

TEMPORAL BECOMING: THE ARGUMENT FROM PHYSICS

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Arguments about temporal becoming often get nowhere. One reason for the impasse lies in the fact that the issue has been formulated as a **choice** between science on the one hand and common sense (or ordinary language) on the other as the primary source of ontological commitment.¹ Often proponents of attributing temporal becoming to the physical universe look to everyday temporal concepts, find them infested with notions involving temporal becoming and conclude that becoming is a basic feature of the physical world. Their opponents may look to physical science, find no reference to temporal becoming and conclude that becoming is not part of the extramental universe.² Thus construed, the issue of temporal becoming is not directly amenable to argument. This stalemate will be broken, however, if I accomplish my aim: to (re)formulate the question of temporal becoming so that it is subject to adjudication; to show how objections to the thesis of the mind-dependence of becoming can fruitfully be seen (and in a sense unified) as attacks on a single argument for the thesis, an argument from physics; and to defend the conclusion of the argument from physics from heretofore unanswered objections.

The question of the status of temporal becoming is the question of the status of past, present and future.³ Events which are at one time in the future, are said to become present and subsequently to recede into the past. Since past and future can be defined as 'earlier than now' and 'later than now,' the question of temporal becoming can be taken to be the question of whether or not *becoming present* or *occurring now* is a property of physical events. The relevant sense of '*occurring now*' is the tensed sense in which the sentence 'Event E is occurring now' is true, if at all, at only one time.⁴ Given that our awareness is causally dependent upon physical events, and given that we take events to be *occurring now*, do physical events *occur now* or *become present*, as opposed to merely occurring at clock times, apart from our awareness of them? Do physical events *become present* in their own right?

The view which will be defended here is that temporal becoming is not a feature of the physical world independently of our self-conscious awareness. Although this thesis attributes *time* to the physical world in the sense that physical events occur at various clock times and are ordered by succession and simultaneity, it denies that physical events have additional temporal properties of being past, present or future. That is to say, there is no ongoing "now," no physical transiency. Although several people have held this view in one form or another,⁵ the focus here will be on Grünbaum's formulation of the thesis of the mind-dependence of becoming. Grünbaum asks: What attribute or relation over and above its tenseless occurrence at clock time *t* characterizes a physical event as belonging to the present or occurring now? His reply is that

what qualifies a physical event at a time *t* as belonging to the present or as now is *not* some physical attribute of the event or some relation it sustains to other *purely physical* events. Instead what is *necessary* so to qualify the event is that at the time *t* at least one human or other *mind-possessing* organism *M* is conceptually aware of experiencing at that time either the event itself or another event simultaneous with it in *M*'s reference frame. And that awareness does not, in general, comprise information concerning the date and numerical clock time of the occurrence of the event. What then is the content of *M*'s conceptual awareness at time *t* that he *is experiencing* a certain event *at that time*? *M*'s experience of the event at time *t* is coupled with an awareness of the temporal coincidence of his experience of the event with a state of *knowing* that he has that experience at all.⁶

The requisite conceptual (or judgmental or propositional) awareness which qualifies an event as *occurring now* at some *t* may be illustrated as follows: Say that *P* is an explosion which *M* hears at *t*. The hearing of *P* qualifies as *occurring now* at *t* if:

At *t*, *M* has an experience which includes

- (1) hearing *P*, and
- (2) being aware that he is having that experience.

In the first instance, then, *nowness* characterizes certain mental events which meet the awareness requirements, such as the *hearing* of the explosion. The satisfaction of the requirements of conceptual awareness at *t* is a sufficient condition for the *experience* of the explosion to qualify as *occurring now*, but only a necessary condition for the explosion itself, a physical event, to qualify at *t* as *occurring now*.⁷ Without physical transiency, a physical event (e.g., the explosion *P*) qualifies *derivatively* as *occurring now* at some *t* either if someone is conceptually aware of the physical event at (or slightly later than) *t* or if the physical event is simultaneous with some other event which meets the awareness requirements.

What is essential to Grünbaum's thesis is that "the nowness of the experience of at least one member of the simultaneity class to which an event E belongs is *necessary* for the nowness of the event E itself."⁸ Thus, from the fact that a physical event is experienced at *t* such that the *experience* of the physical event qualifies at *t* as *occurring now*, it does not follow that the physical event occurs at clock time *t* or at any particular time prior to *t*. If the event in question is itself a mental event (e.g., a pain), then the event *is* the experience of it; nevertheless, to qualify as *occurring now* at some time *t*, the pain must meet the conceptual awareness requirements at that time. The requisite awareness may, but need not, be expressed in a linguistic utterance. To sum up: *Occurring now* is *prima facie* a nonrelational property of mental events in the first instance; Grünbaum's account of a necessary condition for the nowness of physical events entails that a certain relation obtains—namely, the relation of the simultaneity of one's experience of an event and of one's being aware that one has that experience at all.

Grünbaum's mind-dependence thesis is pitted against the thesis that mind-independent status must be assigned to nowness. It is not obvious how a mind-independent view of becoming can be reconciled with a realistic view of physics, however. In the first place, there is the problem of the relativity of simultaneity. The thesis that nowness is a mind-independent property of events seems to involve a Newtonian notion of absolute simultaneity, and it is not immediately clear how a mind-independence thesis could be relativized to reference frames. In any case, if the mind-independence theorist wants a transient division of physical time so that there is a unique "now" at any given moment, his view will be incompatible with the relativity of simultaneity. In the second place, the mathematics of both Newtonian and relativistic theories represents time as constituted by densely-ordered elements.⁹ But the sequence of the "nows" of experience, at least on the well-known view propounded by James and Whitehead, is discretely-ordered. Thus, if the mind-independence theorist wants to reconcile his view with physical theories which attribute denseness to physical time, he must offer some alternative account of the experience of time, which would allow the series of "nows" to be densely-ordered. It is at least not obvious how such an account might proceed. Thus, there appears to be some tension between a mind-independent view of becoming and a realistic view of physics.

In formulating a view which is compatible with both Newtonian and relativistic physics, Grünbaum emphasizes that his account is

not an analysis of what the common-sense man actually *means* when he says that a physical event belongs to the present, past, or future; instead, such an account sets forth how these ascriptions ought to be construed within the

framework of a theory which would supplant the scientifically-untutored view of common sense.¹⁰

Given this understanding of Grünbaum's enterprise, there is a conflict of frameworks¹¹ between Grünbaum and his opponents who argue that the mind-*independence* of ongoing *nowness* is a conceptual necessity. In the interest of recasting this conflict so that it will be susceptible to genuine debate, we now turn to the argument from physics.

I

The thrust of the mind-*dependence* thesis is negative: it is primarily a denial of the mind-*independence* of becoming. One way to argue for this negative thesis is to show that there is no good reason to claim that there is a mind-*independent* "now." A prominent example of such an argument is this:

It seems to me of decisive significance that no cognizance is taken of *nowness* (in the sense associated with becoming) in any of the extant theories of physics. If *nowness* were a fundamental property of physical events themselves, then it would be very strange indeed that it could go unrecognized in all extant physical theories *without detriment to their explanatory success*.¹²

This argument is puzzling because while Grünbaum sees it as having decisive significance—at least when coupled with the noted difficulties for the mind-*independence* theorist—his opponents cite it¹³ without either being convinced by it or arguing convincingly against it.

Since he refers to *extant* theories of physics, we may take Grünbaum's claim of decisiveness to be a claim that there is an inductively strong presumption that *nowness* is not a mind-*independent* property. Underlying the argument, however, is a stronger assumption regarding the *ultimate* explanatory success of physics—an assumption which might be expressed as follows:

For all X, X is a (nontrivial) mind-*independent* property of physical events if and only if failure to take cognizance of X is detrimental to the ultimate explanatory success of physics.¹⁴

By treating an instance of this assumption as a suppressed premise, the argument in the passage just quoted can be transformed into the following inductive argument:¹⁵

The Argument from Physics:

1. *Nowness* is a mind-*independent* property of physical events if and only if

- failure to take cognizance of¹⁶ nowness is detrimental to the ultimate explanatory success of physical theories.
2. Extant physical theories fail to take cognizance of nowness without detriment to their explanatory success to date.
 3. Therefore, there is good reason to hold that nowness is not a mind-independent property of physical events.

This argument has a number of interesting features. First, notice the relation between the second premise and the second half of the biconditional of the first premise: The truth (falsity) of the second premise gives inductive ground for the falsity (truth) of the second half of the first premise. The weight of the inductive support for the second half of the first premise (or its denial) which is provided by the falsity (or truth) of the second premise is determined by such considerations as the following: Is there any reason to expect that physical theories which so far have failed to take cognizance of nowness will be superseded by theories which do take cognizance of nowness? (For example, scientists may have delayed accounting for nowness for pragmatic reasons, intending to return to it later.) Are temporal properties and relations kinds of items that one would expect to be within the purview of physical theories in the first place? Since there is no reason to expect that physical theories will be superseded by theories that do take cognizance of nowness and since temporal properties and relations are within the purview of physical theories, the truth of the second premise gives strong inductive ground for the falsity of the second half of the first premise. Hence, the argument from physics, if the premises are true, provides good inductive ground for holding that nowness is not a mind-independence property of physical events.

It is difficult, if not impossible, to specify what ultimate explanatory success is, or even what explanatory success to date is. Without giving sufficient conditions for the truth of the premises, however, certain conditions are implicitly accepted as necessary. When a critic charges that physics without nowness cannot explain our experience in certain ways, I take him to be charging that some condition necessary for the truth of the second premise is not satisfied; hence, if his charge is sustained, the second premise must be judged false. For the purpose at hand, the vagueness of the notion of explanatory success is thus not a fatal handicap; for even without an analysis of explanatory success, the mind-dependence theorist can acknowledge that certain charges can count against his premises.

The argument from physics has been attacked in two ways which can be disposed of quickly. Both Reichenbach and H. A. C. Dobbs have challenged the second premise by claiming that physics does in fact take cognizance of an ongoing "now." However, both kinds of arguments have

been rebutted, conclusively in my view, by Grünbaum.¹⁷ Another tack against the argument from physics is taken by Paul Fitzgerald, who, although he does not take nowness to be a mind-independent property, claims that the argument from physics can be refuted on the grounds that "nowness need not figure in physical theories precisely because it characterizes all conceivable worlds in which time exists."¹⁸ But Fitzgerald's claim simply begs the question against Grünbaum at this point, because if Grünbaum is correct, then contrary to Fitzgerald's assumption, a world without minds would lack becoming but would still be temporal in the sense that events would be ordered by succession and simultaneity.

The criticisms of the mind-dependence thesis which will be dealt with here consist of variations of the argument that on the mind-dependence thesis, various aspects of our experience are inexplicable. Although it is usually clear in what sense the critic seeks an explanation of experience, a word of caution is needed at the outset: Grünbaum holds that mental events are causally dependent upon physical events; in that case, there is a straightforward sense in which mental phenomena are in principle explainable in terms of the physical phenomena that cause them. But this does not imply that Grünbaum holds that mental events must have the same properties as the physical events that cause them. As Grünbaum points out,¹⁹ mental events *qua* mental items must have distinctive features of their own. Thus when the critic asks the mind-dependence theorist to explain certain features of our experience, we must be sure that the request is an appropriate one, and not, for example, a request for an "explanation" of why events are ever characterized as *occurring now* in the first place. If any of the attacks which allege that experience is inexplicable without physical transiency were to be successful, we would be forced to abandon at least one of the premises of the argument from physics. We would have to abandon the first premise: since the mind-dependence thesis itself would lead to a conceptual muddle, we would have grounds independent of physical theories for assigning a mind-independent status to nowness. And/or we would be forced to reject the second premise: since physics without nowness would be unable to explain our experience in certain ways, there would be a limit to its explanatory success. In either case, the objections, if successful, would force us to give up the argument from physics.

II

The first kind of objection is that the order and "direction" of the mental events which constitute our experience are rendered inexplicable without a mind-independent "now." 'Inexplicable' here should be understood in a

strong sense; for the critic is charging that the order of our experience is completely arbitrary on the mind-dependence thesis, and that the mind-dependence theorist cannot give any plausible story which would lead us to expect that our experience should have the orderliness which it has. We may understand such arguments to be directed against the argument from physics in the following way: They are primarily aimed at the second premise, since if successful, they would show that a physics that takes no cognizance of nowness is in principle unable to explain experience. The falsity of the second premise would provide reason to hold that failure to take cognizance of nowness is detrimental to *ultimate* explanatory success of physical theories. If so, the mind-dependence theorist might have to reject the first premise as well.

One objection concerning the order of our experience takes it that temporal relations among mental events

are determined by the order in which these events become present. Since physical events do not become present *simpliciter* there can be no physical explanation for why mental events become present in the order they do.²⁰

This argument proves too much. By way of counterexample, consider the following: Physical injuries to our bodies are not painful *simpliciter*; but we surely allow that the temporal order of succession of the physical infliction of these injuries can explain the temporal order of the ensuing experienced pains. Thus although the *becoming present* of mental events is not explained physically, the earlier-later relations of mental events which we judge to become present can be explained by reference to physical events. (I am indebted to Professor Grünbaum for the preceding example.) Consideration of a similar criticism of the mind-dependence thesis will underscore this point: Consider two mental events of "now"-awareness, A_1 and A_2 , which occur at clock times t_1 and t_2 , respectively. It has been claimed:

If we suppose that my "now"-awareness A_1 is objectively earlier than A_2 in the sense that t_1 is objectively earlier than t_2 , this entails nothing whatever about an order for my experience if Grünbaum's thesis of the intrinsic tenselessness of the physical universe is taken with full seriousness.²¹

The critic, Frederick Ferré, further notes that "nothing in Grünbaum's universe requires that A_1 be *experienced* first and A_2 second. Both A_1 and A_2 exist in a democracy of tenselessly occurring events."

This criticism overlooks the fact that, on Grünbaum's view, the order of those mental events which constitute awareness of physical events depends on the order of the physical events which cause them together with the distances and velocities of the influence chains reaching the percipient. If the cause of A_2 , say a traffic light's change from green to yellow, is later than the cause of A_1 , say the same traffic light's change from red to green, then given the equal velocities of the causal chains reaching the percipient and the equal distances traveled, A_2 is later than A_1 . And since, *ex hypothesi*, A_2 and A_1 are (mental) events of experience, A_2 must be experienced later than A_1 . The order of the *becoming present* of mental events is governed by the order of their occurrences at various clock times,²² which in turn is governed by the order of the occurrences of the physical events which cause them together with the distances and velocities of the causal chains connecting the percipient with events outside of his body. Thus the order of experience can be explained in the relevant way without appeal to nowness.

It has been further claimed that the mind-dependence theorist cannot account for the fact that our experience of transiency always has the same "direction." It is not obvious what needs accounting for—certainly not the tautology that the future is always later than now and the past is always earlier than now; by definition, the direction of passage is toward the future. Although there is no "flow" of physical time, Grünbaum accounts for the anisotropy of physical time—the fact that there is an asymmetry between events ordered by the relation 'is earlier than' and events ordered by the relation 'is later than'—by the existence of irreversible processes: some kinds of sequences of states in the order of increasing time coordinates do not exist in the sequence of states in the order of decreasing time coordinates.²³ Although anisotropy provides a physical basis for a structural distinction between the two opposite time senses or "directions," the difference between the sequences does not provide any basis on which one of the senses is preferred to the other.

Given this account of anisotropy, however, it has been argued that the mind-dependence theorist is unable to account for the phenomenological fact that in our experience, one of the directions *is* preferred.²⁴ But this objection, like the objection about the order of our experience, fails to go far enough. The preferred direction of our experience, as well as its order, can be explained solely by reference to the physical world without appeal to an ongoing "now." The anisotropic 'is later than' relation can be provided by the increasing entropy in branch systems of the universe. It is a fact that increases of entropy in branch systems generally accompany the

production of traces or memories; and thus, the direction of entropy increase (i.e., the direction of the 'is later than' relation for physical events) is the same as the direction of increase of stored information. And the direction of memory increase is toward the future in "psychological" time. "Hence," writes Grünbaum, "what is *psychologically* later goes hand in hand with what is purely physically later on the basis of the entropic evolution of branch systems."²⁵ The preferred direction of our experience can thus be accounted for without appeal to a mind-independent "now." Thus the objections concerning the "direction" of experience, like those concerning the order of experience, fail to show that a physics which takes no cognizance of nowness is in principle unable to explain that experience.

The next major objection to the mind-dependence thesis concerns the problem of intersubjective agreement. If it turned out that an ongoing "now" were a condition of such interpersonal agreement in matters of tense as obtains, we would have to concede that a physics which failed to admit transiency is unable to explain the intersubjectivity of experience, i.e., we would have to reject the second premise of the argument from physics; and since no extant physical theory refers to nowness, it is not unlikely that we would reject the first premise as well.

Grünbaum has replied to certain arguments concerning intersubjective agreement. For example, Dobbs finds that without physical transiency which would explain why we agree about what is occurring now, "it is impossible to see why *I* should not be contrary, and hold that 'now it is twelve noon on Queen Anne's birthday in the year 1700.'" Grünbaum's ready reply is that, since no event in Dobbs' life is simultaneous with any event in 1700, he can have no experience of any "now" in 1700.²⁶ Nevertheless, other questions regarding our agreement in matters of tense remain.

To illustrate the possibility of our intersubjective agreement about "now"-awareness, Grünbaum draws on the analogy of sensible color qualities: "The mind-dependence of becoming is no more refuted by such intersubjectivity as obtains in regard to tense than the mind-dependence of common-sense color attributes is in the least disproved by agreement among several percipients as to the color of a chair."²⁷ Several have objected to the analogy. Gale, for instance, has pointed out that nowness is not a sensible property the way secondary qualities are,²⁸ and he has argued convincingly that the logic of expressions of pastness, presentness and futurity differs from the logic of sensible terms. To make the further argument that the analogy fails to accomplish its intended purpose, Ferré has attacked the analogy by pointing out a basic difference between common agreement on color and intersubjectivity of tense: in the case of agreeing

on the color of a chair, the agreement takes place within a shared spatio-temporal framework; it is this very framework that makes the chair a public object; but with regard to transiency, what is called into question is not some object within the shared framework, but rather the framework itself:

We can reach agreement about the color of a particular chair because if we assume that we are spatio-temporally co-present, we can experience it in a common "now." But what assures us, on Grünbaum's theory, that our awareness of the "now" itself occurs roughly simultaneously with the subjective co-presence of other mind-possessing organisms?²⁹

Ferré makes his point here in a somewhat misleading way. For co-presence requires only spatial and temporal proximity, without any necessary reference to mind-independent nowness. It is the simultaneity of the experience of the chair, *not* the fact that we experience it in some common "now," that is the basis for agreement. Not even simultaneity of experience, much less a common "now," is always required for temporal agreement: A diary entry for May 1, 1900, notes, "Mother's chair is now painted green." In 1975, a chemist tests the chair and makes the following determination: In 1975, the chair is painted with a red acrylic paint which did not exist in 1900; the only other paint on the chair is an oil-base green; the lack of varnish indicates that the chair was never used unpainted. Called upon to testify in a civil suit, the chemist in 1975 agrees with the writer of the diary in 1900 that the chair was green in 1900. What is required for agreement is that both the writer of the diary and the chemist are referring to the same time in the history of the chair (May 1, 1900), not that they share a common "now," nor that they experience the chair simultaneously.

We are never aware of "the 'now' itself"; rather it is the awareness of events which must be coordinated with others' similar awarenesses; and where such coordination occurs, it can be explained by facts such as these: the chair at t is a terminus of two causal chains, one issuing in my present awareness of it and one issuing in another's present awareness of it; since the cause of my present awareness is roughly simultaneous with the cause of the other person's present awareness, then given the equal velocities and distances of the causal chains, my present awareness is roughly simultaneous with his present awareness, and we both experience the chair as being present at t . The mind-dependence theorist thus has no difficulty explaining the temporal intersubjectivity that obtains without any limitations on the explanatory power of physics.

III

Among those not disposed to favor the mind-dependence thesis, there seems to be a common intuition that our successive characterizations of events as *occurring now* become radically arbitrary on the mind-dependence thesis. This is a difficult criticism to formulate clearly, but given its pervasiveness, the underlying intuition should be made explicit and subjected to scrutiny. Ferré has dubbed this 'the problem of temporal location.' Easier to name than to explicate, the problem of temporal location centers around the problem of accounting, on a thesis which denies physical transiency, for the fact that M is experiencing A now, at *this* time rather than some other time in M's life. Another way to put it, which will still have to be clarified, is this: Given all the events of "now"-awareness, $A_1, \dots, A_i, \dots, A_n$, that occur in M's life history, why does M experience A_i now? The most precise published formulations of this criticism are Ferré's. Consider this:

For Grünbaum it is theoretically forbidden to say of any person that he is more truly at any clock time than at any other in his lifetime.

We should pause to ask, what would it mean to say that a person is more truly at one clock time than at another in his lifetime, and in what sense is Grünbaum forbidden to say it? On the one hand, it is trivially true that a person born in 1945, who dies in 1970, is ten years old in 1955; and in 1955 she is at all the clock times that occur during 1955 and at none that occur during 1960; in this sense, Grünbaum is not "theoretically forbidden to say of any person that he is more truly at any clock time than at any other in his lifetime." On the other hand, we might give expression to the notion that a person is more truly at one clock time than at another in his lifetime by saying, "W is now in her 30th year and not in her 25th year." But Grünbaum is not forbidden to say that either; such a locution, uttered at t , expresses a true proposition if and only if W is in her 30th year at t . On the face of it then, it is not clear exactly what Grünbaum is accused of not being able to say. However, to return to the objection:

For Grünbaum it is theoretically forbidden to say of any person that he is more truly at any clock time than at any other in his lifetime. Since our minds are no less part of the natural order than our bodies, this must apply *a fortiori* to mental events as well. But the phenomenological fact is that for subjective awareness some mental events are uniquely "favoured" over others (in the sense of being judged "now"). Thus a systematically incoherent division is created between the order of *mental events conceived as occurring tenselessly*,

on the one hand, in a perfect democracy of earlier-later relations wherein none has special claims or privileges, and the order of *mental events as occurring transiently*, on the other hand, in a remorselessly ruled public succession of present moments.³⁰

It is still not obvious how this objection should be interpreted. There are several possible interpretations, three of which can be answered immediately by the mind-dependence theorist: (1) The objection may be that the mind-dependence theorist can give no reason for why M experiences A_1 at the time that he does; but as the preceding arguments make clear, M's experience of A_1 at t_1 is explainable by whatever physical events at (or slightly earlier than) t_1 cause A_1 . (2) The objection may be that the mind-dependence theorist cannot account for why A_1 occurs at the time which M characterizes as now at that time; but since A_1 is an event of "now"-awareness, M characterizes A_1 as now whenever A_1 occurs (and at no other time). (3) The critic may be asking why, given that mental events sustain relations of succession and simultaneity, do we ever characterize any event as *occurring now*? As indicated earlier, this is a pseudo-question, equally inappropriate for both mind-dependence and mind-independence theorists.

However, the above interpretations of the objection, even if adequately answered by the mind-dependence theorist, do not lay the objection to rest. And in view of the urgency with which the objection from temporal location is pressed, it behooves us to examine further interpretations. Nicholas Rescher, for example, treats it in a way that links it to attacks on the second premise of the argument from physics. He takes the argument to be this:

If (1) physics views all moments of time as wholly alike [with respect to past, present and future], and (2) the mind gives to one moment, the 'present' one, an experiential preeminence, then how can physics possibly explain *this* mental phenomenon. Hence one must either insist—all indications to the contrary notwithstanding—that physics *does* recognize a preeminent 'now,' or one must give up the thesis that physics can account for mental phenomena in general.³¹

Rescher answers³² the argument by noting that given any moment t , physics can well exhibit the temporal relations between t and other moments; for any event at t , there is a unique class of events earlier than t and a unique class of events later than t . Moreover, physics can maintain that what distinguishes different moments is not some peculiar attribute of *nowness* which is donned and doffed by successive moments, but rather that different moments are distinguished by their contents.

Although Rescher rightly claims that there is no difficulty in giving a physical explanation of what we experience at given times, his reply does not seem to exhaust the objection from temporal location, even yet; to

assure fairness to the critic who charges that there is a problem of temporal location for the mind-dependence thesis, let us consider a final formulation. The objection may be aimed at the *first* premise of the argument from physics; it may be taken as attempting to show that there is some reason, independent of physical theories, for postulating a mind-independent property of nowness. The critic of the mind-dependence thesis may grant that, given any clock time t , it is not arbitrary on the mind-dependence thesis that the events that are judged to be present are those that occur simultaneously with their being judged as "now"; what is arbitrary, according to this formulation, is why we are now given any particular t (rather than some other t') in the first place. Put this interpretation in the context of the following remarks by Ferré.

First consider again the two events of "now"-awareness, A_1 and A_2 . Say that, as a matter of fact A_2 , and not A_1 , comprises my subjective field of awareness now:

Why, if Grünbaum is followed, should A_2 and not A_1 comprise my field of awareness [now]? Time t_1 exists (occurs) just as truly in this region of the universe as time t_2 ; my "now"-constituting mental event A_1 , roughly simultaneous with t_1 , exists (occurs) likewise as genuinely. Yet I find myself in my experience discriminating against t_1 [now], and its associated event A_1 , for no reason whatever.³³

This objection does not question the causal connection between physical events at t_2 and my subjective awareness A_2 at t_2 ; given that it is t_2 , there is no problem of accounting for why I am experiencing A_2 . What Ferré (and, I believe, Gale as well) thinks is radically arbitrary is that I am now at t_2 rather than t_1 in the first place. But Grünbaum has an answer for why the time identified as *now* by a particular event of "now"-awareness is t_2 : that event of "now"-awareness belongs to the simultaneity class at t_2 . Nowness, Grünbaum agrees with his critics, is a feature of experience, and an event such as A_2 qualifies as occurring now at the moment that I experience A_2 and at no other moment.³⁴

Thus on any interpretation—whether aimed at the second or the first premise of the argument from physics—the objection from temporal location fails to dislodge the argument for the mind-dependence of becoming.

IV

The various objections from experience have tried to show, in one way or another, that on the mind-dependence thesis, there is an unbridgeable gap between mental events and physical events. For example,

in place of one universe with common categories it has postulated two, one physical and the other mysteriously mental. Into the tenselessly existing physical machine it has slipped a transient ghost to wander inexplicably among clock readings and other events.³⁵

Similarly, it has been charged that Grünbaum is committed to a "bizarre 'non-naturalistic' theory of mind."³⁶ But we have seen that Grünbaum is committed to a view of mind no more bizarre than that of any dualist who holds that some properties of mental events *qua mental* events differ from those of physical events. At worst, the relation between mental and physical events for Grünbaum is as mysterious as it is for anyone who holds that mental events are causally dependent on brain events.

There remain, however, two further arguments, both of which purport to show that there are insuperable conceptual difficulties for a mind-dependence thesis. These may be construed as attacks directly on the first premise of the argument from physics; for they attempt to show that there is some ground other than physical theory for assigning to *nowness* a mind-independent status. The first involves the concept of the self, and the second brings up the possibility of an infinite regress.

If the mind-dependence thesis supported by the argument from physics were shown to involve a preposterous concept of the self, there would be good reason not to let physics be the only determinant of mind-independent properties. In this regard, consider the following argument:

Premise: For each event of "now"-awareness [in my career] . . . I am at that clock time propositionally aware of its being "now."

Conclusion: I am a genidentical mind-possessing organism which is (tenselessly) aware of all the temporally separated "now"-contents that occur (tenselessly) in its life-career.³⁷

Ferré claims that the mind-dependence theorist is committed to the premise, from which follows the absurd conclusion. That the mind-dependence theorist is *not* in fact committed to the premise can be seen as follows: It is trivially true that each time *I* have an experience of "now"-awareness, I am propositionally aware of some event's being "now," on the mind-dependence thesis. But this should not be confused with holding, on the other hand, that there is a single time in which I am propositionally aware of all the "now"-contents that I experience during my lifetime; and the mind-dependence theorist is certainly not committed to holding that there is any such time. Nor does the premise, in the trivial sense in which it is true at all, provide any support for the absurd conclusion, which is false on the mind-dependence thesis. On the mind-dependence thesis, the only

events that I can ever be aware of as "now" at a given time are those events roughly simultaneous with my awareness. (Even if a stellar explosion occurred years before the time at which I see it, the event of my seeing it is simultaneous with my awareness that I see it; and my seeing it can qualify as *occurring now*.) Because my life career extends over years and because any particular event of awareness must occur at a single time (or, more accurately, in an extremely short interval), the set of all the experienced events in my life career does not constitute a possible object of a single awareness. My separate awarenesses occur at different clock times; to assume that the events of my life are all "there" at one time, to be grasped in some tenseless, nontransient awareness is to confuse tenselessness with permanence in the sense of 'occurring at all clock times.' To make it consistent with the mind-dependence thesis, the concept of the self described in the conclusion above would have to be changed to something like this: I am a genidentical mind-possessing organism which in temporally separated awareness is aware of the various temporally separated "now"-contents that occur in its life career, such that each awareness is simultaneous with the particular "now"-content of which it is aware. Although this is far from a fully developed concept of the self, at least it fails to be the absurd concept of the self attributed to the mind-dependence theorist.

A persistent criticism of the mind-dependence thesis is the charge that in order to account for the transiency of awareness without physical transiency, the mind-dependence thesis must initiate an infinite regress. For the mind-dependence theorist is driven to such desperate measures as postulating a second-order series of mental events, or a second-order self, "for which the proper object of awareness would be the tenselessly existing mental events of 'now'-awareness held by the first-order self at various temporal locations along its career."³⁸ Not only would such an "occult superself" be anathema to anyone holding a naturalistic view of mind, but also it would initiate an infinite regress. If the mental event that qualifies an event as *occurring now* itself occurs now, must we postulate another mental event, via a second-order self, to account for the transiency of the first mental event? For example, say that I am now aware that someone is knocking on my door. Does my complex mental event—i.e., my hearing the knock coupled with my awareness that I am hearing the knock—itself occur now? If so, must we say that there is a further (and even more complex) mental event that qualifies the first mental event as *occurring now*? This regress never gets off the ground, however, because an event can qualify at t as *occurring now* if it is simultaneous with some other event which so qualifies.³⁹ And my complex awareness which qualifies my hearing the knock as *occurring now* at t itself occurs at t ; so trivially, the

complex awareness likewise qualifies at *t* as *occurring now* by virtue of being simultaneous with my hearing the knock.

Thus neither of these latter objections shows that there is some conceptual requirement, not rooted in physics, for physical transiency; and hence, the first premise of the argument from physics remains unscathed.

V

In conclusion, the fact that Grünbaum supports the mind-dependence thesis by an inductive argument, the argument from physics, indicates that it is highly misleading to say that "Grünbaum seems to believe that his vision of the universe, whatever its consequences, is required by logic itself."⁴⁰ Moreover, it has been shown that a mind-dependence theorist need not simply *assume* that "what is good for physics is also good for logic and metaphysics."⁴¹ We may state a variation of such a view as part of an argument, as we did in the first premise of the argument from physics, and defend the argument against objections. Since both premises have survived the objections brought against them, we are justified in accepting the argument from physics. Therefore, we are justified in holding that temporal becoming has no ontological status in the physical universe.

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NOTES

¹ A shorter version of this paper was read at a Pittsburgh Philosophy Colloquium on April 14, 1975. I am especially grateful to Professor Adolf Grünbaum, not only for his provocative work on temporal becoming, but also for his enormous help in working out this paper. Also, many thanks are due to Professor Richard Gale for his detailed comments on an earlier draft of this paper. This work was supported by an Andrew Mellon Postdoctoral Fellowship, 1974-75. Of related interest is my forthcoming paper "On the Mind-Dependence of Temporal Becoming."

² See Richard Gale, *The Language of Time* (New York, 1968), for the first approach and see Adolf Grünbaum, *Modern Science and Zeno's Paradoxes* (London, 1968) and "The Meaning of Time," *Basic Issues in the Philosophy of Time*, eds. Eugene Freeman and Wilfrid Sellars (LaSalle, Ill., 1971), pp. 195-228, for the second approach. There is, however, a complete correspondence neither between those who take their ontological cues from science and those who argue against temporal becoming as part of the physical world on the one hand, nor between those who look to ordinary concepts for ontological commitments and those who argue that temporal becoming is part of the world on the other. Čapek and Dobbs and Reichenbach, all rebutted by Grünbaum, think that they find a basis for tem-

poral becoming in physics. Rescher and Ducasse and Russell do not explicitly use physical science to support their view that temporal becoming fails to characterize the physical universe.

³ McTaggart distinguished between the A-series, according to which events are past, present or future, and the B-series, according to which events are ordered by the relations of *earlier than* and *simultaneous with*. One way to look at the question of temporal becoming is as the problem of relating the A-series and the B-series. See J. M. E. McTaggart, *The Nature of Existence*, vol. II, Book V, Chapter 33 (Cambridge, 1927), reprinted in *The Philosophy of Time*, ed. Richard M. Gale (London, 1968), pp. 86-97.

⁴ The question of temporal becoming is thus not reducible to the question of the relation between the experience of duration and the elapsive character of physical events, a possibility raised by Paul Fitzgerald, "Nowness and the Understanding of Time," *PSA 1972*, eds. Kenneth F. Schaffner and Robert S. Cohen (Dordrecht-Holland, 1974), p. 280, fn. 7.

⁵ See, for example, Wilfrid Sellars' *Science and Metaphysics* (New York, 1968).

⁶ "The Meaning of Time," pp. 206-207. Emphasis Grünbaum's.

⁷ *Ibid.*, p. 208.

⁸ *Ibid.*, p. 209.

⁹ See Wesley Salmon, *Zeno's Paradoxes* (Indianapolis, 1970), pp. 20-26, and see Grünbaum, "Relativity and the Atomicity of Becoming," *Review of Metaphysics* 4 (1950), pp. 143-186.

¹⁰ *Modern Science*, p. 8. Emphasis Grünbaum's.

¹¹ For a discussion of the relevant notion of frameworks and of the problems of supplanting the "manifest image" with the "scientific image," see Wilfrid Sellars, "Philosophy and the Scientific Image of Man," *Science, Perception and Reality* (New York, 1963), pp. 1-20.

¹² *Modern Science*, p. 21. Emphasis Grünbaum's.

¹³ For example, see *The Language of Time*, pp. 224-227; Frederick Ferré, "Grünbaum on Temporal Becoming: A Critique," *International Philosophical Quarterly* 12 (1972), p. 428; H. A. C. Dobbs, "The 'Present' in Physics," *British Journal for the Philosophy of Science* 19 (1969), p. 318.

¹⁴ This biconditional is stronger than is needed to undergird the quoted argument, but I think it more adequately reflects Grünbaum's position than does the weaker conditional which is strictly required. Moreover, some of the arguments against the mind-dependence thesis can more plausibly be seen as charging that failure to take cognizance of nowness is detrimental to the ultimate explanatory success of physics than as charging that such failure is detrimental to the explanatory success of physics to date. The qualification "nontrivial" is meant to rule out properties expressed by, e.g., 'being self-identical.' Throughout the paper, it is assumed that nowness is considered by those attacking the mind-dependence thesis to be a nontrivial property of physical events.

¹⁵ Although Gale sets this argument up as a syllogism (*The Language of Time*, pp. 224-227), it becomes an inductive argument when the needed distinction between ultimate explanatory success and explanatory success to date is supplied.

¹⁶ The fact that physics fails to take cognizance of nowness is meant to encompass the facts that physical theories fail to refer to nowness and that they provide no physical basis for attributing nowness to the physical world.

¹⁷ Hans Reichenbach, *The Direction of Time*, ed. Maria Reichenbach (Berkeley,

1971), p. 17. Dobbs' "The 'Present' in Physics," pp. 319-320. Grünbaum answers Reichenbach in *Modern Science*, pp. 30-32, and he answers Dobbs in "Are Physical Events Themselves Transiently Past, Present and Future? A Reply to H. A. C. Dobbs," *British Journal for the Philosophy of Science* 20 (1969), pp. 148-150. In his reply to Dobbs, Grünbaum also meets the objection that the asymmetry of our knowledge of the past and our knowledge of the future requires explanation in terms of physical transiency. There are other objections to the mind-dependence thesis to which Grünbaum has replied. Among them are the charge that the mind-dependence thesis "spatializes" time, that nontransient events cannot cause transient events, that the anisotropy of physical time gives rise to physical transiency, that indeterminism provides a physical basis for transiency. See *Modern Science*, pp. 3-36, "The Meaning of Time," and *Philosophical Problems of Space and Time*, 2nd ed. (Dordrecht-Holland, 1973), Ch. 10.

18 "Nowness and the Understanding of Time," p. 277. Gale makes a similar point in *The Philosophy of Time*, p. 300.

19 "The Meaning of Time," p. 216.

20 *The Language of Time*, p. 235.

21 Frederick Ferré, "Grünbaum on Temporal Becoming: A Critique," p. 436.

22 This answer to the problem of order might be challenged by Ferré if he assumed that there could be no order of *physical* events without a mind-independent "now"; such an assumption at this point, however, would clearly beg the question. In addition, in his causal theory of time Grünbaum shows how the order of physical events can be established without presupposing that there is a mind-independent "now."

23 *Modern Science*, p. 12.

24 "Grünbaum on Temporal Becoming," p. 437.

25 Grünbaum, "The Nature of Time," *Frontiers of Science and Philosophy*, ed. Robert G. Colodny (Pittsburgh, 1962), p. 172. For a full account of Grünbaum's view of anisotropy, see "The Anisotropy of Time," *The Nature of Time*, eds. T. Gold and D. L. Schumacher (Ithaca, 1967), pp. 149-186.

26 "The 'Present' in Physics," pp. 321-322, and "Are Physical Events Themselves Transiently Past, Present, and Future? A Reply to H. A. C. Dobbs," p. 153.

27 *Modern Science*, p. 28.

28 *The Language of Time*, p. 228.

29 "Grünbaum on Temporal Becoming," p. 440.

30 Frederick Ferré, "Grünbaum vs. Dobbs: The Need for Physical Transiency," *British Journal for the Philosophy of Science* 21 (1970), p. 280.

31 *Conceptual Idealism* (Oxford, 1973), pp. 128-129.

32 It should be noted that the sense in which Grünbaum holds that physics can account for mental phenomena, in general, is *not* a sense in which the nowness of events is given a physical explanation.

33 "Grünbaum on Temporal Becoming," p. 436. Emphasis Ferré's.

34 Whatever difficulty (if any) there is here for the mind-dependence theorist is more acute for advocates of physical transiency. Instead of "Why am I now at *t*?" the question for the supporters of physical transiency would be "Why is the ongoing 'now' at *t*?" (See J. J. C. Smart, *Philosophy and Scientific Realism* (New York, 1963), p. 136, and *Modern Science*, p. 27.) Whereas the mind-dependence theorist can answer his question in terms of the judgmental awareness that qualifies events at *t* as *occurring now*, there is no available answer to the analogue of the question addressed to the mind-independence theorist. However, the mind-independence theo-

rist might reasonably argue that it is illegitimate to push the question this far; it is beginning to sound like the unanswerable "Why is there something rather than nothing?" If so, then it is equally illegitimate to press the argument from temporal location any further on the mind-dependence theorist.

³⁵ "Grünbaum on Temporal Becoming," p. 440.

³⁶ *The Language of Time*, p. 232.

³⁷ "Grünbaum on Temporal Becoming," p. 438.

³⁸ *Ibid.*, p. 439.

³⁹ "The Meaning of Time," p. 208.

⁴⁰ Frederick Ferré, "Transiency, Fate and the Future," *The Philosophical Forum* 2 (1971), p. 390. Although Ferré is not referring to the argument from physics, his remark implies that Grünbaum's view of becoming rests on *a priori* arguments.

⁴¹ *The Language of Time*, p. 21.