporal “point of view” in question is that of the person who makes the statement at the time of making it, the statement is always of the form “It is a fact that . . .” regardless of the tense of the verb which appears in the that-clause. It is this characteristic of what might be called “one-perspective” fact statements which has tempted philosophers to hold that the ‘is’ of ‘It is a fact that . . .’ has to do with a timeless mode of being. Thus, it has seemed proper to connect the ‘was’ of ‘It was a fact that . . .’ not with the factuality of the fact, but with the temporal location of the person or persons whose point of view is being considered in a two-perspective fact statement. It is argued that just as one does not say

(10) Two plus two was equal to four

or

(11) Two plus two will be equal to four,

the ‘is’ of

(12) Two plus two is equal to four

being an ‘is’ which has been “detensed” (turned into a ‘tenseless present’) by depriving it of its normal contrast with ‘will be’ and ‘was,’ so the ‘is’ of a one-perspective statement of empirical fact is equally detensed, and gives expression to a “timeless mode of being” like that attributed to num-

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bers. The ‘was’ of ‘It was a fact that . . . ’ where the latter is appropriate, is then interpreted as an indication of the pastness of the second point of view of a two-perspective fact statement, rather than as a temporal qualification of the factuality of the state of affairs mentioned by the that-clause.

This line of thought is not without its insights. But that the matter is not quite so simple becomes manifest if one turns one’s attention to two-perspective mathematical fact statements. For the above reasoning would lead one to expect that in cases where a past mathematical thinking or saying is being evaluated, it would be proper to make such statements as

\[(13) \text{It was a fact that } 2 + 2 = 4.\]

Thus, we would expect to find such statements as

\[(14) \text{(In 1957) Jones thought that } 2 + 2 = 4; \text{ and, indeed, it was a fact that } 2 + 2 = 4.\]

But, of course, we immediately sense that something has gone wrong. For just as it is odd to say

\[(10) \text{Two plus two was equal to four,}\]

so it is odd to say, even in such a context as (14), “. . . it was a fact that \(2 + 2 = 4\),” to say it, that is, even where two perspectives are involved. We must surely say

\[(15) \text{(In 1957) Jones thought that } 2 + 2 = 4 \text{ and, indeed, it is a fact that } 2 + 2 = 4.\]

The proponents of facts as ‘timeless entities’ may be expected to reply that this criticism actually supplies grist to their mill. They must grant, to be sure, that the two-perspective character of a two-perspective fact statement is, though necessary to, not a sufficient condition of the appropriateness of ‘It was (will be) a fact that . . .’. They will point out that the additional requirement seems to be that the that-clause be a tensed that-clause. And they can be expected to argue that the inappropriateness of “It was (will be) a fact that \(2 + 2 = 4\),” even in two perspective contexts, springs from the tenseless character of mathematical statements themselves, e.g., the tenseless character of “Two plus two is equal to four.” It is this, they conclude, which accounts for the correctness of

\[(16) \text{(In 1957) Jones thought that two plus two is equal to four; and, indeed, it is a fact that two plus two is equal to four.}\]

\[^{1}\text{I deliberately switch to arithmetical notation to take attention temporarily away from the problem of the tense—or tenselessness—of the mathematical that-clause.}\]
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Since they obviously cannot be proposing that the latter are equivalent in meaning to the original statements, the claim must be that (1'), (2'), and (3') are somehow “more basic” then the original statements, as having a core meaning which is somehow prior to the perspectival idiosyncrasies of speakers and thinkers, and constitutes the ‘neutral’ foundation on which the latter are somehow built. In this detensed language, the argument concludes, it makes no more sense to say

(17) It was a fact (in 1957) that $S$ be $\Phi_2$ in 1958

than to say

(13) It was a fact (in 1957) that $2 + 2 = 4$ (i.e., that $2$ plus $2$ be equal to $4$).

Rather, just as we say

(15') (In 1957) Jones thought that $2 + 2 = 4$; and, indeed, it (tenselessly) is—that is, be—a fact that $2 + 2 = 4$

so, given this use of ‘be,’ we would be in a position to say

(18) (In 1957) Jones thought that $S$ be $\Phi_2$ in 1958; and, indeed, it be a fact that $S$ be $\Phi_2$ in 1958.

In other words, the introduction of a postulated “stripped down” tenseless discourse about episodes, and, hence, the introduction of detensed that-clauses, would carry with it the consequence that the fact locutions appropriate to these detensed that-clauses would not be tensed locutions like ‘It is (was, will be) a fact that . . .’ but rather the tenseless present appropriate to fact statements in the domain of mathematics, i.e., by the above convention, “It be a fact that . . .” This “stripped down” locution would express the timeless mode of being shared, at bottom, according to this point of view, by historical and mathematical facts. The argument adds, as an afterthought, that (18) in its turn might be “stripped down” to read

(18') Jones think in 1957 that $S$ be $\Phi_2$ in 1958; and, indeed, it be a fact that $S$ be $\Phi_2$ in 1958

where ‘think’ like ‘be’ is in the ‘tenseless present.’

III

That the above line of thought is profoundly mistaken is scarcely news. On the other hand, the task of exposing the numerous confusions on which it rests has not, in my opinion, been successfully completed; for though most of the relevant distinctions have been drawn, they have not yet been mobilized into a coordinated attack on the perennial nexus of puzzles pertaining to the existence of temporal facts. It is the aim of the present paper to make an attempt in this direction. But if the full story on the mistakes involved in the thesis of the ‘timeless being of temporal facts’ is a long one which is scarcely under way, a provisional measure of clarification can be gained by noting that one can find a place for a ‘tenseless present’ in the formulation of temporal statements without assimilating this tenseless present to the tenseless present of mathematical statements. For it would obviously be perfectly legitimate to introduce a use of ‘is’ in accordance with the schema

(19) $x$ is $\Phi$ at $t \iff \exists \cdot$ Either $x$ was $\Phi$ at $t$ or $x$ is $\Phi$ at $t$ or $x$ will be $\Phi$ at $t$.

Thus, using the archaic ‘be’ for this use of ‘is,’ we could introduce the statement ‘Eisenhower be president in 1956’ in terms of the equivalence

(20) Eisenhower be president in 1956 $\iff \exists \cdot$ Either Eisenhower was president in 1956 or Eisenhower is president in 1956 or Eisenhower will be president in 1956.

And if this convention were a recognized feature of English usage, Tom, in 1955, Dick, in 1956, and Harry, in 1957, could all agree in saying, “Eisenhower be president in 1956.” Would they all be “making the same statement”? Only, of course, in the sense in which “Eisenhower will be president in 1956” (said in 1955) makes the same statement as “Eisenhower was president in 1956” (said in 1957). Thus, Tom, if pressed, would say

(21) Eisenhower be president in 1956 because Eisenhower will be president in 1956.

Whereas Dick and Harry, respectively, would say

(22) Eisenhower be president in 1956 because Eisenhower is president in 1956,

(23) Eisenhower be president in 1956 because Eisenhower was president in 1956.

These considerations make it clear that the ‘neutral’ tenseless present, thus introduced, would be quite other than the tenseless present of mathematical statements. This suggests that instead of construing tensed verbs as the enrichment of a neutral “stripped down” perspective-free mode of making temporal assertions, the device of using ‘perspective-neutral’
sentences to make temporal statements may rest on and presuppose the
tensed verbs of everyday temporal discourse.

IV

The argument to date suggests that whatever we are to do with the ‘is’ of
(21) It is a fact that $2 + 2 = 4$
we must take seriously the prima-facie tensed character of the ‘is’ in such
statements as
(8) It is a fact that S was $\Phi_1$ in 1957
and
(9) It is a fact that S will be $\Phi_2$ in 1959.
If we then turn our attention to the pair
(22) It is a fact that S is $\Phi_2$ today (1958)
and
(4) It was a fact (in 1957) that S would be $\Phi_2$ in 1958,
we may easily be tempted to say that such facts are temporal entities which
exist at times, and, indeed, to say that the 1957 fact that S would be $\Phi_2$
was replaced by the 1958 fact that S is $\Phi_2$. We may even be led to specu-
late whether it could be a fact today that S is $\Phi_2$, without its having been
a fact (in 1957) that S would be $\Phi_2$.

Now there is a sound kernel of truth in the idea that facts about epis-
odes are temporal entities. And if we focus our attention on ‘one-perspec-
tive’ fact statements, that is, fact statements which express the speaker’s
point of view at the time he makes them, it is tempting to put this by
saying that a fact quoad ourselves now is a present entity, even though it
is a fact about the past or about the future. And having said this, it may
well occur to us that this ‘insight’ enables a resolution of a classic puzzle
about truth. For suppose that we were committed to the idea (confused
but endemic) that “the past and the future do not exist.” We might well
say with a sense of relief, “Thank goodness that among the things which
exist are present facts about the past and present facts about the future.
For these account for the truth or falsity of our thoughts and statements
about the future and the past. For if there were no present facts about
the past and the future, there would be nothing for these thoughts to
correspond to, and they would be neither true nor false!”

It is not my purpose to dwell on error for its own sake. But it will, I
believe, be worthwhile to reflect on the above misinterpretation of the
correspondence theory of truth because of its connection with a familiar
gambit, which develops as follows. Facts about the present are in a privi-
egated position. For the fact that S is now $\Phi_2$ has as its companion the
episode* of S’s being $\Phi_2$. This episode exists now. On the other hand,
neither the episode of S’s being $\Phi_1$ nor the episode of S’s being $\Phi_3$ exists
now. The former episode existed in 1957, the latter will exist in 1959.

The next step in this line of thought is to argue (not implausibly) that
the existence of the episode of S’s being $\Phi_2$ is more basic than the exis-
tence of the fact that S is $\Phi_2$. Surely, it is said, episodes are the very stuff
of the world; and even if they are not, they are surely presupposed by facts
about them. What, then, of facts about the future and the past? There
are such facts, and they are responsible for the truth of such of our state-
ments about the future and the past as are true. But while the facts that
S was $\Phi_1$ and that S will be $\Phi_3$ exist now, the corresponding episodes do
not exist (though one did exist and the other will exist).

At this point, the argument, concentrating its attention on statements
and facts about the future, takes a familiar turn. Since the episode of S’s
being $\Phi_3$ does not now exist, it cannot account for the present existence
of the fact that S will be $\Phi_3$. Unless, therefore, we are going to abandon
the idea that statements about the future are ever true, we must find some
explanation of how there can be the fact that S will be $\Phi_3$ in 1959 although
the episode of S’s being $\Phi_3$ does not exist. Is there anything which does
exist and can account for the fact that S will be $\Phi_3$ in 1959? Yes, continues
the argument, there is such a thing, namely the set of facts about the pres-
ent which physically imply that S will be $\Phi_3$ in 1959. For if we knew what
these facts were, we could properly say

(24) It is a fact that $S_1, S_2, S_3, \ldots, S_n$ are thus and so; therefore
it is a fact that S will be $\Phi_3$ in 1959

and

(25) It is a fact that S will be $\Phi_3$ in 1959, because it is a fact that
$S_1, S_2, S_3, \ldots, S_n$ are thus and so.

This is summed up by saying that facts about the future exist as (physi-
cally) implied by facts about the present. The conclusion is then drawn

The term 'episode' will be used, for the time being, in a broad sense in which no
distinction is drawn among episodes, events, states, etc. These distinctions will be
subsequently drawn to a degree of precision which suffices for the purposes of this
paper.
that statements about the future are true or false only to the extent that the future is (physically) determined by the present, or, to put it negatively, to the extent that there are ‘gaps’ in the set of facts about the future which are implied by facts about the present, there are formulable statements and corresponding thinkable thoughts about the future which are neither true nor false.

We have reached the point at which the major confusions which make the above gambit possible must be cleared away before we can locate the element of truth it contains. But before we undertake this task, it is worth noting that if the argument is sound, it applies to the past as well as to the future. Thus, facts about the past would exist as (physically) implied by facts about the present state of the universe, and the truth of statements and thoughts about the past would rest on these implications. Now there is surely no greater a priori (as opposed to empirical-scientific) reason for supposing that the present uniquely determines the past (‘retro-determinism’) than for supposing that it uniquely determines the future (‘antedeterminism’). Once, therefore, the ‘practical’ sense in which the past is ‘determined’—there can be no action which is the bringing about of a past state of affairs as my lighting a match was the bringing about of a future state of affairs (surely an analytic statement as these words are ordinarily used)—is distinguished from the ‘theoretical’ sense in which it is not self-contradictory to say that there are facts about the past which are not ‘determined by’ (‘in principle inferable from’) the present, we see that the above analysis confronts us with the challenging idea that there may well be formulable statements and thinkable thoughts about the past which are neither true nor false. Indeed, by no means the least startling prima-facie implication of the analysis is that while the statement ‘S is Φ₁’ made in 1957 may well have been true, the corresponding statement, made today, ‘S was Φ₁ in 1957’ may be neither true nor false as neither (physically) implied by nor (physically) incompatible with the contemporary (1958) state of the universe. One might even begin to wonder whether, to schematize a medieval example, ‘S was Φ₁ in 1957,’ said in 1958, might be false, although ‘S is Φ₁,’ said in 1957, was true. Clearly something has gone wrong, and we must find out where.

In introducing the above line of thought, I pointed out that the idea that facts quoad ourselves now, that is, facts referred to by ‘one-perspec-

tive’ fact statements, are present entities has the virtue of taking seriously the present tense of “It is a fact that . . ." For that in the case of facts about episodes, at least, the ‘is’ of ‘It is a fact that . . .’ is indeed in the present tense is clear once one abandons the attempt to detense temporal statements. Thus, the ‘will be’ in the that-clause of

(9) It is a fact that S will be Φ₃ in 1959

is ‘will be’ by contrast to the present tense of the ‘is.’

But what can it possibly mean to say that facts quoad ourselves now are present entities? And in what sense, if any, is the fact referred to by the ‘two-perspective’ fact statement

(4) It was a fact (quoad 1957) that S would be Φ₂ in 1958

a past entity? The answer involves a recognition of the intimate connection between

(8) It is a fact that S was Φ₁ in 1957,

(22) It is a fact that S is Φ₂ today (1958), and

(9) It is a fact that S will be Φ₃ in 1959

on the one hand, and

(26) The statement ‘S was Φ₁ in 1957’ is a true statement,

(27) The statement ‘S is Φ₂ today’ is a true statement, and

(28) The statement ‘S will be Φ₃ in 1959’ is a true statement

on the other. Each of the former three is a very close cousin, I might almost say a brother, of its counterpart in the latter trio.

Notice that I did not write, instead of (26), ‘The sentence “S was Φ₁ in 1957” is a true sentence,’ for in discussing problems pertaining to tense, it is essential that we avail ourselves of Strawson’s distinction between statements and sentences. Thus, to refer to the statement ‘S will be Φ₃ in 1959’ is to refer to the sentence ‘S will be Φ₃ in 1959’ as used (indeed, as what would be—properly—used) at a certain time (or during a certain period of time), and when I say

(28) The statement ‘S will be Φ₃ in 1959’ is a true statement

the time in question is now (in a relevant sense of ‘now’).

Notice, next, that I can also say

(29) ‘S will be Φ₃ in 1959’ was a true statement,

in which case the reference is to the same sentence as used at a time before now; while if I say

(30) ‘S will be Φ₃ in 1959’ will be a true statement,
the reference is to a future (but still pre-1959) use of this sentence. Thus, the ‘is,’ ‘was,’ and ‘will be’ of ‘is a true statement,’ ‘was a true statement,’ and ‘will be a true statement’ indicate the time at which the sentence in question would be properly used to make the statement characterized as true.

Note, next, that we say,

(4) It was a fact (quoad 1957) that \( S_2 \) would be \( \Phi_1 \) in 1958

and not

(31) It was a fact (quoad 1957) that \( S \) will be \( \Phi_2 \) in 1958.

The explanation is to be found by reflecting on the parallel between

(32) That \( S \) would be \( \Phi_2 \) in 1958 was a fact

and

(33) ‘\( S \) will be \( \Phi_2 \) in 1958’ (said in 1957) was a true statement.

For whereas the that-clauses of

(34) It is a fact \{ that \( S \) was \( \Phi_1 \) in 1957, that \( S \) is \( \Phi_2 \) today, that \( S \) will be \( \Phi_3 \) in 1959 \}

refer (in a manner to be discussed) to present uses of the sentences “\( S \) was \( \Phi_1 \) in 1957,” “\( S \) is \( \Phi_2 \) today,” and “\( S \) will be \( \Phi_3 \) in 1959” (or their translations in any language), the that-clause, for example, of (4) refers to a prior use of the sentence “\( S \) will be \( \Phi_2 \) in 1958” (or any of its translations), a reference which is manifest in (33). In short, the ‘was’ of ‘It was a fact that’ like the ‘is’ of ‘It is a fact that’ locates the time with respect to which the use of one or another of a specified set of mutually translatable sentences (including ‘mental sentences’) is being considered.

These considerations, incidentally, make it clear why the initial ‘is’ of

(21) It is a fact that \( 2 + 2 = 4 \)

is as tenseless as the ‘\( = \)’ of the mathematical statement itself. For mathematical sentences, not being tensed, are appropriately used at any time and make “the same statement” on each occasion, whereas in the case of tensed statements, different sentences (“differently tensed counterparts”) must be used to “make the same statement” at relevantly different times. Thus, “\( S \) will be \( \Phi \) in 1958” (said in 1957) and “\( S \) is \( \Phi \) today (1958)” (said in 1958) “make the same statement.” The ‘is’ of (21) does not serve the purpose of indicating that a present rather than a past or future use of the sentence “\( 2 + 2 = 4 \)” is under consideration.

I wrote above that each of a trio of fact statements, for example,

(9) It is a fact that \( S \) will be \( \Phi_3 \) in 1959,

is a cousin, perhaps a brother, of a certain truth statement, thus

(28) The statement ‘\( S \) will be \( \Phi_3 \) in 1959’ is a true statement.

Let me now burn my bridges and say that they are identical twins, and, in general, that statements of the form

(35) It is a fact that \( p \),

where ‘\( p \)’ represents a sentence, do not differ in sense from

(36) ‘\( p \)’ is a true statement in our language.

The reference to our language (now) is, of course, essential if we are to have any chance of circumventing Church’s “translation argument” against linguistic interpretations of ‘abstract entities.’ And even with its inclusion, the thesis is a brutal oversimplification, as any isolated philosophical claim must be. I have discussed Church’s argument on another occasion\(^a\) and believe myself to have shown that and how it can be circumvented. But for the purposes of the present discussion I shall simply postulate that the above equation stands. For part of the case which can be made for it consists in the light it throws on the puzzles in which we are involved.

The actual crux of the matter is that if this “nominalistic” thesis be granted, then the equivalence

(37) The statement in (our language) \( L \), “\( S \) will be \( \Phi_3 \) in 1959,”

is true \( \iff \) it is a fact that \( S \) will be \( \Phi_3 \) in 1959

is of a piece with

(38) We’re here \( \iff \) we’re here.

The classical correspondence theory of truth combines a fundamental insight with a fundamental error. It confuses between (and I oversimplify to make the point stand out)

(39) ‘\( S \) will be \( \Phi_3 \) in 1959’ is true \( \iff \) \( S \) will be \( \Phi_3 \) in 1959,

which is both nontrivial and true, and

(40) ‘\( S \) will be \( \Phi_3 \) in 1959’ is true \( \iff \) it is a fact that \( S \) will be \( \Phi_3 \)

in 1959,

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which has, in essence, the form

\[(41) \ p \equiv p.\]

The second point to be noted is that while the equivalence

\[(42) \ 'S \ will \ be \ \Phi_2 \ in \ 1958' \ (\text{said in 1957}) \ was \ true \cdot \equiv \cdot \ \text{it was a fact (quoad 1957) that S would be } \Phi_2 \text{ in 1958}\]

is as sound as two dollars, it does not illuminate what it is to characterize a past statement as true, for it shares the triviality of (40). It is therefore important to note that whereas the nontrivial semantical equivalence (39), which concerns a statement properly made now, involves a use on the right-hand side of the sentence\(^4\) used to make the statement mentioned on the left-hand side and characterized as true, a nontrivial semantical equivalence concerning past statements cannot involve the use on the right-hand side of the sentence\(^6\) used to make the statement mentioned on the left-hand side, and characterized as true. We must use on the right-hand side the appropriate differently tensed counterpart of this sentence.\(^8\) A parallel point can be made concerning the truth of certain spatial statements; thus if Jones, yonder, says “The box is over here,” the appropriate nontrivial semantical equivalence is

\[(43) \ 'The \ box \ is \ over \ here' \ (\text{said by Jones yonder}) \ is \ true \cdot \equiv \cdot \ \text{the box is over there}.\]

Thus, to apply the semantical explication of truth to past statements we must place on the right-hand side the sentence which is the appropriate differently tensed counterpart of the sentence\(^7\) used to make the original statement; for example,

\[(44) \ 'S \ will \ be \ \Phi_2 \ in \ 1958' \ (\text{made in 1957}) \ was \ true \cdot \equiv \cdot \ S \ is \ \Phi_2 \ \text{today (1958)}.\]

I shall have more to say about differently tensed counterparts at a later stage in my argument. For the moment I shall limit myself to pointing out that the right-hand side of a semantical truth equivalence is always a statement in our language, here and now, so that even when the statement which is being characterized as true is past or future, the characterizing of it as true expresses our point of view here and now.

\(^4\) Or, if it is in another language, the translation into our language of the sentence...
\(^5\) See fn. 4.
\(^6\) See fn. 4.
\(^7\) See fn. 4.

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2. Do Past and Future Episodes Exist?

It will be remembered that the views we were examining in Section 1v above made certain assumptions pertaining to facts and episodes in order to argue that statements about the future are true or false only if the states of affairs they express are physically implied by or physically incompatible with facts about the present state of the universe. In the meantime, we have shown that one of the ideas on which the argument rests, viz., that truth is a ‘correspondence’ between statements and facts, is a mistake. It is equally important to see that the other idea to which it appeals, viz., that facts about the present are privileged in that ‘there are’ present episodes, but no past or future ones, is also a mistake. It can readily be shown to rest on a confusion between

\[(45) \ \text{The (future) episode, } E, \ \text{does not ‘exist’—i.e., is not taking place}\]

and

\[(46) \ \text{The (future) episode, } E, \ \text{does not ‘exist’—i.e., there is no such thing as this episode}.\]

Episode E would, of course, simply not be future if it were taking place. But that there is no such thing as a future episode is surely false, and escapes being obviously so only because it is confused with the idea that no future episodes are taking place. To dispel this confusion, it is necessary to see how the language of ‘episodes’ or ‘events’ is related to simple tensed statements of the kind with which this paper began.

But first a terminological remark is in order. It will undoubtedly have been noticed that in the preceding sections the term ‘episode’ has, with a minimum of warning, been stretched to cover items which would not ordinarily be so designated. Thus, we would not ordinarily say that the statement “The soup is salty” reports an episode, even though it does report something that “comes to pass.” Thus, we distinguish, for example, between ‘episodes’ and ‘states.’ It is no easy task to botanize the various kinds of temporal statement, or to find a plausible term for the broader category to which both episodes (‘the salting of the soup’) and states (‘the being salty of the soup’) belong. Perhaps they might be lumped together under ‘outcome.’ For the time being, however, I shall avoid any discussion of states, and limit myself to episodes proper. I shall, therefore, modify the original statements, with which I began, to read
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(1') S became \( \Phi_1 \) in 1957,
(2') S is becoming \( \Phi_2 \) today (1958),
(3') S will become \( \Phi_3 \) in 1959,

and ask how such episode expressions as “S’s becoming \( \Phi_1 \),” “S’s becoming \( \Phi_2 \),” and “S’s becoming \( \Phi_3 \)” are related to statements of these forms.

Actually, the relation between episode expressions and tensed statements which are about things rather than episodes is quite simple, and has been formulated with reasonable clarity by more than one philosopher.¹ Thus, the episode expression “S’s becoming \( \Phi_1 \)” is derivative from tensed statements to the effect that S is (or was or will be) \( \Phi_1 \) in accordance with the following equivalence schema:

\[
(47) \text{S's becoming } \Phi_1 \{ \text{is taking place, took place, will take place} \} \\
\qquad \implies \quad \text{S \{is becoming, became, will become\} } \Phi_1.
\]

Thus we note that there are two kinds of singular term which can be derived from tensed statements of the kind represented on the right-hand side of (47): (a) that-clauses, thus,

(48) That S will become \( \Phi_1 \),

and (b) episode-expressions, thus,

(49) S’s becoming \( \Phi_1 \).

We have already argued that singular terms of the former kind are a special kind of statement-mentioning device and are metalinguistic in character. This being so, we can appreciate the truth contained in the idea that episodes are more basic than facts; for episode-expressions, unlike that-clauses, are in the object language.

On the other hand, it is important not to be misled by this insight into supposing that episodes are the entities of which the world is ‘made up,’ for although it is correct to say that episode-expressions ‘refer to extra-linguistic entities’—indeed, to episodes—the above account tells us that episodes are derivative entities and rest on the referring expressions which occur in tensed statements about things (or ‘substances’).

It is worth noting, in this connection, that though there is a necessary equivalence between the corresponding statements in the following two columns,

(48) It is the case that S is becoming \( \Phi_1 \) is taking place
(49) S’s becoming \( \Phi_1 \) took place

* I have particularly in mind Hans Reichenbach’s discussion of events and things in his *Introduction to Symbolic Logic.*

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It is the case that S became \( \Phi_1 \)
It is the case that S will become \( \Phi_1 \)

S’s becoming \( \Phi_1 \) took place
S’s becoming \( \Phi_1 \) will take place

each statement on the left is differently related than its right-hand counterpart to the ‘basic’ statement from which it is derived. Again, corresponding to the right-hand statements we have the set of (respectively) equivalent statements,

(49) It is the case that S’s becoming \( \Phi_1 \) is taking place,
It is the case that S’s becoming \( \Phi_1 \) took place,
It is the case that S’s becoming \( \Phi_1 \) will take place.

That it can be illuminating to play with the compounding of singular terms of these two varieties will become clear in the sections yet to come.

It is also worth noting—this time as an aside—that both types of singular term (that-clauses and episode-expressions) function in “predicative” implication statements.⁸ We can say not only

(50) That the litmus paper was put in acid (physically) implies that it turned red

but also

(51) The litmus paper’s being put in acid (physically) implied its turning red.

(Note the subtle difference in tense structure of these equivalent statements.) The fact that episode expressions occur as singular terms both in the fundamental, patently object language, contexts explicated in (47) and in such predicative implication statements as (51) gives prima-facie support to the idea that (physical) implication is a relation in re between events, an idea which finds no support in statements like (50) since the metalinguistic character of that-clauses is understood. This makes it doubly important to see that episode-expressions are grounded in tensed statements about things, where these statements, since they are not singular terms, must be that-ed (in effect, quoted) to serve as the subject of statements to the effect that something physically implies something else.

* By a ‘predicative implication statement’ I mean an implication statement in which the function ‘—— implies ———’ plays the role of a predicate, taking singular terms as its substitutends. These statements are to be contrasted with the contrived (but illuminating) form ‘—— ⊃ ———’ in which statements rather than singular terms fill in the blanks to make ‘material implication’ statements.
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viii

I have pointed out that episode-expressions are introduced in terms of the equivalences represented by schema (47). The next step is to explore the relationships represented by the schema

(52) S's becoming Φ₁ is \{present, past, future\} \equiv \{S's becoming Φ₁ \{is taking place, has taken place, will take place\}\}.

The corresponding statements on the left- and right-hand sides are clearly equivalent. But before we ask whether this equivalence is an identity of sense, let us note that the introduction of the adjectival expressions ‘past,’ ‘present,’ and ‘future’ makes possible, when combined with various tenses of the copulative ‘is,’ the introduction of the forms

(52) E was present (past, future)

and

(53) E will be present (past, future)

which, by the use of one overt tensed verb, make statements that would require the use of complex tenses if reformulated as statements about things rather than episodes. Thus, while

(54) S's being Φ₁ is future

is the counterpart of

(55) S will become Φ₁,

to get the counterpart of

(56) S's becoming Φ₁ was future (in 1900)

we must say something like

(57) (In 1900) S was (yet) to become Φ₁,

and to get the nonepisodic counterpart of

(58) S's becoming Φ₁ will be past (in 1960)

we must say something like

(59) (In 1960) S will (already) have been Φ₁.

These considerations call attention to the fact that there are several ways in which we can make ‘two-perspective’ temporal statements. Thus, compare

(60) It was a fact (quoad t) that S would now (1958) become Φ₁,
(61) (At t) S was to become Φ₁ today (1958),
(62) S's becoming Φ today (1958) was future (quoad t).

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Of these, the first has, we have seen, roughly the form

(60’) ‘S will become Φ₁ in 1958’ (said at t) was a true statement.

But what of (62)? Surely it also has a metalinguistic force. That it is equivalent to

(63) ‘S's becoming Φ₂ will take place in 1958’ (said at t) was a true statement

is reasonably clear. I propose to argue that this equivalence is an identity of sense, and that, more generally,

(64) E \{is, was, will be\} past (at t) \equiv \{E took place\} (said at t) \{is, was, will be\} true
(65) E \{is, was, will be\} present (at t) \equiv \{E is taking place\} (said at t) \{is, was, will be\} true
(66) E \{is, was, will be\} future (at t) \equiv \{E will take place\} (said at t) \{is, was, will be\} true

If we combine these schemata with considerations relating to the moves from either

(67) S was true

or

(68) S will be true

to

(69) S' is true

where S' is the appropriate differently tensed counterpart of S which is used now to make the statement which S was used to make (in case (67)) or will be used to make (in case (68)), we have a direct route from statements of the forms represented by

(70) E \{is, was, will be\} \{present, past, future\}

to statements of the form

(71) E is taking place (has taken place, will take place)

and hence (in simple cases) to statements of the form

(72) S is becoming (has become, will become) Φ₁.

But more of this in a moment. For it remains to suggest that even the second of the three ways of making a two-perspective statement listed above, namely,

(61) (At t) S was to become Φ₁ today (1958)

has a metalinguistic component to its sense, and involves a tacit quoting
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of “S will become ψ in 1958” as appropriately tokened at the prior time t. For a temporal perspective is always a cognitive perspective, the perspective of a user of temporal language. But to bring out the metalinguistic component of (61) requires a deeper analysis of temporal expressions, and, in particular, at least a rudimentary account of how they are tied up with references to dates, moments, and periods of time.

IX

Let us consolidate some of the ground which has (tentatively) been won, by noting that the classical notion that ‘there is’ a series of events related by earlier than (or precedes), where the ‘is’ of

(73) E₁ is earlier than E₂

is in the ‘tenseless present,’ is a mistake if it is supposed that this ‘tenseless present’ is logically independent of the use of tensed verbs. Actually, of course, if ‘earlier than’ is to be a temporal predicate at all, the ‘is’ of ‘is earlier than’ can be ‘tenseless’ only as the ‘be’ of the sentence “Eisenhower be president in 1956,” so contrived as to be suitable for making a statement and, in an appropriate sense, the same statement, whenever it is used, was ‘tenseless’ only by virtue of its stipulated equivalence to a disjunction of three sentences involving, respectively, the past, the present, and the future tenses of ‘to be,’ as in (20). In the case at hand, we have the equivalence

(74) E₁ precedes E₂ ∴ E₁ is present and E₂ future, or E₁ was present and E₂ future, or E₁ will be present and E₂ future.

Notice, of course, that in (74) the component “E₁ was present and E₂ future” must have the sense of “E₁ was present and E₂ was at that time future.” In other words, this component must be construed as having the force of

(75) ‘E₁ is taking place and E₂ will take place’ was true rather than

(76) ‘E₁ is taking place’ was true and ‘E₂ will take place’ was true.

Obviously the latter entails the former only if the statements “E is taking place” and “E will take place” are construed as made or to be made at the same time. In the case of (75) this proviso is unnecessary, since we have to do with one conjunctive statement rather than two statements.

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x

Are there past and future episodes? That the answer is ‘yes’ is surely a foregone conclusion, but the logical niceties remain to be determined. To begin with, something must be said about the status of the very term ‘episode.’ That it is a common noun, and that “There are episodes” has the same general form as “There are lions,” is clear. But more than this we can say that ‘episode,’ like ‘property’ and ‘relation,’ is a ‘category word’; and to say this is to say that like the latter pair it is the counterpart in the material mode of a logical pigeonhole for a certain class of expressions in our language. Thus,

(77) E is an episode

tells us no more about E than is exhibited by

(78) E is taking place or has taken place or will take place

and serves to indicate that the singular term represented by ‘E’ is the sort of term which belongs in this type of context. Thus, to say that there are episodes is, in effect, to say that something¹⁰ either is taking place, has taken place, or will take place. And as saying this it is equivalent to (though it does not have the same sense as) a statement to the effect that something is either present, past, or future. These statements can be put logistically as follows:

(79) (Ex) x is taking place ∨ x has taken place ∨ x will take place;
(80) (Ex) x is present ∨ x is past ∨ x is future.

If, now, we introduce into the latter the categorizing function, ‘x is an episode,’ to obtain

(81) (Ex) x is an episode ∧ x is present ∧ x is an episode ∧ x is past ∧ x is an episode ∧ x is future,

we are in a position to note the different roles played by the first and second occurrences of ‘is’ in each of the disjuncts. For while the second ‘is’ in each case is in the present tense in a full-blooded sense (i.e., the context admits ‘was’ and ‘will be’ as well as ‘is’), the first is not. The first ‘is’ is in the ‘tenseless present,’ as is the ‘is’ in all categorizing statements, thus

(82) Triangularity is a quality.

¹⁰ ‘Something’ here does not, of course, mean some thing, i.e., some continuant or substance. It is the ordinary language equivalent of so-called existential quantification and as such moves from category to category depending on context, just as the reversed ‘E’ of the ‘existential’ operator is appropriately combined with variables of all types, thus, ‘(Ex) . . . x . . . ’; ‘(Ef) . . . f . . . ’
We may, indeed, say

(83) E was an episode,

but this has the force of

(84) E is an episode \cdot E has taken place.

In other words, the past tense is connected not with the categorizing, but with the temporal location of the categorized entity.\[11\]

On the other hand, the second 'is' in each disjunct of (81) is full-bloodedly in the present tense, for the functions

(82) x is \{ present, past, future\}; ['x {is taking, has taken, will take} place' is true]

are, as we have seen, to be contrasted with

(83) x was \{ present, past, future\} (at t);

['x {is taking, has taken, will take} place' (said at t) was true]

and

(84) x will be \{ present, past, future\} (at t);

['x {is taking, has taken, will take} place' (said at t) will be true].

Thus, to say that some episodes are past or that some episodes are future (or, for that matter, that some episodes are present) is simply to affirm one of the disjuncts in the statement which is the explicitly categorized form of the assertion that there are such things as episodes. For

(85) There are episodes

has, as we have seen, the force of

(86) (Ex) x is a present episode v x is a past episode v x is a future episode,

which we may read

(87) Something is either a present episode or a past episode or a future episode

and is equivalent to

(88) Something is a present episode v something is a past episode v something is a future episode.

\[11\] I shall return to the topic of the role of the present tense in categorizing statements at a later stage in the argument.

Our discussion of the difference between the 'is' of 'is an episode' and the 'is' of 'is present (past, future)' makes it clear that the 'are' in

(89) Some episodes are \{ present, past, future\}; [(Ex) x is a \{ present, past, future\} episode]

is full-bloodedly in the present tense, for while this 'are' contains the 'tenseless present' of the categorizing function, 'x is an episode,' it also contains the full-blooded present tense of the functions 'x is present,' 'x is past,' and 'x is future.' Thus the statements

(90) There are \{ present, past, future\} episodes

contrast with

(91) There were \{ present, past, future\} episodes;

[There are episodes which were \{ present, past, future\}]

and

(92) There will be \{ present, past, future\} episodes;

[There are episodes which will be \{ present, past, future\}]

which are based on the functions 'x was present (past, future)' and 'x will be present (past, future).'</n

It is important to see that

(93) There are past episodes

and

(94) There were past episodes

make quite different statements, as do

(95) There are future episodes

and

(96) There will be future episodes.

For this puts us in a position to see that to suppose that the correct way of talking about the existence of past and future episodes is by saying

(94) There were past episodes

and

(96) There will be future episodes

is to make a simple mistake. It is, indeed, incorrect to say either

(97) Past episodes are taking place

or

(98) Future episodes are taking place.
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Here the tense of ‘to be’ must agree with the temporal adjective applied to the episodes. On the other hand, the ‘are’ of (93) and (95), as traceable to the functions ‘x is past’ and ‘x is future,’ and hence as giving expression to our temporal point of view in making these statements, contrasts radically with the ‘were’ of (94) and the ‘will be’ of (96) which are traceable to functions (‘x was past,’ ‘x will be future’) each of which locates (from our point of view) a second and different point of view from which the episodes in question might have been, or might yet be, viewed.

Thus, to make ‘single-perspective’ existence statements about episodes, we must use the present tense,

\[ (90) \text{ There are } \{ \text{present, past, future} \} \text{ episodes} \]

and hence make statements which, by virtue of their relationship to simply tensed statements about changeable things, are, in elementary cases, equivalent, respectively, to

\[ (91) \ (ES) (Ef) S \{ \text{is becoming, became, will become} \} f. \]

3. Time and Temporal Relations in a World of Things

The above analysis throws light, I believe, on a number of venerable and well-worn puzzles. Thus, philosophers have been prone to ask, “How can two successive events be temporally related if when the earlier event exists, the later does not yet exist, and when the later event exists, the earlier event no longer exists?” Surely, it has been argued, the terms of any relation must ‘coexist.’ I will not take the time to apply the above considerations to this elementary confusion. What is of somewhat greater interest, however, is that our analysis throws light on the sense in which ‘there are’ temporal relations at all. For while there clearly are temporal relations between events, the latter (we have argued) have a derivative status in the sense that statements about events are, in principle, translatable into statements about changeable things. If we put this somewhat misleadingly by saying that ‘ultimately’ or ‘in the last analysis’ there are no such things as events, we must also say that ‘ultimately’ or ‘in the last analysis’ there are no such things as temporal relations.

It is impossible, however, to make sweeping statements about temporal relations without coming to grips with topics of the most central importance which have simply been bypassed in the argument to date. Thus it will undoubtedly have been noticed by readers who are sensitive to classical issues in the philosophy of time that I have permitted myself to pass back and forth from tensed statements about things which make no explicit reference to location in time, to tensed statements about things which contain a reference to a moment or period of time, thus, “S was \( \Phi \) at \( t \).” Now concepts pertaining to time, and moments or periods of time, are metrical concepts, and involve logical individuals, whether derivative (as we have construed episodes to be) or primitive for which metrical relationships have been defined. It is time, therefore, that we faced the fact that if we are going to take things as our only primitive logical individuals, we must find a nonrelational way of talking about changing things by the use of tensed verbs which provides a logical basis for statements about topological and metrical relations between events when it is translated into the derived framework of episodes and events which we have been concerned to analyze. For once the transition from tensed talk about things to a topologically ordered framework of events has been made, we will have established contact with the many excellent explorations of the constructibility of concepts pertaining to time and its periods and moments on a basis consisting of topologically characterized relationships among events, which exist in the literature of the subject.

There are, roughly, two ways in which the step from a relationally ordered system of events to time, its periods and moments, has been conceived. (1) There is the idea that concepts pertaining to time are explicitly definable in terms of such a relation between events as overlapping, thus Whitehead’s account in terms of the ‘Method of Extensive Abstraction’; (2) there is the idea that time has the status of a quasi-theoretical entity the ultimate particulars of which are moments. According to the latter interpretation, metrical relationships between periods and moments of time would be ‘idealized’ counterparts of empirically ascertainable metrical relationships between episodes pertaining to everyday (and scientific) things. It is the latter approach which I would defend. It is therefore incumbent on me to explain what I mean by characterizing time as a quasi-theoretical entity.

Actually, it is misleading to use the term ‘theoretical’ in this context at all. For all that time has in common with population of molecules is the existence of rules for coordinating statements concerning empirically ascertainable metrical relations between episodes pertaining to the things of everyday life and science, with statements locating these episodes, rela-
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tively to other episodes, in time, that is, with statements having the characteristic syntax of statements "about time." There remains the essential difference that time is introduced as a metrical framework rather than, as in the case of molecules, as part of the content of the world. Needless to say, the fact that we can say that 'time' refers to time, i.e., talk semantically about expressions such as 'time,' 'the year 1900,' 'to,' etc. throws no light whatever on the status of time, since it simply gives expression to the fact that temporal expressions have a use.

"But," it will be said, "even granting that something like the position you have been sketching can stand the gaff, you have not yet shown how metrical relations between empirically ascertainable episodes can be derivative from nonrelational temporal facts concerning things. For, as you yourself have insisted, if things are the only basic individuals, then all relational temporal facts pertaining to episodes must rest on nonrelational temporal facts pertaining to things." The answer to this challenge consists in calling attention to such locutions as

(92) Nero fiddled while Rome burned

and noting that 'while' is a connective which connects statements and remembering that statements are not singular terms. In other words, the answer is simply that we must not equate statements involving temporal connectives such as 'while' with statements formulating temporal relations between episodes, thus

(93) Nero's fiddling coincided with Rome's burning.

Nor are statements of this kind to be equated with statements explicitly mentioning periods of time, thus

(94) Nero fiddled during the period of time in which Rome burned.

On the other hand, it must be granted that these temporal connectives are free from involvement with the framework of time only in a hypothetically primitive use. For tensed discourse with these connectives, but without the framework of time, would constitute a most primitive picture of the world.

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sodes, but also of the periods and moments of time, as past, present, or future, as having been past, present, or future, and as going to be past, present, or future. And the application of 'is (was, will be) present (past, future)' to moments clearly rests on their application to events in a way which is roughly indicated by the formula

(97) \( t \downarrow \{\text{is, was, will be}\} \text{ present } \overset{\cong}{\Rightarrow} (E) \text{ E occupies } t \supset E \{\text{is, was, will be}\} \text{ present} \)

which, for simplicity's sake, has been put in terms of moments and momentary events.

Again, the concept of one moment as preceding another moment in the continuum of time is exhibited by the formula

(98) \( t_1 \text{ precedes } t_2 \overset{\cong}{\Rightarrow} t_1 \text{ is present and } t_2 \text{ is present or, } t_1 \text{ was present and } t_2 \text{ future or, } t_1 \text{ will be present and } t_2 \text{ future.} \)

We can also introduce 'now' as an expression referring to the present moment, thus,

(99) \( \text{Now } = (\ldots t \text{ is present.} \)

It is essential to note the tensed character of the 'is' on the right-hand side, for this formula highlights the fundamental role played by tensed verbs in temporal discourse. We can put this point roughly by saying that 'now' is to be understood in terms of 'is', not 'is' in terms of 'now' construed as a basic demonstrative. Or, more accurately, this is the account of 'now' we must give if we are to construe our language as one in which the basic logical individuals are changeable things. For we shall subsequently be exploring the logic of a framework which, while not that of ordinary discourse and, indeed, an invention of the philosophers, is, if consistently developed, a legitimate alternative to the framework of things. The basic logical individuals of this new framework are 'events' in a sense

\[ ^3 \text{ It is, perhaps, worth noting that 'S remained } \Phi \text{'} \] generates the dual or 'null' episode of S's remaining \( \Phi \), 'null' in the sense that remaining \( \Phi \) is a limiting case of a going's on which is a change. Notice, also, that whereas the idea of a momentary episode (change) is, strictly speaking, nonsense, the idea of a momentary state is not. The latter is introduced by the equivalence between

(95) \( x \text{ remains } \Phi \text{ throughout } p \)

and

(96) \( x \text{ is } \Phi \text{ at every moment of } p. \)

(These statement forms, of course, presuppose the coordination of episode talk with time talk.) The idea of episodes as consisting of a continuum of momentary states would be a reconstruction, in terms of the framework of time, of the idea of an episode on which this framework rests.
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of this term which is radically different from 'episode' or 'event' as they occur in the framework of things. In this 'event' framework, 'now' will play a radically different role. That the two frameworks are, in an important sense, equivalent and easily confused will be found to account for many of the recurring ontological puzzles concerning time and change.

Another important schema is the following, which relates 'was true' and 'will be true' to 'is true':

(100) 'E_i is taking place' (said at) t_i {is, was, will be} true · [E_i 'is taking place, took place, will take place] at t_i' (said now) is true.

With these equivalences behind us, we are in a position to introduce the metaevent expression 'E_i's being present,' which we can abbreviate as 'E_{pr}[E_i]' in terms of the schema

(101) E_{pr}[E_i] 'is taking, has taken, will take' place at t_i · [E_i 'is, was, will be] present at t_i.

(102) E_i be present at t_i · [E_i is present at t_i or, E_i was present at t_i or, E_i will be present at t_i],

where it is a necessary truth that

(103) E_i be present at t_i ⊨ (t) t ≢ t_i ⊨ (E_i be present at t)

i.e., there is only one time, the time which it occupies, at which a (momentary) event "is" (be) present, as there is only one time (now) at which a (momentary) event is present.

Continuing the line of thought initiated by schema (101) we add

(104) E_{pr}[E_i] is (now) 'present, past, future' · E_{pr}[E_i] 'is taking, has taken, will take' place' (said now) is true.

From these equivalences, together with certain considerations which have not been spelled out, but are reasonably straightforward, we can derive

(105) E_{pr}[E_i] 'is taking, has taken, will take' place at t_i · [E_i 'is taking, has taken, will take' place at t_i]

and

(106) E_i is 'present, past, future' (now) · E_{pr}[E_i] is 'present, past, future' (now).

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To spell out the relationship in a particular case, note that

(107) E_{pr}[E_i] is future ⊨ E_{pr}[E_i] will take place' is true
     ⊨ E_{pr}[E_i] will take place
     ⊨ (Et) E_i will be present at t
     ⊨ (Et) 'E_i is taking place' (said at t) will be true
     ⊨ (Et) 'E_i will take place at t' (said now) is true
     ⊨ E_i is future.

The steps which have not yet been adequately clarified (though intuitively sound) are those which involve quantification over moments. For these steps tacitly involve such principles as

(108) 1 E_i is now future ⊨ (t) t precedes now ⊨ E_i was future at t
     2 E_i is now past ⊨ (t) t follows now ⊨ E_i will be past at t
     3 E_i is now present ⊨ (t) t precedes now ⊨ E_i was future at t
        ⊨ (t) t follows now ⊨ E_i will be present at t
     4 E_i is now future ⊨ (Et) t follows now ⊨ E_i will be present at t
     5 E_i is now past ⊨ (Et) t precedes now ⊨ E_i was present at t.

It is therefore time to note that the temporal relation between the metaevents E_{pr}[E_i] and E_{pr}[E_i] like the relation between E_i and E_i is 'timeless' only as involving a disjunction of tenses, thus,

(109) E_{pr}[E_i] precedes E_{pr}[E_i] · E_{pr}[E_i] is present · E_{pr}[E_i] is future, or E_{pr}[E_i] was present · E_{pr}[E_i] was future, or E_{pr}[E_i] will be present · E_{pr}[E_i] will be future.

And the cumulative force of the principles and equivalences set down above is to make intelligible the 'analytic' character of the principle that "earlier events become present before later events," i.e., that, to use the traditional (and dangerous) metaphor, the "bulls-eye of the present moves along the series of events from earlier to later," for it is a consequence of these principles and equivalences that

(110) E_i precedes E_j ⊨ E_{pr}[E_i] precedes E_{pr}[E_j].
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It is also important to note, for future reference, that if it is granted that
(111) E is (now) present ♦: (t) t precedes now ♦ E was future at t
and that
(112) E was future at t ♦: ‘E is future’ (said at t) was true
(113) ‘E is future’ (said at t) was true ·==· ‘E will take place’
   (said at t) was true
(114) ‘E will take place’ (said at t) was true ·==· ‘S will be Φ’
   (said at t) was true

where E = S’s being Φ); and, finally that
(115) ‘S will be Φ’ (said at t) was true ·==· It was a fact (quoad t) that S would be Φ at a time subsequent to t

then the very structure of time talk, as we have laid it out, involves that
(116) S is Φ ·==· It was always a fact that S would be Φ
   ·==· ‘S will be Φ’ (said at any time before now) was always true.

4. Do Past and Future Things Exist?

The explorations of the preceding sections make possible a clarification of certain concepts pertaining to becoming. The first thing to note is that if we have in mind by ‘becoming,’ becoming Φ, then both things and events can be the subjects of becoming, thus
(116) S {is becoming, became, will become} red
   E {is becoming, became, will become} more and more past.13

The next thing to note is that whereas both things and events can become Φ, only things become in the sense of come into being. Many of the puzzles pertaining to becoming rest on a failure to see that in no ordinary sense do events come into being. To equate

(117) E is becoming present

13 It is not my purpose to analyze statements of these forms where the subject is an event and the predicate other than a temporal predicate. That there are such statements is clear, thus ‘E is becoming less and less approved.’ There is, indeed, a sense in which events, as McTaggart points out, can change only with respect to temporal characteristics, but this means only that other changes are to be analyzed in terms of change with respect to temporal characteristics, so that the claim is true only in the sense in which “only primitives exist.”

with
(118) E is coming to be (or coming into existence)
is either to make a mistake, or to stipulate a new use for ‘come to be’ (‘come into existence’). For, as we have seen, there is an elementary sense in which there are future events (and past events) as well as present events. Thus, if
(119) E shall come to pass
is construed (as, I suspect, it is often construed) as
(120) E shall come to be (come to exist)
rather than
(121) E shall come to take place (i.e., will take place)
one is likely to think that the fact that E “shall come to pass” implies that there is no such event as E until it takes place. (Of course, E will not be present until it takes place.) It is easy to fall into the absurdity of supposing that the fact that future events “shall come to pass” implies that there are no future events.

We shall be discussing in a moment the coming into being and the passing away of things. Before we take up this crucial topic, the topic of ‘absolute becoming’ (as contrasted with ‘becoming Φ’), let us remind ourselves that the most puzzling of traditional puzzles about becoming have to do with its status as ‘objective’ or ‘subjective.’ Thus, it is asked, would there be becoming if there were no knowing minds immersed in the temporal order? To this latter question, the answer implied by our analysis is, in a certain sense, No. But to say this at this stage is not to say that becoming is in any usual sense ‘subjective,’ but merely to remind ourselves that however ‘objective’ temporal statements may be in the sense of belonging to intersubjective, rational discourse, they are irreducibly ‘token-reflexive.’ After all, the world would contain no heres and theres if it included no users of ‘here’ and ‘there’—or their equivalents. And to think of a possible world as containing heres and theres is, in effect, to imagine oneself in it, using ‘here’ and ‘there.’14

It is tempting to suppose that the expressions ‘here’ and ‘there’ are the spatial counterparts of ‘now’ and ‘then.’ And, of course, in a sense this is

14 This generates the question, ‘Can we describe in nontensed terms what a world must be like for tensed talk to be appropriately used in it?’ The present essay is, in a certain sense, a preface to an exploration of this fundamental issue in the philosophy of time. See also Sec. 8 below.
true. But to be impressed by the similarity between ‘x is here’ and ‘x is now’ is to run the danger of overlooking an important difference, namely, the association, in the latter case, of the temporal predicate ‘now’ with the temporal present tense of ‘to be,’ as contrasted with the association, in the former case, of the spatial predicate ‘here’ with the temporal present tense of ‘to be.’ To put the point bluntly, our language does not contain spatial tenses.

But before we assess the significance of this difference, let us press the similarities. Thus, just as the temporal dimension of discourse presents us with what we have called ‘differently tensed counterparts,’ the spatial dimension presents us with what can be called ‘differently located counterparts.’ If S₁ is here (where we are) and S₂ is there, the statements, which we now make,

(122) S₁ is here
(123) S₂ is there

have, as counterparts, the statements, made by someone over there,

(124) S₁ is there
(125) S₂ is here

so that we can say not only,

(126) (From here) it is a fact that S₁ is here
(127) (From here) it is a fact that S₂ is there

but also (albeit somewhat forcedly)

(128) (From there) it is a fact that S₁ is ‘there’
(129) (From there) it is a fact that S₂ is ‘here’

that is, both

(130) ‘S₁ is here’ (said here) is a true statement
(131) ‘S₂ is there’ (said here) is a true statement

and

(132) ‘S₁ is there’ (said there) is a true statement
(133) ‘S₂ is here’ (said there) is a true statement.

Suppose, now, someone were to argue as follows: “The distinction between here and there is, in an important sense, ‘subjective,’ for while discourse about here and there is rational, intersubjective discourse, there would be no such thing as here or there if there were no language users using expressions having the force of ‘here’ and ‘there.’ On the other hand,” he continues, “spatial relationships, like ‘between,’ ‘colinear with,’ ‘perpendicular to,’ etc., are objective, and would be in the world even if there had been no language users. These objective relations are presupposed by the distinction between here and there, for it is because language users stand in the objective relations they do to other people and things that they can make proper use of the expressions ‘here’ and ‘there.’” Having thus prepared the way, he goes on to expostulate, “Surely the same is true in the case of time. Must there not be relations independent of the distinction between now and then which are presupposed by this distinction, and are as objective as the spatial relations mentioned above?”

The above argument is as old as the hills, and it points up a familiar dilemma. On the one hand there is the fact that if our argument to date is sound, all temporal concepts contain an irreducibly ‘subjective’ element (though the term ‘subjective’ must be used, as we have seen, with caution); on the other hand, the analogy of spatial discourse suggests that the ‘token-reflexive’ aspects of temporal discourse rest on ‘purely objective’ temporal relations which would ‘be there’ even if there were no language users. Is there any way out of this dilemma?

It might seem that not only is there a way out, but we have already taken it. For have we not undercut it by arguing that events have a derivative status? In the framework of things, it is things which stand in spatial relations (though they do so at a time), whereas it is events which stand in temporal relations. Have we not shown that there is a ‘level of being more basic than the level of events’ and have we not therefore shown that even if all temporal relations between events contain an irreducibly ‘subjective’ element, nevertheless the existence of changing things is objective? Can we not say with Bergson that the framework of temporal relationships rests upon a nonrelational mode of becoming (his durée, more adequately categorized)? The answer is, of course, that even if we have shown that something remotely analogous to what Bergson had in mind is true, to establish the derivative status of the relational framework of events is by no means to find a ‘purely objective’ foundation for temporal facts. For even if statements of the form ‘E₁ overlaps (overlapped, will overlap) E₂’ rest on statements of the form represented by ‘Nero fiddled while Rome burned,’ we are still confronted by the irreducibly tensed, and hence, in the sense in which we are using the term, ‘subjective’ character of such statements.

Nevertheless, as I hope to show, the step of locating the ‘radical sub-
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jectivity’ of ‘becoming’ in tensed statements about things rather than in relational statements about events is a significant advance toward dissolving the puzzles. In addition to its role in facilitating the next steps in the argument, it serves the immediate purpose of making us aware of the limitations of analogies drawn from space. For it brings us back to the difference pointed out above (p. 558) between ‘x is here’ and ‘x is now,’ by highlighting the irreducible role of tensed verbs in the expression of temporal facts.

XIV

Further progress requires a scrutiny of the logical connections between the concept of existence and concepts pertaining to temporal location. It can best be introduced by taking a closer look at exactly how the analogy of space generates puzzles with respect to the status of becoming. We have all heard arguments of the following sort: “The basic individuals of the framework of time are events. They are the domain of a purely objective relation of earlier than. ‘Now’ is a token-reflexive expression tokens of which, occurring in the system of events, give expression to, and have as an essential part of their sense, their location in the system. The distinction between now and then exists only with respect to (from the point of view of) linguistic events in the system. The objective status of the events as a temporal order is independent of the distinction between now and then, and, indeed, the temporal order is prior to and embraces the perspectival facts which are constituted by the occurrence of token-reflexive linguistic events. The temporal order exists in a sense which is independent of, and prior to, any use of token-reflexive expressions. Statements to the effect that such and such events exist are tenseless statements. To say that a certain event will exist is to say that it exists (in a tenseless sense) and is later than now. After all,” the argument concludes, “it is well known that the concept of existence is nothing more than the existential operator, which is no more tensed than ‘or’ or ‘not.’”

But while this argument has proved persuasive, it leaves us puzzles. The idea of a tenseless existence of events tenselessly related by earlier than has a flavor of absurdity, if not of self-contradiction. To view the status of now and then as a matter of the presence in a tenselessly existing relational order of tokens of ‘now’ and ‘then’ is to run counter to the idea, at least as persuasive as the above argument, that to say of two events that one is earlier than the other is to use, and not merely to mention a tem-

poral token-reflexive expression. And if this latter idea is sound, how can there be such a thing as a token-reflexive-free statement to the effect that there exist events which are related as earlier to later?

But the above remarks only heighten the tension, and provide no relief. And a review of the situation makes it clear that the tension is focused in the clash between “Statements to the effect that such and such events exist are tenseless statements” and “The idea of a tenseless existence of events . . . has a flavor of absurdity . . .” Clearly this conflict can only be resolved by a careful analysis of the concept of existence as it relates to entities in time.

Let us first discuss the concept of existence as it appears in the framework of things. In this framework, it will be remembered, the basic logical individuals are things (or substances or continuants), and the names of the language refer to these individuals. While things are referred to by names, the fundamental form of event expressions in the thing framework is indicated by the following: ‘S’s being Φ,’ ‘S’s becoming Φ,’ ‘S’s V-ing (or being V-ed)’ (where ‘V’ represents an appropriate verb). Both ‘S’ and ‘S’s being Φ’ are singular terms, but their statuses within this category are radically different. We have already had quite a bit to say about the ‘existence’ of events and, indeed, of past, present, and future events within the framework of things. It is time we said something about the ‘existence’ of things themselves.

Let me put my finger on the essential point at the very beginning. Existence statements about things are as irreducibly tensed as statements about the qualitative and relational vicissitudes of things. Thus paralleling

(134) S {is, was, will be} Φ

we have

(135) S {exists, existed, will exist}.

How are these latter statements to be understood?

Here we run head on into the fact that it is widely thought (indeed, taken for granted) that there are no such statements, or, more accurately, that there are no such statements if S is construed as a name. It is, in short, almost dogma that existence statements are statements having the form ‘(Ex) . . . x . . .’ and that the difference between general existence statements and singular existence statements lies in the presence or absence of a uniqueness condition. I wish to contend, for reasons which I
have developed in another context, that the truth is the very opposite of this dogma, and that existence statements invariably are of the form

\[(136) \text{N exist}(s)\]

where ‘N’ is either a proper name, in which case the statement is a singular existence statement, or a common name, in which case the statement is a general existence statement.

We have all been brought up to recognize that the argument

\[(137) \text{Lions exist}\]
\[\text{Leo is a lion}\]
\[\text{Therefore Leo exists}\]

exhibits a misunderstanding of the logical form of ‘Lions exist.’ The latter does not stand to ‘Leo exists’ as ‘All men are mortal’ stands to ‘Socrates is mortal.’ On the other hand, the fallacy does not consist in forming a nonsense sentence ‘Leo exists’ under the impression that such a parallel exists. The sentence ‘Leo exists’ makes perfectly good sense, and is not to be construed as the mistake of putting a name (instead of a variable) after the ‘existential operator’ or reversed ‘E.’ Nor is the fallacy adequately exposed by rendering it, logistically, as

\[(138) (\text{Ex}) \ x \ \text{is a lion}\]
\[\text{Leo is a lion}\]
\[\text{Therefore, } (\text{Ex}) \ x = \text{Leo.}\]

For while ‘Lions exist’ would not be true unless ‘(Ex) x is a lion’ were true, and while ‘Leo exists’ would not be true unless ‘(Ex) x = Leo’ were true, these logistical expressions do not represent the sense of the original existence statements.

How are these existence statements to be understood? Let me begin with the rough suggestion that ‘S’ being a proper name)

\[(139) S \text{ exists (did exist, will exist)}\]

has the sense of

\[(140) \text{Something satisfies (satisfied, will satisfy) the criteria for being called S,}\]

where the criteria include a uniqueness condition. Notice that an everyday rendering of (140) runs

\[(141) \text{There is such a (unique) thing as S.}\]

\(^{15}\) See “Grammar and Existence: A Preface to Ontology.”

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If this suggestion is sound, it springs to the eyes that there is a general resemblance (such as we would naturally expect) between ‘Leo exists’ and ‘Lions exist,’ for the latter would have, roughly, the sense of

\[(142) \text{Something satisfies the criteria for being called a lion}\]
\[\text{or}\]
\[(143) \text{There are such things as lions.}\]

Notice that both (142) and (143) are in the present tense, as is ‘Lions exist.’ It is important to realize that we are dealing with the schema

\[(144) Ks \{ \text{exist, existed, will exist} \} \cdot \text{Something } \{ \text{satisfies, satisfied, will satisfy} \} \text{ the criteria for being called a K} \cdot \text{There } \{ \text{are, were, will be} \} \text{ such things as Ks.}\]

The crucial point is that statements of the form

\[(145) (\text{Ex}) \ldots \ x \ldots\]

are not as such in any ordinary sense existence statements. They correspond to existence statements, where they have the force of

\[(146) \text{(Ex) } x \text{ is properly called (an) N}\]

where ‘N’ is a proper or common name. Most of the puzzles about existence, and, in particular, puzzles about the existence of abstract entities, are rooted in a crude equation of existence statement with ‘existentially quantified’ statement.

If one thinks that ‘S exists’ has the force of ‘(Ex) x = S,’ one will conclude that things have a ‘tenseless’ existence, for the function ‘(Ex) \ldots x \ldots’ is not a tensed function. If, for example, one construes

\[(147) 
\text{Eisenhower exists (i.e., ‘There is such a person as Eisenhower’)}\]

(i.e., ‘There is such a person as Eisenhower’) as

\[(148) (\text{Ex}) x = \text{Eisenhower,}\]

one will conclude that the existence of Eisenhower is a tenseless existence, and go on, perhaps, to contrast his tenseless existence with the tensed truths which record his history. The truth of the matter, however, is that ‘Eisenhower exists’ is, as it seems to be, a tensed statement, and has the force of

\[(149) (\text{Ex}) x \text{ satisfies the criteria for being called Eisenhower.}\]

On the other hand, ‘Napoleon existed’ has the force of

\[(150) (\text{Ex}) x \text{ satisfied the criteria for being called Napoleon.}\]
Similarly, ‘Men will exist’ has the force of

\[(151) \ (Ex) \ x \text{ will satisfy the criteria for being called a man.}\]

It is, therefore, a radical mistake to suppose that in the framework of things the basic individuals of the framework have a tenseless existence, with tenses playing a role only at the level of predication about them.

The above line of thought is reinforced by the following consideration. Once we realize that ‘existence’ is not to be confused with ‘existential’ quantification, we are in a position to note that whereas such radically different existence statements as

\[(147) \text{Eisenhower exists}\]
and
\[(152) \text{Triangularity exists,}\]
not to mention
\[(153) \text{Lions exist}\]
and
\[(154) \text{Numbers exist,}\]
have in common the general form

\[(155) \ (Ex) \ x \text{ satisfies the criteria for being called (an) N,}\]

there is a radical difference between the first and second member of each pair, a difference which concerns the nature of the criteria. And once we reflect on these differences we note that whatever may ultimately be true of (152) and (154), the existence statements concerning Eisenhower and lions essentially involve a relation to the person making the statement. For to say that Eisenhower exists is to imply that he belongs to a system (world) which includes us as knowers (i.e., language users). In other words, such statements as that Eisenhower exists have an intimate logical connection with statements which give expression to their own location in the framework to which belongs the referent of the statement (in this case Eisenhower), i.e., token-reflexive statements. And the token-reflexive statements in question are those which formulate the nexus of observation and inference in terms of which the claim that there is something which satisfies the criteria for being called Dwight D. Eisenhower would be justified.

Again, even though proper names are not shorthand for definite descriptors, they have a sense which is properly formulated as a definite description. And the use of the proper name presupposes the truth of the Russell sentence which is the foundation of the description. Thus, the sense of ‘S’ is given by expressions of the form ‘(e x)fx.’ It would, however, be a mistake to conclude that the sense of ‘S exists’ is given by ‘E!(e x)fx.’ For while ‘S exists’ is in some sense equivalent to ‘E!(e x)fx,’ the former makes explicit something which is only implicit in the latter, and what it makes explicit is the claim that the framework (the language) to which both ‘S’ and ‘E!(e x)fx’ belong is our language in its straightforward or primary use, and that the things and states of affairs of which it speaks are our companions, so to speak. For if we reflect on the difference between fictional names (e.g., ‘Oliver Twist’) and the criteria which constitute their sense (say, ‘(e x)Fx’) and ‘real’ names (e.g., ‘Dwight D. Eisenhower’) and the criteria which constitute their sense (say, ‘(e x)Gx’) we see that it is not enough to say that the difference between them consists in the fact that we are entitled to say ‘E!(e x)Gx’ but not ‘E!(e x)Fx.’ For in fictional contexts we are as entitled to say ‘E!(e x)Fx’ as to use the name ‘Oliver Twist.’ Obviously, then, the crux of the concept of (actual) existence is to be found in the distinguishing traits of the real life as contrasted with the make-believe or fictional use of language. Thus, to explicate ‘S exists’ it is not sufficient to call attention to its equivalence to ‘E!(e x)fx’ or to emphasize that a tensed verb is lurking in the function ‘fx’ or to emphasize that being the thing which is f is the criterion for being called S. One must also make explicit the real-life character of the latter statement. And this can be done only by making explicit its connection with our activity as knowers, rather than as storytellers. And it is clearly a reasonable step in this direction to suggest the equivalence

\[(156) S \text{ exists } \iff S \text{ belongs to a system of things which includes this.}\]

It is not, however, my purpose on this occasion to explore in further detail the relation of token-reflexive expressions to the concept of observation, or to analyze the concept of observation. For my purposes it is sufficient to note that if the above equivalence is, as I suggest, a necessary one, then it follows that existence statements have a different sense on each occasion of their use in the sense in which ‘this’ has a different sense on each (reliably) different occasion of its use. And we have been led
once again to recognize the essential token reflexivity of existence statements.

In the thing framework, then, statements asserting the existence of named individuals are fully tensed statements. The nontensed form \((\text{Ex}) \ x = S\) is not the logistical formulation of an existence statement, though of course if \(S\) exists, then it is necessarily true, logistique, that \((\text{Ex}) \ x = S\). We can, if we wish, introduce a tenseless form

\[(157) \ S \text{ ‘exists’}\]

in terms of a disjunction of tenses, thus,

\[(158) \ S \text{ ‘exists’} \equiv S \text{ exists or } S \text{ existed or } S \text{ will exist.}\]

(Notice, however, that though \((157)\) is, in a sense, tenseless, it expresses the temporal point of view of the speaker, so that two people who avail themselves at relevantly different times of this sentence will be making the same statement only in the sense in which differently tensed counterparts make the same statement. The fundamentally tensed character of \((157)\) would also become manifest if this contrived verb were to be used in two-perspective statements.)

Again,

\[(159) \text{ There are future things}\]

is to be understood as a derived statement which rests on

\[(160) \text{ S is future} \equiv \text{ ‘S will exist’} \text{ true}\]

and, hence, on

\[(161) \text{ S will exist.}\]

Here we find a crucial difference between things and events (in the thing framework), for, as we saw,

\[(95) \text{ There are future episodes}\]

does not rest on

\[(162) \text{ E will exist}\]

but rather on

\[(163) \text{ E will take place}\]

which is equivalent to a statement of the form

\[(164) \text{ S will V.}\]

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5. Relativity and the Objectivity of Becoming

xvi

Philosophers who have taken relativity seriously—and for our purposes we can limit ourselves to the Special Theory—have often wondered how it can be reconciled with the idea that there is such a thing as becoming, whether ‘qualitative’ (i.e., coming to be \(\Phi\)) or ‘absolute’ (i.e., coming to be (exist)). “For surely,” they are prone to argue, “relativity theory has an event ontology, and pictures the world as a continuum of events for which the distinction between ‘past,’ ‘present,’ and ‘future’ is relative not only to a now (which is obvious), but to a set of coordinates which is only one among many sets of coordinates, each of which is an equally authentic structuring of the world into one temporal and three spatial dimensions. And,” they continue, “if we call ‘objective’ that which is a matter of intersubjective reasoned agreement, then according to the picture of the world painted by relativity theory, neither spatial distances nor temporal intervals are objective, but only the space-time separations of events (and their character as ‘space-like’ or ‘time-like’), for only the space-time separations of events are invariant with respect to the measurements of all ‘galilean’ observers. How,” they conclude, “can becoming be objective if time itself is not objective, but dissolves into a multitude of times each of which is a ‘shadow,’ to use Minkowski’s metaphor, of a more basic reality (i.e., space-time)?”

The (imaginary, but representative) philosopher from whom the above is quoted is, of course, seriously confused. His confusions, however, are aided and abetted by most of the existing philosophical ‘clarifications’ of relativity—and our philosopher has at least the merit of taking his role as a philosopher seriously. Much of the groundwork has already been laid in the previous sections for a dispelling of these confusions. But certain considerations have been left to one side and must now be discussed before this groundwork can be used.

The reader who is familiar with the philosophy of measurement will undoubtedly have noted that our previous discussion of events and episodes in the framework of things has been tacitly built on the assumption that the events in which the things of this world participate constitute a four-dimensional continuum which, in its turn, is a temporal continuum of spatial, three-dimensional continua. And, indeed, we have been taking for granted, rather than exploring, the metrical character of this con-
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When, therefore, it is said that the structuring of the continuum of events into three spatial and one temporal dimension is relative to a given system of world lines (galilean frame), we must ask ourselves in what sense the continuum of events is ‘prior’ to its metricizing by an actual (or hypothetical) observer who belongs to this frame—at least during the process of establishing the congruences which constitute this metricizing. And to ask this is also to ask in what sense space-time intervals are ‘prior’ to the variety of their separations into spatial distances and temporal intervals with respect to different galilean frames. For most of the confusions about the Special Theory concern the relative ‘reality’ of (a) the continuum of events; (b) space-time; (c) our space and our time.

Given that the ‘four-dimensional continuum of events’ has been ‘metricized’ by an observer in one galilean frame, and representing this metricizing as a cutting up of the continuum into a temporal series of three-dimensional spatial cross sections, the Lorentz transformations provide us with a way of calculating the metricizing of this continuum into a temporal series of three-dimensional spatial cross sections with respect to any other galilean frame. And, of course, these cross sections will consist of different sets of events in the two metricizings where the observers are in uniform relative motion with respect to each other. In a typical spacetime diagram, the metricizing of the continuum with respect to the first frame is represented as in Diagram I. The system of particles \( (P_1, \ldots, P_n) \) which constitutes the frame is represented (more accurately, of course, their histories are represented) in the diagram by straight lines parallel to the \( T \) axis. And the second galilean frame, moving with respect to the first, is represented (its history is represented) by a system of parallel straight lines at an angle to the \( T \) axis, \( P_1', P_2', \ldots, P_n' \).

A number of points are to be noted at once. (1) The metricizing is to be understood as a system of direct and indirect measurements, i.e., congruence relations between certain sets of events belonging to the frame (the ‘measuring’ events) and the system of particles (the ‘measured’ events). The metrical character of the system of particles constituting the frame, including the observer, is, of course, as much a function of the measurements as the metrical character of any event or string of events belonging to the continuum. (2) The point \( O \) represents the origin of a particular set of coordinates which is selected from the infinite set of alternative sets of coordinates which are subject only to the requirement that any \( T \) axis (for this metricizing) be parallel to \( T \), \( O \) being an arbitrarily selected event. (3) The \( X \) axis represents the spatial dimension of the metricizing, and any two points at equal distance above or below the \( X \) axis represent events which are simultaneous with respect to this metricizing. (4) The lines \( AB \) and \( CD \) represent the histories of photons ‘passing through’ \( O \). All pairs of events which can belong to the history of one particle must be connectable by a line which is such that a parallel to it through \( O \) falls within the angle \( DOB \). Thus, \( E_1 \) and \( E_2 \) can belong to the history of one particle, whereas \( E_3 \) and \( E_4 \) cannot.

Consider, next, the situation represented by Diagram II. Suppose that \( E_5 \) and \( E_6 \) belong to the history of an observer \( S' \) in uniform motion relative to the original observer \( S \). Suppose, furthermore, that \( O \) is an event in the history of \( S \), and that the \( T \) axis coincides with the history of \( S \) (at least in so far as the measurements defining the metrics represented by this diagram are concerned). We can now represent a second metricizing of the continuum of events, a metricizing with respect to measurements belonging to the history of \( S' \), by choosing the same origin, but drawing the new \( T \) axis (\( T' \)), and the new \( X \) axis (\( X' \)) at angles to the original axes. \( T' \) will be parallel to \( E_5E_6 \) and \( X' \) will be symmetrically located on the other side of the line \( AOB \). We could, of course, have drawn our original diagram to represent the metricization of the con-
‘future’ is the region containing the events which are properly labeled ‘future’ not only by S (speaking at O) but by any observer belonging to a galilean frame in relative uniform motion with respect to S, and who, at the moment of speaking properly, calls O ‘now.’ Or, abstracting for the moment from the distinction between ‘past,’ ‘present,’ and ‘future,’ we can say that any event in the region labeled ‘future’ in the diagram will be classified as later than O by all galilean observers who cut the pie of events into temporal series of spatial cross sections. Similarly, to label the regions contained within AOD and COB ‘present’ is properly speaking to say that for every event in these regions there is a possible observer passing near S at O with a permissible relative velocity who would properly label it as ‘present’ if, at the moment of speaking, he properly labels O ‘now,’ and would properly say that the event in question is neither earlier nor later than O.

Now what these considerations amount to is simply that the metricizing of a set of events into a three-dimensional spatial array and the metricizing of spatially related events into a one-dimensional temporal array are not independent operations. It brings out clearly the fact that a framework of events structured into a past, a present, and a future is a metrical framework, as is a framework of events structured into a series of three-dimensional cross sections related by earlier than.

In what sense are space-time intervals “more real” than lapses of time and spatial distances? Only in the sense that the space-time interval between two events is an invariant quantity with respect to the Lorentz transformations, that is, with respect to all metricizations into a temporal order of spatially related events. To suppose that it is in any other sense “more real” is, as we shall see, analogous to supposing that events as standing in the earlier-later relations (with respect to a given metricization) are “more real” than events as past, present, or future (in a given metricization) because earlier than is invariant with respect to “the changing location of the ‘now.’”

Confusion is twice confounded when it is supposed that the ‘cone’ represented by the angle DOB constitutes the “edge of becoming.” For just as it is a mistake to think of the area within the angle as “the future with respect to S at O” (except in a very Pickwickian (derived) sense of ‘future’), so it is a mistake to think of the series of light ray ‘cones’ whose vertices lie along T (at \( V_1, V_2, \ldots, V_n \)) as stratifying events into layers...