Some Determinants of the Production of Temporal Markers

BRONCKART, Jean-Paul

This edited book addresses four themes of contemporary importance in the experimental and applied analysis of behaviour, namely chronobiology (relationships between time and behaviour), the emergence of rational thinking, language, and behavioural medicine. The current empirical and theoretical status of each theme is considered in individual chapters of which the authors are distinguished research scientists drawn from a wide range of scholarship and with a distinctive European dimension. This cultural and theoretical diversity emerges from the fact that each chapter is developed from a paper originally presented by invitation at the Second European Meeting on the Experimental Analysis of Behaviour, which was held in Liège, Belgium in 1988.

Within the four themes, individual topics address issues such as circadian rhythms in behaviour, temporal regulation in children and in animals, the emergence of equivalence relations in children and animals, the development of thinking in mentally retarded children, reasoning and associative learning in animals, rule-governed behaviour, theoretical issues relating language to the theory of mind, the relationship between behavioural and visceral functions, the relevance of behavioural approaches to the prevention of AIDS, and the development of self-detection skills for breast cancer.

The book makes an important contribution to the literature of contemporary behaviour analysis by reviewing issues of current interest and importance from a broad theoretical base. The book complements Behaviour Analysis and Contemporary Psychology (Lowe, Richelle, Blackman and Bradshaw, Eds.) which emerged from the First European Meeting on the Experimental Analysis of Behaviour and was published by Erlbaum in 1985.
Some Determinants of the Production of Temporal Markers

J. P. Bronckart
Faculté de Psychologie et des Sciences de l’Education, Université de Genève, Genève, Switzerland

The primary objective of this chapter is to present several aspects of a research project which is currently underway and the goal of which is to identify the parameters which govern temporal markers in texts produced by children.

The study has three main features. First, it is developmental in that we are working with children of three different ages: 10, 12 and 14 years. Secondly, it is comparative in that five languages are being studied simultaneously: German, Basque, Catalan, French and Italian. Thirdly, for theoretical reasons we will discuss later, it deals with four different types of texts: narratives, reports, conversational stories and explanatory texts.

For each of the five languages and each of the three age levels, we asked four groups of 30 pupils to produce the four types of text. Our study thus involves 1800 texts produced by 1800 different subjects.

The object of our investigation (the dependent variables of the experimental design) is temporal markers; that is, the following linguistic units:

1. The verbs themselves (or the verbal lexemes);
2. The verbal endings (or “tenses”);
3. The different kinds of auxiliaries;
4. The temporal adverbs distributed within the verbphrase;
5. The various types of temporal connectives distributed within the sentence unit (conjunctions, temporal adverbs, temporal prepositional phrases).

In what follows, we will present successively:
after Piaget): Children under 6 years of age, because of the egocentrism of their reasoning, are only able to take into consideration the internal characteristics of the action; with access to concrete operations and the resultant development of decentring abilities, they become capable of situating the moment of the action in relation to the moment of production and, thus, to construct genuine temporal relations.

The Discursive Outlook

These initial data have been criticised on three accounts. First, a series of replication studies using similar experimental paradigms were carried out (Di Paola & Smith, 1978; Harner, 1980; 1981; Smith, 1980). These studies did not refute the general trends observed (they confirmed, in particular, the clear dependence of the choice of tenses with regard to the verbal item in the case of young children), but they also showed that children of less than 6 years of age are capable, in certain situations, of using verb endings to code temporal relationships. The “Strong Decentring Hypothesis” must therefore be abandoned.

Secondly, many authors have stressed the distinctly artificial character of the experimental situations used, on two points:

1. The technique of the mime (and the use of toys) considerably reduces the types of actions which can be carried out and, hence, the types of sentences which can be proposed to the subjects.
2. The sentences are context-free, which makes it possible only to deal with one aspect of language, namely its representative function, which is not its most interesting aspect when one is attempting to investigate a category as clearly deictic (and, hence, communicative) as time.

The third type of criticism concerns the very conceptualisation of the categories “time” and “aspect”. Rejecting the sentence-oriented outlook which is implicit in the works we have just mentioned and adopting a resolutely textual approach, many authors revealed the existence of other factors (or determinants) likely to govern the use of temporal markers in a text. The following factors, in particular, were mentioned:

1. The type of text produced. Researchers such as Benveniste (1959) and Weinrich (1964) have distinguished between “discursive” texts and “narrative” texts and have shown that these two forms use clearly distinct paradigms of temporal markers. Further investigations were carried out by Vet (1980) and Simonin-Grumbach (1975), the latter showing that in French, there existed at least four subsystems of temporal markers: two systems on the “discourse” side (discourse in situation and theoretical discourse) and two on the “narrative” side (conversational story and the narrative proper).

2. The text plan. With respect to stories and narratives—in particular, since Propp (1928)—there is evidence of the existence of superstructures (i.e. relatively precise text plans) organised in successive phases. Building on the work of Labov and Waletzky (1967), most researchers define these phases in terms of origin, exposition, complication, evaluation, resolution and coda. Various authors (e.g. Schiffrin, 1981, for English; Fayol, 1981; 1985, for French) have shown that the distribution of various temporal markers is dependent on the phase of the plan.

3. The mechanisms of cohesion. Weinrich (1964) was the first to hypothesise that temporal markers also served to distinguish the foreground from the background of a text, and this theory was confirmed by Hopper and Thompson (1980), who stressed the more generalised role of temporal markers in maintaining textual cohesion (this concerns a new analysis of the phenomenon described classically as the “sequence of tenses”).

4. The modalisation mechanisms. Various temporal markers apparently help express the enunciator’s stand in relation to certain aspects of the content he is evoking (expression of probability, certainty, etc.).

These studies have two important implications for us. First, any analysis of the determinants of the production of temporal markers in a text implies that not only should the two traditional factors of the characteristics of the action and the temporal relationship be taken into account, but also the four factors listed above. Secondly, the setting up of an experimental research to ascertain the respective weight of these factors implies the formulation of a general model of discourse production which arranges these various potential determinants in hierarchical order. We will now discuss the general characteristics of this model, on which we have been working for about 10 years and which was first described exhaustively in our collective work Le fonctionnement des discours (Bronckart et al., 1985).

FRAME OF REFERENCE

Two aspects of our frame of reference are presented here. First, the general principles modelled on the theory of social interactionism, specifically on Vygotsky and Leontiev’s theory of activity (see Wertsch, 1979). These principles will enable us to formulate hypotheses on the status of verbal behaviour and its determinants. Next, some proposals are put forward concerning the linguistic operations which underlie the production of these same behaviours, in particular, the production of temporal mar-
The term "linguistic operation" is related to that of "cognitive operation", as used by Piaget.

General Principles of Social Interactionism

First, human beings form groups and function within these groups; their behaviour develops within the framework of various interactions or activities which find their expression in actions of diverse kinds. These actions can be defined as sets of behaviours oriented by a goal and determined by four social parameters:

1. The social setting, or the institution in which the action takes place.
2. The social role (or social situation) of the enunciator.
3. The social role of the addressee.
4. The purpose of the interaction or the goal which we define as the "projection of the effect of the action on the addressee".

The value which each of these parameters of social interaction take on (What institution is concerned? What social roles are being played? What goal is pursued?) define a given linguistic action. For example, in the social context "university", a linguistic action is initiated by an individual playing the role of teacher, for the benefit of other individuals having the status of students, in order to convince the latter to read Skinner's book Verbal behavior in its entirety.

Secondly, although linguistic actions are primarily social, they are also concretely anchored in a physical situation which we call the "enunciation situation" and which is defined by four other parameters: the time of the action, the place of the action, the producer and the co-producers (the interlocutors).

The parameters of social interaction, as well as those of the enunciation situation, define the context of a linguistic action.

Thirdly, linguistic actions are executed in the form of verbal signs which convey a certain number of representations of the world. We suggest that these representations are organised in the memory of the interlocutors, prior to being translated into verbal behaviour. They constitute the referent of a linguistic action.

Fourthly, the two aspects of the context (the parameters of social interaction on the one hand, and the physical act of enunciation on the other), together with the referent, make up the entire set of potential determinants of a linguistic action. They provide a possible explanation for the characteristics of verbal behaviour.

Fifthly, the observables of the linguistic action (or of verbal behaviour) are textual corpora, which can be broken down into linguistic units (morphemes). These minimal units of textual corpora could be the object of a first, descriptive analysis; they can be identified, labelled and categorised using the strict distributional approach proposed by Bloomfield (1933).

Finally, these same observables can also be the object of a second analysis, this time explanatory. Indeed, if every linguistic unit is under the control of extralinguistic determinants (referent and context), from a psychological point of view, we can consider that the production of each unit is the result of operations performed on the context and on the referent within the constraints imposed by the system of the natural language being used. The notion of "linguistic operation" accounts for the psychological processing to which extralinguistic parameters need to be subjected if effective verbal behaviour is to result.

The Linguistic Operations

In Le fonctionnement des discours, we constructed a first operations model. I will now present certain aspects of this model, limiting myself to the elements pertinent to temporal markers. It is a simplified sampling, which deliberately bypasses a number of thorny problems, such as lexicalisation in the case of natural languages and those related to the heterogeneity of texts. Let us recall that the object of these operations is the different types of processes that subjects have to perform on the parameters of the content and the context, within the constraints of a given natural language, to culminate in a text per se. These operations are extemporaneous in character and in no way compromise processes which subjects initiate, in real time, in the actual production of statements. I will present four categories of operations.

Category 1. The first category of operations involves the structuring of the referent and its lexicalisation. Let us look at its two main aspects:

1. As we have already said, the referent of a text (its content) is pre-organised in the mind of the speaker. We postulate that this organisation is based on a distinction between two forms of representation: "notions" (representations of objects) and "relations" (representations of relationships between notions). We likewise postulate that these representations have properties, the result of the empirical experiences of the subject in the world. With regard to relations, which alone concern us here, the two main properties are the degree of transitivity and the degree of perfectivity. A relation can be transitive to various degrees (it can link one or more notions) and it can be perfective to various degrees (it can change more or less profoundly the notions to which it applies). To simplify, the combina-
tion of these two classes of properties makes it possible to distinguish relations of state (generally expressed by a sentence like “John is tired”), imperfective processes (“John sees a three”), and perfective processes (“John broke a chair”). The properties of these relations, which pre-exist in the memory of the speaker, correspond in part to what is customarily called “aspect” in linguistics and constitute the first potential determinant of the use of temporal markers.

2. When a text is produced, the various representations of the world are the object of lexicalisation within the framework of the natural language used: They are concretised by means of one of the signifiers available in the language and familiar to the speaker. In the case of relations, this concretisation will generally consist in the choice of a verb, and this choice (as shown in experiments mentioned in the first part of this chapter) constitutes the second potential determinant of the use of temporal markers.

Category 2. The second category of operations concerns the choice of the type of text. In every language, there exist different kinds of textual organisation, which are sometimes referred to as “forms of text”: story, narrative, theoretical discourse, report, explanation, argumentation, etc. One must be clearly aware that several types of text can be chosen for a given linguistic action, defined by the parameters of social interaction which we have already discussed. Let us use our previous example. A university professor initiates a linguistic action consisting in persuading a student to read Verbal behavior. He then has the choice between several discourse possibilities:

1. He can elaborate a discourse emphasising the intrinsic qualities of this book. The result will be a theoretical and/or argumentative text.
2. He can also tell how he discovered the book, the difficulties he experienced at the outset in reading it and, finally, the interest he took in the book. In this case he would produce a story.
3. He can question his students about the reservations they might have and discuss these reservations with them, in which case he will construct a discourse in situation.
4. He could perhaps think up a parable or a symbolic story and thus enter into the narrative form of discourse.

To our view, the operation consisting in the choice of the type of text is the result of a double calculation, involving the parameters of the social interaction—a calculation of the relationship existing between the content (or referent) and the parameters of the interaction—and a second calculation of the relationship between the material parameters of the enunciation and the same parameters of social interaction.

The first calculation consists in establishing a relationship of disjunction or conjunction between the referent and the interaction. The referent may either be placed “outside” of the interaction, in which case it is disjoint and this disjunction is marked by an “origin” (yesterday, one day, once upon a time)—this is the case with stories and narratives; or, the referent is not placed outside, in which case it is conjoint, whether the conjunction be real or symbolic—consequently, there is no origin as is the case in theoretical texts and discourse in situation.

The second calculation consists in establishing a relationship of either involvement or autonomy between parameters of the social interaction and the enunciation situation. Either the goal and the mode of interaction “involve” and “solicit” the time-space of the enunciation or the interlocutors (this is indicated by the presence of deictic pronouns and deictic adverbs, and this is typical of the discourse in situation and of the story); or, the goal and the mode of interaction do not interact, and this is indicated by the absence of these very markers, which is characteristic of narratives and of theoretical texts.

The product of these two calculations enables us to define the four textual archetypes of French (see Table 8.1): the DS (“discourse in situation”), the CS (“conversational story”), the TD (“theoretical discourse”), and the N (“narratives”).

With regard to the observables of verbal behaviour, the choice of the type of text has two main consequences:

1. The selection of a subset of linguistic units, more or less specific in type, especially a subset of temporal markers.
2. The construction of a form of plan, which is also specific; narrative superstructure: story, theoretical argumentation or discourse in situation plans.

The choice of the type of text, therefore, makes up the third potential determinant of the use of temporal markers, and, as many authors have shown, the text plan phases constitute a fourth.

<table>
<thead>
<tr>
<th>TABLE 8.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Four Textual Archetypes of French</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Conjunction</strong></td>
</tr>
<tr>
<td>Involvement</td>
</tr>
<tr>
<td>Autonomy</td>
</tr>
</tbody>
</table>

DS, Discourse in situation; CS, conversational story; TD, theoretical discourse; N, narrative (after Bronckart et al., 1985).
Category 3. The third set of operations corresponds to what is traditionally referred to as temporal relations. On this point, we draw on Reichenbach’s (1947) trichotomous conceptualisation. According to the solutions proposed by Reichenbach, establishing a temporal relation means setting up a relationship between three elements: the moment of the event referred to, the moment of speech, and a moment of reference which Reichenbach calls “psychological”. Let us take as an example the following statement:

Cette année, je donne un cours de linguistique générale à l’Université de Genève.

One immediately observes that the use of the present tense does not express a relation of simultaneity between the moment of speech and the moment of the event (I am not teaching a course at this very moment!); rather, it expresses that the moment of the event and the moment of speech are both within a moment of reference expressed by cette année. Transposing this concept to the textual plane, we can consider that each type of text contains an axis of reference which has a precise relationship to the moment of speech, and that the different events or states mentioned in the text are pinpointed or situated in relation to this axis of reference. Let us take a classic example of a narrative text.

Le 12 décembre 1602, les savoyards établirent leur camp sur la colline de Cologny; le lendemain, il pleuvait et ils firent une brève reconnaissance de la ville de Genève; trois jours après, leur capitaine, qui avait beaucoup réfléchi, décida d’attaquer à la nuit tombée . . .

In this excerpt, the origin (le 12 décembre 1602) expresses the relation between the moment of speech and the text’s temporal axis of reference. This axis consists of the same origin together with its temporal relays, which are in the text (le lendemain, trois jours après) and each event expressed by a verb is situated in relation to this axis. Direct temporal pinpointing gives the two basic tenses of the narrative in the French text, the passé simple and the imparfait; more complex pinpointing, which we will not describe here, produces tenses such as the plus-que-parfait (avait réfléchi) the passé antérieur, and so on.

Category 4. The fourth type of operation which we will mention concerns one of the mechanisms of textualisation; in this case, the preservation of the cohesion of the text and, more precisely, the distinction between the foreground and the background. In our example, this distinction is expressed by the opposition between imparfait and passé simple. It makes up the sixth potential determinant of the use of temporal markers in a text.

There exist still other potential determinants (e.g. with regard to modalisations), but the six we have described are amply sufficient for our purposes.

RESEARCH METHODOLOGY

Our research approach relies on the experimental analysis of behaviour and we consider that the object of our study is the role played by extralinguistic factors (the parameters of the context and content) in the development and functioning of verbal behaviour; given, of course, that these extralinguistic factors are the object of a set of psychological treatments or operations in the sense in which we have just defined them. Consequently, at the methodological level, we have adopted the following approach. We try to control the extralinguistic parameters, that is to say, we define precise, limiting conditions of text production, in which the independent variables are the referent (the content) and the parameters of the context, as defined by us. We collect the texts produced under these conditions, and our dependent variables are the linguistic units observable in the textual corpora. The dependent variables are subjected to a first, distributional and statistical analysis, which enables us to categorise linguistically the corpus of texts produced. Finally, a second analysis aims at measuring the effect of the controlled independent variables on the use of the various linguistic units, which allows us to formulate hypotheses on the operations which their use implies, i.e. the respective weights of their different potential determinants.

This methodological approach will now be illustrated by the presentation of the research project dealing with temporal markers.

Background Information Concerning the Population

The experiment involved five different languages and was carried out in five cities: Modena for Italian, Barcelona for Catalan, San Sebastian for Basque, Bern for German, and Geneva for French. For each language, we worked with children of three ages (10, 12 and 14), and for each age group, we set up four groups of 30 subjects, who were subjected to four text production conditions. The four production conditions were the same for each language and each age group.

The Text Production Conditions

For three of the four production conditions, we showed the subjects a silent film for 3–4 min, illustrating the content of the text to be produced. In this way we controlled the referential content of the text. For each
production condition we also elaborated a complex set of directions, designed to control contextual parameters: for whom the text was intended, for what purpose it was written, what social role the writer was to play, etc.

In condition A, the videotape showed an excerpt from the story of Snow White and the directions can be summarised as follows:

Tell the story of Snow White as you would to a pupil who is younger than you and who is not familiar with it.

In condition B, the videotape showed a news item (the arrest of a driver by the police) and the directions can be summarised as follows:

Imagine you are a journalist. Write a newspaper article reporting the events which occurred in the City of X this afternoon.

In condition C, the videotape showed the operation of a lock and the directions can be summarised as follows:

Explain what a lock is for and how it functions to a pupil younger than you and who has never seen one.

In condition D, there was no videotape. The directions can be summarised as follows:

Write a letter in which you tell a story which is funny, sad or exciting, an adventure you had recently. Write it to X (a pupil in a parallel class), who is your age and who is also going to write you a letter.

These production conditions were designed to limit the choice of text as much as possible—in condition A, we expected a “narrative” type of text; in B, a “report” type of text; in C, a “theoretical explanation”, and in D, a “conversational story”.

Analysis of the Data

The analysis of the data comprised three distinct phases. In the first phase, we applied to each text the global text analysis grid presented in Le fonctionnement des discours (Bronckart et al., 1985). This grid (which, fortunately, is partly automated) makes it possible to detect the frequency of occurrence of 27 linguistic marks (the different pronouns, verb tenses, auxiliaries, connectives, adverbs, etc.). An index of relative frequency is computed for each mark according to the number of words and the number of verbs in the text. Obviously, the grids are different for each of the five languages.

These data are the object of extensive statistical treatment (analysis of variance and correspondency), the purpose of which is to identify the type of text effectively produced by each subject. To do this we relied on a previous study involving several thousands of texts already identified as being narratives, reports, theoretical explanations and conversational stories. Analysis of variance and discriminant analysis procedures enabled us to define the profiles of linguistic units characteristic of these texts. A comparison of the earlier data and the data from the present investigation allow us to ensure that the texts produced indeed correspond to the type expected, i.e. that the texts produced in condition A are narratives, in B, reports, etc. The texts which did not correspond to the type expected were excluded from the subsequent analysis.

The second phase focused more specifically on temporal markers, i.e. on the paradigm of units defined at the beginning of this article (tenses, auxiliaries, adverbs, etc.). It consists in the characterisation of each text from this point of view and comprises the following analyses:

1. An examination of the statistical parameters of the distribution of each unit.

2. An examination of the typical text profiles with regard to tense usage. Using an analysis of correspondences, we grouped the texts along an axis according to the tense profiles used. The example which follows (see Fig. 8.1) concerns report texts (or news items) in French produced by 12-year-olds. The texts in this group are represented by a cross. Two factors, represented by the two axes, explain 45 and 39% of the total inertia, respectively, and therefore account for 84% of the variance. The horizontal axis is essentially made up of the opposition of the passé simple to the positive pole and of the présent to the negative pole. The vertical axis contrasts essentially the passé composé and the passé simple. Fig. 8.1 indicates to us in fact that we can consider these texts to be distributed in three subsets: those which are saturated in the présent (11 cases), those which are saturated in the passé simple (11 cases), and those saturated in the passé composé (4 cases). The crosses which stand outside these three dense areas represent the few texts which mix the three basic tenses. One can also note that the other tenses are close to the intersection of the two axes. This mean that their distribution in the three groups is equivalent, with the imparfait and plus-que-parfait more in accord with the group of texts saturated in the passé simple.

3. A study, using an analysis of correspondences, of the phenomena of interaction between different types of markers.

4. Finally, using the same technique, an analysis was carried out of the groupings among the groups of texts and markers, making it possible to identify the typical or discriminant units in each type of text, for a given age group.
Determinant 4: The distinction between foreground and background.
Again, on the basis of our analysis of the content of the videotapes, we will distinguish two levels in the text, and calculate the incidence of this opposition on the distribution of temporal markers as a whole.

This, then, is our programme of research. At the present time, all of the corpora have been collected and have been transcribed on the computer (with a system of codification of all markers); the first two phases of the analysis have been carried out on the five languages, and phase three is underway. The results available to date show a very significant effect of the text production conditions on the distribution of the temporal markers in the five languages. Three groups of texts are to be distinguished:

1. The theoretical explanation, with a tense profile always in the present.
2. The narrative and the report, with different systems of past tenses in the five languages (one basis tense in German, two tenses in Catalan, French and Italian, and three past tenses in Basque).
3. The conversational story, which always combines two subsystems of tenses, clearly dependent of the phases of the plan: one in the present, the other in the past.

Much remains to be done with respect to each language and with respect to the comparison of the results between the five languages, before general conclusions can be drawn.

ACKNOWLEDGEMENTS
This research was supported by Grant 1.406-0.86 from the Fonds National Suisse de la Recherche Scientifique.

REFERENCES
The reflections that will be presented here originated from clinical work carried out over the past few years with autistic children. In a certain sense, childhood autism provides us with a natural experiment, the correct interpretation of which could be of great importance for understanding the nature and acquisition of language and symbolic behaviour in general. The present interpretation is one that will take us on a path beginning with Skinner, continuing with Vygotsky, and leading us finally beyond them.

Skinner has probably done more for autistic children than even he himself realises. At a time when the perspectives on the treatment of infantile autism were scarce and poor, the rigorous procedures for intervention developed from the experimental analysis of behaviour offered a relatively effective path for alleviating their problems. In the field of language, Verbal behavior (Skinner, 1957) exerted its influence above all through the work of Lovaas (1977), and this influence may still be clearly traced in the most recently developed and most sophisticated procedures directed at developing communication in autistics. I suspect that this influence may be explained, in part, by the fact that Verbal behavior was a pragmatic work in a double sense; first, it opened up roads to practical intervention and did so independently of particular hypotheses regarding the possible causes of autism and its supposed “underlying mechanisms”; and, secondly, Verbal behavior was fundamentally a work of pragmatic psychology which conceived of language as an activity which is a function of a context. Thus it anticipated, in many respects, ideas about language which have been developed and elaborated upon, with the predominance of the pragmatic focus in psycholinguistics in the 1980s.