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Nous allons d crire ci-dessous une extension d'un syst me interactif de g n ration de phrases. Apr s une description de SWIM,—acronyme de See What I Mean ?— nous allons discuter la fa on dont on communique au syst me des notions relatives au temps et   l'aspect.

Avec SWIM nous poursuivons trois objectifs : (a) assister un  tudiant dans l'apprentissage d'une langue, plus pr cis ment aider l'apprenant   passer des id es aux phrases (production du langage); (b) visualiser la relation sens-forme.; (c) fournir un environnement voisin des conditions dans lesquelles on apprend naturellement une langue.

Savoir parler une langue n'est pas inn , c'est le r sultat d'un apprentissage. Selon le cadre on parle d'*apprentissage naturel* (on apprend dans le pays m me o  est utilis e cette langue) ou d'*apprentissage institutionnel* (enseignement). Une diff rence fondamentale entre les deux types d'apprentissage se situe au niveau du contr le. Dans un cas l'apprenant est *actif* (apprentissage naturel), - il utilise la parole pour r soudre un probl me le concernant (il cherche   obtenir des informations, il veut v rifier quelque chose, etc.) - tandis que dans l'autre cas il est essentiellement *r actif*, c'est- -dire qu'il ne parle que lorsqu'on le lui demande.

L'inconv nient majeur de l'apprentissage naturel est li  au fait que l'apprenant se trouve dans des situations o  tout change constamment : la situation discursive, les buts ou les intentions de communication, les contenus et les formes linguistiques correspondantes. Cela est normal, car l'objectif est la communication — faire passer un message en vue d'un but donn  — et non la fixation, l'explication ou l'illustration syst matique d'un point pr cis de la langue.

Quant   l'apprentissage dans un contexte scolaire (enseignement), les inconv nients en sont les suivants: (a) la situation est artificielle (on s'exerce pour apprendre la langue et non pour communiquer un message en vue d'un but

donn ); (b) le professeur ignore g n ralement la nature des besoins de l' l ve. Si l' l ve sait ce qu'il veut dire, en revanche, il ignore souvent comment le dire. Quant au professeur, il sait *comment le dire*, mais il ignore *ce que veut dire l' tudiant*.

Pour r soudre ce probl me de communication entre le professeur et l' tudiant nous avons con u un syst me o  l' l ve peut poser des questions et o  le professeur r pond. On notera, ce c'est l' tudiant qui a l'initiative du dialogue. C'est lui qui pose des questions, et il les pose en fonction de ses besoins.

  l'heure actuelle le syst me a plusieurs faiblesses et un des grands probl mes est celui de l'interface conceptuelle : comment lui communiquer le contenu du message, puisqu'on ne parle pas encore cette langue ?

Nous montrons dans la deuxi me partie de ce papier la fa on dont l' l ve communique des informations relatives au temps et   l'aspect. Ces informations sont d licates   transmettre pour au moins trois raisons : (a) il n'y a pas d'isomorphie entre les temps *conceptuels* et les temps *grammaticaux* (le "pr sent" peut aussi bien exprimer des  v nements qui ont eu lieu que des  v nements qui vont avoir lieu); (b) il n'y a pas de correspondance stricte entre les temps des diff rentes langues (c) la terminologie utilis e dans les manuels est trop abstraite. Elle pose des probl mes d'une mani re g n rale, et   plus forte raison lorsque la cat gorie m talinguistique utilis e n'a pas de correspondant dans la langue cible (le *pass  simple*, par exemple, n'existe pas dans toutes les langues).

Partant des travaux de Reichenbach et de Vendler nous avons con u un langage ic nique pour communiquer les informations relatives au temps. Pour ce faire, nous avons compl t  leurs id es tout en les rendant plus accessibles   l'utilisateur (m ta) linguistiquement innocent.

Mots clefs : entr e conceptuelle, g n ration de phrases, relations forme-sens, EIAO

1 Introduction

The major goal of the system described here is to provide a natural environment¹ for learning to produce sentences in French. In order to achieve this goal, we have integrated the student into the process. He should be *active* rather than *reactive*, that is, he should talk not only when being asked. After all, he knows what he wants to say, what he lacks are the means of translating his thoughts into language.

SWIM² is an exploratory environment which has been built to simulate *natural learning*. The student asks the questions and the system answers them. Any of the following questions could occur in a natural setting :³

- 1) How does one say *idea* ?
- 2) Can one say linguistic form ?
- 3) How should one say *idea* ?
- 4) Why does one say *form-1* and not *form-2* ?
- 5) What would happen if conceptual modification ?
- 6) What would happen if syntactic modification ?
- 7) What would happen if word *y* instead of word *x* ?
- 8) What is the difference between *form x* and *form y* ?

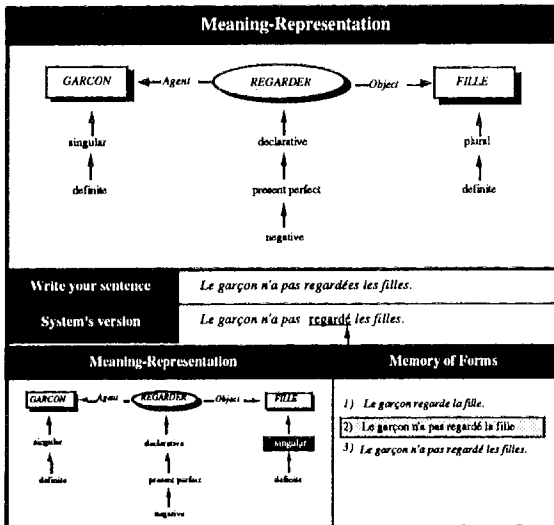


Figure 1

¹ A computerized learning environment is said to be *natural* if the transfer of knowledge is achieved essentially in the same way as could be the case between two human agents, where a learner (child, student) asks questions and the teacher (native speaker, parent/teacher) answers them.

² SWIM is the acronym of See What I Mean ? It has been conceived by Michael Zock and implemented by A. Laroui on a Macintosh.

³ For the time being only the first and last four types of questions are implemented for a small subset of French (simple sentences).

The first communication-mode (how does one say <idea>?) raises an interesting problem : how to tell the computer *what* one wants to say (message). The fundamental question here is in what terms to code thought and access it. Obviously, there are several ways. One could ask in another natural language (translation), one could use images, or one could use some form of metalanguage.

In this paper we discuss some of the problems that arise by using a metalanguage. We then show how a special category of thought, *tense*, can be communicated by using a hybrid form of representation. But, before doing so let us give a short description of the system. For more details see [29, 30, 31].

2 Description of the system

The dialogue is initiated by specifying the communication mode. Let us suppose that the user had started with the first question: How does one say <idea> ? In that case the system presents a menu (type hierarchy) from which the user has to choose:

Speech act : statement, question, command
 Actions - processes: taxonomy of verbs
 tense : present, past, future, etc.
 Discourse objects : taxonomy of nouns
 number : singular, plural
 communic. status : definite, indefinite,
 Attributes: taxonomy of attributes

By choosing specific values from a set of alternatives, the user tells the system what he wants to say.⁴ As the dialogue develops, the system builds the underlying meaning in the form of a semantic network. It then invites the user to try to express this meaning, after which it outputs its own form.

As one can see from Figure 1, the screen is divided into five parts. The large window at the top represents the underlying meaning of the message a student is trying to convey. The next two windows contain respectively the user's attempt to express this meaning and the system's version. Possible mismatches between these two versions are highlighted on the screen. This allows the system to draw the student's attention to errors. Actually, by looking at Figure 1 you can see that the student made a mistake in the verb agreement "regardé". Finally, the two windows at the bottom represent, from left to right, a snapshot of the system's

memory of meaning and the user's memory of form. The former is a device to display, hence to recall the underlying conceptual representation of a specific sentence chosen from the memory of form window, whereas the latter is an incrementally built database (trace) of all the sentences encountered so far.

The idea behind this separation is to allow the user to make a contrastive analysis of meaning and form between

⁴ For more details concerning the interface controlling the conceptual input (what to say-component), see Zock (1991).

two sentences.⁵ Choosing a sentence in the memory of form window gives a representation of the sentence's meaning in the memory of meaning window. By comparing the surface form and the underlying meaning of two sentences, the user can appreciate the relationship between meaning and form. The critical feature, the one that is responsible for the difference of form, is highlighted by the system. In our example it is the value "singular".

Past this point, the user has various options : either he continues in the basic communication mode (How does one say <idea> ?), or he changes the kind of question he wants to ask. Let us suppose that he wants to build a completely different sentence. In this case he could either go through the whole routine, which is quite cumbersome, or he could perform the conceptual changes directly on the graph. Obviously, this latter method is much faster.⁶

Actually, everything you see on the graph, except deep-case relations, is considered by the system as a variable whose value may be changed directly by the user. In order to do so, he clicks on any of the shown attributes (verb, tense, mode, etc.) and chooses a new value. For example, if he clicks on the verb "regarder" (to watch) the system answers by displaying a list of candidates from which we must choose. By clicking on the feature "present", the system shows different values (present, past, future, etc.) of the variable "tense", etc. Everytime the system is given some piece of information it will change the meaning representation accordingly and, if asked, output the corresponding form. For example, if one started from sentence (a) asking the system to change the number of the direct object from "singular" to "plural" it would produce (b). If one asked to change the tense from "simple past" to "present perfect", it would produce (c), etc.

- a) Le garçon regarda la fille (the boy watched the girl)
- b) Le garçon regarda les filles (the boy watched the girls)
- c) Le garçon a regardé les filles (the boy has watched the girls)

As one can see, this method allows for local as well as for global changes. Actually, the dialogue described corresponds to the communication mode 5. If one changes only one value each time, asking the system to tell right away how this meaning change is reflected in form, one can very quickly build and explore a large search space. It should be noted, that this kind of dialogue between man and machine is much faster and

less tedious than it would be between a student and a teacher. The change of meaning and the system's generation of the corresponding form take about a second, even for an untrained user.

Another communication mode the system allows for is called: What would happen if <syntactic modification>? This mode allows the user to perform certain transformations such as passive voice or pronominalization. In the latter case, the system will ask the user to specify which element he wants pronominalized (the boy, the girl, or both). Assume that, starting from the conceptual structure underlying sentence (a), the user wants to pronominalize respectively the agent, the object, and finally both arguments. In these cases he would get the following outputs :

- Il regarde la fille. (he watches the girl)
- Le garçon la regarde. (the boy watches her)
- Il la regarde. (he watches her)

By exploring and contrasting the different possibilities, the user is meant to learn how variations of meaning are reflected in form.

3 Discussion

We have described a computerized learning environment that has several interesting features : (a) it allows a potential user to learn French on his own. (b) it fosters learning through exploration (hypothesis-testing, inductive learning); (c) it allows the user to ask questions rather than simply answer them. As he knows best what his needs are, he is most likely to ask the right questions at the right moment;

On the other hand, the system has also various shortcomings: (a) the *linguistic coverage* is extremely small : only very simple structures can be used; (b) the conceptual interface is a *surface-* rather than a *deep-structure* component (it already contains the lexical items, i.e., the program thinks in terms of the target language); (c) the *size* of the discourse universe : one can only talk about a very limited range of facts; (d) the *rigidity* of the conceptual component : the order in which the meaning is conveyed is defined a priori. The choice of verbs always precedes the choice of the nouns; (e) the *terminology* used (*metalinguage*) may be inaccessible to the linguistically innocent user.

In the remainder of this paper we will only be concerned with the last point. More precisely, we will focus on the problem of conveying the notions of time, tense and aspect. For a proposal of how to increase the power and flexibility of the conceptual component see [33, 34].

4. Sentence generation and tense specification

While much attention has been devoted to the problem of *representing* and *interpreting* tense [2, 13, 13a, 13b], little, if any attention has been devoted to the problem of *generating* tense in the context of natural language generation. A notable exception is the work of V. Ehrlich [6] who describes the properties of a situation (a convenient neutral term for making indiscriminately reference to events, actions, processes, states) in terms of category, aspect, relation, and position.

Sentence generation consists of translating a conceptual structure into a surface form. Obviously, information concerning time, tense and aspect is part of the

⁵ See communication mode 8 : What is the difference between <form x> and <form y> ?

⁶ Actually, that is one of the major advantages of abstract representations compared to, let us say, icons. Another advantage is that this kind of representation shows on-line how conceptual or pragmatic choices affect the intermediate structure, hence more or less directly the final form. In consequence, by displaying on-line the way how the intermediate structure changes after each choice, we have a means of moving from a black box to a glass box. The former only shows how changes of the input (conceptual choices) are reflected in the output, whereas the latter also shows how discourse choices (topicalisation, word choice, etc.) affect the intermediate levels.

conceptual input. The problem is in what terms a naive user could communicate these abstract notions.

4.1 The problem of choosing the right form

Tense can be communicated by choosing among a set of metalinguistic terms (past, present, future, etc.). These terms are actually used in schools, in text books and even in intelligent tutoring systems [7, 8]. Yet this approach has several shortcomings :

(A) Students are not linguists. While notions such as "past, present, future" seem to be meaningful when we deal with simple tenses, things change rapidly as soon as we move to more complex tenses like *present continuous*, *past perfect*, etc. The student is certainly short of intuition when he comes across tenses for which there is no equivalent in his mother tongue.

(B) There is no one-to-one correspondance between grammatical tenses and semantic values. The "present forms" are quite often used in order to convey the meaning of the past, the present, or the future (1-4). In a similar vein, *past forms* can be used with a *present* value (5)

- 1) *J'arrive à l'instant. (I have just arrived.)* PAST;
- 2) *Je réfléchis. (I'm thinking.)* PRESENT;
- 3) *J'arrive dans un instant. (I'm coming right now.)* FUTURE;
- 4) *J'arrive. (I just arrived.)* PAST, - (*I am coming.*) FUTURE.
- 5) *Je venais vous demander une augmentation (I just wanted to ask for a salary increase)* PRESENT;

(C) The possibility of using a certain form depends on the context of the sentence (presence of a temporal adverbial, nature of the subject and complements).⁷ Consider the following examples :

- 6) *Je suis content (I am very glad);*
- 7) * *J'étais content (I was glad);*
- 8) * *J'ai été content. (I have been glad);*
- 9) *Hier, j'étais content. (Yesterday, I was very glad.);*
- 10) * *Hier, j'ai été content. (Yesterday, I have been glad.);*
- 11) *Hier, j'ai été content d'apprendre ton retour (Yesterday, I was glad to learn that you were coming back).*

While (6) is quite acceptable, its translations into past — be it the *simple past* (7), or *past perfect* (8), — need an explicit reference. Moreover, the form of the *past perfect* in French can only be used if one refers to an event, — the ingression of a state, — as in (11).

5. How to visualize tense ?

Icons provide a very natural way of representing tense. Several grammars for English [21] and for French [10] make use of them. We draw on these sources and adapt them for SWIM. In order to do so we provide the user with a basic set of elements for translating tense into icons : (a) a time axis; (b) a representation of the point of speech (NOW) on the time axis; (c) a set of types of

situations (state, event, etc.); (d) a frame of reference (a window); and/or (e) a point of reference.

The time axis represents the intuitive notion of time as an oriented linear structure. The time of vertical arc locates the time of utterance: on the left hand side is the past, on the right the future. The situation to be referred to can be communicated by choosing an icon from a set of alternatives (see figure 7). The last two components, the *frame* and the *point of reference* represent the way (point of view) the speaker looks at the situation.

We start by describing these basic elements and illustrate their use through examples. We then explain how these elements are related to form a coherent metalinguistic vocabulary.

5.1 The basic elements

The minimal machinery necessary for generating tense is composed of a *time axis* with a *point of speech (now)* and a means of locating an action/event with respect to this point of speech (Figure 5).



Figure 5

Reichenbach used the following concepts to characterize tense: a point of speech (S), a point of reference (R) and a point of event (E).⁸ Furthermore he used two kinds of connectors in order to express the fact that two events coincide with one another ("="), or that an event preceded another ("<"). The following formulas shall illustrate his classification.

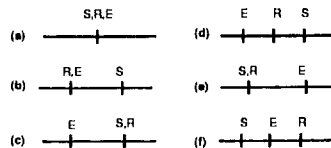


Figure 6

- | | | |
|-------------|-----------------|------------------------------|
| (a) S, R, E | present tense | <i>I see Paul</i> |
| (b) R, E, S | simple past | <i>I saw Paul</i> |
| (c) E, S, R | present perfect | <i>I have seen Paul</i> |
| (d) E, R, S | past perfect | <i>I had seen Paul</i> |
| (e) S, R, E | simple future | <i>I will see Paul</i> |
| (f) S, E, R | future perfect | <i>I will have seen Paul</i> |

Since then the system has been extended or re-interpreted by a number of authors [3a, 12a, 12b, 24, 24a, 25a, 28a].

(A) *Types of situation and corresponding icons:* A sentence refers to some point in time (temporal situation). A situation will be represented by any of the following icons

⁷ When using a specific tense one should also be sensitive to the kind of inferences the addressee might draw. For instance, the following two sentences have completely different implications. : (a) *I've been thinking about you.* (b) *I thought about you.* While (a) suggests that one cares for the person one is talking to, (b) implies that one doesn't care any more. (We owe this example to Nicolay Vazov from the university of Sofia)

⁸ Point of speech refers to the very moment in which the utterance takes place (now). The point of reference is the perspective from which the event is considered. The point of event is the very moment at which the event took place (yesterday).

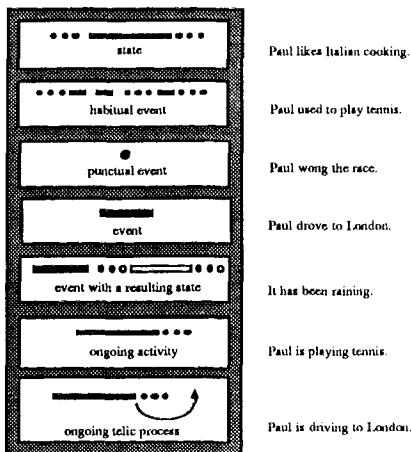


Figure 7 : Types of situation and corresponding icons

A state is considered as covering a stretch of time with no definite boundaries. The icon representing this suggests its open-endedness by having fuzzy delimiting zones. Both ongoing processes and activities have a well-defined starting point but no determined point of termination. Note however, that activities can be interrupted at any time and be reported as events. Let us suppose that "Paul was swimming", and then stopped. This can be reported by «Paul swam». Telic processes do not have this property, because they have some natural point of completion. If «Paul was swimming across the Channel» and then stopped swimming, we could describe this situation as *Paul has been swimming*, but we could not say «Paul swam across the Channel.» In that case, the point of completion can be referred to, even if it is never reached: «Paul was swimming across the channel, but he never made it». The situation can also be considered as indeterminate: «Paul was swimming across the Channel when I last heard about him».

An *event* has both a starting point and a point of termination. It can be punctual or not. According to Reichenbach it is represented as a point or an interval, whereas we allow for the additional use of a frame. An *event* can also be considered with regards to the result of its occurrence. There are events with a resulting state. In the corresponding icon, we represent this state as adjacent to the event which has brought it about. Usually, the precise nature of this resulting state needs to be inferred (cf. [10]): *It has been raining; in consequence the pavement is wet, it got colder, there are puddles in the street, my hairdress is spoiled, etc.*

Habitual events are an undetermined number of events. The icon of habitual events is meant to suggest their resemblance to states. It should also be noted that the number of events may be conceptually indefinite. Compare: (a) *I played tennis many times last year.* (b) *I used to play tennis when I was a young man*

In first case we are dealing with a sequence of individual events, not with a habitual event. Hence it is quite

possible to continue the dialogue by asking the following question "how many times did you play?", while this question seems quite odd in the second case.

(B) *Frame of reference, point of reference*: Optional elements are a *frame of reference* and a *point of reference*, both of which can be manipulated by the user. The former consists of a window which represents the period of time considered by the speaker. It is usually associated with a temporal adverbial (*Yesterday Paul visited the Eiffel Tower*). The point of reference can be used in order to represent some instant which plays the role of a translated point of speech (*In 1980 Paul had already visited Paris twice.*).

5.2 Using these elements to produce a time scenario

The procedure is as follows: (a) Choose a suitable type of situation (icon) to represent the temporal structure of the situation; (b) Position the icon relative to the point of speech; (c) If necessary, introduce and position a frame and/or point of reference and position it. (d) In the overall representation, some part of the situation should be adjacent to, or included in an element of reference (point of speech, point of reference, frame of reference). If not, reexamine step (c).

Suppose we have an untensed representation of : «Paul aime la cuisine italienne» (*Paul likes Italian cooking*). In order to generate the tense, we choose a state and the position of the point of speech on the time axis (Figure 8a). From this representation the corresponding time (present tense) can be generated.

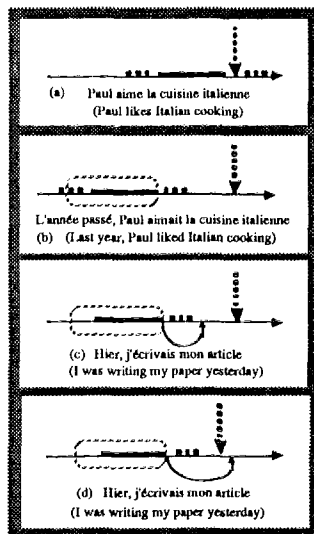


Figure 8

Figure 8b conveys the same message as 8a in the past. Since no direct reference to the point of speech is available, a frame of reference is necessary. Here it plays the same role as the point of speech in figure 8a. If the user adds the adverbial «l'an passé» (last year) as a marker of reference, we get *l'an passé, Paul aimait la cuisine*

italienne) (Last year Paul liked Italian cooking.) The interpretation of «*aimer la cuisine italienne*» (to like Italian cooking) in terms of a *state* should be distinguished from its interpretation as an *event*. The latter would be the instantaneous change from one state to another. That's why we need further specifications: «*Quand Paul a rencontré Gina, il a aimé la cuisine italienne.*» (When Paul met Gina, he began to like Italian cooking). Figures 8c and 8d show two possible representations of similar, yet different situations. The completion of the work is not precisely determined in this case.

Among the difficulties faced by a learner of French is the dual value of "passé composé". Consider, (*Hier*), *j'ai écrit mon article - I (yesterday) I wrote my paper*) In one interpretation (figure 9a), the *writing of the paper* is considered as a past event. Locating the action within a reference frame requires the use of an adverbial like «*hier*» (yesterday).

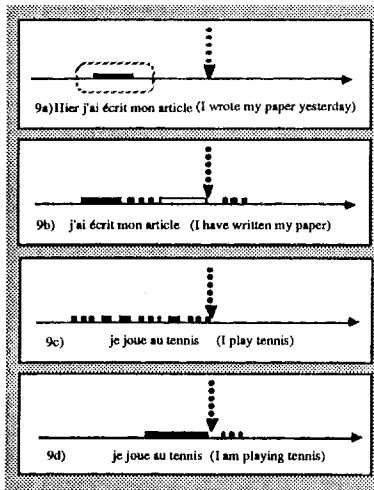


Figure 9

This case is to be differentiated from the situation depicted in Figure 9b. Here the implicit reference is *now*.

The past event is considered with respect to the state resulting from it (present relevance). In fact, the same tense is used in this case in French, whereas «*Yesterday I wrote my paper*» would be used in English in case (9a), and «*I have written my paper*» in case (9b).

Another typical case of ambiguity is the use of the "present tense" in French. The Figures 9c and 9d, while different in English, yield the same form in French. The first one (9c) signals habitual or repetitive use of the present tense, corresponding to «*I play tennis*». The second situation corresponds to «*I am playing tennis*», implying an ongoing activity at the time of speech. Please note that the first situation does not imply any actual activity at the time of speech, but only a general validity of a kind of property. As the icon suggests, it looks very much like a state.

6. The underlying temporal ontology and its use for generation

6.1. Types of situation and corresponding icons

Our classification of types of situation (cf. also [2]) is based on conceiving the temporal structure of a situation as a result of (a) the lexical meaning, the tense and the aspect of a given verb, (b) the nature of the subject, the complements and the time adverbials.

Lexical meaning : We basically subscribe to Vendler's typology [26] who classifies situations in terms of states, activities, accomplishments and achievements. Nakhimovsky, in a more recent classification [17], introduces additional features (generic vs. specific resources for atelic processes) to Vendler's punctuality, stativity, and telicity. Our classification is based on four classes of lexical meanings, corresponding to combinations of the features: punctuality, stativity, telicity.

- punctual events (punctual, non stative, atelic);
- states (non punctual, stative, atelic);
- telic processes;
- atelic activities;

Aspect is related to the perspective from which a given situation is viewed. Following Comrie [4], we distinguish between perfect, perfective and imperfective aspect. In French, the *imparfait* (continuous past) is a typical *imperfective* form: a situation is considered from the inside. *Perfective*, on the other hand, considers a situation as a whole. *Perfect* is related to the consideration of a given event together with a new state which is a consequence of this event happening, for example, *I have prepared some coffee*.

In our system, *perfect* is represented by an event with a resulting state. Aspect plays a dual role: it determines the type of situation and it allows for choosing a specific frame of reference.

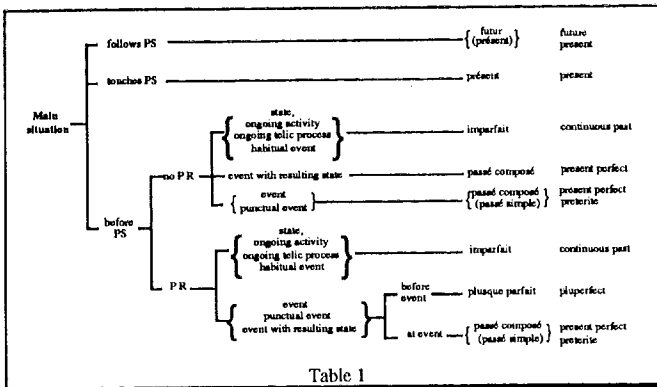
Lexical meaning combined with the aspect of the verb, the types of the subjects and complements, and the temporal adverbials yield the type of situation. For example, the verb *écrire* (to write) has an intrinsic lexical meaning : atelic activity. However, it can change :

- Paul écrivit un roman (John wrote a novel)* : telic process;
- Paul écrit des romans (John writes novels)* : atelic activity;
- Paul écrivait un roman (John was writing a book)* : ongoing process.

6.2. How to choose the right tense ?

The following table shows how tense could be computed on the basis of an iconic representation of a situation. The system determines the position of the *main part* of the situation relative to the point of speech (PS). The qualification is necessary only in the case of an event with a resulting state, where the event is the main part of the situation.

If the main part of the situation is posterior to the point of speech, a future tense is chosen by default, though *present tense* remains a possible candidate. Using either or amounts to communicating a special modal nuance.



- (1) *Quand le directeur est entré dans la classe, les étudiants travaillaient* (When the headmaster entered the classroom, the students were working);
- (2) *Quand le directeur est entré dans la classe, les étudiants ont travaillé* (When the headmaster entered the classroom, the students began to work).

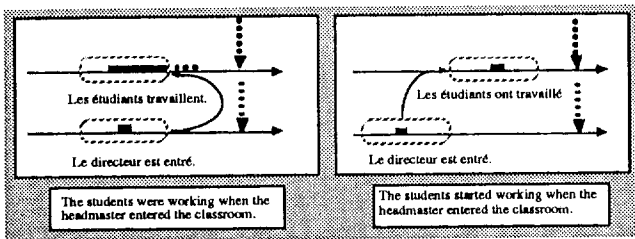
See figure 10

The first case represents an ongoing process or activity, with an event occurring somewhere in the middle of it, while the second is a sequence of two adjacent events. So far we handle the case of *quand* (when), using icons and strategies similar to the ones described by Moens & Steedman [16].

The way in which temporal subordinate clauses reflect on the types and order of the situations has been examined in the literature ([24, 15, 16]).

7 Conclusion

We have presented in this paper a method of visualizing time, tense and aspect. By using icons we have provided the user with an interface that allows him to translate abstract thought into concrete thought. The advantage being that his thoughts are expressed in terms of concrete actions rather than in terms of a (meta)language, which is often



specified, and if the type of situation is an event, one can use the *past perfect*. In the case of an event or a punctual event, the *past perfect* is a stylistic alternative (polished style).

Temporal adverbials are classified as (a) *time-position adverbs* (last night, on Monday); (b) as *span and duration adverbs* (for a month, up to 1979); or (c) as *frequency adverbs* (usually, often). Temporal adverbs constrain tense generation. Durational adverbs may enforce a habitual meaning on verbs having an intrinsic punctual meaning: «He has been diving for several months now.»

Temporal subordinate clauses: In the case of simple sentences, the task of determining the tense from an icon is straightforward. More subtle strategies are needed in sentences with temporal subordinate clauses⁹. Suppose the main clause concerns «students working» (PAST), whereas the subordinate clause is «the headmaster entering the classroom» (PAST). Let the temporal conjunction be *quand* (when). Then we have two possibilities:

⁹ We leave aside the problem of generating subordinate clauses in the subjunctive mood; many temporal conjunctions (e.g. *avant que* : *before*) require the use of the subjunctive mood.

too abstract to be meaningful to the native user.

8 References

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