Causality, lexicon, and discourse meaning

Jacques Moeschler

This paper is about causality, defined as a specific relation between eventualities on an event-state chain, called a 'causal chain'. Though causality is a dynamic temporal relation, the expression of causality in discourse contrasts with temporal discourses, in which temporal order between eventualities is parallel to the sequential order of linguistic segments in discourse. Causal discourses are backward, introducing first the effect and second the cause. This property is used to analyze possible causal discourses with and without explicit causal links by means of connectives (in French *parce que, donc, et*), and mainly their causal and inferential uses. Finally, the paper tries to answer why causal relations in discourse are used to convey explanation and argumentation. Explanation is the discourse relation corresponding to causal relations in the world, whereas argumentation is a special use of causal relation in discourse, implying causality between states belonging to two causal chains.

1. Introduction

The issue of causality is not a specific linguistic problem. Although language is a very efficient way to express causal relations, causality is not an inherent property of language. Evolution theory allows us to suppose the emergence of causal reasoning must have been a crucial step of phylogenesis and the construction of causal ties between concepts yielded a fantastic qualitative change in human cognition. Works in neurophysiology and neuropsychology allow us to hypothesize that before the creation of causal ties, mammals' brain should have been capable to work with associations (for instance, between different stimuli, like a sound and an odor). What has changed with the emergence of causality as part of reasoning is mainly the capability to apply causal schemas or rules to different and new inputs.

Since Hume (1739-1740), causal relation has been defined on the basis of criteria like contiguity, contingency, temporal asymmetry, generality and *ceteribus paribus* conditions (cf. Reboul 2003). Linguistic aspects of causality are spatio-temporal contiguity and temporal asymmetry, while pragmatic aspects of causal reasoning are more centered on contingency (the defeasibility of causal inferences), generality (the use of a rule) and *ceteribus paribus* conditions (sensitivity to the context).

The purpose of this paper is to describe how causality can be expressed in discourse. We will focus here on constructions with and without causal connective like *because*, leaving apart other means to express causality like causative, ergative and inaccusative constructions.

The point of departure of our reflection on causality is not only linked to the temporal asymmetry criterion (the cause-effect consequence is not symmetrical, but anti-symmetrical), but also to the observation that causal expression is not symmetrical in discourse either. In other words, if A is the cause and B the effect, causal discourse will be represented prototypically by (1), and not by (2), although their cognitive content (3) is the same:

(1)   B. A

(2)   A. B

(3)   CAUSE (A, B)

This observation is not only interesting from the linguistic point of view, but should have some consequences on the study of cognition. If language plays a crucial role in the emergence of causal reasoning, it also imposes a discourse pattern reflecting inverse temporal order. Here is a very enthusiastic point for the study of discourse structures: if temporal order (2) is typical of Narration, inverse temporal order (temporal inversion) (1) describes what is generally called Explanation.

Another point I would like to underline is the nature of the entity triggering causal relations. I will show that causal entities are eventualities, and I will distinguish two different situations, depending on the fact that causal relations are or are not contiguous (difference between direct causality and indirect causality). Finally, I will make some remarks to connect causality and argumentation.

2. Types of causal constructions in French

French, as many other languages, has mainly three ways of expressing causality:
1. causative constructions with *faire* and *laisser*,
2. ergative and inaccusative constructions,
3. constructions with *parce que* (*because*).

Examples (4)-(5) are illustrations of causative constructions, (6)-(7) of ergative and inaccusative constructions, and (8) of *parce que* constructions:

(4)   Max fait manger la soupe aux enfants.
        'Max makes the children eat the soup.'

(5)   Max laisse les enfants regarder la télévision.
        'Max lets the children watch the television.'

(6)   Le vent a cassé la branche.
        'The wind broke the branch.'

(7)   La branche a cassé.
        'The branch broke.'

(8)   Axel est malade parce qu'il a trop mangé.
        'Axel is sick because he ate too much.'

In this paper, we will focus only on discourse constructions.[1]

One of the prototypical ways of expressing causality between two propositions is to connect them *via* the connective *parce que* 'because':

(9)   Marie est malade parce qu'elle a trop mangé.
        'Mary is sick because she ate too much.'

In this discourse, the speaker aims to explain Mary's sickness *via* a cause-effect relation between an event (Mary ate too much) and a state (Mary is sick). We can thus assign the two following interpretations of (9), (10) representing its semantic structure and (11) its pragmatic meaning:

(10)   CAUSE (MARY ATE TOO MUCH, MARY IS SICK)

(11)   EXPLANATION (MARY ATE TOO MUCH, MARY IS SICK)

One of the crucial questions about causality and discourse is to explain the relationship between the CAUSE operator and the Explanation relation.

Before going further, I would like to make three observations that will be developed later.

1. Causal relation is a relation between facts or proposition, but

345

not between speech acts. Contrast between (12) and (13) (cf. Groupe λ-l 1975) is about a causality relationship in (12) and an Explanation relationship in (13):

(12)   Est-ce que Marie est malade parce qu'elle a trop mangé? > QUES-
        TION [CAUSE (MARY ATE TOO MUCH, MARY IS SICK)]
        'Is Mary sick because she ate too much?'

(13)   Est-ce que Marie est malade? Parce qu'elle a trop mangé. > QUES-
        TION (MARY IS SICK) & EXPLANATION [MARY ATE TOO
        MUCH, QUESTION (MARY IS SICK)]
        'Is Mary sick? Because she ate too much.'

In other words in (12), the speaker is asking his addressee about the truth of the causality relationship between two facts (Mary ate too much, Mary is sick), while in (13) he is asking his addressee about the truth of Mary's sickness by giving a possible explanation (Mary ate too much) to his question. These two utterances do not share the same presupposition: only question (12) presupposes (14):

(14)   Mary is sick.

2. The Explanation relationship can be realized by other connec-tives which, contrary to *parce que* 'because', do not have a causal meaning. These connectives are in French *car* 'for' and *puisque* 'since' (cf. Groupe λ-l 1975):

(15)   Marie est malade, parce que/car/puisque elle a trop mangé.
        'Mary is sick, because/for/since she ate too much.'

(16)   Marie est malade, ?parce que/car/puisque je ne l'ai pas vue de la
        journée.
        'Mary is sick, because/for/since I didn't see her for the whole day.'

(17)   Marie est malade, *parce que/*car/puisque tu veux tout savoir.
        'Mary is sick, because/for/since you want to know everthing.'

We notice that the *puisque* reading in (15) is different from those of *car* and *parce que*: with *puisque*, the speaker not only presupposes the truth of Mary's sickness, he justifies moreover his assertion by giving an argument (the fact that Mary ate too much), while with *parce que* and *car*, the relationship is a simple explanation.

3. The last observation, developed in § 4, is about the difference

between causality and inference. If we compare uses of *parce que* 'because' and *donc* 'so' in (18) and (19), we observe that these discourses have identical truth conditions:

(18)   Marie ne peut pas boire d'alcool parce qu'elle est mineure.
         'Mary cannot drink alcohol because she is a minor.'

(19)   Marie est mineure, donc elle ne peut pas boire d'alcool.
         'Mary is a minor, so she cannot drink alcohol.'

Our hypothesis is that the cognitive content of these discourses is the same, while their pragmatic content is not. In other words, speakers do not want to communicate the same information within these discourses. Here are different contexts showing the difference in pragmatic meaning:

(20)   Marie: Pourquoi ne puis-je pas boire une bière ?
         Le Père: a. Tu ne peux pas boire une bière parce que tu es mineure.
                       b. ?? Tu es mineure, donc tu ne peux pas boire une bière.
         Mary: 'Why may I not drink a beer?'
         Father: a. 'You cannot drink a beer because you are a minor.'
                       b. 'You are a minor, so you cannot drink a beer.'

(21)   Marie: Garçon, une bière s'il vous plaît !
         Le Père: a. ?? Tu ne peux pas boire une bière parce que tu es mineure.
                       b. Tu es mineure, donc tu ne peux pas boire une bière.
         Mary: 'Waiter, one beer please!'
         Father: a. 'You cannot drink a beer because you are a minor.'
                       b. 'You are a minor, so you cannot drink a beer.'

Let us now discuss the relations between causality and eventualities. If causality is an anti-symmetrical temporal relation, the nature of the propositions must play a role in the expression of causality.

3. Causality and events

Until now, I said nothing about the semantic entities yielding the causality relationship. What we said about causality can be summed up as following: there is a causal relationship between two linguistic segments *a* and *b* iff CAUSE (a, b) is true.

This analysis is nevertheless not precise enough, because causality is about events. From a point of view of physics, causality is a relation between events (cf. the causal theory of time in Sklar 1974). The concepts we need to account for causality are concepts from event semantics, and more precisely the concepts of 'state' and 'event' (cf. Vendler 1967, Parsons 1990). In order to clarify these concepts, whose denotations are states of affairs in the world, one can define the ontological properties of aspectual classes as follows (cf. Dowty 1986, Mouretalos 1981, Bach 1986):

1. states (*being asleep*) are unbounded, homogeneous, atelic and static;

2. activities (*running*) are unbounded, homogeneous, atelic and dynamic;

3. events (*drawing a circle*) are bounded, heterogeneous, telic and dynamic, durative in the case of accomplishments (*building a house*), punctual in the case of achievements (*reaching the summit*).

Although the classification can be justified from a linguistic point of view, our analyses will be limited to the class of states-activities (or simply states) and the class of events, grouping thus accomplishments and achievements. The reasons for such a reduction are due to the dynamic relation between states and events (cf. Asher 1997). Here is Asher's description of dynamic event-state relations:

1. An event destroys a state (called 'pre-state') and creates a resulting state, called 'post-state'; the relation between the event and the post-state is causal.

2. A state is created by an event preceding it (called 'pre-event') and destroyed by an event following it temporally ('post-event'); the relation between the pre-event and the state is causal.

In other words, the dynamic relation between state and event is due to causality. Let us take two examples in order to illustrate this dynamic relation. Event (22) destroys pre-state (23) and creates post-event (24). In a converse way, state (25) is created by event (26) and destroyed by event (27):

(22)   John has built his house.

(23)   John's house is not built.

(24)   John's house is built.

(25)   John loves Mary.

(26)   John meets Mary.

(27) John meets Sue.

4. *Causality and* parce que

Let us now elaborate a little more the question of the expression of causality in discourse, and more precisely the role of *parce que* in the expression of causality. We will see that aspectual classes play a crucial role in one use of *parce que*, i.e. its causal use.

Let us start from a very simple fact: causal relations introduced by *parce que* can be any combination of states and events, as shown in Table 1.

Table 1. Uses of *parce que*

		effect	
		state	event
cause	state	*Marie ne peut pas boire d'alcool parce qu'elle est mineure*	*Le médecin soigne Axel parce qu'il est malade*
	event	*Marie est malade parce qu'elle a trop mangé*	*Jean est tombé parce que Marie l'a poussé*

Each example receives the following logical structure:

1. CAUSE (EVENT, STATE): *Marie est malade parce qu'elle a trop mangé* 'Mary is sick because she ate too much'

2. CAUSE (EVENT, EVENT): *Jean est tombé parce que Marie l'a poussé* 'John fell because Mary pushed him'

3. CAUSE (STATE, STATE): *Marie ne peut pas boire d'alcool parce qu'elle est mineure* 'Mary cannot drink alcohol because she is a minor'

4. CAUSE (STATE, EVENT): *Le médecin soigne Axel parce qu'il est malade* 'The doctor is treating Axel because he is sick'

According to the dynamics of causal relations between state and event, only cases 1 and 2, where the cause is an event, should be acceptable. Nevertheless, cases where the cause is a state yield acceptable and interpretable discourses. In these cases, interpretation comes through an explanation relation, and not a causal one. Here are the paraphrases of cases 3 and 4:

3': Mary's minor state explains why she cannot drink alcohol.

349

4': Axel's sickness state explains why the doctor treats him.

The first problem to solve is to explain the transition from causality between eventualities to explanation.

Let us now examine a second property of the causal/explanation relationship: this relation can be inferred without the presence of the connective:

(28)   Marie est malade. Elle a trop mangé.
       'Mary is sick. She ate too much.'

(29)   Jean est tombé. Marie l'a poussé.
       'John fell. Mary pushed him.'

(30)   Marie ne peut pas boire pas d'alcool. Elle est mineure.
       'Mary cannot drink alcohol. She is a minor.'

(31)   Le médecin soigne Axel. Il est malade.
       'The doctor is treating Axel. He is sick.'

We face here a phenomenon observed in many works (Carston 2002, Blakemore 2002): it is the order of linguistic segments that determines the causal/explanation reading.

This hypothesis is confirmed by a remarkable fact: the reverse order of the same utterances does not yield the same result. Worse, if a causal connective like *parce que* 'because' is introduced, the causal reading becomes impossible, and the only possible reading is the inferential one, which allows us to predict that the appropriate connective for such an explicature is the inferential connective *donc* 'so'. Let us examine these three phenomena:

1. *Utterance inverse order*: in every following discourse, the inferential interpretation (*b* IS INFERRED FROM *a*) is the case, and not the causal one (*a* CAUSE *b*):

(32)   Marie a trop mangé. Elle est malade.
       'Mary ate too much. She is sick.'

(33)   Marie a poussé Jean. Il est tombé.
       'Mary pushed John. He fell.'

(34)   Marie est mineure. Elle ne peut pas boire d'alcool.
       'Mary is a minor. She cannot drink alcohol.'

(35)   Axel est malade. Le médecin le soigne.
       'Axel is sick. The doctor is treating him.'

2. *Utterance inverse order and* parce que: the insertion of *parce que* in discourses (32)-(35) modifies the *parce que* interpretation: its reading is no more causal, but inferential (cf. Moeschler 1989):

(36)   Marie a trop mangé, parce qu'elle est malade.
       'Mary ate too much, because she is sick.'

(37)   Marie a poussé Jean, parce qu'il est tombé.
       'Mary pushed John, because he fell.'

(38)   Marie est mineure, parce qu'elle ne peut pas boire d'alcool.
       'Mary is a minor, because she cannot drink alcohol.'

(39)   Axel est malade, parce que le médecin le soigne.
       'Axel is sick, because the doctor is treating him.'

Here are the explicatures of the inferential reading of *parce que*:

(40)   I infer that Mary is sick from the fact that she ate too much.

(41)   I infer that John fell from the fact that Mary pushed him.

(42)   I infer that Mary cannot drink alcohol form the fact that she is minor.

(43)   I infer that the doctor treats Axel from the fact that Axel is sick.

3. donc *versus* parce que: If we replace *parce que* by *donc*, in the purpose of recovering the initial reading of our examples (cf. Table 1), different readings are obtained (marked by #):

(44)   # Marie a trop mangé, donc elle est malade.
       'Mary ate too much, so she is sick.'

(45)   # Marie a poussé Jean, donc il est tombé.
       'Mary pushed John, so he fell.'

(46)   Marie est mineure, donc elle ne peut pas boire d'alcool.
       'Mary is a minor, so she cannot drink alcohol.'

(47)   Axel est malade, donc le médecin le soigne.
       'Axel is sick, so the doctor is treating him.'

In (44) et (45), the reading is not causal: the speaker does not want to say that the fact of having eaten too much causes the fact

that Mary is sick, nor that the fact that Mary has pushed John caus-
es his falling. On the contrary, he certainly wants to say that the fact
Mary ate too much allows him to infer that she is sick (what can be
false), or to infer from the fact that Mary pushed John that John fell
(what can be false too). But (46) and (47)'s inferential readings do not
seem to be different from causal ones. The point is that these utter-
ances have as starting points of the reasoning (either causal or infer-
ential) a state and not an event.

Thus, *donc* 'so' does not seem to be able to accomplish the same
functions as *parce que* in the utterance inversion situations. So the
question is now whether another candidate could do the same job as
inferential *parce que*, i.e. balance the deficiencies of *donc*. A good can-
didate for such a job is the connective *et* 'and', which has as main
property a very wide use spectrum (cf. Luscher & Moeschler 1990,
Luscher 1994, Luscher 2002, Moeschler 2000a). The following exam-
ples are discourses with standard uses of *parce que* and uses of *et*
with utterance inversion:

(48) a. Marie est malade parce qu'elle a trop mangé.
          'Mary is sick because she ate too much.'
      b. Marie a trop mangé et elle est malade.
          'Mary ate too much, and she is sick.'

(49) a. Jean est tombé parce que Marie l'a poussé.
          'John fell because Mary pushed him.'
      b. Marie a poussé Jean et il est tombé.
          'Mary pushed John and he fell.'

(50) a. Marie ne peut pas boire d'alcool parce qu'elle est mineure.
          'Mary cannot drink alcohol because she is a minor.'
      b. # Marie est mineure, et elle ne peut pas boire d'alcool.
          'Mary is a minor, and she cannot drink alcohol.'

(51) a. Le médecin soigne Axel parce qu'il est malade.
          'The doctor is treating Axel because he is sick.'
      b. ? Axel est malade, et le médecin le soigne.
          'Axel is sick, and the doctor is treating him.'

In the cases of (48) and (49), the cognitive content and the prag-
matic one seem to be identical: the truth conditions of these discour-
ses are the same, and speakers' informative intentions are not differ-
ent. On the other hand, there are major differences in (50) and (51).
In (50), the reading of *et* is strictly additive, without any causal nor

inferential link; in (51), the cause-consequence reading is more difficult than in (28)-(49), because causality is, as we will see, indirect and not direct.

If we now try to sum up all these observations, we obtain a very interesting result (Table 2).

Table 2. Uses of *parce que, donc, et*

eventualities	causal *parce que*	inferential *parce que*	causal readings *donc*	*et*
state-event	+	+	−	+
event-event	+	+	−	+
state-state	+	+	+	−
event-state	+	+	+	?

What conclusion can we draw from these analyses? The following results can be driven:
1. *donc* and *et* are in complementary distribution for the cause-consequence interpretation, which allows to draw two under-conclusions:
    a. *donc* is not the inverse connective of *parce que*;
    b. *et* is not synonymous of inferential *parce que*.
2. *parce que* is the only connective having causal and inferential uses.

Conclusion 2, to be justified, has to be checked against inferential uses of *donc* and *et*. To do this, we use again the original examples, without inversion, and replace *parce que* by *donc* and by *et*. Since *donc* and *et* are in complementary distribution in the inverse uses, the prediction is that, contrary to *parce que*, *donc* and *et* cannot have inferential usages for any type of relation between eventualities. If this is the case, *parce que* is a less constrained connective (from its causal and inferential usages) than *donc* and *et*. Here are the data:
1. Non inversed series with *parce que*:
    a. *Marie est malade parce qu'elle a trop mange.* 'Mary is sick because she ate too much.'
    b. *Jean est tombé parce que Marie l'a poussé.* 'John fell because Mary pushed him.'
    c. *Marie ne peut pas boire d'alcool parce qu'elle est mineure.* 'Mary cannot drink alcohol because she is a minor.'

    d. *Le médecin soigne Axel parce qu'il est malade.* 'The doctor is treating Axel because he is sick.'

2.   Non inverted series with *donc*:

    a. *Marie est malade, donc elle a trop mangé.* 'Mary is sick, so she ate too much.'

    b. *Jean est tombé, donc Marie l'a poussé.* 'John fell, so Mary pushed him.'

    c. *Marie ne peut pas boire d'alcool, donc elle est mineure.* 'Mary cannot drink alcohol, so she is a minor.'

    d. *Le médecin soigne Axel, donc il est malade.* 'The doctor is treating Axel, so he is sick.'

3.   Non inversed series with *et*:

    a. *?? Marie est malade, et elle a trop mangé.* 'Mary is sick, and she ate too much.'

    b. *?? Jean est tombé, et Marie l'a poussé.* 'John fell, and Mary pushed him.'

    c. *?? Marie ne peut pas boire d'alcool, et elle est mineure.* 'Mary cannot drink alcohol, and she is a minor.'

    d. *?? Le médecin soigne Axel, et il est malade.*

Two observations have to be made. On the one hand, all non inverted uses of *et*, which present eventualities in inverse orders relative to their occurrences, are odd; inferential uses of *et* do not support temporal inversion. On the other hand, all non inverted uses of *donc*, which give rise to inferential readings, are acceptable, but with variable strength in the conclusion.

Our last prediction is thus confirmed for *et*, but invalidated for *donc*; *donc* is a very free connective concerning inferential uses, but more constrained for causal ones. Table 2 must thus be modified as follows.

Table 3. Causal and inferential readings of *parce que, donc, et*

eventualities	causal readings (e2 CAUSE e1)			inferential readings (e1 → e2)		
	parce que	*donc*	*et*	*parce que*	*donc*	*et*
state-event	+	−	+	+	+	−
event-event	+	−	+	+	+	−
state-state	+	+	−	+	+	−
event-state	+	+	?	+	+	−

Our provisional conclusions are thus the following:

1. Only *parce que* has, for any factual combinations, causal and inferential uses.
2. *donc* has inferential uses for any factual combination (with temporal inversion), but distributes, in canonical order of events, its causal and inferential reading.
3. *et* is the most constrained connective in its causal and inferential uses: in canonical temporal order, *et* limits its causal uses to temporal ones (e1 precedes and causes e2), but does not accept any inferential uses with inverse temporal order.

Here are some more comments on these conclusions:

3'. *et* is a connective which is difficult to use when it introduces utterances in inverse order relative to their occurrence in the world. In this case, the inferential reading does not save anything.
2'. The great plasticity of *donc* in inferential use (inverse order of events) shows that this connective does not work on criteria based on event order. Its difficulty to account for causal relations between event (e1) and event/state (e2) confirms it.
1'. *parce que* is amazing relative to its great flexibility of uses, either causal or inferential. The explanation of this phenomenon is given by its strong causal instruction,[2] which obliges to invert the temporal and causal order of eventualities in discourse. Inferential readings (with utterances inversion, and thus canonical temporal order) are caused by pragmatic accommodation (cf. Moeschler 2003b).

5. A model for the linguistic expression of causality

I would like to propose a general semantic and pragmatic model for causality. What we would like to do is build a general model capable of accounting for the linguistic expression of causality, including lexical, syntactic and discursive constructions. Finally, we would like to say something not only about causal and inferential uses of *parce que*, but also about the reasons why *parce que* interpretations often yield explanation and argumentation. In order to do this, we will present a simple formalism, coming from first order logic and compatible with most dynamic semantic models (Discourse Representation Theory, Segmented Discourse Representation Theory, Mental Representation Theory, cf. Kamp & Reyle 1993, Asher 1993 and Asher & Lascarides 2003, Reboul et al. 1997).

Let us begin by distinguishing two types of causal relations: causal relation in a strong sense, and causal relation in a weak sense:

Causal relation (strong sense)

There is a causal relation in the strong sense when the CAUSE operator has as arguments an event and a state or an event, the first event causing directly the state or the event.

Causal relation (weak sense)

There is a causal relation in the weak sense when the CAUSE operator has as arguments two eventualities, event and/or state, discontinuous in time.

So we distinguish two types of relations between eventualities, such that discourses can make them manifest:

1. direct causality, corresponding to causality in a strong sense: the relation between event-state or event-event is without temporal discontinuity;

2. indirect causality, or causality in a weak sense: the relation between eventualities is discontinuous, without temporal contiguity.

In order to give a complete model of causality, we still need to say something about the internal structure of an event and of a state:

Structure of an event
EVENT (AGENT, PATIENT)
Structure of a state
STATE (PATIENT)

Here is a formal definition of these two types of causality:

Direct causality
CAUSE [EVENT (AGENT, PATIENT), STATE (PATIENT)]
Indirect causality
CAUSE [EVENTUALITY (x,y), EVENTUALITY (z,w)]

In order to make these notions more concrete, we will give three illustrations of them. Figure 1 gives a general representation of the causality model; Figure 2 is the representation of a causal chain in a causal discourse; finally, Figure 3 gives a representation of a causal chain in a temporal discourse.

In direct causality (cf. Figure 1), there is contiguity between the causing event and the caused event or state. We will not distinguish these two cases, because they resemble each other strongly.
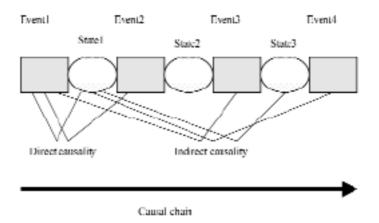
Figure 1. The causality model.

On the contrary, indirect causality yields temporal discontinuity between eventualities: it is necessary that an event interfaces the states/events connected in discourse.
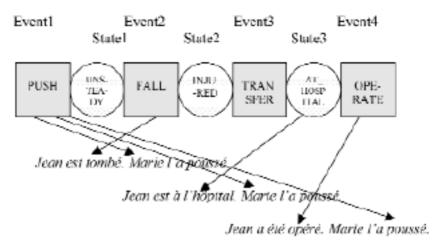
I will illustrate these two cases with the following causal chain: push (event1)- unsteady (state1)- fall (event2)- injured (state2)- transfer_to_hospital (event3)- at_hospital (state3)- operate (event4). This causal chain corresponds to a very common script, accounted for in the following narrative:
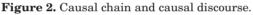
(52) Mary pushed John. Unsteady, he fell and was seriously injured at the head. He was transferred to hospital. There the emergency surgeon decided to operate on him.
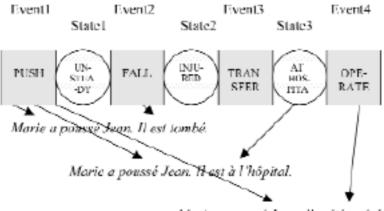
How is it possible to model this causal chain to describe temporal and causal discourses? Figures 2 and 3 give a first answer.

In this configuration (cf. Figure 2), utterances and eventualities are crossed. We notice here that the longer the causal distance is (the longer the interval between the cause-event and the effect-eventuality is), the more difficult it is to understand the discourse. The last one (*John was operated. Mary pushed him*) is not understandable in itself, without referring to the whole causal chain. Our hypothesis is that such a causal chain is the context in which discourses have to be interpreted.
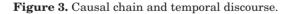
What about temporal discourses, in which eventualities are introduced in discourse in a parallel way to their occurrences? Figure 3 provides an illustration.

357

Figure 2. Causal chain and causal discourse.

Figure 3. Causal chain and temporal discourse.

The same observation suggests itself for temporal discourses. As soon as the distance between the cause and the effect increases, the discourse becomes difficult to understand (cf. *Mary pushed John. He was operated*).

The last step to make explicit is what I call the *bricks* of causal relation. As eventualities have different participants, we have to include of representation the relations between the eventuality and

its participants in our system. Figure 4 completes, for our example-type of causal chain, the participants of the eventualities.
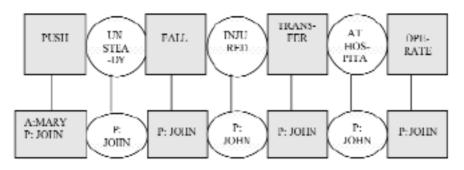

Figure 4. The bricks of causal relation (A = agent, P = patient)

A causal chain is thus a string of eventualities-participants relations. One of the crucial points is not event contiguity, but the permanency of the participants (cf. Reboul 2000 and Moeschler 2000b for such a description of temporal order). We see here that the causal chain functions thanks to the permanency of the patient (P), the agent (A) being at the origin of the causal chain.

The question is what are the necessary bricks for causal relation. Our hypothesis is that what is necessary is the explicature of the effect and the patient, the mention of the cause and the agent being facultative. Let us now test this hypothesis while examining the different causal possible discourses within our initial script.

6. Possible causal discourses

We mentioned in § 5 that the distance between the cause and the effect has a consequence on its interpretability. We can thus predict a certain number of possible discourses and other impossible ones, according to the distance between the cause and the effect on the causal chain. Here are such possible and impossible discourses taken from our initial scenario.

(53)   Jean est en déséquilibre. Marie l'a poussé.
        'John is unsteady. Mary pushed him.'

(54)   Jean est tombé. Marie l'a poussé.
        'John fell. Mary pushed him.'

(55)   Jean est blessé. Marie l'a poussé.
        'John is hurt. Mary pushed him.'

(56)   Jean a été transporté en ambulance. Marie l'a poussé.
        'John was transferred by ambulance. Mary pushed him.'

(57)   Jean est à l'hôpital. Marie l'a poussé.
        'John is at the hospital. Mary pushed him.'

(58)   Jean a été opéré. Marie l'a poussé.
        'John was operated. Mary pushed him.'

(59)   Jean est blessé. Il est tombé.
        John is hurt. He fell.'

(60)   Jean a été transporté en ambulance. Il est tombé.
        'John was transferred by ambulance. He fell.'

(61)   Jean est à l'hôpital. Il est tombé.
        'John is at the hospital. He fell.'

(62)   Jean a été opéré. Il est tombé.
        'John was operatd. He fell.'

(63)   Jean a été transporté en ambulance. Il est blessé.
        'John was transferred by ambulance. He is hurt.'

(64)   Jean est à l'hôpital. Il est blessé.
        'John is at the hospital. He is hurt.'

(65)   Jean a été opéré. Il est blessé.
        'John was operatd. He is hurt.'

(66)   Jean est à l'hôpital. Il a été transporté en ambulance.
        'John is a t the hospital. He was transferred by ambulance.'

(67)   Jean a été opéré. Il a été transporté en ambulance.
        'John was operated. He was transferred by ambulance.'

(68)   Jean a été opéré. Il est à l'hôpital.
        'John was operated. He is at the hospital.'

These discourses do not have the same degree of acceptability, neither do they have the same degree of relevance. For instance, (57) and (58) lack relevant contexts. (64) is relevant inasmuch as the indication of the mood of transferring allows to communicate a relevant information, for instance the seriousness of John's state. Idem for (67), whereas (68) must allow to identify the place (a hospital and not a clinic for instance).

Here is a matrix of the set of possible and impossible discourses.
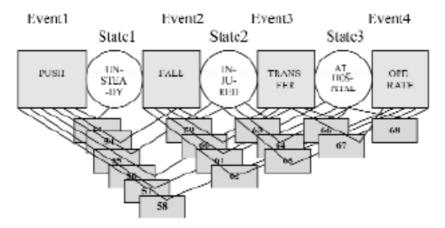

Figure 5. Possible and impossible causal discourse.

What can we say about the parameters yielding causal discourses? Relevant parameters are about the different events (e) and states (s) linked in a same causal chains, and the thematic roles assigned to participants (Agent and Patient), as well as the explicature of the Verb denoting the eventuality. The following matrix gives a possible answer.

Table 4. Parameters of causal discourses

	e1	s1	e2	s2	en	sn
A/I	+		(+)		(+)	
P	(+)	+	(+)	+	(+)	+
V	+	+	+	+	+	+

As we see, verbs denoting eventualities (states or events) are explicated in causal discourses; the patient is present in state clauses, and optional in event clauses; finally, the agent or the instrument is obligatory in the initial clause of a causal chain, and is facultative in the other events of the chain.

What conclusion can we draw from this observation? Our hypothesis was that causal relations impose the presence of a patient and an effect, the agent and the cause being facultative.[3] This hypothesis seems to be confirmed here, and gives a possible understanding of how causal discourses work: a causal discourse starts with the representation of an effect, and then gives the cause. The description of the effect has to mention the patient, but not more, the agent belonging to the representation of the cause.

7. Causality, explanation and argumentation

We would like to end this paper by giving a positive answer to two questions, initially asked: (i) how to account for the relationship between causality and explanation; (ii) how to account for the relation between causality and argumentation? Both questions are mainly about the explanation and argumentation uses of *parce que* 'because'. In our answer, we will try to shed light on the question of the inferential use of *parce que*.

Let us again take a classical example of explanation *parce que*:

(69)   Marie est malade parce qu'elle a trop mangé.
       'Mary is sick because she ate too much.'

Our analysis points at the direct causal relation, contiguous between an event and its post-state. Here is our main hypothesis: the explanation relation is the translation in discourse of the causal relation, which would have taken another form in the case of inferential discourse (70):

(70)   Marie a trop mangé. Elle est donc malade.
       'Mary ate too much. So she is sick.'

Figure 6 accounts for example (69), and shows in contrast the situation represented by the inferential use of *parce que*, repeated in (71):
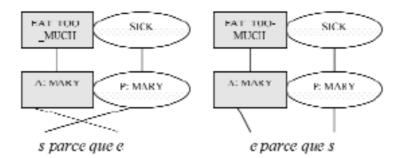
362

Figure 6. Explanation and inferential uses of *parce que*.

(71)   Marie a trop mangé, parce qu'elle est malade.
       'Mary ate too much, because she is sick.'

Briefly, the explanation relation follows from the discourse setting of causality within a causal chain. So, there is a very simple way of answering the first question: explanation is a discourse property, whereas causality is a state of affairs property, and the relation between causality and explanation follows from the description in discourse of causal relations between eventualities.

Let us try to answer the second question, about the relations between causality and argumentation. I have chosen a complex example, because I would like to argue that argumentation is a particular use of a causal relation, which does not pass through the contiguity relation between eventualities, but the relation between two states belonging to two different causal chains. I call 'causal rule' the generalization of this *ad hoc* relationship.

Here is an example taken from an advertisement published on the day of Concorde's last flight.

'Concord will not really stop flying, because it will never leave men's imagination', Jean-Cyril Spinetta, President of Air France.

I will give a first analysis in terms of eventualities, then a second analysis will attempt to locate where argumentation rises.

First analysis: The two utterances connected by *parce que* are future and negative. This allows to make a first statement: what is designated in the world is a future state, corresponding respectively to Concorde's non-stopping and its non-leaving men's imagination. I make a further claim: both states occur in a parallel way in time (Figure 7).
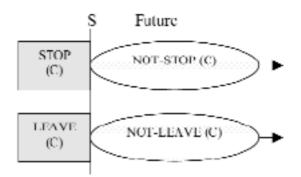
363

Figure 7. First analysis

In other words, if it is true that Concorde (C) stops flying, what Spinetta says (in the future, Concorde is not going to stop flying) is literally false, since Concorde does not fly anymore. But it is justified by a temporal analogy, taken for granted that Concorde has now left men's imagination, which is doubtful while making true its negation in the future. In other words, argumentation is based on the fact of making true a false future state by giving an argument now false but true in the future.

This paradoxical discourse makes sense and contrasts with other possible discourses, past in (73) and present in (74), at the positive form (72):

(72)   Le Concorde ne s'arrêtera pas vraiment, parce qu'il ne sortira jamais de l'imaginaire des hommes.
       'Concord will not really stop flying, because it will never leave men's imagination'

(73)   Le Concorde s'est arrêté, parce qu'il est sorti de l'imaginaire des hommes.
       'Concord stopped flying, because it left men's imagination'

(74)   Le Concorde s'arrête, parce qu'il sort de l'imaginaire des hommes.
       'Concord stops flying, because it leaves men's imagination'

While Spinetta's discourse (72) makes sense, alternative positive discourses (73-74) don't. I would now like to answer the question why such a contrast does exist. This is the purpose of the second analysis.

Second analysis: The second analysis is based on the relation-ship between events and states. The question to be answered now is

the following: what makes a non-forgotten entity x an argument to think that x will go on doing what it has been conceived for (for instance flying)? The only possible answer passes through *parce que* and its instruction: *parce que* introduces an eventuality that causes another one. The question is therefore the following: can the state *The Concord will not really stop* cause *The Concorde will never leave men's imagination?* Our hypothesis is that an *ad hoc* causal rule [4] connects on the one hand positive events and on the other one, via invited inference, negative states (cf. Figure 8).
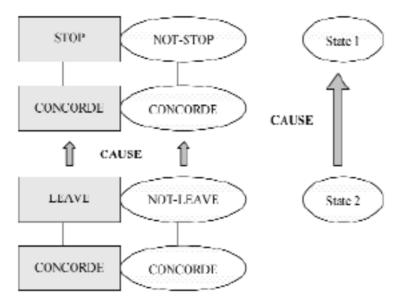

Figure 8. Second analysis

We can now distinguish two types of uses of *parce que*:
1. uses in which *parce que* connects elements belonging to a same causal chain: these are what we call causal uses of *parce que*;
2. uses in which *parce que* connects non causally connected states: they are argumentative uses of *parce que*.

The Concorde example is sophisticated, but ordinary for an argumentative use. In argumentative uses, a causal rule connects state2 and the mention of state1. In our example, the causal rule has a negative correlate, allowing a causal connection between negative utterances. Here is a more precise representation of these rules:

a. (positive) causal rule: CAUSE [LEAVE (C), SAY (S, STOP (C))]
b. negative correlate: CAUSE [NON-LEAVE (C), SAY (S, NON-STOP (C))]

To sum up, in the causal use of *parce que*, no causal rule is required, since connection is located between elements (eventualities) belonging to two causal chains. We can now give a more precise definition of what a causal rule is:

CAUSAL RULE

A causal rule is a connection between states belonging to different causal chains.

What is now argumentation? Following our analysis, there is argumentation if and only if states belonging to different causal chains are connected:

ARGUMENTATION

Argumentation consists in connecting two causal chains.

We can now understand why argumentation is directly connected with refutation (or counter-argumentation)[5] and also with manipulation: refutation is the refusal of the connection of two causal chains against another connection; manipulation is about the obligation of connecting causal chains. Finally, ordinary argumentation is the survival (for practical, cognitive and emotional reasons) of the connection of two causal chains.

8. Conclusion

The purpose of this paper was to give a description of one of the main strategies to express causality in discourse. What I proposed is a model general enough to explain why the canonical order of causal discourses is the effect-cause order, and why the mention of the patient of the state-effect is obligatory.

What is central for the study of the lexicon is the connection between lexical entries of eventualities and causal relations between eventualities, and also the contribution of lexical items like connectives, whose main function is to give instructions on the way representations of eventualities have to be connected.

What would be particularly interesting to do now is to investigate the generality of this model regarding the way causal relations and causal meanings are encoded, lexically, syntactically and discursively. This is a real challenge, both for linguistics and pragmatics.

Address of the Author:

Department of linguistics, University of Geneva, 2 rue de Candolle, 1211 Geneva 4, Switzerland <jacques.moeschler@lettres.unige.ch>

Notes

1   Cf. Moeschler (2003a) for a general presentation of discourse constructions and causative, ergative and inaccusative ones.
2   Cf. Moeschler (2002) for an analysis of connectives in terms of strength of conceptual and procedural content.
3   In Moeschler (2003b), I confirm this analysis by giving analyses for causative, ergative and inaccusative constructions.
4   A new Relevance-theoretic analysis (Wilson & Sperber 2003) would say that the concept LEAVE is an *ad hoc* concept: LEAVE* is relevant in the context of this discourse, whose aim is to convince the reader that Concord will always stay in men's spirit, event if it stopped flying. Cf. Saussure (2000a), (2000b) for arguments against causal rules.
5   Cf. Ducrot (1980), Moeschler (1982), (1985), (1989), Roulet et al. (1985).

References

ASHER Nicholas (1993), *Reference to Abstract Objects in Discourse*, Dordrecht, Kluwer.
ASHER Nicholas (1997), "Evénements, faits, propositions et anaphore évolutive", *Verbum* XIX/1-2: 137-176.
ASHER Nicholas & Alex LASCARIDES (2003), *Logics of Conversation*, Cambridge, Cambridge University Press.
BACH Emmon (1986), "The algreba of events", *Linguistics and Philosophy* 9: 5-16.
BLAKEMORE Diane (2002), *Relevance and Linguistic Meaning. The Semantics and Pragmatics of Discourse Markers*, Cambridge, Cambridge University Press,
CARSTON Robin (2002), *Thoughts and Utterances. The pragmatics of Explicit Communication*, Oxford, Blackwell.
CORBLIN Francis (2002), *Représentation du discours et sémantique formelle*, Paris, Presses Universitaires de France.
DOWTY David R. (1986), "The effects of aspectual class on the temporal structure of discourse: semantics or pragmatics?", *Linguistics and Philosophy* 9: 37-61.
DUCROT Oswald (1980), *Les échelles argumentatives*, Paris, Minuit.
GROUPE λ-l (1975), "Car, parce que, puisque", *Revue Romane* 10: 248-280.
HORN Larry R. & Gregory WARD, eds. (2003), *Handbook of Pragmatics*, Oxford, Blackwell.
HUME David (1739-1740), *A Treatise of Human Nature*, Londres, Millar.
KAMP Hans & Uwe REYLE (1993), *From Discourses to Logic,* Dordrecht, Kluwer.
LUSCHER Jean-Marc (1994), "Les marques de connexion : des guides pour l'interprétation", in Moeschler et al. (1984: 175-227).

Luscher Jean-Marc (2002), *Eléments de pragmatique procédurale*, Göppingen, Kümmerle Verlag.

Luscher Jean-Marc & Jacques Moeschler (1990), "Approches dérivationnelles et procédurales des opérateurs et connecteurs temporels: les exemples de *et* et de *enfin*", *Cahiers de Linguistique Française* 11: 77-104.

Moeschler Jacques (1982), *Dire et contredire. Pragmatique de la negation et acte de refutation dans la conversation*, Berne, Peter Lang.

Moeschler Jacques (1985), *Argumentation et conversation. Eléments de pragmatique conversationnelle*, Paris, Hatier.

Moeschler Jacques (1989), *Modélisation du dialogue. Représentation de l'inférence argumentative*, Paris, Hermès.

Moeschler Jacques (2000a), "L'ordre temporel est-il naturel ? Narration, causalité et temps verbaux", in Moeschler & Béguelin (2000: 71-105).

Moeschler Jacques (2000b), "Le Modèle des Inférences Directionnelles", *Cahiers de Linguistique Française* 22: 57-100.

Moeschler Jacques (2002), "Connecteurs, encodage conceptuel et encodage procedural", *Cahiers de Linguistique Française* 24: 265-292.

Moeschler Jacques (2003a), "L'expression de la causalité en français", *Cahiers de Linguistique Française* 25: 11-42.

Moeschler Jacques (2003b), "Economy and Pragmatic Optimality: the Case of Directional Inferences", *Generative Grammar@Geneva* 3:1-22.

Moeschler Jacques et al. (1984), *Langage et pertinence. Référence temporelle, anaphore, connecteurs et métaphore*, Nancy, Presses Universitaires de Nancy.

Moeschler Jacques & Marie-José Béguelin, eds. (2000), *Référence temporelle et nominale*, Berne, Peter Lang.

Mouretalos A.P.D. (1981), "Events, processes, and states", in Tedeschi & Zaenen (1981: 191-212.

Parsons Terence (1990), *Events in the Semantics of English. A Study of Subatomic Semantics*, Cambridge (Mass.), The MIT Press.

Reboul Anne (2000), "La représentation des éventualités dans la Théorie des Représentations Mentales", *Cahiers de Linguistique Française* 22: 3-55.

Reboul Anne (2003), "Causalité, force dynamique et ramifications temporelles", *Cahiers de Linguistique Française* 25: 43-69.

Reboul Anne et al. (1997), "Le projet CERVICAL. Représentations mentales, référence aux objets et aux événements", *http://www.isc.cnrs.fr/reb/cervical/cervicalintro.htm*.

Roulet Eddy et al. (1985), *L'articulation du discours en français contemporain*, Berne, Peter Lang.

Saussure Louis de (2000a), *Pragmatique temporelle des énoncés négatifs*, Thèse de doctorat, Université de Genève.

Saussure Louis de (2000b), "Les 'règles conceptuelles' en question", *Cahiers de Linguistique Française* 22: 147-164.

Sklar Lawrence (1974), *Space, Time and Spacetime*, Berkeley, University of California Press.

Tedeschi Philip J. & Annie Zaenen, eds. (1981), *Syntax and semantics 14: Tense and aspect*, New York, Academic Press.

Vendler Zeno (1967), *Linguistics in Philosophy*, Ithaca, Cornell University Press.

Wilson Deirdre & Dan Sperber (2003), "Relevance theory", in Horn & Ward (2003): 607-632.