METAPHYSICS AND TIME

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Abstract. The leap from primitive to *scientific* time represented as the „time" in „relativity physics", or in „thermodynamics" or perhaps in „quantum physics" or even within „statistical mechanics" is large. Large also is the conceptual difference between these various understandings of the nature of time. How are we really to understand these physical perspectives on time: As knowledge about the real nature of time represented by the objective concepts: Or as epistemological-operational abstractions that cannot avoid elevating their results to the level of full-fledged reality, to ontology?

I. Introduction

Metaphysics and epistemology presuppose each other. Both of these philosophical disciplines are involved in the investigation of reality. Being involved also implicates both in the problems concerning the conceptual determination of the kind of status we are to ascribe to the various different properties and aspects we find intrinsic to reality, that is, to existence and ontology. Another important aspect of metaphysics is that metaphysics is involved at some level in every epistemological doctrine. Perhaps the most important way in which metaphysics is involved in epistemological doctrines, concerns the various metaphysical ideas and assumptions that *commit* investigators, in different ways, in their roles as researchers and scientists. Every epistemological doctrine assumes a certain specific world-view, a cosmology, and a stance either towards realism or idealism, positivism or rationalism, naturalism, objectivism or subjectivism. In short, every thinker is somewhat „biased" by ideas and notions, theories and paradigms that help shape and form what may be termed his or her „background of

conscious acts". And this is the case for the large variety of metaphysical theories concerning the issue I will be discussing, namely how to determine the „*nature*" of time.

II. About Epistemological Metaphysics and the Foundation of Time

The self-understanding of any epoch, including our present conceptions of science, is determined by metaphysical presuppositions.[1] The reaction each and every one of us may have to this statement should give us a hint about our own personal commitments. The answer one gives depends on how one views the role of metaphysics in relationship to science and to human spirituality, and how human spirituality and science are related. That is, how rational science and the spiritual yet temperamental human being can become united in the effort to disclose reality.

Metaphysics has often been criticized for being a dogmatic way of arguing for certain definitions of what „reality" is supposed to signify. Traditionally metaphysics has been identified with ontology, with the type of theory that defines „being" and as such is constitutive for ideas concerning reality. The critiques of metaphysics claim that instead of constructing theories about what reality *is*, we should investigate in a critical manner what possibilities there are for knowledge in the first place, that is, we should be concerned with epistemology. It is only relatively recently that metaphysics has again been looked upon as an approach which has importance for our understanding of how we construct knowledge. Now, it has become evident to most investigators in the field of knowledge that metaphysics presupposes epistemology while epistemology also presupposes metaphysics. Epistemology has to presuppose metaphysics as ontology because all awareness and experience, that is, human cognition, is directed towards „that which is", or „being in itself" or „being as it is perceived to be". Ontology is precisely concerned with „being" as well as with „becoming" and „passing away", or „not-being".

Epistemology must also presuppose metaphysics in the sense that we all have metaphysical „commitments" from which we seek guidance in our

[1] See Friedrich Rapp, „Metaphysical Systems and Scientific Theories: A Structural Comparison", in P. A. Bogaard & G. Treash (eds.), 1993, *Metaphysics as Foundation*, SUNY, p. 240.

attempts to decide upon whatever topic. These are „commitments" that we have to take with us everywhere we go; „commitments" that constitute our general outlook on the world. Thus, background elements are hard to get rid of since the very character that makes them such important aspects of our personal symbolic universe are precisely their „likeliness"; their claim to „truth"; their cultural „actuality" – whether it be scientific or otherwise. We could also call this concept of „background" our „life-world", „horizon", and „transcendental categories" – although these elements are not, in my opinion, innate but *cultural*. I prefer to term this „background"; since we are here talking of individual or *personal* „backgrounds" which influence one's choice of certain things. Others may share elements of this „background", but it is rather unlikely that someone else can share *all* the elements of an individual's „background". We need only to consider the complex nature of anyone's personal beliefs to agree upon this claim. *This „background" may therefore be an obstacle to rationality.* Background elements may involve an intrusion of ideal, or rather „theoretical" elements that are part of the subject's personal belief-system; elements that are seldom questioned themselves.

Husserl already emphasized this aspect with the term „life-world" in his *The Crisis of European Sciences...*[2] However, some of the commitments, perhaps most of them, are in many cases only influential in a *tacit* sense, as tacit knowledge, upon what we think and how we represent the world we have perceived.[3] Furthermore, it is a „background" which also has a practical purpose in that it serves as our personal source of information – information concerning the world *we* live in. In this sense, our „background" is understood as i.e. our memory, of utmost pragmatic importance to our comprehension of the world. However, we can easily distinguish between such elements of memory as originate in the practical perception and experience of the world, and those ideal elements which have become influential for quite other reasons.

I have already mentioned that this „background", as far as it is „metaphysical", is „cultural" rather than „innate". It is simply a product of learning. Thus, there are in relation to the characteristic complexity of the human mind *cognitive elements* of knowledge, like those of religious, political, and philosophical foundations, which together with various other beliefs,

[2] E. Husserl, 1970, *The Crisis of European Sciences and Transcendental Phenomenology*, Northwestern University Press, Evanston.

[3] See M. Polanyi, 1998, *Personal Knowledge*, Routledge.

ideas and concepts *constitute* this „background". Sir Francis Bacon already wrote that,

> Ideas of the Cavern are the Ideas of every Man in particular; we every one of us have our peculiar Den, which refracts and corrupts the Light of Nature, because of the differences of Impressions as they happen in a Mind prejudiced or prepossessed.[4]

The background that we possess will tint our judgments and other types of reflective work we might be doing.

Now, it happens to be the case that it is most probably the elements that are *products of learning* that are authoritative, and as such they are the dominating elements in the construction of experience. These learning-elements are authoritative because we believe them to be just that, because they are emphasized as *true*, *necessary* and *fundamental* for instance by an academic authority. As Kathryn Pyne Addelson has pointed out, we tend to believe that the methods of science are the most rational ones, and that when these are practiced properly they yield objective knowledge. There can be only one truth and science is the instrument we apply in obtaining this truth.[5] Scientists are specialists and specialists have therefore an epistemological or cognitive authority.[6] Furthermore, their *understanding* of matters within their sphere of expertise is often regarded as *knowledge*. We believe that the methods applied to reach this understanding are rational because we believe that they have been criticized and tested. Thomas Kuhn[7] focused on academic authority and metaphysical commitment as an irrational aspect clinging to scientific procedure. Kuhn focused on science as an activity but he also stresses that as an activity science includes not only theories and laws but also metaphysical commitments. Metaphysical commitments are therefore certain beliefs about „the nature of the living and the non-living things of our world and about their relations with us and with each other."[8]

In fact Kuhn has argued that metaphysical commitments, although they are irrational aspects of our background knowledge, cannot be omitted in any way – they are necessary elements in every construction of the per-

[4] Frances Bacon, *Novum Organum Scientarum*, Section II, Aphorism V.

[5] Addelson, K.P., 1983:165.

[6] Ibid.

[7] Kuhn, T., 1996, *The Structure of Scientific Revolutions*, The University of Chicago Press.

[8] Addelson, 1983:167.

ceived, also in scientific praxis.[9] We cannot simply conduct our science without the metaphysical commitments, according to Kuhn. Furthermore, metaphysical commitments concern the essence or nature of both living and non living entities in the world and also the assumed relations existing between these entities.[10]

Metaphysical commitments are part of the „background" information we have as individuals. This background information is highly influential with regard to *theoretical* considerations, for instance *reflective* decisions, *idealizations* and *abstractions*, which are again elements that depart in a clear and distinct way from the immediacy of conscious presentness. The fact is that when we sense directly the sensible things of the physical world we may say that we *sense* the *same* things more or less the *same* way. When we *perceive* a thing, the acts of differentiation and identification will be present and thus be influential in the reconstruction. This will happen according to what we already know about the thing, that is, „know" or „believe" or „assume" the thing to *be* from the generality of the framework/background which it falls into and by which we also identify it. Thus, among individuals, there have to be different opinions about concrete things, their functions, essences, natures, and so on, since these elements are already part of the individual's „background" which is applied in the thing/object identification and conceptual reconstruction. Therefore, all these different views cannot be correct; they cannot all be products of *cognition* and *rational* method. They must somehow have been „put into the frame" constituting what we refer to as „rationality", together with other relevant elements. In this sense, for instance, *ontological* „commitments" are *constitutive* in the construction of epistemological strategies to disclose what is assumed to be *real*.

This line of investigation carries within itself, for instance, the assumption that no human being in the world has a more favored position than any other, which would, if it were possible, enable him or her to be completely unbiased in the pursuit of knowledge. Therefore, I believe that the notion that *all* theories and *all* epistemologies must have *metaphysical* elements, or a „*forcing schemata*", is important. It is important because this hypothesis could help to clarify what aspect of the background material *aids* or *obstructs* the scientist or philosopher in their activities. The development

[9] T. Kuhn, 1996, *The Structure of Scientific Revolutions*, The University of Chicago Press.

[10] Addelson, K.P., „The Man of Professional Wisdom" in Harding, S., and Hintikka, M., eds., 1983, *Discovering Reality*, Dordrecht, Boston and London, p.167.

of a greater rationality in science would require a critique of metaphysical commitments.[11]

But we should perhaps state that we do not claim that the scientific effort to gain knowledge is relative, that there is no objective knowledge, and so on. I believe there is. We just have to change the perspective a little. Personal knowledge is not necessarily always a hindrance to objective knowledge; it does not render knowledge *relative*, it represents perspectives on the world, frameworks that may be useful instruments for gaining verifiable knowledge. *It is the unverifiable knowledge*; *the hypothesized and idealized elements constituting the intelligible binding material of various theories that can be questioned*. And, as I will be arguing, the assumed *ideal* symmetric or reversible nature of time is precisely such an element.

Knowledge, on the other hand, is not relative if we stick to the structures of the concrete and empirical, that is, to those structures and features of the world we can intersubjectively agree about from an empirical (experiential) point of view. These are the elements that are necessary for us in order to construct intelligible and intersubjective concepts of the real.

Thus, we can see that the aspect, which is mostly concerned about knowledge, is how we are able to define a borderline between what is genuinely human („subjective") and what is evidently and genuinely independent of human nature. The real problem of knowledge is how to decide what separates the human mind and (experienced?) nature from the theoretical „nature" science is interested in. This would be a „nature" that has no correspondence with human concepts. This is a „nature" that is independent of man and thus has a reality which is „in itself" and therefore cannot be approached by man with his normal cognition capabilities. The decision as to which elements of our „background" shall be allowed to dominate the scene has to do with a distinction between speculative elements, that is, between an abstracted „perspective" *and* the common and concrete perspective of experience. Relativity is avoided if one is able to maintain an experience of what connects the concrete with the abstract.

Hence, we cannot avoid the fact that there are rational as well as irrational elements in the production of theories, that is, of *theoretical* knowledge.[12] Scientific and philosophical theories must therefore be defined as

[11] Addelson, 1983:168.

[12] A theory – even if it is scientific, does not necessarily signify the same as knowledge. However, we can distinguish between several forms of knowledge; „concrete knowledge", „practical knowledge" or „theoretical knowledge". This is to say; *theoretical* knowledge is a kind of knowledge that is dependent upon its specified theoretical context framework,

being either *realistic* or *idealistic/anti-realistic* theories. The theories will define and specify certain ways of conducting the „rational procedure" or „method". These metaphysical positions both believe that they posses the *correct* and only method that will grant them access to the kind of reality of interest for their branch of science. Realism or idealism constitutes a preferred framework for the actual thinker. These positions, which are part of the metaphysical „background", have to include assumptions about *human* nature. Assumptions about cognition and estimations about the epistemological *value* of perception and experience are especially important factors of this „background". Idealized elements constitutive of specific theoretical frameworks lurking on the „horizon" will be applied categorically when judgments and decisions are made.

My focus is on the peculiar „gulf" between concrete experienced reality and the abstracted or idealized aspects which are present as elements in memory and experience. My own rather trivial opinion is that the more *abstract* our theories are the more they will differ in nature from concretely experienced reality. In other words, abstract theory will suffer as a consequence of suspicions which are caused by the theory's obvious lack of a relationship to the concretely real. To be more specific: for *time* this means that when our opinions about the *nature of time* differ from each other it is because we try to explain time in terms of abstractions. This also indicates that we apply different explanatory models which force us to conform to a specific technical terminology already implying a certain specific style of „rational" procedure, that is to say, „forcing" us to accept certain inherent meanings that are hidden in the presuppositions of the theory. This perspective emphasizes the influence of theory on our „background".

On the other hand, differences in opinion that appear both in the philosophy of time and in the philosophy of physics have to do with differences, not in *how* and *what* we factually experience when we experience *time*, but in the „background" or metaphysics, which for the most part arises from existing theories. This „background" must then be viewed as part of the personal knowledge which the individual carries with him/her into the overall explanation of things. In a sense we could perhaps say that the more abstractly

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perhaps more than any other kind of knowledge. All these types of knowledge are typified by the area or object they represent. What typifies this knowledge as „theoretical" is that it is about *types* and not about things. On the other hand, we have the concrete „object" presence in „concrete knowledge". Although this concrete kind of knowledge is *general*, it is „concrete" because it has contained the conceptual linkage to the concrete object that this kind of knowledge is said to represent.

metaphysical[13] a theory about time gets, the more *personal* it probably is, that is, with respect to the specific background elements implemented by the theorist. This seem less rational from an empirical point of view, that is, when and where the empirical content, together with its structure and order is denied any relevance to the overall explanation. But it may still be rational in the sense that the abstract theory conforms to scientific norms, to a pre-given rational framework and to a set of specified rules. This also means that it is rational because it may apply a certain accepted form of methodology, that is, that it conforms to certain forms of logical *discourse*. Since epistemology cannot avoid talking about „being" or „reality" in some sense, it should deal with these metaphysical issues. The issue of what the nature of the relationship is between concrete, lived time and scientific, abstract time has not been thoroughly analyzed before.

It is this idea of an epistemological metaphysics that I intend to apply as a framework to understand a few different scientific and philosophical views, which are meant to give us an account about the real *nature* of time. In my treatment of the possible nature of time the investigation is concentrated around the contrast between experienced temporality and scientific, objective time. Thus, we have to explain the term „foundations".

The term foundation in relation to the idea of time indicates an approach that deals with time as a most basic idea, which is somehow presupposed or should be presupposed in other parts of the culture. It treats time as an idea, which is fundamental, because it is a pervasive idea.

To examine the foundations of time in this manner is simply metaphysics. As it has been pointed out, the method is to highlight presuppositions and assumptions, commitments and experiences in order to differentiate between the real properties of time and what can be termed „purposive" alterations of what we commonly know time to be. This means that we are either looking at ideas or concepts which have their origin in the experiencing and cognizing individual subject itself, or which have *become* part of this cognizing individual's horizon and yet at the same time do not have their origin in the individual's own cognitions of the real world. This last aspect is twofold, since one strand is about the „injection" of time from theoretical learning, while the other is about a time which is part of nature proper. The last point may indicate a relationship between concepts about time, which have their origin in the individual's experiencing and cognizing

[13] Which means that its idealized (abstracted) elements are far removed from the concrete elements of experience.

of the world. „Foundations", therefore, means that we shall discuss some of the arguments that are *connecting* or *disconnecting* to the „experience of time" and the „theoretically and idealized approaches to time" with science and reason. Thus, we cannot avoid investigating the inextricable relation between time and the concepts of subjectivity and objectivity. And so we should take a stand in the debate between realism and idealism.

All experience can be characterized as made up of a subject on the one hand, which is confronted by and aware of something, and on the other hand, something opposite it as an object. In this sense, we must define our awareness as a relation between subject and object. Where metaphysics and epistemology intersect we see that the problem of subject and object becomes extremely difficult. If, as realism claims, subject and object exist independently of each other and both are „in-themselves", how can we then establish a relation between subjectivity and objectivity, which discloses the objects, as they are „in-themselves" without tainting the essence disclosed with subjective aspects? Concerning time as an object for science we have, of course, the initial problem of deciding the issue of how to determine the nature of the object when the object is time. This makes us ask how time becomes an „object" in the first place. It is the task of epistemological metaphysics, within the framework of general metaphysics, to analyze and discuss this problem.

Thus, there are basically two main types of approaches to the problems of science, and hence to time in particular, namely that of „realism" and that of „anti-realism/idealism". Realism understands the object, the independent object, as the first and most important issue in relation to the experiencing subject. Idealism, on the other hand, sees the subject as the most important and primary one since it is the subject, who establishes the relation to the object in the first place, irrespective of the fact that the „object" has to „be there" in order to be perceived by someone. The task of the idealist is to show how the subject can objectify the content of subjective awareness and experience. This appears to be contrary to realism, which endeavors to explain objects in terms of movement, energy, force and matter. Or time as symmetry of processes expressed by the fundamental laws of physics. This has left us with a confusingly large amount of time-concepts, concepts that originate together with the characteristic features of physical thinking. Thus we have absolute time in two senses: a) *Newtonian time*, and b) *non-relativistic time*; we have furthermore *special relativistic time* and *general relativistic time*; but also *relational time* as well as *constitutive time*, being logical opposites. And there are more ideas about time, which we shall not

go into here, restricting ourselves only to a couple of general but stubborn ideas that are of special interest, since they keep to the notion of time having a „nature" of its own. That is, a nature which is absolutely independent of human cognition. One of the problems that realism is faced with is to explain how a world of objects, like „objective time", in one or other of the meanings just mentioned, can produce *subjective*, *conscious awareness of time* when it is independent of human perception and thus unreachable by ordinary human experience.

The above situation can be described by asking how we conceive of the nature that we ascribe to the „objectivity" of time. When we say that time is real we are stating some kind of reality for time that is dependent upon some specific kind of nature. When we say that „time is real", everything hinges on what is meant by „real", on how *we* relate to this „reality" and to this kind of „time", and ultimately, how we relate „real" and „time" so that its objective nature becomes evident and unambiguous for everyone to understand.[14]

III. Reality and Time

The relationship between *time* and *reality*, and how time and reality are related to human temporal *experience*, and furthermore, how human temporal experience is related to temporal abstractions, here termed *physical* or *scientific* time, is the theme of this dissertation. It is a complex of ideas related to the interpretation and understanding of reality through the understanding of the reality of time that can only be analyzed by understanding the relationship, or lack of such a relationship, between human temporal experience and abstract scientific time. Time is „becoming" and „being", it cannot be reduced to a definition that sees in time the characteristics of only one of the concepts. The reason for this claim is very simple, too simple perhaps, but it rests on the fact that we deal with reality, which can be characterized as both changing, as flux, but also as „permanence". We deal with these factors in our everyday life; we deal with the reality of time, a reality that is contradictory from a logical point of view, in an unproblematic and simple way everyday of our lives. It is simple in the sense that we do not pay any

[14] See my paper „Some Neglected Aspects in Connection with the Objectification of Time", in V. F. Hendricks & J. Ryberg (eds.), 2001, *Readings in Philosophy & Science Studies*, Vol. I, Roskilde University.

attention to the logical contradictions by the way we normally go about in the concrete world; by solving concrete and practical problems. It is, on the other hand, not as simple as experienced reality since the experience of time involves us on a personal level and makes us very aware of our own mortality. On the abstract level it is difficult to unify the differences implicit in the concepts of „becoming" and „being". However, attempts to reconcile important aspects of temporal reality as it is found empirically in the world have begun to take shape as „temporal logic" in recent years.[15] Although the abstractness of theoretical time is our business temporal logic is not. Our everyday or simple non-logical adaptation to both the transitiveness and permanence of the world is found in experience. But it is also found in the logical way we apply language to describe, in communicable terms, our experiences to others, by using both tenses and references to tenseless „facts". We can move around easily with both categories, placing the event within the scope of experienceable reality as something which becomes or changes and as something which *is* in relation to something else and which makes sense to others as an intersubjective reference point both in time and place. In this sense time is a fundamental reality.

Another fundamental concept we cannot avoid using, whether it is as a common-sense concept or as a scientific term, is the concept and/or intuition of „reality". Most people assume that the world we live in is real. We have a fundamental certainty about what is real and what is not and why these things are real and why they are not. However, the more theoretical our reality gets, the less simple it seems. Everyone regardless of metaphysical position must presuppose some sense of „reality". Since we all share the notion of something that is real, and since we have differences in our metaphysical view, we have irreconcilable and ultimate differences in our ideas about what reality is. We can see the divergence in the different views about time. Time and reality are inextricably (in every sense of the word) linked together; eliminate time from reality and we cannot imagine what reality would be like. If we removed reality from time we would be left with appearances that we would have to know were mere beliefs or fantasies about reality. What we sense and experience would only appear to be properties of reality.

[15] I am thinking of the studies within the field called „temporal logic", begun by A. N. Prior and taken further by Peter Øhrstrøm. For an excellent introduction see: Peter Øhrstrøm & Per F. V. Hasle, 1995, *Temporal Logic: From Ancient Ideas to Artificial Intelligence*, Kluwer Academic Publishers.

No one denies that time is „real" phenomenally speaking. When it is stated that time is *not* real it may be the same as stating that time is an illusion, or it does not have to mean that at all. We could still have grounds for believing that we perceive and experience things as if they were in time. The serious consequence of denying the *reality* of time, of time *experience*, is that our way of experiencing things is denied any *ultimate* significance. To many theorists, it is self-evident that we exist in a reality where time is appearance. Others again see reality as part of the texture of wholeness, that is, which includes appearance among those phenomena of the world defined as real, and hence includes time, although in a rather inferior position. Still others reject the reality of time altogether because time, that is, a time conforming to the characteristics of experience, does not conform to the premises put down by pure thinking, premises which are beyond questioning. The answer to the question of the ultimate significance of time, which is beyond the reach of experience, is by this very fact beyond the reach of human cognition. Perhaps, the answers we actually come up with are only provisional; perhaps they cannot be anything else since these answers would then depend upon our partiality to certain commitments.

There are, however, ways to *understand* the issue of the *real nature of time*. It is quite often held that time is inexplicable. Time is thought to be inexplicable *because we cannot separate* it from our experience. Furthermore, it is believed that time cannot be explained because there are certain problems or difficulties that are peculiar to time. First, we see that time is seen as something that we necessarily have to deal with because we experience it and cannot part with the experience. Thus, time seems fundamental, although we cannot be sure how it *is* independently of our experience. One assumes that our view on time is necessary but partial and subjective. All experience is temporally structured. The other sense mentioned assumes that there is something irrational about time. That time can be divided between human temporal experience and that it is independently in-itself of human participation. There is a division between human beings and time. This is, in my opinion, an undesirable claim since, evidently, *we are in time*.

The time of mind that constitutes our awareness of presence *now* is fundamental to our experience. It is so fundamental that it cannot be separated from any kind of experience. This must put some restrictions on what we can claim to be part and property of the nature of time. That is, our analysis must, at least from the perspective of the realist, remain incomplete. The incompleteness of the description of nature of time tends, however, to be more on the side of the realistically inclined theorist, who tends to exclude

temporal experience altogether, than on the side where the temporal experience is found to be fundamental. This is so, since we may project our private cognitive limitations on time when we perceive time in the way we do. On the other hand, we have to keep in mind the opposite danger of separating time in an absolute sense from experience so that we give „real" time an independent and thus alien mode, different than the one we perceive. Metaphysical theories about the nature of time, and this should include epistemological and physical treatments of time that claim something about the nature of time, must, however, risk this danger. We have to admit that it is not illegitimate to consider the nature of time as something „abstract". The abstraction enters every level no matter how one chooses to describe or explain the nature of time. Even in our everyday talk, which must refer to primitive, experienceable temporality, we have to apply idealizations and abstractions to a certain degree. When we refer to „now" or „yesterday" or „tomorrow" or „before" or „after", we are abstracting and applying the abstractions in our description of things and situations by creating a comprehensible, i.e. intersubjective, order in our communication. This shows us how we objectify or abstract and when and how we actually go too far with our abstractions claiming a „nature" for time that can never be verified empirically. In my opinion, it is important to avoid going too far.

It is the exaggerated philosophical valuation of abstractions that motivates me to focus on temporality as an integral property of reality, that is, of *nature*. Perhaps it is more correct to say that it is the time of nature, which is integrated in the minds of men. The confusion is precisely that the ontological, i.e. the actual, real-world issues and the epistemological issues, i.e. assumptions and hypotheses, are hard to distinguish.

Even if temporal realism rejects the ultimate significance of time from the perspective of temporal experience it nevertheless should, and this I believe to be one of the great weaknesses of realism, accept that *time is experienced* and as such time is *empirically* real. The consequence of all realist accounts about the nature of *scientific* time, hypothesized to play the role of the *real* nature of time, is that it consequently refuses to take experienced time as something *given* in experience. Instead of beginning with the simple everyday experience of temporal ordering it is usually completely ignored. The theorist pulls it out of the hat when it is necessary to legitimize his abstractions by referring to the experience of time as inadequate and/or illusory, that time is contradictory if we compare experience and abstraction. Only a very simple view of time can be satisfactory. To begin with abstract consistency and then to bring this abstract consistency to bear upon the issue

of the nature of time is doomed to fail because it is to begin with the wrong end. We must accept the fact of experienced temporality.

It is, however, true that we can freely explain away temporal aspects and characteristics as being nothing but „mere" appearances, definitely not *real*, not properties of reality. As I see it, the problem seems to be the question about the ultimate significance of time; that it is difficult to determine from attempts which are focused on the characterization of experienced temporality as *not* real. Or by reducing the experience since it cannot be believed to be nothing else but a flickering of a time that is much more fundamental. This is problematic because we cannot escape the temporal perspective and claims are made for properties of real time in its *independent* „state of existence". Therefore, it is my view that no attempt has actually succeeded in eliminating or reducing empirical time.

IV. Metaphysical and Scientific Foundations of Time

All theoretical *use* of time in one form or the other must presuppose primitive time. The foundational aspect of scientific time is therefore experienced temporality. My reason for illustrating the procedure of objectifying by beginning with the concrete and proceeding to the abstract is that we can, from an epistemological point of view, save a *real* basis for our accounts of reality. Furthermore, our awareness *of* time must *presuppose* time such as it is, and that we have *access* to this time. Somehow, real time must, time as it really is, be foundational for the human awareness of time as our awareness of time is foundational for the scientific and philosophical idealizations and abstractions. Abstractions and idealizations are secondary to experience in that they are applied to help separate out and thus individualize certain pre-conceived aspects of particular value for the kind of knowledge craved by theorists.

We must understand that the human awareness of time is something that evolves and which is a product of the interaction between subject and nature[16]. That is, temporality is a product that evolves and emerges together with the evolution of subjectivity. This evolution goes hand in hand with a conceptual evolution crossing over into different cultures both historically

[16] I refer to this „adaptive" ability and to the „organic" origin of temporality as a phenomenon, which has to do with flux or becoming and which is an experienceable phenomenon.

and intellectually, and thus slowly giving „time", as we today understands it to be, a significance of being intrinsic to physical and organic existence. The activity of the human subject is of vital importance. And in the end it must be emphasized that commitments and other metaphysical „beliefs" must be put aside in order to realize that the foundation of concrete time in experience, and ultimately in science, is a necessary product of the active subject in its interactive discourse with nature. My notion of subjectivity refers to that internal subjectivity which activates every subject as an agent in the pursuit of *knowledge*, that is, „know-how" of the world.

Conclusion

The leap from primitive to *scientific* time represented as the „time" in „relativity physics", or in „thermodynamics" or perhaps in „quantum physics" or even within „statistical mechanics" is large. Large also is the conceptual difference between these various understandings of the nature of time. How are we really to understand these physical perspectives on time: As knowledge about the real nature of time represented by the objective concepts: Or as epistemological-operational abstractions that cannot avoid elevating their results to the level of full-fledged reality, to ontology? Abstract concepts appear in physics as transformations of *idealized aspects*, which may or may not have their roots in the concrete experience of things. This indicates that these abstract concepts can only exist in the intelligible and ideal realm of theoretical reason. Abstract time, in the way physics applies it, is a transformation of experience in relation to other ideas; ideas that can be related to each other in specific ways; ways that are dependant on the peculiarities of the theoretical context. Physics aims at explaining time in a way in which it is certain that time eventually will fit into the pre-established epistemological explanatory scheme. This means that, in regard to time, physics aims at making time part of its general methodology. Physical time is abstract time in the sense that its purpose in the scheme of things is to be concerned solely with specific types of relations which can be found only within physical theory. This is not to imply, however, that physical-*theoretical* time necessarily shall be identical to the mental time. Primitive time is altered, or conceptually transformed in such peculiar ways precisely because physical time must have a different purpose in the scheme of describing *physical* things or processes. The objectification of time, that is, the idealization of certain aspects as well as the elimination of others, of

what we otherwise know to be time, cannot give us a theory of what real time is *really* about.

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