

THE MISSING NOW*

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Introduction

Mc Taggart's proof that time is unreal has been almost unanimously criticized, first of all because several steps of the reasoning have been denounced as fallacies, but also because the conclusion it reaches is both hard to believe, and difficult to understand due to a loose use of the concept of reality. In spite of these criticisms, Mc Taggart's argument remains, at least among English speaking philosophers, a paradigm organizing the set of questions which constitute the problem of time.

This surprising situation can be explained by the fact that the criticisms did not succeed in challenging many subtle aspects of Mc Taggart's thought on time, which thus keep their power of fascination on the investigators (1).

Most criticisms bear in fact on a simplified version of Mc Taggart's argument which may be sketched as follows:

- (i) Time involves change.
- (ii) Change opens the possibility of ascribing incompatible tensed predicates to one event.
- (iii) The previous contradiction cannot be removed, since any attempt at such removal generates further steps in an infinite regress of ascription of higher-order incompatible tensed predicates.
- (iv) Therefore, time is unreal.

This version of the argument does not contain some of the most important, however often implicit, features of the original statements.

In particular, it relies on the idea according to which temporal assignment taking a tensed form (past, present, future or P,N,F) are mere one-place predicates ascribed to an event. Even though Mc Taggart did not rule out this possibility, and used it quite often in his reasoning, he asserted that P,N,F are ultimately to be considered as relations (2). But a relation is a two-place predicate, and the event only occupies one of its places. Which kind of entity could then occupy the second place in such a relation? Mc Taggart's answer is so strange that it was usually (with a few exceptions which I shall discuss, mainly in footnotes), not even considered. We shall study

this answer at length later, and show that it brings out the concept of an entity which both plays a role in temporal relations, and cannot be referred to: the 'missing now'. The analysis of this entity, which is the main theme of the present paper, will lead us to a renewed account of the metaphor of time-flow. The involvement of the 'missing now' in many self-referential situations will appear to be the key point enabling one to go beyond the traditional opposition between a 'static' and a 'kinematic' view of time.

The present study is entirely organized as a comment of the following sentence "All the three (present, past and future) are predicable of each event (...)" (3). This sentence contains two pieces of information: the first one is the implicit assumption that past, present and future can be considered (at least for the sake of simplification) as predicates of events. The second one is the explicit assertion that all three incompatible determinations are to be predicated of one and the same event. These two claims will be analyzed successively.

1) Temporal predication of events

a) Levels of predication

The introductory point we shall examine is the subtle distinction that ordinary language maintains between temporal predicates: (is) present, past or future) on the one hand, and temporal copulas (has been, is, or will be) on the other hand. This distinction was explicitly dropped in Mc Taggart's early paper on time, by the following sentence: "(...) 'has been' is only distinguished from 'is' by being existence in the past and not in the present, and 'will be' is only distinguished from both by being existence in the future". (4) The importance of the distinction was however emphasized by Broad (5), and Prior (6). The latter argued that it is the systematic reduction of time copulas to time predicates "(...) which generates each of the moves that leads us to a contradiction." (7) The importance of the above-mentioned distinction may be appreciated through careful analysis of the meaning of two simple sentences:

(a) The event e is past

(b) The event e has been present

If we reduce the time-copulas to time predicates, (a) and (b) become:

(a₁) e is past, or Pe

(a₂) e is present in the past, or PNe

(P standing for 'past' and N for 'present' or 'now')

The reduction can be carried on a step further by acknowledging that "(...) the presentness of an event is just the event." (8). 'e' and 'e is present' are then equivalent. This equivalence may be displayed in sentences (a) and (b) by dropping the predicate N:

(a_2, b_2) e is past or Pe
 Pe is the usual notation for both (a) and (b), since in Prior's system (9) the predicate N is not used.

At this stage, any difference between the two sentences under consideration is lost. This difference is how ever far from purely formal. Rather, the possibility of complex tenses (such as past perfect and future perfect) relies on it. According to Reichenbach (10) one needs, when dealing with complex tensed sentences, to consider both the time of utterance and the time from which the event spoken of is directly referred to; the latter being called 'point of reference'. More generally (11), one can account for any tense of higher order than past perfect and future perfect through a hierarchy of points of reference, of which the time of utterance is a particular instance. The construction of the said hierarchy may be carried out in the following way. The time from which the event e spoken of is directly referred to is called the first-level point of Reference $R_{(1)}$. The time from which $R_{(1)}$'s view of e is referred to, is the second-level point of reference $R_{(2)}$. The time of utterance is then the last-level point of reference $R_{(n)}$. A difference between Prior's account and the present one is that we proposed to reverse the hierarchy of points of reference. Prior indeed considers the time of utterance as the first-level point of reference, whereas the time from which e is directly referred to is the last-level point of reference. Our choice is justified by the fact that $R_{(1)}$ can easily be specified from simple internal analysis of the complex-tensed sentence under consideration, and is thus a convenient departure point for building the hierarchy of points of references. By contrast, the 'time of utterance' can only be defined through a meta-reference to the sentence. Indeed, each point of reference can a priori be associated with an utterance, just in the same way as the point we called 'time of utterance'. What actually distinguishes the 'time of utterance' from other points of reference is the fact that it is the time of utterance of the complete sentence itself.

Now, let us come back to sentences (a) and (b). In (a), the only point of reference is the 'time of utterance' itself. The event e is indeed directly referred to from the time of utterance by being ascribed the characteristic 'past'. (b) on the other hand has two points of reference. From the first one, $R_{(1)}$, e is ascribed the characteristic 'present', whereas from the second one $R_{(2)}$ which is the time of utterance, $R_{(1)}$'s view of e is located in the past.

The symbolic writing of any tensed sentence could at least implicitly display the hierarchy of points of reference on which it is built, by proper introduction of quotation marks. For instance, (a1) would remain Pe , while

(b1) would become P'Ne', to bring about the fact that in (b), e is not referred to directly from the time of utterance, but through a point of reference from which it is present. Allowing 'Ne' to be equivalent to 'e' no more leads to the disappearance of any difference between (a1) and (b1). Indeed, the latter sentences transform into:

(a'2) Pe (b'2) P'e'

The meta-description which includes the time of utterance into the hierarchy of points of reference can also be denoted by further addition of quotation marks enclosing the previous tensed sentences:

(a'3) N'Pe' or 'Pe' (b'3) N'P'e" or 'P'e"

McTaggart did not ignore completely the distinction expressed by the quotation marks in (a2) and (b2), even though he did not bring out its ultimate consequences. The concept of point of reference was in fact partly introduced in his 1927 treatise, where it bears the name 'moment': "When we say that X has been Y, we are asserting X to be Y at a moment of past time." (12)

Dropping the distinction, in simplified versions of Mc Taggart's reasoning, was denounced by Lowe (13) and by McBeath (14) as an "indexical fallacy". Indeed, each proposition in which a first-order time predicate is attributed to an event is meaningful only with respect to a 'now' (the indexical term) from which it can be said to be true or false. Accordingly, a proposition containing an n-th order time predicate is meaningful only with respect to the n points of reference from which each of the n constituent first order predicates can be said to be true or false.

b) Relations and the 'actual now'

An important shift of the notion of time-predication has been realized if a time predicate is no more a one-place predicate of events but rather a two-place predicate relating the two components of the couple: (Point of reference, event). It is easy to display this shift by rewriting Pe and Fe in the metasentences 'Pe' and 'Fe', as follows: $\exists R_{(a)} [P(R_{(a)}, e)]$ and $\exists R_{(b)} [F(R_{(b)}, e)]$

Or: 'There exists a point of reference $R_{(a)}$ with respect to which e is past', and 'there exists a point of reference $R_{(b)}$ with respect to which e is future'.

The quotation marks in the first writing aimed at indicating the existence of a meta-level from which the simple tensed sentence is referred to, thus introducing implicitly intermediate points of reference. In the relational writing, these points of reference are directly displayed. The only point to clarify concerns the nature of $R_{(a)}$ and $R_{(b)}$. $R_{(a)}$ and $R_{(b)}$ are abstract entities called 'points of reference' and thus they are not events by themselves. But they may easily be defined as being simultaneous with some reference events e_a and e_b (for instance the utter-

ance of the sentences 'e is past' and 'e is future'), in such a way that 'e is past with respect to $R(a)$ ' is equivalent to 'e is earlier than e' and 'e is future with respect to $R(b)$ ' is equivalent to 'e is later than e_b '.

A major difficulty arises if one tries to express in a relational way the same sentences P_e and F_e , when they are not part of any meta-sentence wherein both the sentence and its last-order point of reference are referred to.

A first way to solve the problem is to deny its very existence. This denial was first formulated by J.J.C. Smart (15) through his token-reflexive analysis of simple tensed sentences. For him, every tensed sentence bearing on an event e reduces to a B-relation (simultaneity, earlier or later) between the event e and the utterance of the sentence. But, as we know, the simple fact that one speaks of the utterance of a sentence involves a meta-sentence in which the sentence is referred to. This, alone, violates our preliminary requirement. One could argue at this point that the case of a tensed sentence which is not embedded in a meta-sentence is after all very artificial, and that all practical uses of tensed sentences involve a meta-statement of simultaneity. But this meta-statement must, strangely, remain implicit: saying explicitly that an event e is simultaneous with 'this utterance' is not equivalent at all to saying that e is taking place now, nor is saying explicitly that e is earlier or later than 'this utterance' equivalent to saying that e is past or future (with respect to now). For now should rather be defined by pointing at the meta-sentence which is being uttered, rather than at the past sentence which this meta-sentence refers to. But the new definition in turn implies a meta-meta-sentence, etc. The relevant point to notice here is that the token-reflexive definition of 'now', however able to encompass the practical a posteriori content of the word, fails to grasp the singularity of the concept of an 'actual now'. A now which cannot be referred to without becoming part of the field of description of 'another' now which then holds its role. The reason why this 'actual now' is so rarely considered is probably right the fact it cannot even be made objective without evacuating from it most of its original meaning. One can however find in Sartre (16) a very striking expression of the lack of any possibility of objectivizing 'the actual now' (called by him 'present') as opposed to a referred to 'now' (which he calls 'present instant'): '(...)the present is not. The present instant emanates from a realistic and reifying conception of the for-itself'.

A diametrically opposite approach to the difficulty of finding a relational expression of tensed sentences which are not part of any meta-sentence referring to their

last-order point of reference, consists of acknowledging that it cannot even be overcome. Some authors indeed hold that there exist situations wherein ascription of tensed predicates is irreducible to any relational account (17). This position is fully coherent in so far as it at least recognizes the nature of the difficulty. But on the other hand it remains incomplete. First of all, by maintaining a distinction between two classes of tensed sentences (those which are reducible and those which are irreducible to a relational expression), it renounces to conceive an unified view. Moreover, it evacuates the concept of the 'actual now', just as completely as the token-reflexive analysis does.

A third way of dealing with the above-mentioned difficulty was suggested (but not further developed) by Mc Taggart himself: 'If (...) anything is to be rightly called past present or future, it must be because it is in relation to something else. And this something else to which it is in relation must be something outside the time-series' (18). One can interpret this odd reference to 'something outside the time series' as follows: when tensed sentences such as P_e and F_e are not embedded in some meta-sentence in which their last-order point of reference is referred to, their relational content can but be expressed by saying that e is past or future with respect with the 'actual now'. But, as a result of our discussion of the token-reflexive analysis, we know that these tensed sentences are not equivalent to an explicit statement according to which e is simultaneous to, earlier than or later than a given event belonging to the time-series. If one can speak of an 'actual now' with respect to which e is said to be past or future, it does not belong to the time-series. Claiming further that it is outside the time-series appears to be a metaphorical expression for its being absent from the time-series. Such a metaphor could however be misleading if it suggests the existence of an 'outside' where the 'actual now' can be located. The 'actual now' has in fact no other property than being the abstract 'that with respect to which' an event is past or future, when the ascription of pastness or futurity does not refer to a point of reference belonging to the time-series. In a relational denotation of tensed sentences which are not part of any meta-sentence, it must then hold the place of a point of reference, without being specified as such. We shall denote it by a blank. When P_e and F_e are not part of a meta-sentence, we may thus rewrite them:
 $P(\quad , e)$ and $F(\quad , e)$

It is noteworthy that the previous form taken by tensed sentences provides us with an unified scheme for the study of both Mc Taggart's B-series and A-series. Indeed, on the one hand, the relation P and F in $P(R_{(a)}, e)$

and $F(R_{(b)}, e)$ are respectively isomorphic with the B-relations 'earlier than' and 'later than' in: 'e is earlier than $R_{(a)}$ ' and 'e is later than $R_{(b)}$ ', account being taken of the fact that points of reference are defined by their simultaneity with some event of the time series. On the other hand, we have mentioned the impossibility to refer to an event which be simultaneous with the 'actual now' in the relations $P(, e)$ and $F(, e)$ of which it is a member. This impossibility renders the latter relations isomorphic to the one-place predicates P and F of the A-series.

The weakening in modern thought of the notion of an A-series, and especially of its origin which is to be found in the extra-temporal entity we called the 'actual now', coincides with the historical loss of any possibility of understanding the views many ancient authors held about time. For instance, as Hintikka pointed out: '(...)Aristotle saw no difficulty in combining the two assumption which to a modern thinker are likely to seem incompatible, viz the assumption that the truth value of a temporally indefinite sentence changes with time, and the assumption that the sentence may nevertheless express one and the same content' (19). For these modern thinkers, indeed, the content of a sentence referring to 'now' depends on the utterance with which 'now' is supposed to coincide. This results from an exclusively external and objective account of 'now'. On the contrary, Aristotle retained the experienced immutable aspects of the 'actual now' as one of the meanings of 'now'.

We must show at this point how the relational account of the tensed terms Past and Future allows one to deal easily with the writing of any complex tensed sentence which is not part of any meta-sentence, at least if a strict one-one correspondance between the points of reference and the events to which they are simultaneous is maintained. In the latter case, the two-place predicates P and F can relate a point of reference to another as well as they do for a couple (point of reference, event). A n-th level complex tensed sentence then takes the form:

$$\exists R_{(i)} (i=1, \dots, n-1) [U^n(, R_{(n-1)}) \wedge U^{n-1}(R_{(n-1)}, R_{(n-2)}) \wedge \dots \wedge U^2(R_{(2)}, R_{(1)}) \wedge U^1(R_{(1)}, e)]$$

Where $R_{(i)}$ are the points of reference, \wedge stands for the logical conjunction 'and', and U^i is either F or P.

For instance, the second-level sentence P'Fe' writes:

$$\exists R_{(a)} [P(, R_{(a)}) \wedge F(R_{(a)}, e)]$$

If an n-th level tensed sentence is part of a meta-tensed sentence referring to its ultimate point of reference, the blank in the relation U^n can be replaced by $R_{(n)}$.

For instance, 'P'Fe' in 'P'Fe" writes:

$$\exists R_{(a)} R_{(b)} [P(R_{(b)}, R_{(a)}) \wedge F(R_{(a)}, e)]$$

While the complete sentence 'P'Fe" writes:

$$\exists R_{(a)} R_{(b)} [N(, R_{(b)}) \wedge P(R_{(b)}, R_{(a)}) \wedge F(R_{(a)}, e)]$$

A similar structure was built by Schlesinger (20), who used the numerical concept of instant t. This structure allowed the author to give a formal account of A-statements. For instance, 'e is at present' is considered as equivalent to: $\exists t [(e \text{ is at } t) \text{ and } (t \text{ is at present})]$

Several differences between the conception presented in this paper and Schlesinger's can however be seen:

(i) The explicitation of the missing 'actual now' by a blank in the expressions just written is a central theme in this work, whereas it is ignored by Schlesinger. This difference will prove crucial in the following.

(ii) The sentence Schlesinger used as an instance: 'e is at present' is, according to the present analysis, partly ambiguous. We would indeed carefully distinguish between the simple 'e is present': e or Ne or N(, e), which is not equivalent to Schlesinger's expression, and the compound 'e is now present' or 'e is present at present' which writes 'e' or N'Ne' or: $\exists R_{(1)} [N(, R_{(1)}) \wedge N(R_{(1)}, e)]$

which is equivalent to Schlesinger's formal account.

(iii) We don't consider that the isomorphism between time and the set of real numbers should have logical precedence over the tensed expression of time. It was even demonstrated by Prior (21) that it is possible to derive the properties of the set of the real numbers (density and continuity for instance) from some conditions bearing on tenses.

To conclude this section we must stress again the main point which was raised in it, namely that the 'actual now' is necessarily, by its own definition, absent from any tensed sentence. But the way one deals with this absence is of uttermost importance for understanding the role the absent entity plays in our account of time. We have successively described three such ways.

The first one merely amounted to keeping silent the existence of the 'actual now' which is the ultimate point of reference of a tensed sentence. This attitude is not incorrect by itself, and it is the most usual. However, complete silence opens the possibility of an explicit denial of any role for the 'actual now'.

The second one consisted in making extensive use of quotation marks in complex tensed sentences, in order to display the hierarchy which constitutes the framework on which the said sentences are built. In this approach, the 'actual now' is assigned the domain of what is external to the higher level quotation marks.

The third one was the most explicit since, in it,

both the absence and the role of the 'actual now' are manifested. This was done through a blank denoting the unspecified higher-order point of reference to which an event is related in a tensed sentence.

The latter notation underlies a transformation of the mere absence of the 'actual now' whose intervention is accordingly occult and uneasy to handle, into the positive concept of a 'missing now' which we expect to be a unifying tool in the analysis of the most paradoxical features of time.

2) Incompatible predicates

a) When is now?

Let us examine the way the ascription of incompatible predicates to one and the same event was introduced by Mc Taggart as the first step of his regress: 'e is past and present and futur' was taken as a consequence of 'e has been future, is present, and will be past'. It is in this sense that the ascription of three contradictory tensed predicates is said to be a consequence of 'change', or time flow. But the last quoted sentence is to become, in a further point of the reasoning, the second step of the regress. Is then the first step of the infinite regress only a consequence of its second step, as Prior (22) showed it is the case provided one takes literally Mc Taggart's formulation? If this were the only way to get the crucial first step of the regress, the whole reasoning would be undetermined at a very elementary level, since it would be a mere petitio principii.

But the whole subtlety of this part of the argument lies in the loose use of the meaning of tensed expressions by Mc Taggart. I shall argue in the following that 'will be' and 'has been' does not mean exactly the same thing when they are used by the author as an introduction to the first step of the regress as when they constitute the basis of its second step.

At the very beginning of the argument, Mc Taggart states:

Ma: 'If M is past, it has been present and future. If it is future, it will be present and past. If it is present, it has been future and will be past. Thus, all the three characteristics belong to each event.' (23)

Here, the meaning of the tensed forms 'has been' and 'will be' is taken for granted by the author. But when he comes to his second step, this meaning is made explicit, through the use of the concept of 'moment' which corresponds to what we have called (after Reichenbach) a 'point of reference'.

Mb: 'Thus, our first statement about M --that it is present, will be past and has been future-- means that M is present at a moment of present time, past at some moment of future time, and future at some moment of past time.' (24)

A straightforward interpretation of the latter quoted sentence (Mb) allows us to write the conjunction of statements about the event M in the following way:

MT2: $\exists R_{(1)} [N(, R_{(1)}) \wedge N(R_{(1)}, M)]$ and
 $\exists R_{(2)} [F(, R_{(2)}) \wedge P(R_{(2)}, M)]$ and $\exists R_{(3)} [P(, R_{(3)}) \wedge F(R_{(3)}, M)]$

The moments or points of reference which it is spoken of being here represented by $R_{(1)}, R_{(2)}$ and $R_{(3)}$.

In the first quoted sentence (Ma), however, the absence of any reference to 'moments' implicitly calls for a slight (but decisive) difference of interpretation of formally similar tensed expression. In so far as the points of reference are not even mentioned, one is indeed authorized to work out the sentences just as if these points were bearing the same open status as the 'actual now' itself. For instance, the former expression would become:

MT1: $[N(,) \wedge N(, M)]$ and $[F(,) \wedge P(, M)]$ and $[P(,) \wedge F(, M)]$

Those of the two-place predicates relating only to blanks could then be removed for a purpose of economy of thought, just by the same process the blank in an expression such as $F(, M)$ is usually removed, and F considered economically as a one-place predicate. But once this is done, we are left with:

MT3: $N(, M)$ and $P(, M)$ and $F(, M)$

or even: NM and PM and FM, which is just the first step of the infinite regress.

An argument could still be used to dismiss this analysis of Mc Taggart's thought. It is the fact that the sentence Mb aims openly at explaining the meaning of 'has been' and 'will be' in Ma and thus that MT1 should retrospectively become identical to MT2. But it appears that this precision comes too late: once the loose meaning of the tensed expression in Ma has opened the way to the ascription of incompatible tensed predicates to one and the same event, namely to MT3, further tightening can but give rise to the second step of the regress. The introductory argument of Mc Taggart's reasoning thus arises from an imperceptible shift of the meaning of the tensed expression, and in particular of the status of the points of reference which constitute the network on which any compound tensed sentence is built. The shift goes from an unspecified entity to a set of specified 'moments', from the referring 'now' to the referred to 'nows'. The introductory argument of Mc Taggart could however have been stated in a much more straightforward manner. It was indeed enough to say that the 'actual now' being 'outside' the time series (the series of events), its relation to an element of the time-series is undetermined, and that it may, in particular, be any tensed relation whatsoever (25). In other words, the hidden seed of Mc Taggart's regress is that there is no

answer to the question 'when is the actual now?' This version of Mc Taggart's introductory argument does not use any longer the notion of 'change' or of 'time flow', but merely relies on the impossibility of referring to the 'actual now'. The relation between such a negative property of the 'actual now' and the notion of 'time flow' is to be examined thereafter.

An important issue to raise at this point is the question as to whether the mentioned imprecisions in the implicit use of 'now' are really specific to his indexical, and thus to time. According to Mac Beath, the same problem exists for other indexicals of which the most striking example is 'here'.

Let us consider the two following propositions (26):

O1: 'London is nearby far away, but far away nearby'

DO1: 'London is nearby and far away'

As long as 'here' is completely unspecified, it may appear that DO1 is a possible consequence of O1. But if, as suggested by the author, O1 means:

O1a: "London is nearby" is true (only) if said far away, and "London is far away" is true if said nearby.',

one has gained an explicitation of the existence of two 'heres' from which the two contradictory propositions of DO1 can be asserted, and any confusion is avoided. Using the relational notation we have introduced, with Fa for 'Far away' and Ne for 'Nearby', L for London and H(i) for the specified 'heres', and moreover dropping the explicit mention of a truth-ascription in O1a, we can rewrite O1, DO1, and O1a:

O1: $[Fa(,) \wedge Ne(, L)]$ and $[Ne(,) \wedge Fa(, L)]$

DO1: $Ne(, L)$ and $Fa(, L)$

O1a: $\exists H_{(1)} [Fa(, H_{(1)}) \wedge Ne(H_{(1)}, L)]$ and

$\exists H_{(2)} [Ne(, H_{(2)}) \wedge Fa(H_{(2)}, L)]$

The parallel of O1, DO1 and O1a with expressions MT1, MT3 and MT2 respectively, is so striking that one might consider that the problem of time is not as specifically untractable as it first appeared to be. This similarity is however purely formal. The blanks in expressions DO1 and O1a, as well as the left-hand blanks in O1 occupy the place of a 'here' which is not specified but could be so without losing the status of 'actual here'. Indeed, we can locate what we call the 'actual here' by specifying its coordinates, without moving at all, and thus being still enabled to call it the 'actual here' when the location has been carried out. On the contrary, if we locate the temporal position of the 'actual now' with respect to a given origin, it can no more be the 'actual now' when this location has been carried out. It is also true that it is possible to make reference to events occurring here while being here, but that it is not possible to make reference

to any event occurring now without making, by the sole fact of this reference, a distinction between the referred 'now' which is no more really now, and the referring 'actual now' (27).

The latter way of expressing the difference between here and now, however intuitive, is quite loose because it involves usual temporal and spatial expressions such as 'when', 'coordinates' 'location', past tenses etc... One may nevertheless gather easily the previous observations without making use of our usual picture of space and time, by reducing them to a distinction of the grammatical properties of 'here' and 'now' in a certain type of self-referential sentence:

1: The 'actual here' and its content can be specified here, whereas the 'actual now' and its content cannot be specified now.

A related thought was developed by Schrodinger, speaking of the 'ego': 'The reason why our sentient, percipient and thinking ego is met nowhere within our scientific world picture can easily be indicated in seven words: because it is itself this world picture.' (28). Such a remark would hold in an even far more rigorous sense if it were applied to 'the actual now' rather than to the 'ego' or 'I'. Indeed, the 'ego' has a very wide field or definition in its usual acception. It includes my past history, my body, etc... and these at least may be included in our scientific picture of the world. The 'actual now' has no such aspects and thus has definitely no place in our picture of the world. For it is the referring 'now' from which everything is referred to. I shall come back later to the relationship between the 'actual now' and the concept of a knowing subject.

b) Infinite regress

Most simplified versions of Mc Taggart's reasoning make use of compound tensed predicates in order to build the infinite regress which this reasoning is based on (29). The first step of the regress consists, as we know, in ascribing the three incompatible predicates P,N,F to the same event e:

R1: Pe and Ne and Fe.

But, to proceed, e is not now past, present and future: it will be past (or FPe in terms of tensed predicates), is now present (or NNe), and has been future (or PFe). At which point one notices, for instance, that F is not the only tensed predicate which can be ascribed to Pe. In fact, the same three incompatible ascriptions as at the first step can be made at this higher level. Thus,

R2: PPe and NPe and FPe

(but also PNe and NNe and FNe; PFe and NFe and FFe)

Here again, e is ascribed incompatible predicates, the only difference being that, in the latter case, they

are compound tensed predicates of the second order, while in the previous one they were simple tensed predicates. Therefore, any attempt at removing the contradiction from R1 by noticing that the three incompatible tensed predicates cannot be ascribed simultaneously to e, is bound to reach a new contradiction through the ascription of incompatible tensed predicates of higher level of complexity to the same event e.

The replacement by Lowe (30) and Mc Beath (31) of '(...)the compounding of tenses in an object language with a hierarchy of simply tensed meta-languages' (32) did not succeed in suppressing any kind of infinite regress (33), but it changed at least, as we shall see, the nature of this regress. The key point of the new interpretation is, as we noticed above, that it must make use, more or less explicitly, of points of reference with which each level of simple tensed ascription is related.

A version of Mc Taggart's regress making use of the concept of points of reference (and of that of 'actual now') would develop thus:

The (missing) 'actual now' is related to an event e through any of the three relations N, P or F:
 $N(,e)$ and $P(,e)$ and $F(,e)$

To remove the apparent contradiction, one notices (for instance) that the relation $N(,e)$ holds from a point of reference $R(1)$ which is present, $P(,e)$ from a point of reference $R(2)$ which is future, and $F(,e)$ from a point of reference $R(3)$ which is past:

$\exists R(1) [N(,R(1)) \wedge N(R(1),e)]$ and $\exists R(2) [F(,R(2)) \wedge P(R(2),e)]$
 and $\exists R(3) [P(,R(3)) \wedge F(R(3),e)]$

In the latter expression (which is just MT2), each of the explicit points of reference $R(i)$ is related in a particular way to the (missing) 'actual now'. $R(2)$ for instance is future with respect to it: $F(,R(2))$. Still, due to the temporal indeterminacy of the 'actual now', we have $P(,R(2))$ and $N(,R(2))$ as well. Thus, the contradiction has reappeared. However, it concerns no more the event e, but only the points of reference which helped removing the contradiction at its first level. It is certainly this structure of the infinite regress Mc Taggart had originally in mind when he stated: '(...)every moment, like every event, is both past, present and future. And so a similar difficulty arises.' (34)

As long as tenses were assimilated to one-place predicates, their repeated intervention only resulted in an increase of the complexity of the incompatible predicates which were ascribed to the same event. The intervention of points of reference, replacing the blind point represented by the 'actual now', allowed one to remove truly any con-

tradiction from what can be said of the event *e*, by transferring it to the points of reference. The latter contradiction bearing on a point of reference can in turn be removed and transferred to another point of reference etc... The infinite regress still exists, but one could argue at this point that, as in Prior's interpretation (35), it is not so vicious after all, since any well specified contradiction can be removed, even if it is at the expense of generating a new entity (the point of reference) which is bound to face the same difficulty as that it helped removing.

The previous analysis has at any rate provided us with the tool we needed to answer the fundamental question generated by Mc Taggart's argument: Does the infinite regress invalidate the idea of time-flow which is supposed to generate it? I shall argue in the following that far from being invalidated by the infinite regress, the idea of a time flow is but the metaphorical expression of this infinite regress which in turn originates, as has already been suggested, from the unique characteristics of the concept of the 'actual now' with respect to self-reference. This program involves an investigation of the relationship between 'now' and the most general instances of self-referential regress.

c) The self-reference of self-references

We have already noticed that the first step of the infinite regress, namely the ascription of incompatible tensed predicates to an event, can be seen as a consequence of the absence of the 'actual now' from the series of the specified events. It also appeared that the absolute impossibility of facing a certain class of self-referential situation is an unique characteristic of the 'actual now' and that it does not hold for its spatial equivalent: the 'actual here'.

I shall further stress the striking singularity of the indexical 'now', by pointing out that precluding its self-reference is the way by which every other self-referential situation can be sorted out, however unspecifically. A straightforward and quite general instance of the previous claim is afforded by the Liar's paradox, whose shortest version is contained in the sentence: 'This sentence is false'. Such a sentence is generally unfolded as follows: 'Suppose that this sentence is false. Then it is true. But if it is true, then it is false, etc...' The potential of contradiction enclosed by the liar's statement may eventually be completely abolished by adopting a specific version of self-reference forbidding such as the theory of types. But it is essential to realize that this potential of contradiction of the self-referencing sentence was neutralized at its very origin by splitting it into two 'successive' and ever repeated steps. Further

analysis of this splitting enables one to unveil its structure.

Let us suppose that the meaning of the sentence 'This sentence is false' is accepted now as a result of simple reading. Such a meaning however involves the ascription of a truth-value 'false' which would be changed into 'true' in a meta-reading. But the 'actual now' and its content (the sentence) cannot be referred to or specified now. Thus, the meta-reading of the sentence, and the meta-ascription of the meta-truth-value 'true' to the sentence, can but be performed if it is precisely not right now that the simple reading (and acceptance) of the sentence is performed. Therefore, an outline of the distinction between sentence and meta-sentence is already implicitly operating in so far as there is an ultimate level of indexical (the 'actual now') whose self reference is precluded.

A half-serious way of delivering the same message consists in considering the question: 'Why is it that a man who ignores Russell's theory of types does not become mad at the simple sight of the liar's sentence?' (36). Our answer amounted to say, developing a reflexion by the quoted authors: 'This man does not become mad because he manipulates unconsciously a both non-specific and all pervasive class of theory of types. Since he has never read Russell, he calls it "the flow of time"'.

Another issue which reveals the deep entanglement between time and the general problem of self-reference, bears on the validity of mechanical models of mind. One of the most popular arguments challenging this validity relies on the differences of behaviour of minds and machines, the latter being put in correspondance with formal systems, towards self-referential situations. It was presented by Lucas in the following terms:

'We now construct a Gödelian formula (such as "this formula is unprovable in the system") in this formal system. This formula cannot be proved-in-the-system. Therefore, the machine cannot produce the corresponding formula as being true. But we can see that the Gödelian formula is true: any rational being could follow Gödel's argument and convince himself that the Gödelian formula, although unprovable in the given-system, was nonetheless --in fact for this very reason-- true.' (37)

What the mind is supposed to do in order to see that the Gödelian sentence of the machine is true, is to formulate a meta-description of the relationship between the machine and its Gödelian sentence. But this can be done by a second-order machine as well. Lucas demonstrated however that introducing higher-order machines does not help solving the difficulty in a purely mechanistical way, since this only leads to an infinite regress (the second order

machine has its own Gödelian formula referring to its formal system, etc...). Why is it then that the mind is not confronted with the same difficulty as any higher order machine? Lucas' answer is at first sight very awkward: 'We are trying to produce a model of mind which is mechanical --which is essentially 'dead'. But the mind, being in fact 'alive' can always go one better than any formal, ossified, dead system can.' The crude idea of ascribing the alleged superiority of 'mind' over 'machines' to the fact 'mind' is a living system is utterly unconvincing, in so far as our present scientific knowledge leaves less and less room for the possibility that a living system as such be not as fully specifiable as a mechanical system. Some aspects of the concept of a 'living mind' remain however worth considering. These aspects have been brought about by Gödel in his own argument against a mechanical model of mind:

'(...)mind, in its use, is not static, but constantly developing.' (38). A temporal characteristic (development) is here taken as the basic distinctive property of mind when confronted with machines. It is then important to examine the link between time and truth value ascription being the crux of the major argument against mental mechanism.

The central point of Gödel's and Lucas' reasoning is that for every specified machine, it is possible to formulate its Gödelian sentence. Let us then suppose that the meta-description of the relationship between the higher-order, n-th level, specified machine and its Gödelian sentence is performed just now. Since the 'actual now' and its content cannot be specified now, any specification of the (n+1)-th order formal system (or machine) in which (or be means of which) the meta-description is performed is impossible now. But it is only if this (n+1)-th order formal system or machine is specified that its own Gödelian formula can be defined and give rise to one more step of the regress. Besides the ordinary state wherein the (n+1)-th order system is specified and its completeness is threatened by its Gödelian formula, one must therefore consider the more seldom situation in which this (n+1)-th order system which performs the meta-description of the n-th order system is not specified, and its Gödelian formula cannot even be defined. This situation has nothing to do with the nature of the material structure which embodies the unspecified (n+1)-th order system (39).

Whereas it is easy to make a clear-cut distinction between the structures of the specified machines of formal systems which are part of the regress, there is obviously no criterion to distinguish between one unspecified formal system and another. It is then natural to treat them as a single entity. The said entity shares most of its (purely negative) characteristics with the 'mind' of Gödel's and

Lucas' antimechanistic views. In particular 'it' is just as capable of making the truth-value ascription of the Gödelian sentence of an n-th order specified machine as an (n+1)-th order specified machine is. And 'it' can be said 'constantly developing' because whatever level of incompleteness of a specified formal system, there exists an unspecified formal system from which the meta-description of the specified system may be carried out.

The similarities between this notion of the mind and the 'actual now' becomes striking at this stage: both are the missing end of a self-referential regress, at any level of it. In Mc Taggart's regress, the actual now is the missing end of a series of points of reference that are specifications of the 'moment' at which a given tensed relation holds. In Lucas' regress, the mind is the missing end of a series of machines that give meta-descriptions of the machine just below them, together with its Gödelian sentence. An even more fundamental similarity is their being both, by construction, unspecifiable.

Our analysis of Gödel's remark about the 'developing mind' has not only revealed the mentioned similarities, but also the fact that they are not superficial. In fact, the limiting concept of mind has been derived from that of the 'actual now'.

The identification of some of the deepest aspects of the mind to 'now' is by no means new in the history of human thought. It is for instance revealed very clearly in the widespread use of the epistemological couple (Knowing subject, Known object), since the subject is associated with a present tense of the verb 'to know', whereas the object is associated with a past tense of the same verb. This identification is even likely to be the main underlying presupposition of some American Indian languages. B.L. Whorf's (40) analysis of the Hopi language has for instance revealed that the fundamental distinction on which it is based is between what '(...)we may call manifest and manifesting, or again objective and subjective.' The subjective or manifesting includes our 'future' and '(...)an aspect of existence which we include in our present time. It is what is beginning to emerge into manifestation'. This correspond very closely to what we called the 'actual now' as opposed to the accomplished or referred present which the Hopi language includes, with the past, in the field of the manifest or objective.

The notion of mind which we arrive at may be considered as too restrictive. Indeed, the meaning of the word 'mind' generally includes the knowledge of a personal history, of a personal identity and of personal feelings, as well as univocal association with a material substrate (human body, for instance), and its behaviour. But the latter aspects of the usual concept of mind belong to the

field of the known rather than to that of the knowing. Personal identity is the possible object of psychological science, whereas the (human) body may be the object of physiological (and especially neurophysiological) sciences. Personal feelings, however part of the known, are a particular case since they are only known by a single individual. This usually gives rise to the idea of a private experience. At any rate, the mixture of features which 'genuinely belong to the knowing subject with those which rather belong to known objects, in our idea of mind, is likely to be the main source of the difficulties discussed under the heading of 'mind-body problem'. Conversely, replacing the border between mind and body by a border between knowing (mind in the restricted sense) and known (world) may yield a renewed appraisal of the whole problem. It may also afford a clear understanding of what mystical thinkers mean when they speak of the impersonality and timelessness of mind (41).

It remains to be shown that the previous reasonings have opened the possibility of accounting for what is usually called 'change' or 'time flow' without any risk of circularity.

Mc Taggart gave very strong arguments against the belief according to which time may retain some of its original meaning without involving 'change'. Change was shown in turn by the same author to be irreducible to any aspect of event ordering, i.e. to the B-series. These arguments led to the image of an A-series sliding along the B-series, thus raising a classical difficulty: If sliding is taking place, one could try to know the velocity at which this sliding occurs. But this velocity (an amount of time per unit time) can only be defined by appealing to a supertime (42).

In short:

- (i) Time requires 'change' or 'flow'
- (ii) 'Change' is not reducible to static ordering
- (iii) Any attempt at explicating the kinematic components of the meaning of the word 'change' leads to the paradox of supertime.

A third conception could still retain the logical consistency of the static one without losing the irreducible specificity of the experience of change. We shall call this, after Sartre (43), the 'ek-static' view of time. It relies on a simple fact, which we expressed by saying that knowledge requires duplication between the knowing and the known. We have already noticed the high significance of the use of tensed words when the fundamental poles which organize knowledge are referred to. It could therefore seem that using the same tensed words as a basis for an account of time brings back the threat of circularity and that moreover, the introduction of a second entity besides

the known is a crypto-dualist move. But one must realize that the couple knowing-known is actually nothing more than a translation into a popular tensed language of the limitation of knowledge: Anything can be known, but not everything. The knowing is then but the tensed expression of an absence in the field of the known, rather than a second entity besides the known. It may be replaced by the same blank as that by which we displayed the absence of the 'actual now' in the time series.

The basic incompleteness of knowledge is thus our departure point. The fact that this incompleteness is usually expressed by tensed words being a strong indication of the existence of a close relationship between it and the central issues of the problem of time, we must now look for a more precise assessment of the said relationship.

The principle of the incompleteness of knowledge specifies that there must be a boundary between the known and what is not known, but it says nothing about the position of this boundary. The latter is thus a priori arbitrary. Whichever choice is made for this position, it may then be noticed:

(i) That within the field of the known, there are other possible positions of this boundary, such that they encompass subsets of the content of this field (let us call them the 'inner boundaries').

(ii) That nothing prevents the field of the known from being more extended than the one this choice implies.

The first noticing gives rise to the idea of 'succession' while the second one is the basis of the experienced instability of the present.

To develop the previous remarks in a more formal way, we can write the basic relation K_G which constitutes knowledge: $K_G(, S_k)$ where S_k is the set of the known events (what we called 'the field of the known'), while the blank stands for the 'knowing-unknown'.

Condition (i) then writes:

For any set S_k , there exists a set of m events r_k belong to S_k such that the relation K_G also holds between the two following sets: $S_p = \{, r_{k1}, \dots, r_{km}\}$ and $S_{k-1} = S_k - \{r_{k1}, \dots, r_{km}\}$. Or, in formal notations:

$$PG: \forall S_k, \exists r_{k1}, \dots, r_{km} \in S_k [K_G(, S_k) \wedge K_G(S_p, S_{k-1})]$$

The same being true of S_{k-1} , S_{k-2} , etc..., further steps of the hierarchy might be written. A restriction K of the relation K_G to single events instead of the specified sets S_k , S_{k-1} , S_{k-2} , S_p ... (for instance substituting a single event $r_k \in S_k \cap S_p$ taken as point of reference, to

both S_k in the first K_G and S_p in the second one, and substituting an event $e_{k-1} \in S_{k-1}$ to S_{k-1} itself) could yield complete isomorphism with the tensed P-relation.

For example, $P(, e_{k-1})$ corresponds to the restriction $K(, e_{k-1})$ of $K_G(, S_{k-1})$, and

$\exists r_k [P(, r_k) \wedge P(r_k, e_{k-1})]$ corresponds to the restriction

$\exists r_k [K(, r_k) \wedge K(r_k, e_{k-1})]$ of the expression PG.

Condition (ii) is more subtle. A straightforward interpretation of it is as follows: Saying that the field of the known could be more extended than S_k means that a relation K_G holds between the knowing-unknown and a set $S_k^u = \{, S_k\}$ including both S_k and some part of the knowing unknown:

$$K_G(, S_k^u) = K_G(, \{, S_k\})$$

Now, the establishing of a relation K_G with a partly unknown set $S_{k-n}^u = \{, S_{k-n}\}$, such that S_{k-n} is included into S_k , can in turn be an event of the set S_k (in ordinary terms, one can remember of having thought, at a stage when the field of the known was S_{k-n} , that this field could be more extended than S_{k-n} . This thought is part of the set of events S_k).

Comparison of the relation: $K_G(, \{, S_{k-n}\})$ and of the relation $K_G(, S_k)$ leads to identify part of what is denoted by the blank in $\{, S_{k-n}\}$ with $(S_k - S_{k-n})$. Coming back again to ordinary terms, the latter sentence means the following: comparing the past thought that the field of knowledge could be more extended than S_{k-n} to the fact that this field is actually the set S_k which contains S_{k-n} , leads to believe that this thought was justified. The field of the known was indeed extended from S_{k-n} to S_k . The relation $K_G(, S_k^u)$ is therefore to be taken as a prediction that the extension of the field of the known will increase.

It is also possible to specify the content of the unknown part of the set S_k^u , at least by analogical projection of the events of S_k^u . S_k^u then writes for instance:

$$S_k^u = \{e_k^{u1}, \dots, e_k^{un}, S_k\} \text{ instead of } \{, S_k\}$$

The relation $K(,e_k^{ui})$ written by analogy with $K(,e_k)$ obviously corresponds to the tensed F-relation: $F(,e_k^{ui})$, while $K(,e_k)$ itself corresponds, as has been seen above, to a P-relation (44).

The whole A-series is generated thus.

My preferred metaphorical expression of the role of the all-pervasive absence of the actual now and of its self-referential characteristics in giving rise to what we call 'time', was provided by Sartre, in some pages of his 'being and nothingness'. Concerning the absence of 'now', I have already noticed his very strong statement: 'the present is not', but I must also add his central concept of 'nihilation', of which the present is only a particular instance. As for the relations between time and attempts at self-referential description, how could it be more vividly addressed than in such sentences as: '(...)temporality can only indicate the mode of being of a being which is itself outside itself' (45).

Another metaphor, even closer to the formal account just given, would consist in a comparison between time and the vertigo which is felt in front of the unavoidable presence of the unknown. The image of vertigo (which was also used by Sartre, but in his metaphysical study of freedom) tries to suggest the feeling of a motion in a motionless state, generated by the simple possibility of falling in the adjacent void.

Conclusive remark:

Time flow, in the present account, has no purely objective foundation, in so far as it is not based exclusively on some characteristic of the known. This however does not imply that it is 'subjective' in the restricted sense of its depending on the particular feelings of particular beings, or even on general features of the human species. It only arises from what is both the most irreducible constraint of knowledge and the consequence of the mere possibility for it to exist: Its incompleteness. Neither objective, nor subjective, time flow can thus be said 'epistemic' (46) since it arises from an universal condition for something to be known. Such a conception is clearly Kantian in its spirit, but it considers time as even more fundamental an entity than Kant would have it. For, here, time is not only the intuition a priori which '(...) renders comprehensible the possibility of change' (47) nor is it the '(...)real form of our internal intuition (48). It rather arises from a characteristic which is logically prior to the splitting of the known into 'moving' and 'motionless' or into an 'internal' and an 'external' field.

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END NOTES

* This work was initiated while I was Dr. A. Watts' guest at St Hugh's college, Oxford. I wish to thank him for having provided me such an opportunity.

(1) See M. Dummett, Truth and other enigmas, London, Duckworth, 1978, p.351, for a statement of some these subtleties.

(2) J.M.E. Mac Taggart, The nature of existence, Cambridge, Cambridge University Press, 1927, p.19.

(3) J.M.E. Mac Taggart, Philosophical Studies, London, E. Arnold, 1934 p.124.

(4) J.M.E. Mac Taggart, Philosophical Studies, London, E. Arnold, 1934 p.124.

(5) C.D. Broad, Examination of Mac Taggart's Philosophy, Cambridge, Cambridge University Press, 1938, vol. 2, p.315.

(6) A. Prior, Past, present and future, Oxford, Oxford University Press, 1967, p.6.

(7) Ibid.

(8) A. Prior, "The notion of the present" in: J.T. Fraser, F.C. Haber and G.H. Muller (eds.), The study of time, Berlin, Springer-Verlag, 1972, p.322.

(9) A. Prior, Past, present and future, Oxford, Oxford University Press, 1967.

(10) H. Reichenbach, Elements of symbolic logic, London, Mac Millan, 1974, par. 51.

(11) A. Prior, Past, present and future, Oxford, Oxford University Press, 1967, p.13.

(12) J.M.E. Mac Taggart, The nature of existence, Cambridge, Cambridge University Press, 1927, p.21.

(13) E.J. Lowe, "The indexical fallacy in Mac Taggart's proof of the unreality of time", Mind, 1987, p.62.

(14) M. Mac Beath, "Dummett's second order indexicals", Mind, 1988, p.113.

(15) J.J.C. Smart, "The river of time", Mind, 1949, p.492.

(16) J.P. Sartre, Being and nothingness, London, Methuen, 1957, p.123.

(17) K. Rankin, "Mac Taggart's paradox, two parodies", Philosophy, 1981, p.333. See also Q. Smith, "Sentences about time", Philosophical Quarterly, 1987, p.37.

(18) J.M.E. Mac Taggart, The nature of existence, Cambridge, Cambridge University Press, 1927, p.19. This paragraph of McTaggart's treatise has been rarely commented. However, a very clear account of it was

given by K. Rankin, "Mac Taggart's paradox, two parodies", Philosophy, 1981, pp.333-48. According to this author, McTaggart was led to the quoted sentence by noticing '(...)first that the A-determinations may be relativized to events or position in the time-series, and second, that they cannot be exclusively so relativized, that in some applications they are ultimately mediating. Hence, instead of concluding, as he equally well might have (and indeed seriously considered) that A-determinations are not exclusively relational, he further inferred that (directly or indirectly) they are relations to something extra-temporal.'

(19) J. Hintikka, Time and necessity, Oxford, Oxford University Press, 1973, p.73.

(20) G. Schlesinger, Aspects of time, Indianapolis, Hackett, 1980.

(21) A. Prior, Past, present and future, Oxford, Oxford University Press, 1967, p.71.

(22) A. Prior, Past, present, future, Oxford U.P., 1967, p.5.

(23) J.M.E. Mac Taggart, The nature of existence, Cambridge, Cambridge University Press, 1927, p.20.

(24) J.M.E. Mac Taggart, The nature of existence, Cambridge, Cambridge University Press, 1927, p.21.

(25) K. Rankin, "Mac Taggart's paradox, two parodies", Philosophy, 1981, pp.333-48, has also stressed this point. But rather than bringing to its end McTaggart's proposal of a relation with something external to the time-series, and then using extensively, as we do, the concept of the 'actual now' to which an event is related in a tensed relation, he distinguishes between relational and absolutized A-determinations: '(...)given that absolutized A-determination is tenseless, then if any event or moment instantiates an absolutized A-determination at any time, it instantiates that A-determination at all times.'

(26) M. Mac Beath, "Dummett's second order indexicals", Mind, 1988, p.113 and E.J. Lowe, "The indexical fallacy in Mac Taggart's proof of the unreality of time", Mind, 1987, p.62.

(27) K. Rankin, "Mac Taggart's paradox, two parodies", Philosophy, 1981, pp.333-48, tried (parodically) to reduce the problem of incompatible tensed predicate ascription to another non-temporal instance. He recalled a Plato's paradox according to which Simmias is both and short, but that each of these predicates is purely relational. Tall or short can then only be said of Simmias by comparison with somebody else. It seems to me that the analogy with incompatible tensed ascription is once more purely formal, because the human being to whom Simmias is compared could be specified without altering him (and in particular without altering his height). This is not the case for the 'actual now'.

(28) E. Schrodinger, Mind and matter, Cambridge U.P., 1983, p.138.

(29) See: M. Dummett, Truth and other enigmas, London, Duckworth, 1978 p.352 for instance.

- (30) E.J. Lowe, "The indexical fallacy in Mac Taggart's proof of the unreality of time", Mind, 1987, p.62.
- (31) M. Mac Beath, "Dummett's second order indexicals", Mind, 1988, p.113.
- (32) R. Le Poidevin and D.H. Mellor, "Time, change, and the 'indexical fallacy'", Mind, 1987, p.534.
- (33) See Le Poidevin and Mellor (Op. cit.) for a demonstration.
- (34) J.M.E. Mac Taggart, The nature of existence, Cambridge, Cambridge University Press, 1927, p.21.
- (35) A. Prior, Past, present and future, Oxford U.P., 1967, p.6.
- (36) See D.R. Hofstadter and D.C. Dennett, The mind's I, Penguin Books 1982, p.269, for a detailed analysis of this question.
- (37) J.R. Lucas, "Minds, machines and Gödel", Philosophy 1961, Reprinted in: A.R. Anderson (ed.), Minds and machines, New Jersey, Prentice-Hall, 1964, p.47.
- (38) Quoted in: H. Wang, From mathematics to philosophy, London, Routledge and Kegan Paul, 1974, p.325.
- (39) The apparent difference between machines and human beings in this respect is only due to a biased standpoint. When we think of a machine of a formal system, it is a device which we have built or defined, and which is then necessarily specified now. This constraint does not exist for a human being who is thus able to place himself in the situation wherein the system which performs the meta-description of a lower-order one is not specified now. Nothing however precludes the possibility of a reversed standpoint bias. The only relevant distinction which remains is thus not between machines and human beings, but between specified system and unspecified content of the 'actual now'. It is from this distinction that a new concept of mind may arise.
- (40) B.L. Whorf, Language, thought and reality, pp.59-60.
- (41) See G.N. Schlesinger, "How time flies", Mind, 1982, pp.501-23, for a discussion of the possibility of super-time.
- (42) A. Huxley, Perennial philosophy, London, Triad Grafton, 1985, and Schrodinger, My view of the world, Cambridge U.P., 1964.
- (43) J.P. Sartre, Being and nothingness, London, Methuen, 1957.
- (44) Given a certain boundary between the known and the knowing-unknown, there are thus two ways to conceive its alteration: The first one, which consists of transposing part of the known into the field of the unknown, is the basis of the concept of past. The second one, which consists of transposing part of the unknown into the field of the known, generates the concept of future.
- (45) J.P. Sartre, Being and nothingness, London, Methuen, 1957, p.136.
- (46) See M. Bitbol: "The concept of measurement and time symmetry in

quantum mechanics", Philosophy of Science, 1988, (in press), for an epistemic account of the problem of time asymmetry.

(47) I. Kant, Critique of pure reason, translated by J.M.D. Meiklejohn, London, Everyman's library, 1945. Transcendental aesthetics II, par. 6.

(48) I. Kant, Critique of pure reason, translated by J.M.D. Meiklejohn, London, Everyman's library, Transcendental aesthetics II, par. 8.

RESUMEN

La mayoría de las versiones simplificadas del argumento de McTaggart acerca de la "irrealidad del tiempo" entrañan el supuesto de que los tiempos (*tenses*) son predicados monádicos (pasado, presente y futuro) atribuidos a un suceso. En este trabajo se examina minuciosamente la posibilidad de considerarlos como relaciones. La dificultad principal para hacer tal cosa reside en el hecho de que una relación es un predicado diádico, mientras que el suceso ocupa sólo uno de sus lugares. Pero esta dificultad arroja nueva luz sobre el problema del tiempo. El segundo lugar (vacante) en la relación pone de manifiesto, de hecho, el concepto de una entidad que juega un papel en los tiempos (*tenses*) y a la que no se puede hacer referencia: el "ahora ausente". Mediante la utilización de este concepto, se pueden exhibir los sutiles desplazamientos del razonamiento subyacentes a algunos pasos cruciales del argumento de McTaggart. Por otra parte, las características únicas del "ahora ausente", confrontadas con situaciones autorreferenciales, nos permiten sugerir una forma de ir más allá de la oposición tradicional entre las concepciones "cinemática" y "estática" del tiempo.

