Conscious Goal-Seeking and the Nature of Time

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We human beings consciously project ourselves into the future.* We consciously envision goals. We make plans and strive to implement them. Sometimes we attain an intended goal, or at least make good progress towards it so as to accomplish some of what we intend. Other times we do not succeed.

What if this business of thinking toward the future and working into the future is not what we ordinarily suppose it to be? What if our understanding of the processes of aiming at future results is contaminated with mistake, misconception, and illusion? As a first approximation, these questions state the topic that I intend to consider.

The discussion here covers only *conscious* future-directed intentions, not non-conscious ones. By this restriction I do not mean to suggest that non-conscious goal-seeking processes are either unimportant or uninteresting. Quite the contrary, processes which non-consciously persevere toward a specifiable end-state, despite obstacles and varying circumstances, form an important class of phenomena. I would say the same about phenomena of a related type, namely, homeostatic processes. For both types of processes, there are unanswered questions. Nonetheless, conscious goal-seeking processes are at least as important and as interesting as non-conscious ones, and even more puzzling. As I said, our investigation is concerned only with conscious future-directed aims and intentions.

For clarity, I must also specify that the intentions we shall consider are plans for the future. They are thoughts which aim to guide action toward a goal. Thus, I use the word "intention" in the standard dictionary sense. I am not talking about intentionality as "the power of minds to be about, to represent, or to stand for, things."[1] This latter kind of intentionality is important, particularly for philosophy of mind and philosophy of language, but it is not the present topic.

Perhaps surprisingly, we have good reasons to raise the question whether the familiar processes of aiming at future results are what we normally suppose them to be. One reason is a rational suspicion that time is not what we normally suppose it to be. When a person forms a conscious intention about the future, he or she takes for granted an understanding of how the present is connected to the future. If there is something wrong with our ordinary conception of time, then there might be something wrong with our normal understanding of past, present, and future; and if we are mistaken about past, present, and future, then perhaps the mistake pervades what we think we are doing when we set goals and attempt to implement them. Perhaps the facts are not what we suppose. Perhaps in some way our goal-seeking does not make sense.

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* We of course also retroject ourselves into the past by means of memory and by the promptings of records and signs. This orientation to the past is not at issue here, except to the extent that reflections on backward-directed consciousness also apply to that which is forward-directed, and vice versa.

The reasoning just sketched requires several steps. The first step is the big one, and we have reason seriously to consider it. Many contemporary scientists and philosophers argue that time as we normally conceive it is "unreal." This unreality of time need not mean that time is absolutely nothing. That view would be too extreme for the scientists and philosophers we consider here. Their contention, rather, is that the objective facts which account for our sense of time and for our concepts of time are unlike our imaginary picture of the facts. For instance, Julian Barbour writes,

> No doubt many people will dismiss the suggestion that time may not exist as nonsense. I am not denying the powerful phenomenon we call time. But is it what it seems to be? After all, the Earth seems to be flat. I believe the true phenomenon is so different that, presented to you as I think it is without any mention of the word 'time', it would not occur to you to call it that.[2]

Clearly, if Barbour is right, we shall have to develop a new understanding of what takes place when we form plans and intentions for the future. Indeed, I would add one final step to the argument. Setting goals and working to achieve them are substantial parts of the human way of life. Therefore, if they are not what we take them to be, we ourselves are not quite who or what we think we are.

Although the antitemporalist critique might at first sound strange, we should not dismiss it out of hand. The (alleged) problems with the ordinary notion of time are rooted in scientific findings. For the most part the arguments are not constructed from abstract a priori reasoning, and certainly they make no appeal to supposed mystical insight. I do not intend here to repeat the arguments. Though they are not conclusive, they are so substantial that it is not too early to ask about some of the human implications of the position the arguments try to establish.

For our purposes, the uncertainty whether the critique of time is correct does not detract from the significance of its human implications. Rather, that significance is increased. The critique of time would, if correct, require us to alter some attitudes and expectations. The necessary changes might be somewhat welcome or somewhat distressing, or perhaps both in different ways. But surely it would be distressing to be suspended in uncertainty between the normal view of time and the novel critical view. Unfortunately, however, upon examining the issues, we might find ourselves in that kind of predicament of uncertainty.

So then, what might be wrong with the way we think about time? The great problem, according to many thinkers, is our supposition that time flows. We are wrong when we believe in a moving Now. There is no such thing as the passage of time.

If this is true, then the required rethinking will be so radical that I cannot see—perhaps nobody can really see—what must be done. When we consider what we assume, perhaps erroneously, to be time as it is objectively, passage seems to be its most essential and distinctive property. The flow of time distinguishes the temporal dimension from a dimension of space. There may be other distinctive attributes, but this surely is one. Furthermore, when we consider time in its relation to human life, no feature of human conscious experience is more fundamental or comprehensive than the passage of time. Passage is the basic feature not only of human temporal consciousness, but of human consciousness with all its qualities and relations.

Right now the present moment slips away into the irretrievable past, while a hitherto non-existent moment comes to be. The new moment, in its turn, then vanishes into the past. This is how we experience time, and this is how we believe time itself to be. But, according to more than a few scientists and philosophers, our beliefs and apparent experiences do not correspond to anything in objective reality. At any rate, our beliefs, concepts, and presumed experiences do not reveal the nature of the objective correlates.[3]

These nay-sayers deny the reality of what J. M. E. McTaggart called the A-series properties of time. Basic to this series are attributes such as being past, being present, and being future. McTaggart contrasted the A-series with the order defined by the dyadic relations of simultaneous with, earlier than, and later than. In McTaggart's terminology, the latter order is the B-series. McTaggart argued both that the A-series is essential to time and that the A-series is logically self-contradictory. Therefore, McTaggart concluded, time is unreal.[4] Contemporary thinkers rarely argue that the concept of temporal flow is logically self-contradictory. Barbour, for example, differentiates his position from McTaggart's.[5] Although few people, if any, accept the details of McTaggart's reasoning, his concepts and terms have become a standard part of the way problems about the passage of time are formulated.[*6]

It would be something of a waste of time to repeat here arguments against temporal flow. These arguments are easy to find in the sources mentioned earlier[7] and in other places. Moreover, I do not contend that the arguments are conclusive. I do believe, however, that the arguments are strong enough that we have to take them seriously, and philosophers and scientists who study time do take them seriously. At an international conference in 1991 on the physical origins of time asymmetry,[8] Barbour informally polled the forty-two participants, "Do you believe that time is a truly basic concept that must appear in the foundations of any theory of the world, or is it an effective concept that can be derived from more primitive notions . . . ?" Twenty "said there was no time at a fundamental level," and five more "were sympathetic to or inclined to" that belief. Ten thought that time exists "at the most basic level." Seven abstained or were undecided, without being inclined toward the view Barbour favors.[9]

Then, too, there are the opinions of philosophy professors. In 2009 David Bourget and David J. Chalmers conducted a survey on thirty philosophical problems.[10] Among the 931 professors who completed the survey (of 1,972 invited), a little over twenty-six percent either accepted or leaned toward the B-theory. Only six per cent accepted the A-theory, another ten per cent leaned toward it, and three per cent accepted both theories of time. Fully thirty per cent considered themselves "insufficiently familiar with the issue" to state an opinion. The rest of the respondents (about twenty-five per cent) said they did not know, skipped the question, or handled

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* Theories about time come in several varieties, and admit of many refinements. For simplicity I consider only two broad positions: (1) that only the present exists, and (2) that all temporal conditions are equally existent. The former is a kind of A-theory, and the latter is a B-theory. In particular I ignore the "growing block" theory. According to it, the future is non-existent, the present comes into existence, and the past retains the existence conferred on it in the present. The "growing block" view is perhaps a kind of A-theory. Because our topic concerns the formation of conscious intentions about the future, we can set aside this complication about the status of the past.

it in some other way.*

Such polls and surveys of course do not prove anything about the nature of time. However, they do call attention to issues that demand further exploration. In this case, as in others like it, if we doubt the reliability of the experts' opinions, we can judge for ourselves by inspecting the evidence and arguments that the experts adduce. Surely the ongoing discussions about the flow of time are by now far enough advanced that we need to take up the question what the human consequences are *if* indeed the passage of time is unreal. As I have stated, this is the question that we investigate here. The answer will be instructive, regardless of how the debate about the passage of time is someday settled, and even if that debate is never settled.

Some scientists and philosophers have gone beyond a critique of A-series temporality to argue that the supposed asymmetry between the two directions in time is also not well-founded. Asymmetry is more rudimentary than flow: the two directions in time might be distinguishable, even in the absence of a transient Now. According to Paul Horwich, time itself is symmetric, although the cosmic world-process has contingent features which render that actual process asymmetric.[11] Huw Price goes beyond Horwich in denying temporal asymmetry. Price argues that concrete processes within the world do not impart a preferred direction to time. We can imagine ourselves detecting such directionality only if our descriptions of such processes already include a covert ascription of it. In Price's view, when we presuppose neither symmetry nor asymmetry, we cannot discover any objective distinction between the two directions of time.[12]

If temporal flow is unreal, then our consciously forward-directed thoughts and actions are quite different from what we normally suppose them to be. In order to grasp the magnitude of the difference, we can assume time without passage and then ponder the implications of this assumption for the human practice of working toward a future goal. For this exercise, we need not add the further modifications which would be required if temporal asymmetry were also assumed to be unreal. The absence of passage is sufficient of itself to require revisions which are hard to conceptualize and hard to express in words. So, our task is to bring this assumption about time into confrontation with a normal type of human action.

However, before turning to that task, I need to clarify the difference between our topic and the more familiar topic of free will and determinism. The issue of the supposed passage of time is different from the issues of determinism, indeterminism, and free will. The problems of determinism and indeterminism are generally formulated within a context that assumes the "ordinary" view of the reality of temporal passage. I think that the issues can be restated on the assumption of the denial of the "ordinary" view, but such reformulation is not relevant here. However, I do want to point out that denying the flow of time should not be construed as a roundabout way of denying free will and so asserting determinism about human choices and

* The details as reported in Appendix 1 of the paper [Bourget and Chalmers, page 38]:

Time: A-theory or B-theory?

Other 58.2±1.6%	Insufficiently familiar with the issue (30.8%), Agnostic/undecided (10.5%), Skip (5.7%), Accept both (3.1%), The question is too unclear to answer (2.0%)
B-theory 26.3±1.1%	Accept (15.8%), Lean toward (10.5%)
A-theory 15.5±0.8%	Lean toward (9.5%), Accept (6.0%)

decisions. The ordinary concepts of cause and effect are designed to apply to a universe in which time exhibits the A-series properties of past, present, and future. If time possesses only the B-series properties of order, then causes cannot produce the existence of their effects, because existence is possessed equally by all things located at any moment or in any interval of time. The events of yesterday exist no less than the events of today. Moreover, also fully existent are the events which people say took place a year ago. The difference between the events of these three days is that yesterday's events are not at the same time as today's events, and the events from this date last year are even more distant in time. Given this view of time and existence, what would count as causation and what would count as determinism need as much reconceptualization as does the notion of free will. Another difference between the question of temporal flow and the question of free will is that the question of free will applies only to the relation between a volitional act and its temporal antecedents, but the question of temporal flow applies to the relations between a volitional act and both its predecessors and its successors. Indeed, the question of temporal flow applies to the forwards and backwards relations of all events, volitional and otherwise. The question of temporal flow is much more comprehensive than the question of free will. Because our topic is the forward-facing process of forming intentions about the future, we do not need to take notice of the question of free will, but we do have to consider the implications of a theory about the general and inherent nature of time.

Now to return to the main thread of reflections on time and conscious intentions for the future. In a standard metaphor, people talk about the moving river of time. To deny temporal passage is to reject this image. Time is not like a river. It does not move. Yet, if time itself does not move, still time as experienced does move. Experienced time is like a river. Hermann Weyl has clearly stated the great difficulty: "The objective world simply *is*, it does not *happen*. Only to the gaze of my consciousness, crawling along the lifeline of my body does a section of the world come to life as a fleeting image in space which continuously changes in time."[13] Objective time and subjective time differ with respect to this fundamental property. We now explore what this contrast might mean for the understanding of ourselves. In particular, we are interested in the implications for the familiar human practice of acting to implement conscious intentions about the future.

This particular objective/subjective contrast is noteworthy in several ways. In the first place, it is pervasive. Experience always and everywhere takes place in fleeting time. Hence, if the passage of time is only subjective, and hence in some sense illusory, this is not at all an illusion like seeing a mirage in the desert or (to bring in the analogy Barbour mentions) seeing the surface of the earth as flat. These illusory or misleading appearances are local. They are manageable. They can be explained, and we can accept the explanations and move on. But there is not yet much of an explanation how consciousness adds passage to time. Even if someday a plausible explanation is available, the possession of that explanation would not change the fundamental character of the experience of time.

This means that the subjective experience of temporal passage is not only pervasive; it is also irremovable. If time does not flow, we can become informed of that fact, and we can incorporate it into our worldview. Nonetheless, we cannot really live with a realization that time

does not flow (if indeed it does not). Whatever we may think about time, we must live from moment to moment in time. Because time is so central to our lives, we might then wonder whether denial of temporal passage is tantamount to asserting that, insofar as we experience time, each of our lives is one big illusion from beginning to end. Furthermore, we might wonder whether forming intentions for the future is not futile, since the future is somehow equally as real as the present. These concerns lead into a thicket of issues, some substantive, some conceptual, and some merely verbal. At least we might need to revise our language. We cannot here embark on the lengthy and tedious discussions that would be needed to disentangle and clarify the relevant issues. I can say, however, that the worries about planning for the future and working for the future are mistaken, so far as the practical business of living is concerned. Even if the day exactly one year hence is equally as real as today, the contents of that day next year are what they are, not independently of what we decide and do today, but contingent upon our current choices and actions. Forming intentions for the future and working to secure intended results are entirely appropriate for beings like us. For each of us, consciousness is temporally limited. Each of our conscious lives has a beginning and an end. But more than that, during the interval between beginning and end, none of us enjoys his or her consciousness whole and entire. Human consciousness always exists in just one moment. This is a limitation we must respect.

Although our lives are subject to this inherent structural constraint, we have great freedom to ponder and to evaluate. When we start to think about the implications of time without passage, the question which arises immediately is whether that type of time would be for us better or worse than time as normally conceived. Of course, maybe the difference would not or should not make any difference, or maybe each possible temporal structure would have its own merits and demerits. In any case, even though we do not know for sure what time is like, we shall learn something important from the comparison. Time with genuine passage—that is, time of the A-series—either is real or it is not. Thus, when finished with the comparison, we shall perceive what we would prefer for this world's time. Of course, until we understand time more fully, we still will not know whether reality has honored or disallowed our judgment.

In a way there is something very appealing about the notion of the unreality of the passage of time. The equivalent reality of past, present, and future insures that the people whom we have loved and the good times we have shared remain in existence. This hopeful vision was quite likely the basis for Einstein's comforting letter to the widow of his old friend, Michele Besso. Shortly after Besso's death in March, 1955, Einstein wrote, "Now he has departed from this strange world a little ahead of me. That means nothing. People like us, who believe in physics, know that the distinction between past, present and future is only a stubbornly persistent illusion."[14] Within a few weeks of writing this letter, Einstein himself died.

Similarly, in a more recent memorial tribute, a deep bedrock of consolation seems to rest beneath the sorrow felt at the loss of J. J. C. Smart. Opposition to temporal passage is one of Smart's best-known philosophical positions.[15] In John Bigelow's words, "Even if he is right in his theory that his whole life does exist, though at a spatiotemporal distance from us, nevertheless the present and future parts of those who knew him, those parts that exist in the years after his death, will be pained by their temporal distance from him."[16]

Both of these references deal specifically with the past. Although our topic concerns the future, we can gain a useful perspective by thinking about these retrospective views. After we have briefly considered an appropriate attitude toward the past, we can then turn about to face the future. It is easy to see why we might believe that time without passage is at least somewhat better than an alternative in which the present perishes as it moves into the past. Nothing is really lost. Upon further reflection, however, a difficulty clouds the scene. If the supposed ontological difference between present and past "is only a stubbornly persistent illusion," then the evil of the past, as well as the good, abides. For Michele Besso (1873-1955) and J. J. C. Smart (1920-2012) we certainly hope that their lives are real in a kind of time which distances but does not destroy. But for most of those who have lived and died we have to ask ourselves whether there would not be more mercy in a kind of time in which the past brings nonexistence.

Now we should ask whether the judgments about the past are appropriate also for the future. Given the governing assumption that all parts of time are equally real, then the judgments have to be reached in the same way. In a world without temporal passage, the future is as real as the present, and the future is as real as the past. Therefore, to respect the reality of the future, we have to treat the good and the evil it contains as seriously as we treat the good and the evil of the past. We of course have specific information about the past which we lack about the future. This difference is, however, only a fact about us. It is not an objective fact about past events in themselves as contrasted with future events in themselves. We can think about the future in just the same way as we think about past eras for which we have general understanding but no specific information. When we think about the future this way, we proceed in two steps. First we guess what the contents of the future might be, and then we apply to those (plausibly inferred) contents the same standards of value that we use for the past. The results are not surprising. As best we can now tell, future times contain good, but they also contain evil. We are largely ignorant about the specific persons and events which exist in the future, but we expect that there are future persons and events.

To accustom ourselves to the appropriate vision of the future, we should notice that future moments in time are temporally distant from one another, as well as distant from the present. For instance, a hundred years from now is forty years after sixty years from now. (Relations of before and after are also relevant within the past, of course.) Thus, as we try to understand what it means to deny the passage of time, we must remember that the temporal point from which judgments are made makes no difference. From now we consider the time a hundred years ago, and we consider the time a hundred years in the future. We can imagine that from a moment two hundred years in our future people will look back a hundred years (to what is a hundred years in our future), two hundred years (to our time), and three hundred years (to a time a hundred years before us). Available information varies; the objective facts do not vary.

Whether or not we think this picture provides the truth about time, we can at least understand the conception. It makes sense, we can understand it—when we contemplate the world. Unfortunately, however, when we act within the corner of the world where we dwell, and especially when we plan to act, the picture seems impossible to reconcile with our forward-looking states of mind. The forming of conscious intentions for the future apparently demands

that the future be open in a way which the past is not. Without an objective passage of time, this distinction between future and past does not exist. What we normally take to be a precondition for conscious future-oriented action does not obtain. This is not a problem for thinking, but it is a problem for living. In acting to bring about a goal, we are engaged in something more than the mere contemplation of the future. Even if the future is as real as the present and the past (because there is no such thing as the passage of time), we must still act to bring about the future states which we desire. We must act. We must act in the immediate future. We must act now.

A little while ago I stated that we must respect our limitations as conscious beings who exist from moment to moment in time. That still seems to me the reasonable view. Whatever may be the truth about time as it really is, our conscious experience of time is at each moment bound to that moment. All the same, in a system of existence in which past, present, and future are equivalently real, there is something unsettling about the human practices of forming intentions for the future and working to achieve goals. People have to do these things. But if the future is fully real, the reason we have to do these things is that time as we experience it does not align with time as it actually is. The illusion of passage, if it be an illusion, infects not just our thinking but also our living. Intellectually we may be able to overcome it, but experientially it is irremediable. Imagine, then, that three things are true. Firstly, the present and the future are equally real. Secondly, we possess good reasons to believe this. Thirdly, we nonetheless are conscious only in the present and act only in the present as we endeavor to achieve goals in the future. On the assumption that all three of these are true, it seems likely that attitudes toward the future will change in character and become less intense. We might not have foreseen that anything as recondite as inquiry into the ultimate nature of time could impact the practices of daily living. But then again, there was never a guarantee that the normal course of daily living would of itself make sense, no matter how the facts of the world might turn out. In this case rethinking would be necessary. With a deeper understanding of the nature of time, human life will be different, because the assessments of life will be different.

As conscious beings we face these two alternatives for the nature of time. Which seems better? Would we choose that the processes of nature should be subject to an evanescent present reality, just as our consciousness seems to be? Or would we prefer that the differentiations of past, present, and future, being objectively unreal, are simply projected onto nature by consciousness? Of course, our preferences are irrelevant to the truth of the world. What is, is. Nonetheless, clarifying our preferences is a legitimate enterprise. The great advantage of time without passage is the one which Einstein discerned: good things now past to us are in themselves still existent. Against this there seem to be two disadvantages: ill things which we deem past have the same status as past good things; furthermore, we shall have to adjust our attitudes both toward the formation of future intentions and toward actions to implement them.

Understanding our preferences is important, but knowing the truth about reality is more important still. When we inquire after the truth about the passage of time, the answer is that at present we do not know. So we come at last to the uncertainty mentioned earlier.[17] In view of the complexities of the issue, such uncertainty is hardly surprising. If indeed we do not know, then quite obviously on this matter we cannot live in the light of the truth. Instead, our basis for

living has to include this uncertainty, and others too of course. As we have noticed more than once, human consciousness is always consciousness in the present moment. If time lacks what we normally deem its defining characteristic, then, looking from our vantage point in the present, we must rethink our relationships both to the past and to the future. Is this rethinking required? What is the truth about the passage of time? To live day by day while we wait for answers is somewhat awkward, but given the current frontier between knowledge and ignorance, that is what we shall do.

[1] Pierre Jacob, "Intentionality," *Stanford Encyclopedia of Philosophy* at <https://plato.stanford.edu/entries/intentionality/>. See also Roderick M. Chisholm, "Intentionality," in Paul Edwards, editor in chief, *The Encyclopedia of Philosophy* (New York: Macmillan Publishing Co., Inc. & The Free Press, 1967), volume 4, pages 201-204.

[2] *The End of Time* (Oxford: Oxford University Press, 1999), page 14.

[3] Donald C. Williams, "The Myth of Passage," *The Journal of Philosophy*, volume 48, number 15 (July 19, 1951), pages 457-472. Kurt Gödel, "A Remark about the Relationship between Relativity Theory and Idealistic Philosophy," in Paul Arthur Schilpp, editor, *Albert Einstein: Philosopher-Scientist* (La Salle, Illinois: Open Court, 1949), pages 557-562. Adolf Grünbaum, *Philosophical Problems of Space and Time*, 2nd edition (Dordrecht, Holland: D. Reidel Publishing Company, 1973), pages 209-210, 314-329. Grünbaum, *Modern Science and Zeno's Paradoxes* (Middletown, Connecticut: Wesleyan University Press, 1967), pages 7-27. J. J. C. Smart, *Between Science and Philosophy* (New York: Random House, 1968), pages 255-259. Smart, "Time," in Edwards, *Encyclopedia of Philosophy*, volume 8, pages 126-128. Huw Price, "The Flow of Time," in Craig Callender, editor, *The Oxford Handbook of Philosophy of Time* (Oxford: Oxford University Press, 2013), pages 276-277, 302-310. Paul Davies, "That Mysterious Flow," and Craig Callender, "Is Time an Illusion?" both in *A Matter of Time* (Scientific American special edition, Spring, 2012), pages 8-13 and 14-21 respectively. Steven Savitt, "Being and Becoming in Modern Physics," *Stanford Encyclopedia of Philosophy* at <https://plato.stanford.edu/entries/spacetime-bebecome/>. Joel L. Lebowitz, "Time's arrow and Boltzmann's entropy," *Scholarpedia* at <http://www.scholarpedia.org/article/Time%27s_arrow_and_Boltzmann %27s_entropy>. For a visual presentation, see Brian Greene, "The Illusion of Time," episode 2 of the PBS Nova series *The Fabric of the Cosmos* (available on DVD).

[4] J. B. Schneewind, "McTaggart, John McTaggart Ellis," in Edwards, *Encyclopedia of Philosophy*, volume 5, pages 229-231. Ned Markosian, "Time," *Stanford Encyclopedia of Philosophy* at <https://plato.stanford.edu/entries/time/>.

[5] Barbour, page 343.

[6] References for footnote: Dean Zimmerman, "Presentism and the Space-Time Manifold," and Barry Dainton, "Time, Passage, and Immediate Experience," both in Callender, *Oxford Handbook of Philosophy of Time*, pages 163-239 and 382-418 respectively.

[7] Note 3 above.

[8] In Mazagon, Spain. Proceedings published as J. J. Halliwell, J. Pérez-Mercader, and W. H. Zurek, editors, *The Physical Origins of Time Asymmetry* (Cambridge, U. K.: Cambridge University Press, 1994).

[9] Barbour, pages 337-338.

[10] "What Do Philosophers Believe?" Published in *Philosophical Studies*, 170 (November, 2014), pages 465-500. Also available at <https://philpapers.org/archive/BOUWDP>. [This online version is used for citations and references.] Data, results, and analysis at <https://philpapers.org/surveys>.

[11] Paul Horwich, *Asymmetries in Time* (Cambridge, Massachusetts: The MIT Press, 1987).

[12] Huw Price, *Time's Arrow and Archimedes' Point* (New York: Oxford University Press, 1996).

[13] Hermann Weyl, *Philosophy of Mathematics and Natural Science*, translated by Olaf Helmer (Princeton: Princeton University Press, 1949), page 116.

[14] Often quoted. This translation from the *Wikipedia* article, "Michele Besso" at <https://en.wikipedia.org/wiki/Michele_Besso>. Some of Einstein's additional reflections on the problem of the Now are reported in Rudolf Carnap, "Intellectual Autobiography," in Paul Arthur Schilpp, editor, *The Philosophy of Rudolf Carnap* (La Salle, Illinois: Open Court, 1963), pages 37-38.

[15] See the references to Smart's work cited in note 3 above.

[16] "Vale J. J. C. Smart," dated October 10, 2012, Monash University Web site, at <ht1010tp://www.monash.edu/news/articles/vale-j.-j.-c.-smart>.

[17] Page 2 above.