The Reality of *Now*

Mickey Mantle: What time is it?
Yogi Berra: Do you mean right now?

Though there are many analogies between time and space, there appear to be three commonplace yet deeply perplexing features of time that reveal it to be quite unlike space. These can be called 'orientation', 'flow' and 'presence'. By orientation I mean that there is a direction to time, a temporal order between events which is not merely a reflection of how they are observed (what McTaggart 1908/1968 labelled the B-series time). Assertions that objects stand in spatial relations, such as *to the left of*, or *above*, or *to the north of* explicitly depend upon the position from which they are asserted or upon arbitrary, conventionally established spatial frameworks. There is nothing intrinsic about them; the objects involved are, so to speak, indifferent to them. Temporal relations are not like that – times are not just arranged along, as it were, a line but are successive along that imaginary line. Whether one event is *before* or *after* another is not (altogether) dependent upon how, or from where, they are viewed. Nature appears to respect temporal orientation, as enshrined in the laws of thermodynamics, though it remains a deep mystery exactly how the temporally symmetric basic laws of physics ground strongly asymmetric temporal processes (see Sklar 1993).

However, temporal orientation is perhaps not so peculiar as the features I mark by the terms 'flow' and 'presence' (which McTaggart called the A-series time). These refer to the apparent and familiar fact that there is one, constantly *advancing*, distinctive time, the current time, which we mark by the word 'now'. Facts – if they really are facts rather than artefacts – such as 'it is *now* 1997' are not reportable without reference to this special time. For example, on the face of it at least, we cannot translate 'it is now 1997' into the philosophically more anodyne: 'statements of the form "it is now 1997" are true when uttered in 1997' for such claims neglect to mention the crucial point that *now* is 1997. Sometimes I need to know what time it is. What I need to know is the conventionally indexed name of the time which is simultaneous with *now*. It is not enough to find out that, for example, 2:00 PM on such and such a date is simultaneous with *this experience* unless my notion of *this experience* already contains covert reference to *now*. That is, while it is obvious that the word 'this' means something like 'the thing I am indicating,' the tense in 'am indicating' is necessary for the referential task of 'this' to succeed. If 'this' meant 'the

thing I am [tenselessly] indicating' then 'this' would be ambiguous since I have indicated many things throughout my life. Otherwise, the fact that these experiences occur (tenselessly) at 2:00 PM on such and such a date would not tell me that *now* is 2:00 PM on that date. Though there appears to be a roughly similar phenomenon about space insofar as one cannot translate 'I am here' into entirely non-indexical language, there remains a subtle difference between 'now' and 'here'. For while we might passably define 'here' as 'the place I am now,' the corresponding definition of 'now' does not seem quite correct. 'The time I am here' non-circularly defines 'now' only if 'here' (or the phrase 'am here') does not contain covert reference to the present, but it seems that if it does not contain such reference the definition also fails. For then it is clear that I am (or could be) *here* at many times throughout my life, and not just *now*. Thus, 'now' seems to be the more primitive notion, essentially deployed in the definition of spatial indexical.

Flow and presence are closely connected to orientation. Orientation in time is (partly) explained and to some extent made intelligible by saying – metaphorically – that the now *moves*, or that time passes, and that the direction of passage is always from earlier to later. While in space we can move left or right, up or down, north or south, at will, we are 'locked' into time and our consciousness of necessity flows with time so that we are always aware of what is happening *now*. We seem to understand this very well. We all know that we must wait for future events to 'arrive', that we cannot 'go back' to relive, let alone alter, the past. Our understanding of flow and orientation is informally used to explain other temporal features. For example, in a textbook on dynamical systems, we find that the distinction between discrete and continuous time systems is explained as follows: 'consider our earlier example of a ball thrown straight up. Its instantaneous status is given by its state vector $\mathbf{x} = [h \; v]$. However, it doesn't make sense to ask what its state will be in the 'next' instant of time – there is no 'next' instant since time advances continuously' (Scheinerman 1996, p. 4). Obviously, in this case we don't *need* to invoke flow and orientation to understand the point, but our vivid sense of these temporal features helps make it.

Our sense of the flow and presence as well as the orientation of time can lead to judgements that, from certain perspectives, may seem odd or irrational. In the end, though, I suspect that these judgements lend some support to our commonsense view of time. They are certainly deep indications and outlines of our sense of existing in time. Derek Parfit once worried

about the following kind of problem (Parfit, 1984, pp. 174 ff.). Which situation would you rather be in: to be facing one hour of excruciating pain, or to have had 4 hours of excruciating pain just ended? From an 'objective' – where this is already taken to mean, in some sense, an atemporal – point of view one should prefer a life with less pain, so you should prefer to be facing the short pain. But it seems to me (and I hope to you) that one would quite properly rather have 4 hours of pain behind one than even a single hour in front of one.

We can modify the example somewhat to drive the intuition home. Let us suppose that after both pain sessions, there is no memory of them[1]. So after the 4 hours of torture, you can remember nothing of them, and after the one hour of pain to come, you will remember nothing about it (though – in both cases – you will of course be vividly aware of the pain while it is happening). It seems still clearer to me than in the previous example that if I could somehow choose between the situations, I would much prefer 4 hours of unremembered pain in the past to one hour of pain, certain to come, but as yet unexperienced even though it too will later be completely forgotten. Is this preference irrational? Not if temporal flow and presence are real. I can see that, from the outside so to speak, I would or should prefer a life with less pain, but I can also see that as things are I am *in* time, and my preferences should take into account not only the events of my life but *where I am in my life.* Since I cannot get 'outside' my temporal existence and choose my whole life from some fictive atemporal, objective standpoint[2], why should such an ideal standpoint form a preferred basis for judgements of rationality? Furthermore, such 'temporal preferences' seem to be, in a way, absolute. I prefer any amount of past pain to any amount of future pain, so long as the past pain does not impinge on my future (e.g. if the degree of past pain

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[1] Parfit makes the point by imagining a patient who either will undergo a painful procedure (with amnesia about it induced afterwards) or who has already had the operation (and so can't remember it because of the induced amnesia). But the patient does not know which situation he is in. The question is: does, or should, the patient care about which of the two situations he is in? I think it would be natural and rational for the patient to hope that he has already had the operation.

[2] I note that the idea of such an atemporal choice of 'life' (or even entire worlds) seems to be implicit in Kant's metaphysical theory of freedom (see Kant 1787/1965, pp. 464 ff.; for a clear explication see Wood 1984). I wonder if it makes a difficulty for Kant's theory that we rationally discount the past in our 'empirical lives' even though these lives were supposedly chosen by some kind of rational agent operating outside of time?

entails that I will be a psychological wreck for the rest of my life, whereas the future pain does not I might well choose to undergo the future pain). But the fact that we are willing to take into account the *future* consequences of the hypothetical past pain and that only these future consequences really matter to our assessment only reinforces the point of these examples.

We can purify the Parfit-style examples further. Suppose that you awake in a hospital to the soothing words of your nurse. You are temporarily blind and can feel very little (and you are, let us say, told that this is perfectly normal). You find that your personal memories are very few, vague and altogether unclear, but you can recall that there were two people in the ward prior to the operation which you (as well as the other person) have survived. You recall that one of the two was ninety years old, the other thirty. In the absence of further information, is it rational to hope that you are one rather than the other; to prefer that you be the thirty year old rather than the ninety year old? To utter the question is to answer it. And it seems to me that such preferences *are* rational and depend in part upon our sense of temporal flow and presence (they would also depend upon the nature of the lives of the two patients of course, but in the example these are set as equal by the miracle of philosophical fiat).

To really take this sort of example to its limit, imagine that you don't know which of the following two extremely bizarre situations you are in. The first situation is one in which you have just been created *ex nihilo* and have replaced someone, who, let us suppose, has at the same instant been conveniently destroyed by some kind of cosmic accident. You are, I am supposing, an absolutely perfect – atom for atom – duplicate of the one you replace. Of course, you won't know about any of this and, since you are a perfect duplicate of your 'replacee', you – and everyone else – will accept his or her past as your own. The second situation is the mirror image of the first; you are about to be destroyed by such a cosmic accident (and, for perfect symmetry, are about to be replaced) but have already lived a life up to now (as we say). We suppose that the *amount* of life and quality of life that you will receive are the same in both situations so that we have the suitable non-temporal symmetry around the balance point of these two situations. Given that you are at the balance point, which would you prefer? Although the situations are admittedly absurd, I have a strong intuitive preference for one situation over the other. Which one? That depends upon the quality of the lives on offer. If it is a life worth living, I prefer the first situation,

in which I get my life *after* the balance point. If the life to come is to be utterly miserable – truly not worth living – I naturally prefer to be snuffed out; at least my suffering is *over*. Common to both assumption is that I care less about the past than I do about the future. It seems to me that temporal flow and presence explain this preference. And if flow and presence are real this intuition seems rational. If flow and presence are not real, are mere illusions, then the intuition is inexplicable. Why prefer a life after 1998 to an exactly equivalent one before 1998? One wants to say: because I am (tenselessly) *in* 1998. Surely, but you are equally *in* either pre or post 1998; both situations are equivalent in that respect. You are going to be *in* just as much time either way. Presence and flow let you say just a little more: I am (tenselessly) *in* 1998 *right now*. If this says something more than simply that I am (tenselessly) in 1998 then there is some sort of a ground for this set of powerful intuitions.

It is of course possible to dispute whether such 'discounting' of the past as such examples disclose is rational. At the very least, the naturalness of the attitude is real and reveals an intuitive understanding of temporal presence, flow and orientation[3]. Abstractly speaking, the general form of this problem is, for situations that are suitably symmetrical around the *present*, should the asymmetry of temporal orientation and inexorable *flow* of time ever make it rational to care that one situation rather than the other is actual? If it ever is rational to have such cares, then there will be no *explaining* this rationality in any terms other than those involving the particular temporal properties of the choice point. This undercuts one of Parfit's critical strategies: he asks us to explain why it is rational to prefer finding out that one has already undergone something horrible to finding out that one faces the horrible event as a certainty in one's (near) future, and he asks us to explain this without, as he puts it, begging the question. But if the *only* difference between the envisaged situations is the temporal one (i.e. whether the horrible experience is past or future), there will be nothing else to appeal to in any such explanation. This hardly shows that the preference in question is irrational. To take yet another, and one which I hope is an entirely realistic example, imagine that you have forgotten whether or not you have completed some small and disagreeable task (a task which does not have a deadline anytime soon to avoid the essentially

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[3] Mellor tries to explicate and undercut our sense of temporal passage in ch. 3 of Mellor 1981.

irrelevant possibility that you are hoping that you haven't failed to meet it). Is it *irrational* to hope that you have already done it, rather than being absolutely careless about whether the task still faces you or not? It is the same amount of work, with the same outcome, in either case. Yet it indeed does make sense to hope that the work is already behind one.

Such preferences would be shown to be irrational for anyone who accepted that temporal presence, flow and orientation were themselves fundamental misunderstandings of time and how we exist in time. In particular, if the passage of time is an *illusion* and known to be such then preferences based upon the idea would be irrational, or at the very least it would take a special argument to show that they were not, simply because all preferences based upon illusions are *prima facie* irrational, and should be rethought once the illusion is recognized. In the sort of cases we've been considering, if temporal passage is regarded as an illusion, what could possibly mark the difference between earlier and later pains so that one would be preferred to the other? Either way they are equally experiences and they are both equally yours. In the knowledge that temporal passage was mythical, wouldn't it be *insane* to prefer 4 hours of pain before 1998 (pain that occurred in 1996 say) to one hour of pain after 1998 (in 1999)? Of course, in 1995 I prefer the short 1999 pain to the long 1996 pain. In 1998 my preferences are different. Why? Not because of anything like the thought that I have *arrived in* 1998, for that is an illusion which I accept as such. (It is even, I think, understandable and fairly commonplace, if perhaps less than entirely rational, for someone, once 1998 arrives, to wish – necessarily hopelessly of course – that they had after all chosen the long pain just because it would then be over with.) And, in 2000, I prefer the short pain to the long pain again (or maybe I don't care at all, because it is all in the past). I think that belief in temporal passage can perhaps account for some of the judgements we take to be rational, that become very difficult to account for if temporal passage is denied and we accept mere temporal orientation (i.e. the relations of being earlier than, later than or simultaneous with – McTaggart's B-series).

Now, there is a famous argument that temporal passage is demonstratively illusory, given in McTaggart 1908/1968 (and recently endorsed, more or less, by Dummett 1960, Horwich 1987 and Mellor 1981). If this argument succeeds then we should reconceive how it is that we are in time and thus reorder some of our preferences; this would be a case (and there are not many)

where a purely philosophical argument would have a reformative effect upon our lives, indeed upon one of its most basic features. My main aim in this paper is to show that McTaggart's argument does not succeed. However, before turning to McTaggart and his recent followers, I want to examine briefly the claim that modern science, relativity theory in particular, shows the temporal passage is illusory, for I think that this is a fairly common claim which is also not correct. Relativity theory is consistent with the claim that temporal passage is illusory, but it does not entail it.

The special theory of relativity certainly does require some reform in our intuitive idea of time. Its distinctive claim is that temporal relations among events are relative to the state of motion of the observers of those relations. To reconcile this fact with the notions of temporal flow and presence (there is no real problem about orientation here) I think we must assume that there are many temporal streams rather than just one. I do not think such an assumption is incoherent. It seems just as plausible as the notion that there many different, though interrelated ways of ordering events in B-series terms (that is, in terms of the relations of earlier than, later than or simultaneous with). So, each observer exists in his or her own time. If we make this assumption and resolutely fix upon maintaining flow and presence then relativity theory can be seen as actually supporting these notions rather than undercutting them.

It seems to me that I can divide the whole universe into past, present and future. It is tautologous, hence true, to say that everything that is happening is happening *right now*. That is to say, everything that is happening is simultaneous with 'the now'. Notoriously, relativity tells us that other observers will disagree about what events go into the set of events simultaneous with 'the now'. This is evident in the typical space-time diagram:
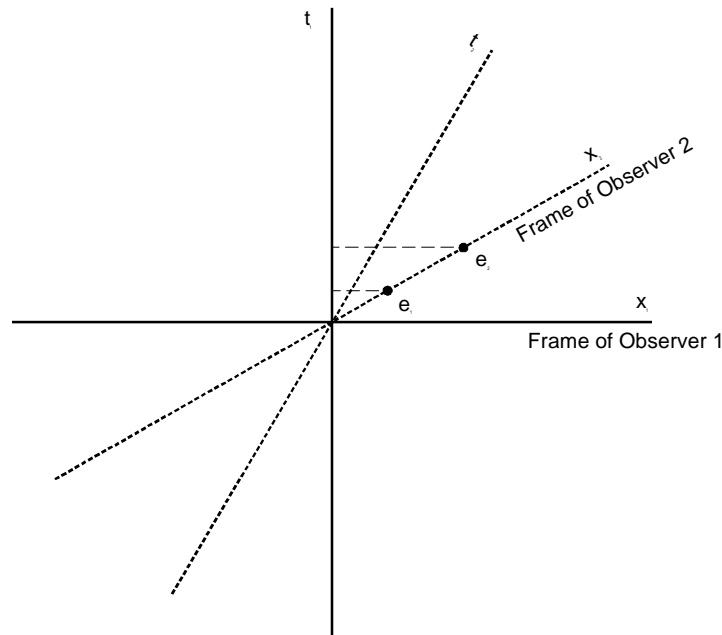
Here observer 2 is moving at a great rate compared to observer 1 and hence they disagree rather sharply about the temporal relationship between e_1 and e_2. Though observer 1 might disagree with observer 2 about what events are 'now', both of them can be right since what is happening now for each of them depends upon their relative state of motion. Nonetheless, both observer 1's and observer 2's 'space of simultaneity' marks out a 'now' that encompasses the whole spatial world; it is just that these spaces are, so to speak, unaligned – tilted across the fourth dimension of time. It is interesting to note that we all 'generate' significant relativistic effects of the kind depicted in the diagram despite our extremely low relative velocities. Let's say that I am strolling away from you at 5 km an hour which equals 5/3600 km per second or about 5 billionths of the speed of light, .000000005 c. Despite this ridiculously small difference in our velocities as compared to the speed of light, we would disagree in our simultaneity judgements by almost 4 days ... with regard to events in the Andromeda galaxy. In a way, that is *because* my 'now' encompasses all of space 'in an instant'. None of these facts show that temporal passage is illusory, but they do show that each of us has our own time, our own temporal stream that bears specifiable, objective but

frequently changing relations to the temporal streams of others[4].

Relativity theory also tells us about what is called time dilation (a term resonant of the language of temporal passage, or flow, and orientation). A moving clock runs slow. If we allow the legitimacy of temporal passage and a multiplicity of temporal streams, there is no difficulty incorporating this feature of relativity into a view of time that accepts passage. In fact, it rather supports this view. There is a very old objection to the idea of temporal passage that one cannot specify the *rate* at which time flows in any sensible way. The only possible specification seems to be that time flows at the rate of one second per second. It is important here to state that though we speak of 'time's passing', strictly speaking there is no claim that *time* is in motion itself; it is *nowness* that is supposed to move through time, and the rate at which the now 'runs like a fire along the fuse of time' (in the beautiful phrase of Santayana's) is the peculiar rate of one second per second. Actually, while the objection has a certain cleverness to it, what, exactly, is *senseless* about one second per second as the rate of time's passing? It may be trivial, but it is trivially correct. We do not – *pace* Williams (1951) – need to invoke a regress of higher-order times: it takes exactly one second for one second to pass.[5] But this rather uninformative description is true only from within a given temporal stream. From the outside, the rate of time's passing will vary with the relative motion of the observer. For someone zipping past me at half the speed of light, my *now* slips into the future at the rate of one second (of mine) for every .87 seconds (of his).

There is one extremely strong form of the idea that time passes which perhaps relativity theory does refute. This is the claim that *all* that exists is what is present. According to this view both the past and the future are non-existent[6]. As possible variants of this view we have the idea that it is only the future or only the past – though I know of no philosopher that has maintained this latter view – that is non-existent. This view maintains that as the now slips into the future the future is coming into existence and the past is sliding out of existence. It is hard to reconcile this

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[4] See Lockwood (1992), pp. 10 ff.

[5] Though in another context – a defence of time travel – Horwich makes the same point against Williams's meta-time argument (see Horwich 1987, p. 114).

[6] It seems that Arthur Prior held some such view; see Prior 1967, 1968.

notion with a multiplicity of temporal streams each disagreeing about what events are occurring *now* and each being right. Take the andromeda example above. There is an event in the andromeda galaxy that you would say is happening now while I would say that it happened 4 days ago (of course there is no possibility of my *knowing* about the event *and* passing on to you the information that this event *will* occur, for you, 4 days hence – neither of us will find out about the event for many, many years). You say the event exists; I say that it does not. I think it is better to deny the doctrine restricting reality to the present than to make existence itself relative to observers's frames of reference[7] (although I don't see that the latter claim is actually incoherent given that relativity theory guarantees the coherence of all causal relations between events). In any case, I can see no requirement for someone who believes in temporal passage and the existence of the now to further claim that both past and future are non-existent[8].

I assume here that it is not an essential part of our ordinary notion of temporal flow that there is necessarily a distinction between the determinateness of the past (or, as examined above, just the *present*) and that of the future. In fact, it seems almost evident to me that the ordinary notion allows for the equal determinacy of past and future. Consider a coin toss: if the toss is in the past we say that the coin *came* up heads; if in the future we say that the coin *will come* up heads. These are equally true or false, as the case may be[9]. Of course, there is an epistemic

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[7] The argument suggested here is explored in detail in Putnam 1967, though Putnam perhaps draws a stronger conclusion from it than I.

[8] Although it is getting ahead of myself to bring McTaggart's views in here I want to note that – in a way – McTaggart himself allowed the possibility of multiple temporal streams. That is, while he denies the possibility of any A-series time, he sees nothing incoherent about the notion that if there was *one* A-series time there could be *several* of them. He says that if there were a multiplicity of A-series times then 'no doubt in such a case, no present would be *the* present – it would only be the present of a certain aspect of the universe. But then no time would be *the* time – it would only be the time of certain aspect of the universe. It would be a real time-series, but I do not see that the present would be less real than the time' (1908/1968, p. 18).

[9] Contrary to what some philosophers (for example, Taylor 1992) maintain, this does not lead to 'logical fatalism' – at least not to any metaphysically disturbing sort of fatalism, or one that is disturbing in a way distinct from the worries of determinism. The crucial fact, noted by Horwich (1987, p. 30), is that even though the future may be determinate it is not, or not entirely, *made determinate* by anything in the present. I suspect that the distinction between 'being determinate'

asymmetry between past and future which is universally recognised, but there need be no *ontological* asymmetry, even if we accept the existence of the now. Whether a notion of time which allows for such an ontological asymmetry is legitimate relative to current scientific theory is a difficult and intricate question (see for example Dorato 1996). The point here is simply that the legitimacy of the now does not require such an ontological asymmetry between past and future.

So let us assume the existence of 'the now' – a point in time which is not fixed but is rather set by the current time, constantly advancing, in flux throughout time. 'Now' is an index of current location in time, in somewhat the way that 'here' is an index of current location in space, although with the crucial differences between time and space that we have noted. As we saw above, 'now' is seemingly more than an indexical term. For consider: suppose that I know that Seager exists (tenselessly) in 1955 and that I know that I *am* Seager. Do I know when now is? No; I would need the explicit information that *now* is 1955 or that the information about Seager is about the *present* Seager. Suppose that I know that I am Seager and that Seager is in Toronto. Do I know where I am? No, not unless I know that Seager is *now* in Toronto. As noted, 'here' implicitly contains reference to *now*. All tensed statements are, implicitly or explicitly, statements which relate the time of an event to *now*. There is no way to reduce tensed statements to non-tensed statements mentioning only temporal relationships amongst events (or times).

We can regard tensed statements as ascriptions of predicates to events (or possibly times themselves). That is to say: 'e happened' is to say the e has the property of being past (e is a past event). If we continue to allow for a tenseless use of various verbs, especially 'is', we can take the statement 'e is a past event' as equivalent to 'e happens (tenselessly) in the past'. Various predicates, containing more or less information about temporal relationships, are possible, but the obvious beginning point is with the basic three: past, present, future. Following Mellor, let us abbreviate these predicates as follows:

'e is a past event'	=	'e happens (tenselessly) in the past'	=	Pe
'e is a present event'	=	'e happens (tenselessly) in the present'	=	Ne
'e is a future event'	=	'e happens (tenselessly) in the future'	=	Fe

and 'being made determinate by state α at time t' has some relevance to the technical debate on becoming as well, though I know of no direct application of it in this debate.

If we allow ourselves the use of an index for that special time we call *now*, all these statements can be translated into a formal and precise form. Let's use the symbol ν to stand for *now*. So we have:

$$Pe = \exists t(Oet \land t < \nu)$$ [Here, 'Oxy' stands for 'x occurs (tenselessly) at y'; 'x < y' stands for 'x is before y']

$$Ne = \exists t(Oet \land St\nu)$$ [Here, 'Sxy' stands for 'x is simultaneous with y'; 'Sxy' is defined as '~(x < y) ∧ ~(y < x)']

$$Fe = \exists t(Oet \land \nu < t)$$

Now, consider the challenge of McTaggart (along with Dummett, Mellor and Horwich). The predicates P, N and F are evidently pairwise logically incompatible. It does, however, require some extra (entirely reasonable) assumptions to *show* that each predicate excludes the other. For example, Pe implies ~Ne, so long as we further assume that every event occurs at only one time (this is surely a reasonable assumption; without it there could be no complaint at all about an event's really being *both* past and future) and, of course, that we also assume that 'before' is an asymmetrical relation which excludes simultaneity (the above definition of simultaneity provides for that).

McTaggart famously claimed that time is unreal since the realist supposition leads to the contradictory claim that every event (even one would do) is all of past, present and future. While there is a certain sense in which this appears to be true, to say that every event has, for example, the property of being present would be to say that the time of every event is simultaneous with *now* – a palpable absurdity. It seems clear that the most that we can properly say is that every event occurs (tenselessly) at some time or other, and that now-ness 'visits' every time sooner or later (in succession). So the obvious reply to McTaggart's claim, which McTaggart in fact explicitly considered, is that events have all three temporal predicates only *across* time – no event is past and present, say, at the *same* time. In fact, given the above definitions (and assumptions), it is of course easy to *prove* that if e is past then it is *not* present. But, along with his contemporary followers, McTaggart argues that the same problem applies to the times by which, in the above reply, one supposedly distinguished pastness from presentness and futurity. That is, every *time* is all of past, present and future. If the reply to this is that this fact, like the last, is only true across

time we have the beginning of a regress which appears to be vicious. At least it appears that there is no temporal determination of events as past, present or future until the regress is 'grounded' which, by its nature, it cannot be. There is another way to regard McTaggart's problem (forcefully advanced by Mellor 1981, ch. 6). If it is true that events are all of past, present and future but are so at *different times* then it ought to be possible to specify those times. So let us be provided with these times. Let it be revealed at what times e was past, was present and was future. It is irrelevant to say (though it may be a rather trivial truth) that e is (tenselessly) past at all times after e's occurrence. For this does not tell us whether e is past or not. Similarly, it is pointless (if correct) to assert that e is future at all times prior to its occurrence and is present at the time of its occurrence. As McTaggart would have said, all these facts are timelessly true and so cannot entail anything about an event's pastness, presentness or futurity.

We might try to provide the times at which an event *changes* its temporal property by directly tensed statements. An event which is present *was* future and *will be* past. By an obvious extension of the notation provided above, this would appear to be expressible so:

$$Ne \rightarrow PFe \wedge NNe \wedge FPe$$

However, this proposal appears to fall victim immediately to McTaggart's original complaint (as noted by Mellor). For the set of 9 'binary temporal predicates' contain incompatible pairs (most obviously the binary replacements of our basic predicates: NP, NF and NN). Now every event seems to have every one of these predicates. If we complain that events have these properties at different times, we are once again heading down McTaggart's regress (with the next encounter in the realm of the ternary temporal predicates and so on without end).

A closer examination is in order. I suspect that the regress is halted and that we could state all we wished to state about the tensed temporal properties of events, *if* we take seriously the assumption that there is a *now* reference to which simply cannot be eliminated from tensed statements. It is crucial to notice that some of the binary predicates have the curious property of *erasing* tensed information about the event in question. That is, while Pe, for example, entails (by definition) that e occurred in the past, FPe has no such entailment. It is absolutely true that *every* event has this property, now and always. On the other hand, PPe does entail that e occurred in the past. There is in fact an interesting 'nest' of entailments (and inter-definabilities) amongst the

binary (and beyond) predicates. But, I assert, they are all transparent once we translate the predicates into statements that explicitly allow the use of 'now'.

What, exactly, is the proper translation of FPe into our formal dress. It is:

$$FPe = \exists t(v < t \land \exists t'(Oet' \land t' < t))$$

This simply says that there is a time in the future *after* the time at which e occurs. Note that t' might bear any relation to v (it is, for example, true that in the future, WWII will be past as it is even now past, and it was true in that past that WWII would be past at some time in the future). Consider now PPe. Its translation is:

$$PPe = \exists t(t < v \land \exists t'(Oet' \land t' < t))$$

which says that in the past, e was past. It is easy to see that PPe entails Pe, since if $t' < t$ and $t < v$ then $t' < v$ (I assume that time is a simple ordering, i.e. that the before relation is asymmetrical, transitive and that times are 'strongly connected' – for any two distinct times one is before the other). We might wonder if Pe is actually equivalent to PPe. The entailment works on the condition that time is dense, i.e. between any two times there is another time. If time is not dense then there is a past time that is, so to speak, the *first* past time before the present, and thus Pe → PPe could fail. However, since I am inclined to believe that time is dense I will proceed on that assumption. Other relations between the predicates reveal other interesting assumptions about the nature of time.

For example, we can show that PNe implies Pe. PNe translates as follows:

$$PNe = \exists t(t < v \land \exists t'(Oet' \land Stt')).$$

The entailment to Pe follows if we assume – and it is surely a safe assumption – that if an event occurs at t and t is simultaneous with t' then e occurs at t'. A somewhat less innocuous assumption comes into play if we consider an entailment such as Ne → PFe. This entailment requires that there exist a past time or, more generally, that there be no first time, which, strictly speaking, Ne does not require. Similarly the entailment from Ne to FPe requires that there be no last time. I will assume that there is no first or last time here. Note that this assumption does not imply that time stretches infinitely into the past and future; time could be modelled on the *open* set from 0 to 1 for example. Note also that with these assumptions the entailment from Ne to either PFe or FPe becomes trivial since then *every* event must have the properties of FP and PF, so that

all 'tensed information' about e is erased in the statements FPe and PFe (in line with our intuitions as considered above).

Now, as noted, although Ne → PFe, the reverse entailment does not hold. The fact that e is future relative to *some* past time tells us nothing about e's now-relative temporal location. It is true though that PFe and FPe are equivalent. It might be worth comparing the formal renditions of these predicates (I repeat that of FP from above):

$$FPe = \exists t(\nu < t \wedge \exists t'(Oet' \wedge t' < t))$$

$$PFe = \exists t(t < \nu \wedge \exists t'(Oet' \wedge t < t'))$$

These are inter-deducible from our assumptions about the 'geometrical' structure of time.

Under these three assumptions, the logical relations amongst our unary and binary predicates take on a simple and pleasing form, diagrammed here:
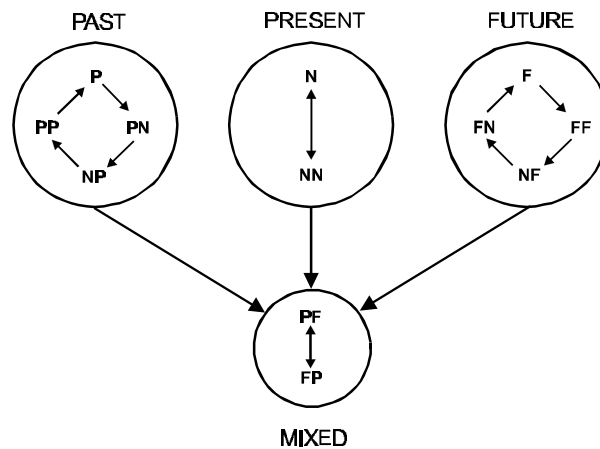
It is interesting to note that these are *all* the classes of tensed statements there are (we could expand their number only by introducing temporal predicates that contained specific information about how far in time an event is from *now*, as in 'yesterday' or 'three months ago' or 'in two weeks time', etc. but I doubt that any thing of significance would emerge from considering such temporally particularized predicates). If we consider the set of 27 ternary temporal predicates, PPP, PPN, PPF, etc. they will one and all fall into the above classes. Each one will either be equivalent to a simple temporal determination of past, present or future or will fall into the mixed class in which such temporal determination has been erased. Let me give one example. Consider

the ternary predicate, PFPe (in the past it was future that e was past – read this tenselessly).

$$PFPe = \exists t(t < \nu \wedge \exists t' \exists t''(Oet' \wedge t < t' \wedge t' < t''))$$

This implies none of e's being past, present or future. It merely asserts that e's occurrence is *after* some past time (t) and *before* some time (t'') which is after the time of e's occurrence. But it evidently has to (trivially) imply FPe and PFe. And, given – as per our assumptions about the nature of time – that we can find times before or after any given time as well as interpolate times between any two times, either of PFe or FPe will also trivially entail PFPe. All ternary predicates made up of P's and N's will be equivalent to P, those made solely of N's (i.e. NNN) will be equivalent to N and those formed from F's and N's will be equivalent to F. All the mixed predicates (any predicate containing at least one of both P and F) will be equivalent to PF.

A general proof of the claim that all predicates formed of (finite) combinations of P, N and F reduce to P, N, F or PF can be sketched as follows. All binary predicates reduce as shown above. Suppose that all n-ary predicates reduce and consider a n+1-ary predicate, X. X will begin with one of the binary predicates. That is, X = PPY, or PNY or PFY etc. If X's initial binary string is not mixed then it reduces to either P, N or F and X is equivalent to PY or NY or FY and then by induction X reduces. But suppose X begins with either PF or FP. In that case, consider the next predicate in X. One case will show how this works. Let's say that X begins with PF. If the next predicate in X is F then X = PFFZ, which reduces to PFZ and then by induction X reduces. On the other hand, if the next predicate in X is P then X = PFPZ. But since PF is equivalent to FP, X is equivalent to FPPZ, which reduces to FPZ and then by induction X reduces. A detailed version of this proof would require rather more care and the use of the assumptions about the structure of time deployed above, but I believe this sketch is sufficient to reveal the existence of such a proof.

So the complaint (be it McTaggart's or Mellor's) that the attempt to specify the times at which an event has the incompatible temporal properties of pastness, presentness or futurity merely generates a vicious regress of more complex temporal predicates must be groundless[10].

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[10] It is worth noting that McTaggart prefaces the 'regress argument' with another difficulty. In his words: '... an A series depends on relations to a term outside the A series. This term, then, could not itself be in time, and yet must be such that different relations to it determine the other terms of

There are *no* new temporal predicates (of the nature under consideration here) once we get beyond 'binary mixing'. Now, this is not to say that we *can* specify these times without reference to *now*. That reference is ineliminable from any tensed statement.

Our formulas are analogues of tensed statements. The truth conditions of all such statements depend, in part, upon *when* they are uttered. Although the *character* of this dependence is specifiable in non-tensed terms referring to the relations between times (including the times of utterances), the dependence itself – the truth-conditions – of tensed statements cannot be given in non-tensed statements. It is an irreducible fact that the truth values of tensed statements depend upon *when now is*. The truth conditions of 'Presently, Seager is in Toronto' cannot eliminate reference to *now*. The system of tensed statements is easily understood (children make correct tensed assertions with ease at an early age) but is not explicable in terms which do not themselves have the kind of temporal reference which 'now' enjoys.

One of McTaggart's ripostes was to note that his opponents slipped from talking about the pastness/presentness/futurity of *events* to the temporal properties of *times* themselves. Events do not have all of pastness, presentness and futurity in a logically pernicious way since they do not have these properties at the same time. But then, claims McTaggart, *times* must be the bearers of the logically incompatible temporal properties of pastness, presentness and futurity. But, given that we can use the term 'now', I don't see why we cannot simply say that a time is past if and only if it is prior to *now*. That is, we could write:

$$Pt = t < v$$

and by extension:

$$Nt = Stv \text{ or } (\sim(t < v) \wedge \sim(v < t))$$

$$Ft = v < t.$$

No vicious regress or logical incompatibilities emerge. Of course, these are themselves tensed statements, but what is wrong with that? Does any one fail to understand the (admittedly

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those relations, as being past, present or future. To find such a term would not be easy ...' (1908/1968, p. 20). But McTaggart neglects the obvious possibility that the needed term is one that is a part of time but not a fixed part of time, exactly what 'the now' is supposed to be. There is no way to fix a date which is, somehow timelessly, *now*, but the present is nonetheless a time.

somewhat philosophically stilted) claim that December 4th, 1996 is prior to the current date?

It is possible to complain (see Horwich 1987, ch. 2) that this machinery manages to deflect McTaggart's argument only by transforming the predicates *past*, *present* and *future* into relations amongst times or events, and in particular into the familiar B-series relations of *earlier than*, *simultaneous with* and *later than*. If so, the idea of temporal passage has been trivialized; there is nothing left of the *now* and no incentive to continue the defence of temporal presence and flow. But this cannot be so. If we have replaced *past*, *present* and *future* with *earlier than*, *simultaneous with* and *later than* then everything we can say with the former we can say with the latter. Now, consider the simple statement that event e is present, which I am writing as $\exists t(Oet \wedge St\nu)$. There is no equivalent claim written in a language which lacks the resources to refer to *now* and which is restricted to the relations of *earlier than*, *simultaneous with* and *later than*. One might try this: e is present amounts to 'e occurs at t and t is simultaneous with *this* experience'. This works only insofar as 'this experience' has a covert reference to the *now*. If it does not, then we have not made the claim that e is present. What is correct in Horwich's objection stems from the fact that *iteration* of the temporal predicates *does* reduce to specifications of B-series relations. To say 'e was past, in the past' is simply to say that there is a time in the past which e was *before*. This is precisely why there is no regress of the sort McTaggart wished to use in his destruction of the A-series. Statements are tensed only once, so to speak. But this goes nowhere towards showing that *all* A-series relations have been reduced to B-series relations.

Horwich thinks more is required to secure the reality of the A-series. He says: '... to have a real A-series ... it is not enough that there be a variation in *relative* presentness from one time to another (like the variation in the velocity of an object relative to different reference frames). Rather, there must be variation of facts' (1987, p. 22, original emphasis). This is correct but if it is understood to mean that the truth of ascriptions of the predicates past, present and future to an event must be independent of the time when they are made, our temporal language is faced with an impossible demand. Many statements involving temporal predicates can be made absolute by explicitly indexing them to a time. For example, the seemingly problematic 'x is bald and x is not bald' transforms to 'x is bald at t and x is not bald at t'. Temporal variation is erased from the second form. But it is obvious that we cannot use this method to erase reference to the *now* when

we speak of events being past, present or future. Events only have now-ness, when they are simultaneous with the present. The fact that past, present and future all involve an essential relation to the *now* hardly shows that these predicates are bogus, or reduce to the relations of earlier than, later than and simultaneous with.

However, this line of objection does point to what I think is the most viable argument against the notions of presence and flow. It is possible to argue that the ideas of presence and flow (though not orientation) are, in a way, dispensable. It can be argued that we can say everything that we *ought* or really need to say using the language of *earlier than*, *simultaneous with* and *later than*. We then *explain* the intuition of presence and flow in some way or other which reveals them to be mere illusions. The common explanation (see Mellor and, perhaps, Horwich, but not, apparently, Dummett) is that *now* is nothing but an indexical term, entirely analogous to 'here' and that the sense of temporal presence and flow that is such an obvious feature of experience is an illusion engendered by the fact that our memories are richer and richer (contain more data) at later and later times. While I suspect that this is a consistent approach to the problem, it does require us to regard a central feature of experience as a gross and extremely extensive cognitive illusion. *If* the central features of temporal presence and flow could be shown to be impossible attributes of time, there would be a weighty consideration in favour of doing away with them. But with the failure of McTaggart's argument that presence and flow are incoherent, I think it would require more than 'scientific convenience' and a rather vicious deployment of Occam's razor to overturn our common view of time[11].

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