



Ce matin, il pleuvait (It was raining this morning) - A Time Proof Reference

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"Ce matin, il pleuvait" ou la référence à l'épreuve du temps

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1. Introduction.

In this paper we will be mainly interested in studying some French temporal clauses such as *le matin* (the morning), *ce matin* (this morning) and their referential abilities. This might be surprising for researchers whose field remains the study of the phenomenons implied in the launching of man-machine dialogue systems. Such a discrepancy can be explained in two ways. Firstly, one of the most important problem raised by the launching of a man-machine dialogue is to resolve references, that is to say- at least the way our community understands it¹ - to find the objects the user is talking about in order to fulfill his will concerning a particular task. In this scope, temporal phrases, for instance, though not often used in the task driven dialogues, enjoy an important referential meaning and develop themselves along a particular dimension. They represent a kind of experimental melting pot in which some of our hypothesis can be tested. On the other hand, the temporal dimension which is here displayed is particularly important in the field of task oriented dialogues. Indeed, their goal is the evolution of objects in a task. We will come across utterances such as *mets cette fenêtre en vert* (colour this window in green) followed by *déplace la fenêtre qui était verte* (shift the window which was green). Then we should be able to represent these transformations as well as their consequences. So we must have a particular model in order to integrate our systems in time, here again, temporal phrases can be a means to test such a model.

The double concern we have for reference and time seems to express itself through temporal phrases which draw a frame for the analysis of other referential clauses which can be found in a discourse. Moreover we shall see that resolving referential phrases also implies the treatment of the predicative frame in which they fit.

In a sentence such as *nous arrivâmes dans un village* (we arrived in a village), the village in question - apart from actually being a village - possesses the property to be the one in which we arrived. It already breaks away from the prototype attached to the lexeme village. It seems that *un matin* (one morning) in *un matin nous arrivâmes dans un village* (one morning we arrived in a village) can be analysed in a more autonomous way. In this scope, temporal phrases as well as many peripheral constituent are good examples for a simplified analysis of reference phenomenons.

At this stage we can ponder over the methodology to be used when working on long term projects which aim is to launch language comprehension systems. These are not bound to the mere analysis of phrases such as *la semaine dernière* (last week). We cannot afford to give only a specific explanation to these phrases. This would lead us to implement a specific procedure and to progressively build a patchwork system with no global coherence. So we are constantly obliged to propose relatively general models which widely cover the utterances we may encounter, even though some of these models may not fit "limit cases" raised by the linguist. The advantage of this method is that it allows us to understand the ground of one or another reaction of our systems in a real situation whereas the multiplicity and incompatibility of the models often prevents our studies from progressing.

First we shall present a particular frame for the analysis of referential phrases (Gaiffe 1992). Then, we shall display the principal basis of a time and object representation model that we developed in our team for the peculiar needs of man-machine dialogue (Romary 1989 and 1991). At last we shall try to synthesize these two approaches in the frame of temporal phrases.

¹ Along this article we shall see why this vision is particularly limitative.

1.1 The reference problem

In the field of man-machine dialogues, and above all when multimodal dialogues¹ are concerned, the problem of reference resolution can be approached from two different ways. The first case is the one of professional users who would accept to submit themselves to a training period and also when the application is simple enough. In this diagram the most efficient approach is to define an artificial language such as the ones created to launch an electronic letterbox (Morin 1987) or a sonar console (Souvay 1992). In those situations the language is defined in order to ease the resolution of the references expressed by the user.

However in other cases we cannot proceed in this way. Indeed, we know (Deville 1989, Falzon 1984 and 1990) that the dialogue is oriented towards the task, consequently the language which is to be treated corresponds to a sub-language which is commonly referred to as natural language. It appears however, that whatever the task is, it is impossible to obtain a reduction of the palette of referential phrases generally used. That is to say the definite, indefinite, demonstrative or pronominal phrases. The restrictions we can observe are rather situated at the level of relevant concepts for the task and lead to the reduction of the lexicon and of the semantic value of its entries. the choice we made is to consider referential phrases such as they are used in the current language (i-e natural language) and to bet they will be used the same way in a task oriented dialogue rather than trying to imagine the reactions of the user of a dialogue system and to limit our implementations to this narrow view (which often is a nonsense).

In order to exemplify this point, let's have a look at a few phrases which can be treated in a windowing environment.

- (a) iconifie la fenêtre. *iconify the window*
- (b) agrandis cette icône (avec un geste de designation). *widen this icon, with pointing gesture*
- (c) transforme la fenêtre rouge en icône et met (d)cette icône près de l'horloge (sans geste de désignation) *(turn this red window into an icon and shift this icon next to the clock without pointing gesture.)*
- (e) crée une nouvelle fenêtre de texte. *(create a new text window)*
- (f) mets la ici accompagné d'un geste *(put it here with pointing gesture)*

Through these exemples we can observe what our fellow linguists call anaphoras (b: *la fenêtre*; the window; d: *cette icône*; this icon; f: *la*; the) which compell us to take in account the previous utterances and the deictic phrases (f: *ici*; here) which are on occasion accompanied by a pointing gesture and direct references (a: *la fenêtre verte*; the green window). We can point out — thus following many others (Wilmet 86, Corblin 1987, Kleiber 1991) — that the behaviour of a demonstrative phrase is not necessarily situated in an homogeneous category and that a pointing gesture made by the user is not always to be awaited for. Though it may be tempting (to simplify an implementation) to set up such restrictions and to forbid the use of anaphoras and demonstratives. A general analysis of the references phenomenons compells us to give up these choices. Otherwise we would conceive tailor-made systems for the application we aim at.

1.2 Approaches ensuing from a naïve logic

In the field of man-machine dialogues, since the application is generally not very complex, the resolution of references most of the time hinges on what we can call a naïve logic. In a few words, it is assimilating the search of a referent associated to a phrase such as *la fenêtre* (the window) to the search among the objects of the task of an element submitted to the constraint '*fenêtre(?x)*' '*window(?x)*' (predicative form associated to a linguistic phrase). It is only when such a procedure fails, that is to say when there isn't a single element which fits the constraint, that an anaphoric interpretation of the nominal phrase is considered. The anaphoric resolution is then made by scanning the story of the dialogue, looking for an element which fits the constraint previously uttered. In a way it can be said that such an approach is based on a test of pragmatic incompleteness of the nominal phrase³. To solve the problem raised by pronouns, we use a similar mechanism: the pronoun (give or take the genre and number constraints) can be associated to any object in the task. So, if more than one object is to be found in the task (which is naturally often the case) the referent is obtained thanks to discourse memory.

¹ That is to say dialogues in which different ways of communicating occur, such as gesture or speech.

³ Milner describes the pronoun as being deprived of virtual reference. We then face a semantic incompleteness. In our case it is indeed a pragmatic incompleteness since a parameter is lacking to call a function of the task.

If demonstratives are introduced in such systems (for instance in a multimodal context) we obtain a relatively similar mechanism. If a gesture is observed, it is used in association with the nominal phrase in the current utterance. Otherwise, as in the case of definite descriptions, the search is made by anaphoric lack (by a search in the story of the dialogue) (Neal 1988).

If we consider the whole range of possible phrases - un N, a N, le N, The N, ce N, This N - they are all associated to a constraint expressed as $N'(?x)$ in which N is a thing which is kin to the class of objects which can be called N (In the case of the pronoun, it is the class of all the objects which associated noun fits the number and genre constraints). In this way, and this is why we qualify this logical approach as naïve, we evacuate the specific properties of the French determinants (or English for corresponding works) whereas it is clear that each of them has a working principle which must be analysed.

This can be shown easily in the following examples, where it is obvious that the sentence (2') is acceptable in the context of (1) whereas (2) is not.

- (1) déplace la fenêtre verte et l'icône bleue. (*shift the green window and the blue icon*)
- (2) iconifie cette fenêtre. (*iconify this window*)
- (3) iconifie la fenêtre. (*iconify the window*)

More precisely, if there is still a doubt concerning the fact that a pointing gesture has or has not been made - and if the utterance given is (2) - we will rather acknowledge that a gesture has been made⁴. On the contrary, in the context of speech recognition and provided we can be sure that no pointing gesture has been made, we will consider that (2) is not a good hypothesis for recognition in the case of an oral dialogue system.

The conclusion we can draw from these approaches is that wanting to know whether the phrase is an anaphora or not is not a good way to handle the problem. Indeed as it is impossible to take a decision concerning the anaphoric character of a phrase before the actual referent has been found, it is useless to manipulate two different hypothesis which will anyway lead to the same computed set. Another option is to base the computed set on a steady ground which would integrate the data directly available from the utterance as a whole. This is why we try to propose an unified analysis for each type of determinant (definite, indefinite or demonstrative) that can be found in a nominal phrase. Moreover, as we know that the interpretation of a pronoun mainly depends on the nature (definite, indefinite or demonstrative) of its antecedent in the dialogue, we only consider those in the frame of a sufficient explanation of the other type of referential phrases.

1.3 Defined descriptions

We try to obtain an homogeneous description of the definite nominal phrase, whether it is or not anaphoric. There is one certainty about these phrases, it is that the associated referent must be found within a set⁵. For instance, the search for the referent associated to la fenêtre (the window) can be made within the set of objects appearing on the user's screen. Other types of sets can be drawn according to the utterances preceding the current utterance. In this case there will actually be an anaphoric resolution of the definite nominal phrase. At this stage, we notice that the comparison between the applicant referent and the operation of reference has been replaced by the creation of sets and their comparisons.

Let's have a look for instance at the following utterances:

- (1) déplace la fenêtre verte et l'icône bleue; (*shift the green window and the blue icon*)
- (2) agrandis la fenêtre. (*widen the window*)

The reference corresponding to the window can be resolved in one of the following set

- the set of objects which can be seen by the user. (S1)
- the set - created by the discourse - containing the green window and the blue icon (provided the references have been correctly resolved in the frame of utterance 1): (S2)

The argument which leads us to choose S2 rather than S1 is that S1 is going to contain more than one window. Actually the sets considered are sets of objects. So S2 does not contain the description of each object. That is to say neither information concerning the words used to refer to these objects, nor any halfway result from their analysis are part of the description of the set. S2 contains the object (for a dialogue system: The

⁴ The generalized use of the mouse could make us think that a pointing gesture is never ambiguous. With a glove, however, we can never be sure whether a gesture has actually been made or not.

⁵ This notion will become meaningful later on. It is by no means a 'hard' mathematic concept.

description of its computed set) resulting from the referential analysis of the phrase *la fenêtre verte* (*the green window*) as well as the one resulting from the analysis of *l'icône bleue* (*the blue icon*). Consequently, S1 and S2 are kin ontologically speaking: they are detached from the linguistic origin which may or not have led to their creation.

As a criterion for the choice of one or another set we have mentioned that there is one and only one object which fits the description in the applicant set. Another important criterion is that the set must contain at least one object which does not fit the description. Consequently in our exemple, the set S2 was a good applicant because it contained an object which was not a window.

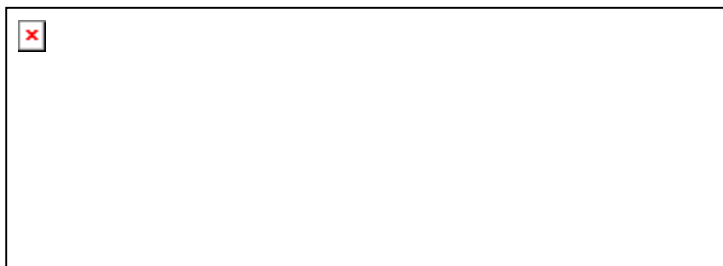
Such a criterion, though it might seem at face value arbitrary, enables us to explain the following exemple and its like.

- (1) *déplace la fenêtre verte et la rouge* (*shift the green and the red window*)
- (2) *agrandis la fenêtre la plus à gauche* (*widen the window which is the most on the left*)

Since the set which contains the associated referent to *la fenêtre verte et la rouge* (*the green and the red window*) contains only windows, we will rather choose here the set of objects which can be seen on the screen for it generally contains other things and has only one window which is the most on the left.

So, a hierarchy is established between the name and the other elements of the nominal phrase. Indeed, we consider that the set should contain elements which are not of the type uttered by N, then we will select among the remaining elements to obtain the actual reference.

Trying to translate the interpretation process associated to *la fenêtre la plus à gauche* (*the window which is the most on the left*) we obtain the following diagram:



Generally the resolution sketch associated to definite description of le N (the N) type is as follows



For this diagram the previous explanations concerning hierarchy must be taken in account.

The problem is now to understand to which extent it is possible to say that a given object is a N or, in terms of associated categories, according to which criteria an object can be predicated by N'. (Class predicate).

In the specific case of a strictly coreferential anaphora it is a lesser problem since we only have to take up the name by which the considered object has been designated. This is what happens in:

- > *déplace la fenêtre rouge et l'icône bleue.* (*shift the red window and the blue icon*).
- > *agrandis la fenêtre.* (*Widen the window*)

Here, the system has only to keep the fact that the referent resulting from the interpretation of *la fenêtre rouge* (*the red window*) has actually been named by *la fenêtre* (*the window*) and so, it is the correct applicant for the phrase *la fenêtre* (*the window*) which is found in the second utterance. This, of course, does not explain why this very object has been initially recognized as fitting the description *la fenêtre rouge* (the red

window) in relation to the other objects on the screen. However, this enables us to follow part of the progress of the discourse and even in certain cases to follow the evolution of the referent as shown below:

- > iconifie le texte bleu et la fenêtre verte (*iconify the blue text and the green window*)
- > déplace la fenêtre (*shift the window*)

To have a good resolution of the second reference in this example it is important to know that what is now an icon has previously been called a window.

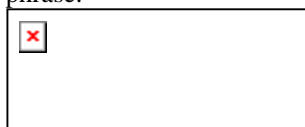
Now, if we consider once again the case for which there has not been a previous reference to establish the association of an object with a peculiar nominal head, we can imagine different solutions. Either the system (or the user) has categorized the objects as their observation went along: this can correspond to the choice of a 'basic term' for each object. As long as the user uses the same term to designate the same object there is no difficulty left to resolve references. Or the system is unable to categorize all the objects of the task and moreover, the user is allowed to use a wide spectrum of names for the objects he considers. Then it is necessary to launch a recognition process for N type objects. This process, somehow or other, has to be based on something prototype like. At the level of temporal phrases we will face once again the necessity to introduce prototypes. For now we will limit ourselves to witness that the use of a prototype for the creation of a referent is all the more capital when we cannot perceive the object directly. (case of the referent associated to temporal phrases).

1.4 Demonstrative nominal phrases

One of the main differences between a definite nominal phrase and a demonstrative nominal phrase is that the last one does not need a set from which it would draw its reference. so, it is impossible to interpret accurately the following set of utterances if by doing so we hope to designate by *cette fenêtre* (this window) the object previously designated by *la fenêtre rouge* (the red window).

- > (1) déplace la fenêtre rouge et l'icône verte; (*shift the red window and the green icon*)
- > (2) iconifie cette fenêtre; (*iconify this window*)

Another difference between the two types of designation is that the demonstrative can also be used to reclassify an element, something a definite cannot do. For instance, *Ce matin, j'ai vu Laurent. Ce fameux chanteur...* (This morning, I saw Laurent. This famous singer...) is understandable whereas *Ce matin, j'ai vu Laurent et Bertrand. Ce fameux chanteur...* (This morning, I saw Laurent and Bertrand. This famous singer...) seems awkward. To reclassify the referent with a demonstrative nominal phrase necessarily implies that the N category (in ce N; this N) is not a capital element in search of the considered object. another way to conceive the same phenomenon is to consider that the interpretation process is based on an element which must be salient to be then applied to the constraint expressing that it is an N. In most of the cases this will lead to a referent strictly identical to the one used as a basis for the interpretation. However the two referents can be different as we will see later on. For now we end up with the following diagram translating the constraints mentioned for the interpretation of a demonstrative nominal phrase.



This sketch means that, given a referent possessing properties which are not directly implied by the fact that it is a N (the property of being salient for instance) we add to this the fact that it belongs to the N class. The main reason why we impose that there must be class N members that do not fit the striking properties of the referent comes from the fact that a demonstrative nominal phrase cannot be specific at the N class level as a whole. Therefore, if we have *J'ai acheté une Toyota parceque ces voitures sont sûres; (I've bought a Toyota because these cars are safe)*. *Ces voitures (these cars)* is not referring to all the cars. The referent must show specific properties which allows it to be a particular element in the car class. (Even if this referent has to be generic as it is the case in this example).

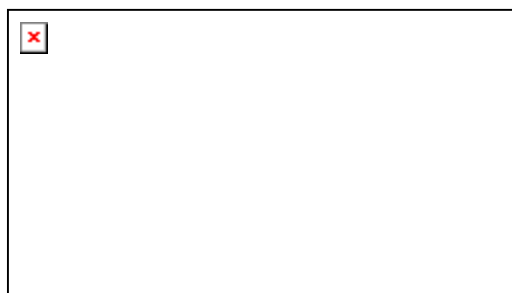
The other important point concerning the demonstrative nominal groups is that they can be analysed regardless of the predicate of the sentence in which they belong. Such a phenomenon can be observed in the following exemple: *Les italiens exportent cette voiture depuis l'année dernière (Italians have been exporting this car since last year)* expressed while pointing out a Lamborghini. In this case the referent as such is not only the car pointed out by the gesture, though it must share properties with it. What narrows the range of properties which have to be taken in account is the predicate "*être exporté par les italiens depuis l'année dernière*" (*be*

exported by the Italians since next year). Let's imagine that the car in question is dirty. If this last property remains among the P-properties used as a basis in the referential computerization (in our diagram) this would mean that it is a significant criterion to isolate the referent in the general class of cars as an object "exportable par les italiens" (*which can be exported by the Italians*). As it is generally understood that italians do not first and foremost export dirty cars, it seems clear that this choice is incompatible with the uttered predicate.

The interpretation of a demonstrative nominal phrase takes place in this way: given a salient object (because of it being mentionned in an immediate previous utterance or by a pointing gesture) we assign it to the N class (which leads us to map it with the prototypic properties of the class). Then we eliminate a certain number of properties which do not match with the predicate applied to the temporal referent. The final result of this computed set is represented by the set of initial properties which have not been eliminated. Otherwise, there would have been a generalization effect corresponding to a specific utterance. Besides it is necessary that a number of those initial properties are kept so the utterance remains understandable (cf: "ce parfum est ouvert à la page 4"; *this perfume is open on page 4*). Then, in order to justify the re-categorization in the N class it is essential that the predicate does not suppress all the properties issued by the prototype. Such a principle allows to justify the interpretation of utterances such as: Ce jour sera célébré tous les ans. (*this day will be celebrated each year*)

1.5 Indefinite nominal phrases

We can present the computed set diagram associated to the indefinite nominal phrases more rapidly. This diagram rounds off what we have presented for the definite and the demonstrative:



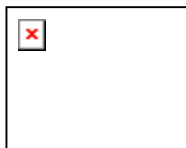
Here, the main idea is to represent the fact that when we express un N (*a N*) we identify a peculiar referent inside the N class knowing that these peculiarities, as opposed to what happens for ce N (*this N*), shall not be previous to the occurrence of the definite expression. On the other hand they are confirmed or precised by the predicate. Thus, if we state: un triangle a trois côtés (*a triangle has got three sides*) the predicate brings no particular property (in relation to the prototype triangle for instance) the utterance has then a generic value. On the other hand, in the case of un chat (*a cat*) in un chat mangeait (*a cat was eating*), the P-properties are confirmed: the predicate cannot be applied to all the elements of the class (especially because of the temporal mark). The utterance has then a specific value. The referent, as in the demonstrative case, is built on the basis of a prototypic description available for instance at the lexicon level.

2. Some elements for the representation of time

As we pointed out in the introduction we are in need of a temporal representation associated to the objects of the task. generally speaking any interpretation process (of a text or of an utterance in a dialogue) has to insert itself in a particular temporal frame. At our level and considering the type of information carried by language, an accurate temporal representation in the frame of automatic understanding should essentially possess the properties of localization of information and should be able to express the constraints bound to relative time. Moreover such constraints do not have to be very precise. This is why we will limit our study to the introduction of two relationships between temporal elements: the precedence and the inclusion. These relationships beyond their strict temporal interpretation can be seen as elements of articulation for the underlying logical reasoning. In this way stating the precedence of two zones, Z1 and Z2 as in the sketch below is like uttering the incompatibility of the informations carried by these two zones. (ex: la fenêtre a été verte puis rouge; the window has been green then red).

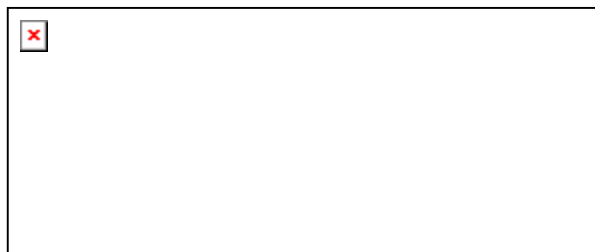


As well, an inclusion between two zones Z1 and Z2 as above allows to show the logical dependance of the informations contained in one in relation to the informations contained in the other.



To put it differently, all that is described at the level of Z2 is limited in time by what is described at the level of Z1⁶. On the contrary all the informations described at the level of Z1 are necessarily true for Z2 and consequently must be inkeeping with what is described at the level of Z2. Then, we can point out that between two data zones only one of the mentioned relationship can be established even if in some cases neither is valid. (case of a temporal split between two zones).

Among the set of temporal zones it seems useful to isolate a special sub-set we call universe of object (Romary 1991). These zones represent the temporal development associated to objects perceived or mentioned in a discourse. In practice identifiers are associated to these universes of objects, they will be used as a variable to describe the known properties of an object. Then, we will have this type of representation:



This diagram represents the "story" of window which has been green and of which we know by now that it is red. Besides, the window contains an image, though we don't know how to synchronize this information with the one of the colour. However if we have been able to describe the fact that a window can only have one colour at the same time, we can state that the two zones associated to the predicate 'red(w)' and 'green(w)' are in the position of precedence.

the type of reasoning which has been carried here hinges upon a tacit use of the present tense. We consider the most recent - and compatible - informations we possess concerning an object to be valid at the present moment. Though this may seem at face value awkward, such an hypothesis is very often used in the launching of a task oriented dialogue.

According to this representation, the recognition of a prototype on an object equates to detect that no new information has been added while applying the prototype on the object.

3. Different temporal phrases.

When we ponder over temporal phrases such as *le matin* (*the morning*); *cette semaine* (*this week*), or *un jour* (*a day*)⁷ we quickly notice that they can be clearly divided into two distinct classes. On the one hand we can isolate what we can call 'time units' in which we find terms such as *mois* (month), *jour* (day) (in one of its uses), *heure* (hour), *minute* (minute), *seconde* (second). On the other hand we find terms of period which fit ordered series as for instance, *matin* (morning) or *novembre* (November). Considering the nature of other temporal elements which co-exist in a wider interval with the given unit, these terms can respectively be qualified as homogeneous and heterogeneous units. In this way, a minute is 'surrounded' by other minutes in an hour. On the other hand, a morning, in a day will be an alternative to an afternoon or an evening according to the context.

⁶ The mathematic concept of opened or closed interval having of course no meaning in the context of a linguistic phrase or more generally of human reasoning.

⁷ There is a very large spectrum of temporal adverbials for which many global analyses have been made (Bras 1992). Our aim is to focus on the details of the functioning of a reduced number of phrases.

If we admit the principle of a semantic representation - for instance such as Rastier (1987 and 1989) proposes it - which would give us the means to gather the lexical items according to their properties of homogeneity and in conformity with the classification which has been introduced, we still need to establish the constraints which will enable us to change this representation into a prototype.

In the case of homogeneous units, what opposes one of them (for instance an hour) to the other (a minute or a day) can be represented at the level of a prototype which would be associated to it thanks to a relationship of temporal inclusion. A minute is included into an hour, the hour can be defined as included into a day, and so on.

In the case of heterogeneous units, the semantic opposition between a morning and an afternoon will be expressed, at the level of a prototype, by a relationship of temporal precedence. A morning precedes an afternoon, in the same way janvier (*January*) precedes février (*February*) etc...

Considered the sequence of the different utterances we notice that *Ce dimanche-là (...). Le matin (That sunday (...). The morning)* is acceptable, whereas *Ce dimanche-là (...). L'heure (That sunday (...). The hour)* is not.

so, if we wish to use a phrase of *le N (the N)* type - N belonging to the set of the homogeneous units - it is necessary to give further precision (in order to break the homogeneity) such as *le jour suivant (the next day)*.

This seems clear and would be compatible with what has previously been said concerning the definite nominal groups. This is not relevant for *l'heure (the hour)* for there are several hours in a given day such as the one introduced in *Ce dimanche-là (that sunday)*.

However, some examples seem more difficult to treat in the frame of our hypotheses. *Le matin (the morning)*, out of a context cannot refer to the current day. In the same way, *ce matin (this morning)* expressed in the afternoon refers to the morning of the day in which the afternoon is included (i.e the current day).

If we keep the interpretation we proposed for definite and demonstrative nominal groups, we must consider in the first case that the current day is not accessible and in the second case that the morning of the current day is salient in the discourse or the situation. We would have the following paradoxal situation: the morning of the current day would be salient whereas the current day would not. This seems difficult to admit and it is then necessary to refine the mechanism introduced in order to understand the grounds of the phenomenon.

3.1 Definite temporal phrases

We have shown the way *le N (the N)* works as a selection, inside of a set, of an element which can be qualified as - or called - N. However the problem of generic phrases has been very little treated, as well as the problem of phrases which refer to objects which do not belong to the perceptual space shared by two speakers. In this case it may happen there is no set in which we can find a N that fits. Though if we must carry on the analysis on this ground we must imagine there is one in any case and precise the requirements for its creation. In such a context the considered set is necessarily built on the basis of semantic datas. So, to identify *le matin* we not only need to possess a prototype associated to *matin* but also a representation which would allow us to oppose *matin* to other lexical items which might challenge it. In the introduction we pointed out that the study of temporal phrases may ease the understanding of the reference phenomenon for they seldom were under the influence of a predicate.

At this stage we notice that in addition to a prototypic representation of the set in which it is possible to extract Ns, it could be possible for the predicate in an utterance to guide or to restrict the choice of this set. The development of this idea would lead us far from the field of this article. Taking over the analysis of *le matin* we end with a reference resolution which may be expressed by the following diagram.



The computed set of the referent is then kin to a matching between the abstract set representing the day and a compatible element in the discourse memory recorded at this time, in order to display the very morning it is about. This mechanism explains sets of expressions such as *ce dimanche-là(...)* (*that sunday*) *Le matin* (*the morning*) ... The abstract day in which an abstract morning appears filters the day associated to *ce dimanche-là* (*that sunday*) (without giving new informations) in order to display a morning which easily opposes to the other parts of the day: *Le matin, je me lève* (*In the morning I get up*). In this example (supposed with no previous linguistic context) we cannot resolve the contextual referential phrase since nothing at all matches our abstract day. Consequently, our abstract day remains abstract and the phrase is then interpreted as generic.

Another difficulty appears in the case of *Le matin, je me casse une jambe* (*In the morning, I break my leg*) if we stick to a generic interpretation we are led to a contradiction between the utterance and the probability to break a leg every morning.

3.2 Demonstrative temporal phrases

3.2.1 Generalities

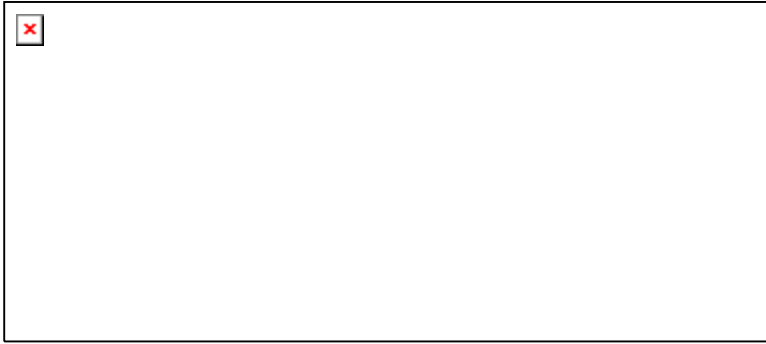
The second problem we shall ponder over now is the interpretation of a phrase such as *ce matin* (*this morning*) expressed at different moments of the day and not necessarily during the actual period associated to this phrase. The explanation we gave - which fits the constraints imposed by man-machine dialogue - was based on the notion that the referent was being salient when associated to the demonstrative phrase. However, in most of the contexts there is no explicit reference made to a peculiar morning which *a fortiori* forbids any saliency to sustain the analysis of *ce matin*. Though, it is possible to consider that at any moment the current instant (we can call NOW) is in a salient position in a dialogue . In the case of a narration a similar property can be observed for the moment of attention in the temporal unfolding. From now on the demonstrative phrase can be seen as a re-categorization of NOW under the shape of a morning. The main idea here is to consider that NOW supplies the P-properties necessary to the intanciation of the prototype associated to the notion of morning.

The prototype is of course the same as the one presented in the previous section:



In which the relationship between the morning and the other parts of the day is an abstraction of the temporal relationship of precedence we talked about in part 2.

Given this prototype describing what a morning is like, a demonstrative nominal phrase will be able to refer to an object of the universe which distinguishes itself from the nominal phrase according to P-properties (peculiar). In the present case, the only properties we can imagine (in the absence of a predicate) are those linked to the present instant. This allows us to draw the following diagram:



The important thing pointed out by this diagram is the fact that instantiating a sub-part of the prototype is enough to instantiate it as a whole. The final referent is of course on the sub part of the instantiated prototype which fits the N description to be found in the referential phrase. What distinguishes it from other Ns comes from another part of the prototype.

Now we can come back to phrases such as *ce jour sera célébré tous les ans* (*this day will be celebrated each year*). The computed set we view is always launched in a way similar to those presented up to here. Whether the prototype associated to *jour* (*day*) contains or not informations about weeks is not important here. But each time a day prototype is instantiated with an anchoring on NOW the predicate must be applied on it. Moreover, applying a predicate can lead to the withdrawal of a certain amount of properties among those of the set, gathering those of the prototype of Ns and the P-properties which have allowed to instantiate it. However we are submitted to two constraints

On the one hand, at least one P-property must remain in order to preserve the specificity of the instanciation of the N which has been chosen, and consequently forbids any genericity at the level of all Ns.

On the other hand there must be enough properties left for the object to be qualified as a N. The aim of *ce N* (this N) being to situate a referent in the N set.

The second constraint indicates that it is impossible to suppress properties among those which characterize, for instance, a day, to the point that it could as well be an hour or a month in the same context. In this way, in *Ce jour sera célébré* (*this day will be celebrated...*) it is not enough to keep what is celebrated (a victory, a birth etc...) we also have to keep the fact that the event happened at a day's scale.

3.2.2 Habits contexts

The analysis we have carried previously shows the necessity to stick to a temporal zone designated by a demonstrative phrase on the basis of an abstract prototype which draws its possible boundaries. This point is particularly interesting in the automatic treatment of demonstratives since the referential analysis becomes similar to a kind of pattern matching. To be able to extend the process to other types of demonstrative expression other axes of representation would still have to be defined (spatial for instance) on the basis of relationships similar to inclusion and precedence which are used to represent time. It is not our point here, furthermore other problems remain concerning the treatment of temporal phrases. One of these problems is the status which is to be given to the prototypes used in the referential sketches associated to demonstrative. The way they have been presented, it seems that for any given N, the associated abstract representation has unchanging characteristics so that it can be directly extracted from a computerized lexicon defined beforehand. However, observations of the occurrence of demonstrative phrases in the narrative context seem to indicate a phenomenon of particularization of the abstract sketches used for the analysis of temporal demonstrative phrases. In such a frame these phrases most often appear under the shape of *ce N-là* (That N) in order to raise the ambiguity related to the double temporal anchoring which can occur on the instant of the narration or on the focus of the story⁸.

If we rapidly scan the whole of a narration in which phrases such as *ce N-là* occur, we notice that they mostly appear in what we can call habits contexts, that is to say general descriptions of a behaviour which can

⁸ The analysis in terms of inclusion/exclusion (Debruyne 1992) seems too mathematic to reflect a phenomenon which belongs more to the discourse than to associated temporal ontology.

be more specifically instantiated in the field of demonstrative phrases. As an example, we can consider two short extracts by Maurice Leblanc in which temporal situations are introduced.

Le collier de la reine

The queen's necklace

Deux ou trois fois par an, à l'occasion de
solemnités importantes...

Twice or thrice a year, on solemn occasions
(...)

[...]

(...) The afternoon of the day his wife wanted to
adorn herself with it ...

[...], l'après midi du jour où sa femme voulait s'en
parer...

The same evening, at the reception at the Palais de
Castille.

Ce soir-là, à la reception du Palais de Castille,...

Le piège infernal

The diabolical trap

Les époux Dugrival et leur neveu, [...], presque
chaque jour...

The Dugrival couple and their nephew (...) almost
everyday (...)

En général, le ménage restait assis...

Generally, the couple remained seating...

La chance, ce jour-là, ...

By luck, on that day.

In both cases, the demonstrative phrases designates a peculiar evening or day in the context of a serie of usual behaviours. It is then impossible to state that in this context, the abstract evening or day which is instantiated is the more general prototype we can get at the lexical level. On the other hand in none of the cases encountered (in about ten novels or short stories by the same author) indicates a real anaphorical take up by the ce N-là phrase. Each time the aim is to indicate that the period displayed possesses something peculiar the rest of the narration is going to complete. This behaviour seems then to ratify in terms of opposition the analysis we have presented for temporal demonstrative.

We can then point out that the behaviour observed for demonstrative phrases may occur for some indefinite phrases which of course can introduce new temporal periods. Such a parallel justifies the similarity between the schemes associated to ce N (this N) and un N (a N) the main difference between them, that is to say the necessity of a pre-existing opposition for ce N (this N), being erased by the beginning of narration effect⁹.

The following example illustrates such a parallel:

Arsène Lupin en prison

Arsène Lupin in jail

Chaque jour, au coucher du soleil, ...

Everyday, at sunset...

Or, **un vendredi de septembre**, ...

When, one friday of Sempember...

It is clear that at this stage, in the field of an automatic analysis of demonstrative phrases, we are not able to define the computed set which would allow us to progressively define the abstract representations associated to the nominal heads according to peculiar contexts. The above observations, which should be completed by more accurate linguistic analyses, give us hints in order to precise the nature of the models we use.

4. Conclusion

In this article we have tried to apply a certain amount of hypotheses concerning the processes of referential interpretations to the specific cases of temporal phrases. We have then been led to consider a double movement. On the one hand, le N (the N) draws its reference under the shape of a micro-period originated from a wider temporal period (that is to say a temporal inclusion). On the other hand, ce N (this N) is based on a shorter period (often as a focus point in the discourse) and ends up in a macro-period.

working on temporal phrases has obliged us to refine the nature of general oppositions which have been introduced in our sketches. Since temporal phrases do not refer to material objects (in opposition to the exemples we were used to work with) it seemed necessary to introduce prototypes.

⁹ This effect occurs when defined descriptions appear without any previous context.

More generally the study of temporal phrases has raised the problem of the articulation of referential computed sets (opposition sketches inside of a set, of a situation) and of an ontology - in our case of the temporal zones- as the basis of a system of reasoning on this world. The first one is by nature linked to language and to its mechanisms whereas the second one is related to the knowledge of the world. At the temporal level, we notice that none of these levels of representation is superfluous. Consequently in the field of the automatic understanding of a reference we must have two types of diagrams. For *le matin (the morning)* the referential access of le N (*the N*) type finds its counterpart in a temporal sub-structure such as shown on the following diagram:



The referential part allows the discourse to keep a certain continuity (anaphorical take up etc) whereas the cognitive part is used as an angle stone for potential reasonings on time. So, the referential diagrams give a more abstract view of the represented world and express the fact that language gives more of a point of view on knowledge than a real description of them as opposed to what a too vericonditional semantic would like us to believe.

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