

Where is procedural meaning located? Evidence from discourse connectives and tenses

Abstract (200 words)

This article makes a proposal about where procedural meaning is located. Procedural meaning is defined as guiding the processing of conceptual information, whereas conceptual meaning includes information on the representation of entities, which mainly concerns events as regards tenses and causal connectives. Conceptual information for connectives is described at the level of entailment, explicature and implicature, including the possibility or the factivity of causal relations, whereas procedural meaning, for causal connectives, is restricted to the direction of the causal relation (forward or backward). As tenses are concerned, conceptual information encodes temporal coordinates, while procedural meaning encodes directional and subjective properties of events, represented in pragmatic features as [\pm narrative] and [\pm subjective].

A second goal is to answer to a central issue for pragmatics: what is the contribution of connectives, that is, what is the difference between discourses with and without connectives. The pragmatic framework developed in this article, based on Relevance Theory, gives the following answer: discourses without connective are contextually dependent, in order to make accessible the intended interpretation; on the contrary, discourses with connectives allow a simpler routes, reducing the number of inferential steps and contributing in determining semantic and pragmatic contents such as entailments, explicatures and implicatures defining their semantics and pragmatics.

Keywords

Procedural meaning, conceptual meaning, causal connectives, tenses, causality.

1. Introduction

A lot of scholars working on discourse connectives are reluctant to use the notion of *procedural meaning* (see for instance works by Sanders and his team on causal connectives in Dutch and related languages). This reluctance is not conceptual in nature; it is mainly due to the nature of the research questions asked. To illustrate, it has been observed using experimental methods that the presence of causal connectives increases recall of information in text comprehension (Sanders and Noordman, 2000). So from a cognitive perspective, the role of discourse connectives goes beyond merely ensuring discourse coherence, they affect performance in comprehension tasks, by increasing information recall. From a Relevance-

theoretic perspective, this result is not surprising and could be addressed by assuming that the type of meaning encoded by connectives (mainly procedural meaning) activates more salient routes in the discourse comprehension process, whose outputs should therefore be easier to recall.

From a more theory-neutral perspective, an adequate account of discourse connectives should suggest answers to the following general questions:

- a. What explains the differences in meaning between discourses with and without connectives?
- b. What type of meaning do discourse connectives have, and what is its function?
- c. Where is the meaning of discourse connectives located?
- d. How are meaning variations in discourse linked to the use of connectives?

These are traditional issues raised by various approaches to discourse connectives. However, these questions have not all received clear and convincing answers.

Question (a) is generally answered, especially in Diane Blakemore's work (Blakemore, 1987 and 2002), by claiming that connectives facilitate discourse comprehension: they guide the comprehension process by giving instructions on how to process and connect discourse segments. This is the same line of argument found in Ducrot's work on connectives: their meaning is an instruction on discourse interpretation (Ducrot et al., 1980).

Question (b) also receives a classical answer within RT, with the notion of *procedural meaning* (Wilson and Sperber, 2012, chapter 7). But procedural meaning is not clearly delimited in linguistic terms, because (i) discourse connectives are not a natural class, (ii) some connectives, like *and* or *because*, are described as having both conceptual and procedural meaning (Blakemore, 2002, Carston, 2002), and (iii) procedural meaning is not restricted to connectives.¹ In Ducrot's theory, connectives are seen as playing an argumentative role, carrying instructions on how to draw argumentative conclusions (see for instance the classical argumentative analysis of *mais* in French in Anscombe & Ducrot, 1977).

¹ Procedural meaning has been attributed to negation (Carston, 1996, Moeschler, 1997), pronouns (deictic and anaphoric – Wilson and Sperber, 2012, chapter 7) and tenses (Moeschler et al., 1998, Saussure, 2003, Moeschler et al., 2012, Escandell-Vidal and Leonetti, 2011, Grisot and Moeschler, 2014), to name but a few.

Question (c), on the other hand, has not been explicitly addressed, since discourse connectives with procedural meaning are not seen as encoding concepts (in other words, a connective is not the lexical entry of a concept that plays a role in the language of thought). In Ducrot's approach, the locus of connective meaning is clearly semantics (defined as a set of instructions) which gives rise to different meaning outputs grounded in different discourse settings.

The classical description of how and why discourse connectives have different meanings in use (question (d)) is also due to Ducrot: a general argumentative meaning template receives different values on different occasions, thus explaining meaning variation (see Luscher and Moeschler, 1990).

In this paper, I would like to give precise answers to these four questions, within a general pragmatic framework whose main focus is on the nature of the semantics-pragmatics interface. In other words, I will present proposals designed to explain:

- a. the contribution of connectives to discourse meaning;
- b. the nature of their meaning;
- c. the location of their meaning;
- d. their variations in meanings on different occasions of use.

In order to correctly address the issue of how the conceptual-procedural distinction applies to connectives, I put forward a proposal about the procedural meaning of tenses, which will help to answer the questions about connectives raised above.

The article is organized as follows: section 2 discusses some differences in meaning between discourses with and without connectives; section 3 makes a proposal about the conceptual/procedural distinction; section 4 is about tenses and their procedural meaning; section 5 considers where the meaning of discourse connectives is located; and section 6 gives an overall explanation for the differences in meaning between discourses with and without connectives.

2. What explains the differences in meaning between discourses with and without connectives?

Let us begin by looking at connectives, and in particular at the difference between discourse sequences with and without connectives.

Blochowiak (2014a) discusses this issue in relation to the temporal and causal readings of *and* and *because*, where some striking differences are found:

1. In certain cases, the temporal relation associated with *and* is lost when the connective is absent, and the second segment is then understood as an explanation (cf. the so-called Bar-Lev and Palacas, 1980 puzzle, discussed in Carston, 2002).
2. Although *and* clauses cannot in general provide explanations, a certain subset of cases seem to involve explanatory uses of *and* (Horn's example)
3. Although *because* clauses typically describe causes, in so-called 'epistemic' or 'speech-act' uses, the temporal relations that normally hold between the two discourse segments are reversed.

Blochowiak (2014) analyses these puzzles within a possible worlds semantics, and offers a solution in terms of presupposition and entailment relations (Blochowiak 2014b). Here I will only take advantage of her overall presentation, and consider what issue these puzzles raise for the analysis of discourse connectives.

Let's begin with the contrast between temporal and causal relations with *and*, illustrated in (1):

- (1)
- a. We spent the day in town *and* I went to Harrods.
 - b. She shot him in the head *and* he died instantly.
 - c. I forgot to hide the cake *and* the children consumed it.

In (1a), there is a temporal inclusion relation between the events described in the two segments, and also a possible cause-consequence relation (a kind of *as a result* reading); in (1b), there is a temporal and causal relation where the events described are understood as contiguous; finally, in (1c) there is a temporal and causal interpretation, with the first event preceding and causing the second.

Without *and*, the iconic interpretation (where the order of events reflects the order of the segments) is maintained:

- (2)
- a. We spent the day in town. I went to Harrods.
 - b. She shot him in the head. He died instantly.
 - c. I forgot to hide the cake. The children consumed it.

In (2a), there is a containment relation, in (2b) a causal iconic relation and in (2c) an enabling relation, which explains why the children ate the cake. In other cases, however, these temporal and causal relations are lost when the connective is absent, as in the following examples:

- (3) a. Max didn't go to school; he got sick.
 b. Max didn't go to school and he got sick.

In (3a), the absence of *and* gives rise to an explanation relation (non-iconic), whereas in (3b), *and* triggers a temporal and causal relation (iconic). In other words, whereas (3a) presents the events described in the order consequence-cause, the presence of *and* in (3b) changes the causal order, and gives rise to a cause-consequence interpretation. The challenge for an account of discourse connectives is to explain why.

The second puzzle, raised by Horn, is the reverse of the first. In some contexts, *and* is compatible with a non-iconic order (consequence-cause), violating Bar-Lev and Palacas' (1980) semantic command constraint, which states that *P and Q* cannot have an interpretation where *Q* precedes *P*: *P and Q* $\not\rightarrow$ *Q* < *P*. Here is Horn's example:

- (4) A: What happened to the vase?
 B: a. Well, the vase broke; John dropped it.
 b. Well, the vase broke, and John dropped it.

In this context, the non-iconic reading (consequence-cause) is possible both with and without *and*. (4Ba) receives a classical explanation reading: John's dropping the vase caused it to break. According to Bar-Lev and Palacas's semantic command constraint, this reading should not be possible, but in fact it is, as (4Bb) shows. Note that this reading of (4Bb) is not equivalent to another version (without 'comma' intonation), given in (5):

- (5) Well, the vase broke and John dropped it.

In (5), the only possible reading is the iconic one, which gives rise to a counterintuitive interpretation on which first the vase broke and then John dropped it. With (4Bb), by contrast, the hearer has to derive a supplementary meaning in order to establish the non-iconic reading, so the overall interpretation is along the lines of (6):

- (6) The vase broke, and the reason why it broke is that John dropped it.

On this approach, *and* can sometimes introduce an explanatory clause, just as *because* can sometimes introduce a consequence clause in an inferential or epistemic reading, as in (7), standardly interpreted along the lines of (8) (Sweetser, 1990, Zufferey, 2010):

- (7) He loves him, because he came back.

- (8) I conclude that he loves her, and the reason why is that he came back.

The third puzzle is the so-called temporal use of *because* (Blochowiak, 2014a):

- (9) Oh, Jane has eaten her banana, because she is drinking her coffee now.

In (9), the speaker intends to communicate that first Jane ate her banana and then she drank her coffee, because she always eats a banana before she drinks her coffee in the morning. The way we can access such an interpretation is given in the following scenario (Blochowiak, 2014a, 319):

“According to what you know, your neighbour Jane always eats a banana before she drinks her coffee in the morning. Now, imagine a scenario where you look through the window and you see your neighbour Jane drinking her coffee in the morning. In this case, you can felicitously utter a sentence with the connective *because* that will refer to this temporal relation as in [9]”.

However, as Blochowiak underlines, what is crucial here is that the expression of this iconic temporal relation with *because* can only occur in its epistemic use where the temporal rule plays the role of premise. Here again, the puzzle is explained on the basis of a general rule that makes sense of the atypical iconic reading of *because*. It is therefore not surprising that the absence of *because* does not change the epistemic reading: the standard temporal order is preserved, and the second clause gives the reason why the speaker believes that Jane has eaten her banana thanks to the general rule:

- (10) Oh, Jane has eaten her banana: she is drinking her coffee now.

The conclusion from this section is as follows: a connective can change the interpretation of the discourse segment (*and*), or impose an interpretation that would not be possible without it (*and*). Unlike *and*, *because* imposes a causal reading, and in its epistemic use imposes a reading which contradicts the temporal order associated with its more typical semantic use. In other words, a connective like *because* contributes to the pragmatic interpretation of the utterance by imposing a causal reading which could be iconic. *And*, on the other hand, is compatible with a non-iconic causal reading, which raises the question of how such a contribution can be compatible with its semantics.

3. Connectives and the conceptual/procedural distinction

The first issue, addressed in section 2, was about what explains the pragmatic differences linked to the presence or absence of a connective. In general terms, this issue can be formulated as follows: What is the semantic contribution of a connective? I have shown above that connectives can (i) confirm discourse relations obtained without them (*and*), (ii) change the discourse relation (*and*), (iii) impose a discourse relation (*because*), (iv) be consistent with a discourse relation seemingly incompatible with its semantics (*and*).

The contrast between *and* and *because* is interesting, because the distinction lies in the nature of their semantics: *and* is semantically weaker than *because*, since it is compatible with several apparently conflicting pragmatic interpretations: additive, as in (11), contrastive, as in (12), temporal, as in (13), causal, as in (14), to name but a few.

- (11) Mary is married and pregnant.
- (12) Mary is single and pregnant.
- (13) Mary married Paul and got pregnant.
- (14) Mary married Paul and obtained Swiss citizenship.

By contrast, *because* has three main uses (Sweetser, 1990, Zufferey, 2010 and 2012 for *parce que*): causal, as in (15), epistemic, as in (16) and speech act, as in (17), all of them implying a causal component.

- (15) He came home because he loves her.
- (16) He loves her, because he came home.
- (17) Does he love her? Because he came home.

The different interpretations of these uses can be represented as in (18) for *and*, and in (19) for *because*:

- (18) a. Mary is married and additionally pregnant.
b. Mary is single but pregnant.
c. Mary married Paul and then she got pregnant.
d. Mary married Paul and because of that she obtained Swiss citizenship.
- (19) a. His loving her caused him to come home.
b. I conclude that he loves her, and the reason is that he came home.
c. I ask whether he loves her, and the reason is that he came home.

So one of the first assumptions we can make is that connectives are not equal as regards the complexity and specificity of their semantics: the weaker their semantics, the more uses they have, and vice-versa: the stronger their semantics, the fewer their uses. This suggests that weak connectives like *and* must meet some extra conditions in order to trigger the appropriate pragmatic interpretation. This is certainly one of the most important issues for any theory of connectives: not to describe how a plain semantic meaning is compatible with different uses, as in the *because* case, but to show how a minimal semantics can contribute to a much richer pragmatic interpretation.

On the other hand, this asymmetrical relation between meaning complexity and number of uses should be explained in terms of the meaning a connective encodes. As regards the *and/because* contrast, there seems to be a correlation between the *strength* of the encoded meanings and their range: a connective *C* encodes a weak meaning if it is not restricted to one meaning, whereas it is strong if its meaning is restricted to one specific one (like the CAUSE relation for *because*). The next issue is about what type of encoded meaning can be weak or strong. My proposal is that the strong/weak opposition applies to *conceptual*, not *procedural*, meaning. Why should this be the case?

Before answering this question, let us briefly recall what *conceptual* and *procedural* meanings are. The conceptual meaning of a connective – when it has one – is determined by the concept the connective encodes, i.e., the concept for which the connective is the lexical entry. The condition under which a connective has conceptual meaning thus depends on the possible relation between a lexical entry and a concept. This may strike one as a weird proposal, because there is no a priori argument to show that a word like *and* or *because* can encode a

concept. A simple comparison with lexical words should make this claim seem more reasonable. For instance, there is certainly a concept DOOR, a concept BACHELOR, and a concept OPEN, whatever the grammatical category of the lexical words involved (here, respectively, a noun, an adjective, and a verb). This is not only because the corresponding lexical entries (i.e., the words *door*, *bachelor* and *open*) are used to refer to sets of entities (the sets of entities which are doors, bachelors and openable, respectively). But a concept is not only a mental representation of different sets of individuals, it is the abstract or mental entity that allows the fixation of beliefs and knowledge: concepts are the locus of information construction, storage and retrieval.

Now, a concept must be sufficiently plastic to allow a range of uses that are pragmatically connected with it. For instance, the concept DOOR must be compatible with at least two descriptions of what a door is, as in (20); the concept BACHELOR must be compatible with a more specific use, and also with a broadening of its denotation, as in (21); finally, the concept OPEN must be compatible with different types of events, even if their telic and accomplishment properties are constant, as examples (22) show.

- (20) a. John painted the door pink (DOOR1 =solid panel)
 b. Mary left through the door (DOOR2 = space to go in and out)
- (21) a. John is not married, he is still a bachelor (BACHELOR1= not-married)
 b. Mary is happy, she finally met a bachelor (BACHELOR2 = not-engaged)
 c. Mary's husband behaves like a bachelor (BACHELOR3 = unfaithful)
- (22) a. John opened the door (OPEN1 = to move the door panel)
 b. The children are eager to open their presents (OPEN2 = to unwrap their gifts)
 c. Can you explain how I can open this file? (OPEN3 = to unlock a computer file)
 d. In order to be paid, you have to open an account (OPEN4 = to fill the bank questionnaire and sign the form)

So a single word can be used to communicate a variety of meanings, and the general explanation given in Relevance Theory lies in the difference between the encoded concepts and the inferred or communicated concepts, that is, *ad hoc* concepts (Carston, 2002, Wilson, 2003, Wilson and Carston, 2007).

So variations in the conceptual meanings carried by lexical words are not particularly surprising. What about the conceptual information carried by connectives like *and* or *because*? How can we account for these differences in meaning, and more precisely the strong/weak

variation? In previous articles on temporal relations and causality (see Moeschler, 2005 for a synthesis), the following claim has been made: the variation in meaning is located within the conceptual information encoded by the connective, which means that the conceptual entry for the concept specifies a set of possible meanings. For instance, with the weak connective *et* in French, its temporal, causal and inclusive meanings, as well as the temporal relations it gives rise to, are all represented in its conceptual entry, which consists of a set of relations. The inferential comprehension process is thus restricted to selecting one of the possible temporal meanings. With a strong connective such as *parce que* (*because*), its conceptual entry should be restricted to a single meaning, activated in all pragmatic uses, as illustrated for instance in (19). Notice that this proposal about *et* applies only to its temporal meanings, illustrated in (23), and not to non-temporal ones, as in (18).

- (23) a. Jean se leva et prit une douche (forward inference²)
 ‘John woke up and took a shower’
 b. Marie poussa Jean et il tomba (causal inference)
 ‘Mary pushed John and he fell’
 c. Jean regardait la television et mangeait un sandwich (temporal inclusion)
 ‘John watched the television and ate a sandwich’

Table 1 summarizes this first finding, linking the strength of a connective and the complexity of its conceptual meaning:

<insert Table 1 here>

Table 1: conceptual meaning and strength of connectives

As a first conclusion, we can hypothesize that the wider the range of conceptual information, the weaker a connective is. Thus, in order to infer the intended interpretation, extra processing work has to be done, based mainly on access to event-type information (aspectual classes for instance), as well as other types of information, for instance procedural information (mainly associated with tenses in the case of temporal reference).

² ‘Forward inference’ means here a temporal inference which is parallel, at the event level, to discourse segments.

As regards event-type information, it is evident that general event properties play a central role in selecting the appropriate temporal relation. For instance, waking up and taking a shower are ordered for reasons which are linked to general knowledge: waking up generally implies that one was in bed, and taking a shower generally implies being in a bathroom. So the reverse interpretation, first taking a shower, and second waking up, would not normally make sense, because it would contradict the Relevance Theory comprehension heuristic (“Follow the path of a least effort in computing cognitive effects”, Wilson and Sperber, 2004, 613). The forward inference in (23a) makes sense because the distance between the two events is both temporally and spatially short: generally, when one wakes up and takes a shower, the temporal interval between the two events is brief and the spatial interval is short. Moreover, the use of temporal *et* communicates that the temporal interval between the two events was not filled by a string of other extraneous events (for instance, preparing the breakfast, making a phone call, looking at one’s emails, etc.) (see Wilson and Sperber, 2012, chapter 8 for further arguments on the interval question).

However, one of the main issues as regards connectives is not about their conceptual meaning, but about the meaning commonly referred to as *procedural*, since Blakemore’s (1987) book on connectives. Procedural information is rather easy to describe in general terms, even if its exact details and location are unclear. Human cognition typically involves an interaction between representations and computations. Some representations are conceptual, and involve the creation, storage and use of concepts. Generally speaking (Sperber and Wilson, 1986), a concept can be represented as consisting of an address which gives access to various types of information, including a logical entry, an encyclopaedic entry and a lexical entry. For instance, (24) and (25) might represent the concepts encoded by *door* and *et* (*and*).

(24) Address: @DOOR

logical entry: $\text{DOOR}(x) \rightarrow \text{OPEN}(x) \text{ or } \text{CLOSE}(x)$

encyclopaedic entry: (i) door panel, (ii) space to go in and out, (iii) size depending on the entity which uses it, (iv) generally accessible and visible, (v) etc.

lexical entry: N, countable, *door*

(25) Address: @AND

logical entry: $x \text{ AND } y \rightarrow x, y$

encyclopaedic entry: \emptyset

lexical entry: Conj, *et*

A concept like DOOR has not only an encyclopaedic entry, but also a logical one: a door has some logical properties (e.g. it is a physical object, located in space). From a logical point of view, the main function of a door d is to provide access from space A to space B, where A and B are separate spaces, connected by d . From this, it follows that d is either closed (access from A to B is not possible) or open (access from A to B is possible).³ Moreover, since the concept DOOR denotes a set of entities, there should be conditions under which an entity can be truly described as a DOOR.

As represented in (26), the concept encoded by *et* has no encyclopaedic entry, since it has no denotation. However, if we change the representation of the concept AND by giving it a conceptual entry⁴, then it will be possible to fill the empty slot and complete the representation of the meaning of *et*:

- (26) Address: @AND
 logical entry: $x \text{ AND } y \rightarrow x, y$
 conceptual entry: {FORWARD INFERENCE, CAUSE, INCLUSION}
 lexical entry: Conj, *et*

Now, let's go back to the second aspect of cognition, that is, *computation*. The idea is that processing information involves not only creating, storing and retrieving representations, but also manipulating representations and performing computations over them. This is exactly what procedural meaning is used for: manipulating conceptual representations.

A lot of proposals have been made about how to define precisely the general properties of procedural information and the way in which procedural information is attached to lexical items (see for instance as a survey of proposals Escandell-Vidal et al., 2011, Wilson, 2011). Procedural information has been described as being: (i) not accessible to consciousness; (ii) not paraphrasable; (iii) not translatable; (iv) associated with specific lexical items. The question of its (non-)truth-conditionality has been discussed in Wilson and Sperber (2012,

³ There is a literary argument for this logical property, given by the title of a famous theatre play, by Alfred de Musset: *Une porte doit être ouverte ou fermée* (*A door must be open or closed*).

⁴ A conceptual entry allows giving conceptual information to concepts that have no denotation. I hypothesize here that *and* does not refer to any type of entity, but has anyway a conceptual meaning. A conceptual entry is just a formal notation for this type of content.

chapter 7), which notes that while much procedural information is non-truth-conditional, some (particularly information associated to referential items such as personal pronouns, which play a crucial role in the development of explicatures) is truth-conditional. In what follow, I will neither assume that the difference between conceptual and procedural information is linked to truth-functional status, nor claim that procedural information is restricted to specific grammatical categories, such as functional heads for instance.

One of the main strands in the conceptual-procedural debate has involved adopting a much more flexible position, allowing a mixture of conceptual and procedural information to be encoded. The exact way in which such a combination of conceptual and procedural information can arise has not been clearly established. However, Moeschler (2002) makes a specific proposal about how to connect some general properties of lexical and functional categories, such as verbs, tenses and connectives. The main claim is that a lexical item is defined by a certain quantity of conceptual and procedural information, and that the general distribution of the correlation is connected with specific categorial domains. A further distinction, between propositional or non-propositional status, is used to explain why and how some procedural information has or lacks truth-conditional effects. Figure 1 gives a general picture of this model:

<insert here Figure 1>

Figure 1: conceptual and procedural information

The criteria used to define categories (verbs, connectives, tenses) are based on the following empirical evidence:

Propositional vs. non-propositional information: connectives are propositional, because they connect propositions or speech acts (which take propositions in their scope), but not all verbs are. For instance, modals and auxiliaries are propositional, because they are operators which take a proposition in their scope, whereas event and state verbs are one-place or two-place predicates. As regards tenses, French Passé Simple (PS) is clearly propositional, because one of its main functions (see below) is to switch reference time (Reichenbach, 1966), that is, move the reference time forward (this is a classical forward inference effect, as in (27)). On the other hand, French Imparfait (IMP) is not propositional: its main function is to depict an internal perspective, not to connect propositions or events, as example (28) shows:

- (27) Marie poussa Jean. Il tomba.
 ‘Mary pushed-PS John. He fell-PS’
- (28) Marie poussa Jean. Elle était furieuse contre lui.
 ‘Mary pushed-PS John. She was-IMP angry with him’

Conceptual information: some lexical items are more conceptual than others. In the case of verbs, it is clear that their event and state status give them causal and temporal content that modals and auxiliaries lack. In the case of connectives, some have a more specific conceptual meaning, as argued above, and in this respect, *et* (*and*) is less conceptual than *parce que* (*because*), the argument being that the strength of conceptual meaning is non-orthogonal to its uses: the more meanings in use, the less conceptual a connective. One delicate point is the status of *mais* (*but*). The prediction is that its content is more procedural than conceptual, because it triggers certain inferences. For instance, in the corrective uses of *mais* (29) and its contrastive uses (30), certain content relations are inferred, which are predicted by the scope of negation and the different discourse relations (respectively Correction and Contrast) (see Moeschler, 2013a for a more precise description). In corrective uses, the corrective clause (COR) entails the negative one (NEG); in contrastive uses, COR entails POS, the positive counterpart of NEG.

- (29) Abi is not beautiful; she is ordinary. Corrective use
- (30) Abi is not beautiful; she is gorgeous. Contrastive use
- (31) Corrective use: x is ordinary $\rightarrow x$ is not beautiful
- (32) Contrastive use: x is gorgeous $\rightarrow x$ is beautiful⁵

Procedural information: Verbs are mainly conceptual, but modals are procedural too: they have a root meaning which allows for deontic and epistemic interpretations, depending on the linguistic and contextual properties of the utterance. Connectives too can be more or less procedural: *et* has some conceptual meaning, even if this is weak, whereas *mais* (*but*) is strongly procedural and weakly conceptual, for the same reason as *et* (many uses). The

⁵ In Moeschler (2013a), (29) is given as a typical example of descriptive or ordinary negation, with downward entailment and truth-conditional effects, whereas (30) is an example of metalinguistic negation, with upward entailment and non-truth-conditional effects (Horn, 1985, 1989, Carston, 1996, 2002).

difference lies in the vagueness or precision of the procedural meaning. Finally, tenses are highly procedural, as I will argue below.

The last point for discussion is the nature of procedural meaning. The classical argument, stated in Blakemore (1987), is that procedural meaning is directly connected to one of the three possible positive cognitive effects of an utterance: the addition of new information (contextual implication), the strengthening of old information or the suppression of old information. My proposal is that procedural information is either less or more informative than this. In other words, procedural information contributes to inferential processes, but in a way that specifically depends on the nature of the connectives. In section 4, I will give some arguments about what the procedural information attached to tenses might look like, and in section 5 I will consider the procedural information attached to connectives.

4. How procedural are tenses?

There have been a lot of proposals about the procedural nature of tenses. Among empirically grounded approaches, most agree on the procedural nature of temporal information, but there is less convergence on the exact details of what is procedural, and what is conceptual in the meaning of tenses.

We can summarize some of the proposals as follows:

1. *The full procedural meaning approach*: from this perspective, tenses encode only procedural information. Here, two approaches can be distinguished: on the first, procedural meaning mainly concerns the saturation of a Reichenbachian temporal template for locating events on the time arrow (Saussure, 2003, 2012, Escandell-Vidal and Leonetti, 2011, Aménos-Pons, 2011); on the second, procedural meaning is restricted to guiding directional inferences, that is, forward (FI) or backward (BI) inferences (Moeschler, 2000, 2002, 2005).
2. *The mixed conceptual and procedural meaning approach*: in this approach, tenses encode both conceptual and procedural meaning: they have a robust semantics, formatted by a Reichenbachian template, and a more flexible template, represented by a hierarchy of *pragmatic features*. In other words, temporal coordinates are described as conceptual,

whereas information implicating a narrative and a subjective interpretation are defined as procedural (Moeschler et al., 2012, Grisot and Moeschler, 2014, Grisot et al., 2013).⁶

In what follows, I will briefly present Moeschler's Model of Directional Inference (MDI) and Grisot and Moeschler's mixed model.

The MDI is a system combining conceptual and procedural information from different linguistic and non-linguistic sources. It is based on the idea that linguistic expressions encode directional features allowing for forward and backward inferences, and that these features are weak or strong, depending on the triggering expression. The model is governed by three principles:

- (33) Principle A: contextual information is stronger than linguistic information.
- (34) Principle B: procedural information is stronger than conceptual information.
- (35) Principle C: propositional procedural information is stronger than morphological procedural information.

The implications of these assumptions are the following:

1. When a conflict arises between directional features, contextual information, that is information derived from contextual assumptions, wins.
2. When a conflict arises between conceptual and procedural information, procedural information always wins, that is, tenses are stronger than event predicates.
3. When a conflict arises within procedural information, propositional information wins against morphological information, that is, connectives are stronger than tenses.

⁶ In this framework, these features are called pragmatic for terminological reasons: semantic meaning is restricted to entailment and presupposition, and pragmatic meaning includes explicatures and implicatures. The contribution of conceptual meaning will be restricted to explicatures and implicatures, and the contribution of procedural meaning is restricted to determining causal and temporal relations, playing a role at both the explicature and implicature levels. See section 5 for further discussion.

So there is a hierarchy of information, and the computation of a directional inference results from combining the directional features encoded by predicates, tenses and connectives. The hierarchy is given in (36) and the chart of encoded information in Table 2:

(36) contextual assumptions > connectives > tenses > event predicates

<insert Table 2 here>

Table 2: a chart showing encoded procedural information in French: weak features are in [regular font], strong features in [CAPITALS]. [fi] and [FI] stand for *forward inference*, [bi] and [BI] for *backward inference*

This first model makes interesting predictions, but it is incapable of giving a fine-tuned semantics and pragmatics for tenses and connectives. This is the main reason why it has been replaced by a second, much more flexible model, which has been successfully tested and improved based on empirical data (see Grisot and Moeschler, 2014, Grisot, 2015).⁷ The mixed conceptual/procedural model (MCPM) was first proposed in Moeschler et al. (2012), and tested for its description of the French Historical Present (Moeschler 2014).

The MCPM is based on a classical Reichenbachian analysis of tenses, supplemented by further pragmatic features. The use of Speech point (S), Reference point (R) and Event point (E) as well as the relations of precedence (<) and simultaneity (=, \subseteq)⁸ provide a general template for tense systems.⁹ For instance, with French tenses, this system classically

⁷ Grisot (2015) notes that a verbal tense form in Romance languages and English contains information both about Tense and (grammatical) Aspect, where Aspect is not morphologically expressed (apart from English *-ing* for the progressive aspect). Moreover, aspect encodes procedural information constraining the construction of explicatures, whereas Tense encodes both conceptual and procedural information. The procedural information encoded by Tense constrains the construction of explicatures with respect to temporal relations holding among the eventualities referred to, operationalized as the [\pm narrativity] feature.

⁸ The simultaneity relation can be co-extensional or inclusive.

⁹ Grisot (2015) suggests that E and S are used to operationalize the conceptual content of Tense, that is, the vague concept (i.e. pro-concept according to Wilson and Sperber, 2012, chapter 8) TIME specified contextually as *past* and *non-past*, whereas R is linked to its procedural content.

distinguishes between two sub-systems, one for past tenses, and the other for present and future tenses. The main assumption is that this information corresponds to the semantics of tenses and their conceptual meanings. The novelty of the MCPM is that each tense has potentially 6 pragmatic uses, based on the following hierarchy of features: [\pm narrative] > [\pm subjective] > [\pm explicit]. Figure 2 gives the general template for the use of each tense, illustrated in examples (37) to (42):

<insert her Figure 2>

Figure 2: types of uses for tenses

- (37) Demain, j'irai chez le coiffeur et je me teindrai les cheveux.
 'Tomorrow I will go to the barber and will have my hair dyed.'
 [+narrative], [+subjective], [+explicit]
- (38) Marie sauta dans le train. Dix minutes plus tard, le train déraillait.
 'Mary jumped on the train. Ten minutes later, the train was derailed.'
 [+narrative], [+subjective], [-explicit]
- (39) Paul entra dans un café et commanda une bière.
 'Paul went into a café and ordered a beer.'
 [+narrative], [-subjective]
- (40) Qu'elle était stupide! pensa-telle.
 'How stupid she was! she thought.'
 [-narrative], [+subjective], [+explicit]
- (41) En 1805, Napoléon se déclarait empereur.
 'In 1805, Napoleon declared himself Emperor.'
 [-narrative], [+subjective], [-explicit]
- (42) Un père tue ses enfants et sa femme.
 'A father kills his children and his wife.'
 [-narrative], [-subjective]

(37) illustrates the string [+narrative][+subjective][+explicit]: there is a temporal order between events, the perspective is subjective and is made explicit by the first personal pronoun. (38) is also narrative and subjective, but the perspective is not explicitly stated in the IMP utterance (*le train déraillait*). (39) is the standard case of non-subjective narrative use of the French Passé Simple. (40) to (42) are all non-narrative discourses: (40) is a standard

example of free indirect style (Banfield, 1982, Reboul, 1992), (41) is a case of non-narrative, subjective but non-explicit discourse (no point of view is accessible, but the French IMP triggers a subjective interpretation). Finally (42), which is a typical newspaper headline, is both non-narrative and non-subjective.

The originality of the system is that, theoretically, all tenses can have those 6 uses. In practice, and this is much more interesting, only some paths are actually exploited. For instance, Figure 3 illustrates the possible uses for past tense meanings, that is, *Passé Simple* (PS) and *Imparfait* (IMP), cf. respectively examples (57) and (58):

<insert here Figure 3>

Figure 3: types of uses for French PS and IM

The Mixt Conceptual Procedural Model, unlike the Model of Directional Inference, makes precise claims about the division of labour between conceptual and procedural meaning, and also some predictions. The main claim is that variations in the meaning of connectives are due to pragmatic features, that is, procedural meaning. These features are treated as pragmatic because they are not licensed unless some other information makes them active. Moreover, Cristina Grisot (2015) has demonstrated that this division of labour for tenses is not arbitrary: their semantics, that is, the conceptual information they encode, is easily recognizable and correctly evaluated in offline experiments using linguistic judgment tasks, whereas this is not the case with procedural information (mainly the $[\pm\text{narrative}]$ feature), which gives rise to a rather low value of the Kappa coefficient, which measures inter-annotator agreement.

What conclusions can be drawn from this proposal? First, it seems that the conceptual-procedural distinction is definitely active in utterance comprehension; second, what is certainly one of the most important findings in Grisot's PhD thesis is that this information, particularly procedural information, is encoded in different ways in different languages (her target languages were French, English, Romanian and Italian).¹⁰

¹⁰ Similar cross-linguistic evidence about the different ways of encoding procedural information with connectives is provided in Zufferey and Cartoni (2012), in a contrastive analysis of causal connectives in French and English.

5. Where is the meaning of discourse connectives located?

In this section, I want to consider where the meaning of discourse connectives is located. I will approach this question by investigating similarities and differences in the meanings of three closely related temporal and causal connectives: *parce que* (*because*), *donc* (*therefore*) and *et* (*and*), as discussed in Moeschler (2011) and (2015a). The close similarity between the meanings of these connectives is illustrated by examples (43) to (45):

(43) Jean est tombé parce que Marie l’a poussé.

‘John fell because Mary pushed him.’

(44) Marie a poussé Jean, donc il est tombé.

‘Mary pushed John, therefore he fell.’

(45) Marie a poussé Jean, et il est tombé.

‘Mary pushed John, and he fell.’

In each sequence, there is a *causal* relation, and in truth-conditional terms, each sentence communicates, with different strengths and at different levels of meaning, that there is a causal relation between a pushing event and a falling one. The main question is: how is this information inferred? My hypothesis is that the differences in meaning are not explainable in terms of the encoded content of the connectives, but rather in the levels of meaning they affect.

All three connectives encode a CAUSE relation at some level, and make it possible to infer the factive vs. non-factive status of the related propositions. In other words, in all three cases, temporal and causal inferences are made, but via different routes. For instance, some contents figure in entailments, while others are part of explicatures or implicatures. The following entailments and causal relations are derivable from the use of these connectives:

(46) Jean est tombé parce que Marie l’a poussé.

a. JOHN FELL AND MARY PUSHED JOHN

b. MARY PUSHED JOHN CAUSE JOHN FELL

(47) Marie a poussé Jean, donc il est tombé.

a. MARY PUSHED JOHN

b. POSSIBLE (MARY PUSHED JOHN CAUSE JOHN FELL)

- (48) Marie a poussé Jean, et il est tombé.
 a. MARY PUSHED JOHN AND JOHN FELL
 POSSIBLE (MARY PUSHED JOHN CAUSE JOHN FELL)

The differences in these implications are the following. First, *parce que* and *et* are factive predicates: they entail the propositions they connect. On the other hand, *donc* is not factive: only the antecedent is presented as true, but not the consequent. Second, *donc* and *et* are compatible with situations where the CAUSE relation is explicitly presented as *possible* but *not certain*, as (49) and (50) show:

- (49) Marie a poussé Jean, donc il est peut-être tombé.
 ‘Mary pushed John, therefore he may have fallen.’
 (50) Marie a poussé Jean, et il est peut-être tombé.
 ‘Mary pushed John, and he may have fallen.’

On the other hand, *parce que* does not accept a modal operator:

- (51) ?? Jean est tombé parce que Marie l’a peut-être poussé.
 ‘John fell because Mary may have pushed him.’

Moreover, the causal relation associated with *parce que* can be denied:

- (52) Jean n’est pas tombé parce que Marie l’a poussé, mais parce qu’il a manqué une marche.
 ‘John did not fall because Mary pushed him, but because he missed a step’.

In short, these connectives trigger different speaker’s commitments about the truth of the propositions expressed: (i) *P* is entailed by all three connectives, *parce que*, *donc*, *et*; (ii) *Q* is entailed only by *parce que* and *et*. As regards the CAUSE relation, it contributes to an *explicature* with *parce que*, and an *implicature* under the scope of a modal operator with *et* and *donc*, since it can be cancelled:

- (53) Marie a poussé Jean et il est tombé, mais cela ne s’est pas passé dans cet ordre.
 ‘Mary pushed John and he fell, but events did not happen in that order’.

- (54) Marie a poussé Jean, donc il est tombé. En tout cas, c'est ce que je crois.
 'Mary pushed John, therefore he fell. Anyway, that is what I believe.'

Hence, the same informative content is semantically and pragmatically distributed in different ways. Table 3 gives a summary of these findings:

<insert Table 3 here>

Table 3: a chart showing the semantic and pragmatic meaning of causal connectives

The first positive conclusion I draw from this is that different contents are communicated by different connectives. This is not a surprise, but if we recognize that the same state of affairs can be described by different connectives, it seems plausible that with each connective, the same basic meaning is subtly differentiated in some way. My first proposal is that these subtle differences relate to whether the meaning of the connective is realised at the semantic or the pragmatic level, as an *entailment*, an *explicature* or an *implicature*.

The crucial question is about whether the meanings of the connectives are conceptual or procedural. I would like to make the following proposals. First, entailments are conceptual representations, because they carry no instructional element. As I have argued elsewhere (Moeschler (2013b, 2015b), entailments are meanings which do not have to be computed, because they are linked to the meaning of the lexical items which trigger them. For instance, when *P* and/or *Q* in *P parce que Q* are questioned, some consequences follow about what belongs to the common ground: in *P parce que Q*, *P* and *Q* are presented as true, and are not supposed to be questioned (55); only the causal link between them gives rise to possible denials, as in (56):

- (55) A: Jean est revenu parce qu'il aime toujours Marie.
 'John came home because he still loves Mary.'
 B: # Es-tu sûr qu'il est revenu? Es-tu sûr qu'il l'aime toujours?
 'Are you sure that John came home? And are you sure that he still loves her?'
- (56) A: Jean est revenu parce qu'il aime toujours Marie.
 'John came home because he still loves Mary.'
 B: Ne sois pas si naïf. Il est revenu à la maison parce qu'il n'avait plus d'argent.
 'Don't be so naïve: he came home because he had no more money.'

Second, what could be the status of the causal relation? In Table 1, I have suggested that a CAUSE relation is part of the conceptual meaning of the connectives. So what, then, is their procedural meaning? In section 3 (Table 2), I have given as the procedural meaning for the connectives *et* and *parce que* a directional property, respectively FI and BI, that is, a forward and a backward inference. In other words, the procedural meaning is restricted to determining the *direction of the causal inference*: backward with *parce que*, and forward with *et* and *donc*. This second conclusion is not trivial: it implies that procedural meaning is basically simple, and provides supplementary information about the relations between discourse segments. So Table 3 can be made more specific, as in Table 4:

<insert Table 4 here>

Table 4: conceptual and procedural meaning for causal connectives

We have now a precise proposal about the types of meaning encoded by connectives. If we want to capitalize on this type of representation, we could make a similar proposal for tenses, by combining conceptual and procedural meanings. I would like to make such a proposal for tenses such as French Passé Simple and French Imparfait, which has been described in the MCPM (Moeschler et al. 2012). The examples in (57) and (58) illustrate the principal uses, described as [\pm narrative], [\pm subjective] and [\pm explicit] (cf. Figure 3). Table 5 combines the classical Reichenbachian analysis with the procedural account:

(57) *The two main uses of French Passé Simple*

- a. [\pm narrative] [\pm subjective]

Max entra dans le bar. Il alla s'asseoir au fond de la salle.

'Max entered the bar. He sat down at the back of the room.'

- b. [\pm narrative] [\pm subjective] [\pm explicit]

Aujourd'hui, personne ne lui adressa la parole. (Stendhal, *Le Rouge et le Noir*, in Vuillaume 1990)

'Today, no one spoke to him.'

(58) *The four main uses of the French Imparfait*

- a. [\pm narrative] [\pm subjective] [\pm explicit]

Marie sauta dans le train. Dix minutes plus tard, le train déraillait.

'Mary jumped onto the train. Ten minutes later, the train was derailed.'

- b. [\pm narrative] [\pm subjective] [\pm explicit]

Marie entra dans le bureau. Que lui arrivait-il donc?

‘Mary entered the office. But what happened to her?’

c. [-narrative] [+subjective] [-explicit]

Le juge alluma une cigarette. La fièvre donnait au tabac un goût de fiel (Roger Vaillant, *La Loi*)

‘The judge lit a cigarette. The fever made the tobacco taste like gall.’

d. [-narrative] [-subjective]

Les dinosaures vivaient il y a des centaines de millions d’années.

Dinosaurs lived hundreds of millions of years ago’.

<insert Table 5 here>

Table 5: Conceptual and procedural analysis of French Passé Simple (PS) and Imparfait (IMP)

Now that we have an overview of what the conceptual and procedural meanings of tenses and connectives might be, I would like to address one last question: what explains the differences in meaning between discourses with and without connectives?¹¹

6. With and without again

Our description of the semantics and the pragmatics of causal connectives should help. In particular, only entailments are properly semantic; the remaining conceptual and procedural information is realised at the pragmatic level (via explicatures and implicatures).

So, if the presence or absence of connectives makes a difference, two types of information should be concerned: the CAUSE relation itself, and the direction of CAUSE. The CAUSE relation is a conceptual one, and conceptual information can be inferred from other sources, for instance lexical ones. If we come back to the examples without connectives discussed in section 2, the conceptual information carried by event/state predicates should give access to an appropriate interpretation – Explanation in (59), Containment in (60) and Temporal order in (61):

¹¹ This question does not arise for tenses: they are obligatory in tensed sentences.

- (59) The vase broke; John dropped it.
- a. DROPPING THE VASE CAUSE THE VASE BREAKING
 - b. Explanation
- (60) We spent the day in town. I went to Harrods.
- a. GOING TO HARRODS IS CONTAINED IN SPENDING A DAY IN TOWN
 - b. Containment relation
- (61) Jane has eaten her banana: she is drinking her coffee now.
- a. JANE HAS EATEN HER BANANA IS FOLLOWED BY HER DRINKING HER COFFEE
 - b. Temporal order

So the same information can be accessed without the use of connectives. The question is then: what explains the difference between the two cases? If we take the information carried by a connective such as *parce que* in its causal reading, as shown in (62), then it becomes clear that all this information should play a role in comprehension, by minimizing processing effort and providing the best route to the intended meaning.

- (62) *P parce que Q*
- a. Entailments: P and Q
 - b. Conceptual meaning: CAUSE
 - c. Procedural meaning: $Q \rightarrow P$

My hypothesis is that the difference lies at the level of *procedural meaning*. Procedural meaning gives a precise direction to the causal relation, allowing efficient processing. When no connective is present, it may be possible to infer the causal relation from other sources, and the factivity of the segments may also be inferred from other information (for instance, temporal), but the direction of the causal relation must be accessed *via* implicated premises. So the processing of (59) might involve the following steps:

- (63) The vase broke; John dropped it.
- a. Temporal inferences: THE VASE BREAKS and JOHN DROPS THE VASE are past events
 - b. if X DROPS Y, and Y IS FRAGILE, then Y BREAKS
 - c. JOHN DROPS THE VASE CAUSE THE VASE BREAKS

This process can be compared with what happens with a connective like *because*:

- (64) The vase broke because John dropped it.
- a. Entailments: THE VASE BROKE AND JOHN DROPPED THE VASE
 - b. Conceptual and procedural meaning: JOHN DROPPED THE VASE CAUSE THE VASE BROKE

Step (b) combines conceptual and procedural information. So the prediction is that processing an utterance with a connective rather than without one is a matter of efficiency and speed.

There are, however, two caveats to my proposal. The first involves explaining how some uses of connectives seem counterintuitive, since their procedural meanings are not satisfied. To illustrate, let us return to the epistemic uses of *parce que* and the explanatory use of *and*:

- (65) He loves her, because he came back.
- (66) The vase broke, and John dropped it.

The application of the encoded semantic and pragmatic meanings gives the following results:

- (67) He loves her, because he came back
- a. Entailments: HE LOVES HER AND HE CAME BACK
 - b. Conceptual meaning: CAUSE
 - c. Implicated premises: X LOVES Y CAUSE Y COMES BACK
 - d. Implicated conclusion: HE LOVES HER CAUSE HE CAME BACK
- (68) The vase broke, and John dropped it
- a. Entailments: THE VASE BROKE AND JOHN DROPPED THE VASE
 - b. Conceptual meaning: POSSIBLE_CAUSE
 - c. Implicated premise: if X DROPS Y, and Y IS FRAGILE, then Y BREAKS
 - d. Implicated conclusion: JOHN DROPPED THE VASE POSSIBLE_CAUSE THE VASE BROKE

So the intended meaning is accessible via an implicated premise, even if the number of steps is greater than in more ordinary uses.

The second question involves explaining why the procedural meaning of *and* has been ruled out. One possible explanation is given by principle A of the MDI: contextual information is stronger than linguistic information. So, as procedural meaning is encoded in linguistic

expressions (here *and*), the directional FI information has been suspended because of an implicated premise, that is, a contextual assumption.

7. Conclusion

In this paper, I have attempted to explain the similarities and differences in meaning between discourses with and without connectives. To obtain a plausible account, I have presented an approach to the conceptual-procedural distinction which combines, at least for functional lexical items, both procedural and conceptual meaning.

The MCPM makes precise predictions about the semantics and pragmatics of tenses and connectives. In the case of tenses, conceptual information is restricted to Reichenbachian coordinates, which allow events to be located relative to the speech point. Procedural information then differentiates the various uses based on a hierarchy of pragmatic features: [\pm narrative], [\pm subjective], [\pm explicit]. In the case of connectives, conceptual information is restricted to establishing the relations between discourse segments, at the level of explicature or implicature, whereas procedural meaning determines the direction of the causal relation.

Finally, I have addressed the question of how to explain the differences in meaning between discourses with or without connectives. The main finding is that the route to a satisfactory interpretation is longer without connectives, and requires pragmatic accommodation of procedural meaning, which must be offset by contextual import.¹²

As a final point, I would like to address a more general issue, about the interface between Semantics and Pragmatics. In this article, I have made a clear proposal about what the Semantics-Pragmatics Interface might be: semantic information is located at the entailment level (for connectives) and at temporal coordinates (for tenses); pragmatic information can be conceptual or procedural, and conceptual information can contribute to either explicatures or implicatures, whereas procedural information has a special status: it mainly contributes directional information, directly linked to the connectives.

In a nutshell, in the case of tenses and connectives, the Semantics-Pragmatics interface is the locus of conceptual and procedural information, and this explains why connectives and tenses can vary in meaning: with tenses, this variation is due to procedural information; with connectives, on the other hand, it is due to selection of the appropriate relational concept.

¹² This is a similar analysis to the one proposed in Blochowiak (2014a), who offers a more sophisticated inferential model.

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Tables

Connectives		<i>et</i>	<i>parce que</i>
Conceptual meanings	weak	{FORWARD INFERENCE, CAUSE, INCLUSION}	–
	strong	–	CAUSE

Table 1: conceptual meaning and strength of connectives

Expressions	Directional feature
Passé Simple (French Simple Past)	[fi]
Plus-Que-Parfait (French PlusPerfect)	[bi]
Passé Composé (French Present perfect)	[fi] or [bi]
<i>et (and)</i>	[FI]
<i>parce que (because)</i>	[BI]
<i>pousser... (tomber) (push...fall)</i>	[fi]
<i>tomber... (pousser) (fall...push)</i>	[bi]

Table 2: a chart showing encoded procedural information in French: weak features are in [regular font], strong features in [CAPITALS]. [fi] and [FI] stand for *forward inference*, [bi] and [BI] for *backward inference*

	Entailment		Explicature	Implicature
<i>parce que</i>	P	Q	Q CAUSE P	
<i>donc</i>	P			POSSIBLE (P CAUSE Q)
<i>et</i>	P	Q		POSSIBLE (P CAUSE Q)

Table 3: a chart showing the semantic and pragmatic meaning of causal connectives

Meanings →	Conceptual				Procedural
Connectives ↓	Entailment		Explicature	Implicature	Direction of CAUSE
<i>parce que</i>	P	Q	CAUSE	–	$Q \rightarrow P$
<i>donc</i>	P	–	–	POSSIBLE_CAUSE	$P \rightarrow Q$
<i>et</i>	P	Q	–	POSSIBLE_CAUSE	$P \rightarrow Q$

Table 4: conceptual and procedural meaning for causal connectives

	Meanings	Conceptual	Procedural		
Tenses	Usages		Narrative	Subjective	Explicit
PS	PS1	$E = R < S$	+	–	–
	PS2		+	+	+
IMP	IMP1	$E \supseteq R < S^{13}$	+	+	–
	IMP2		–	+	+
	IMP3		–	+	–
	IMP4		–	–	–

Table 5: Conceptual and procedural analysis of French Passé Simple (PS) and Imparfait (IMP)

Figures

¹³ $E \supseteq R$ means that E includes R. E represents the time of the event described by the IMP, which includes the reference time R, generally given by a previous utterance, at the PS.

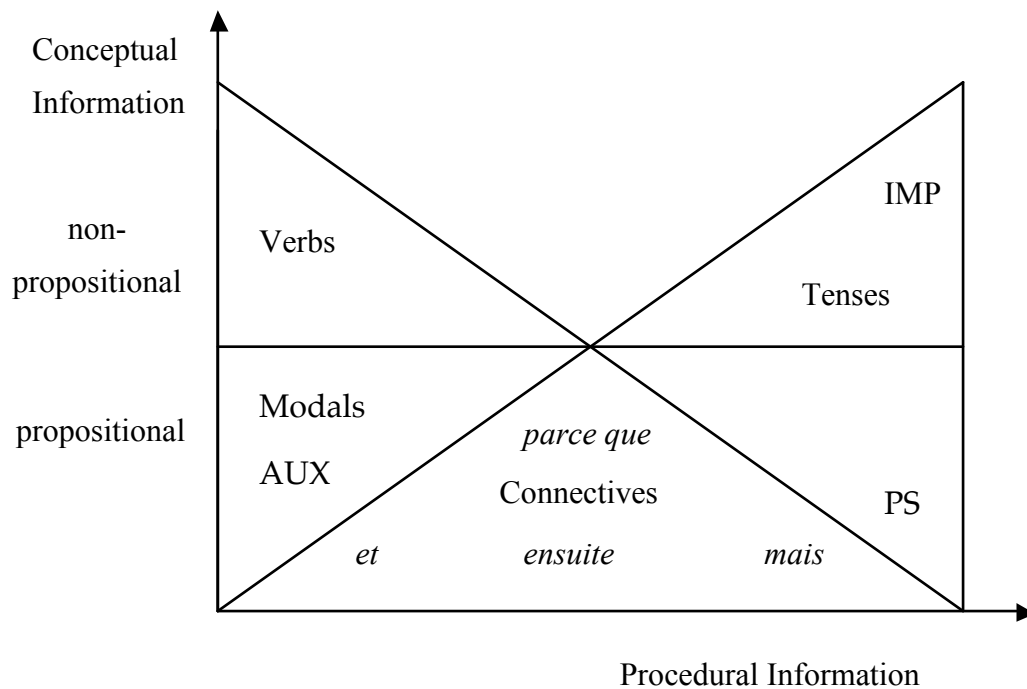


Figure 1: conceptual and procedural information

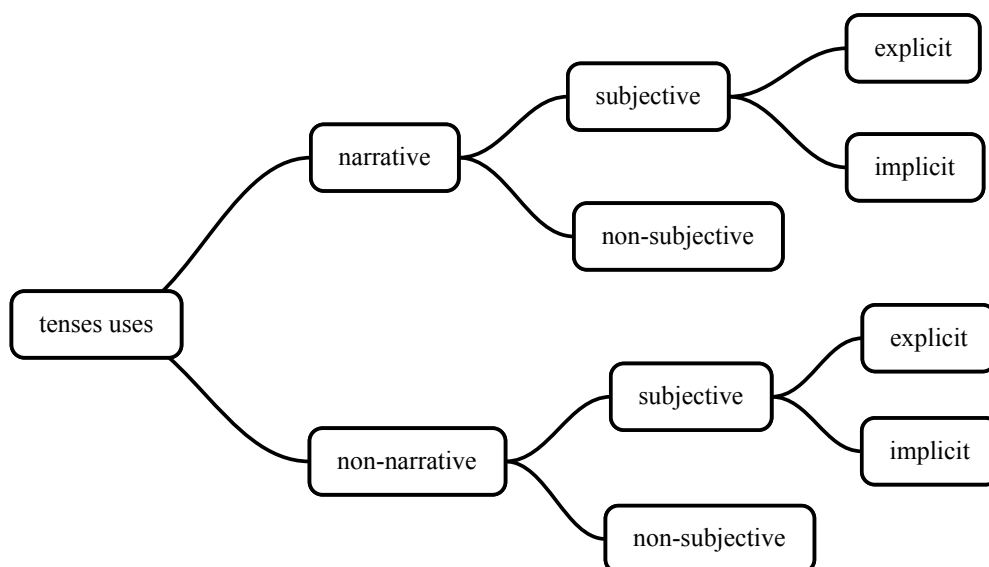


Figure 2: types of uses for tenses

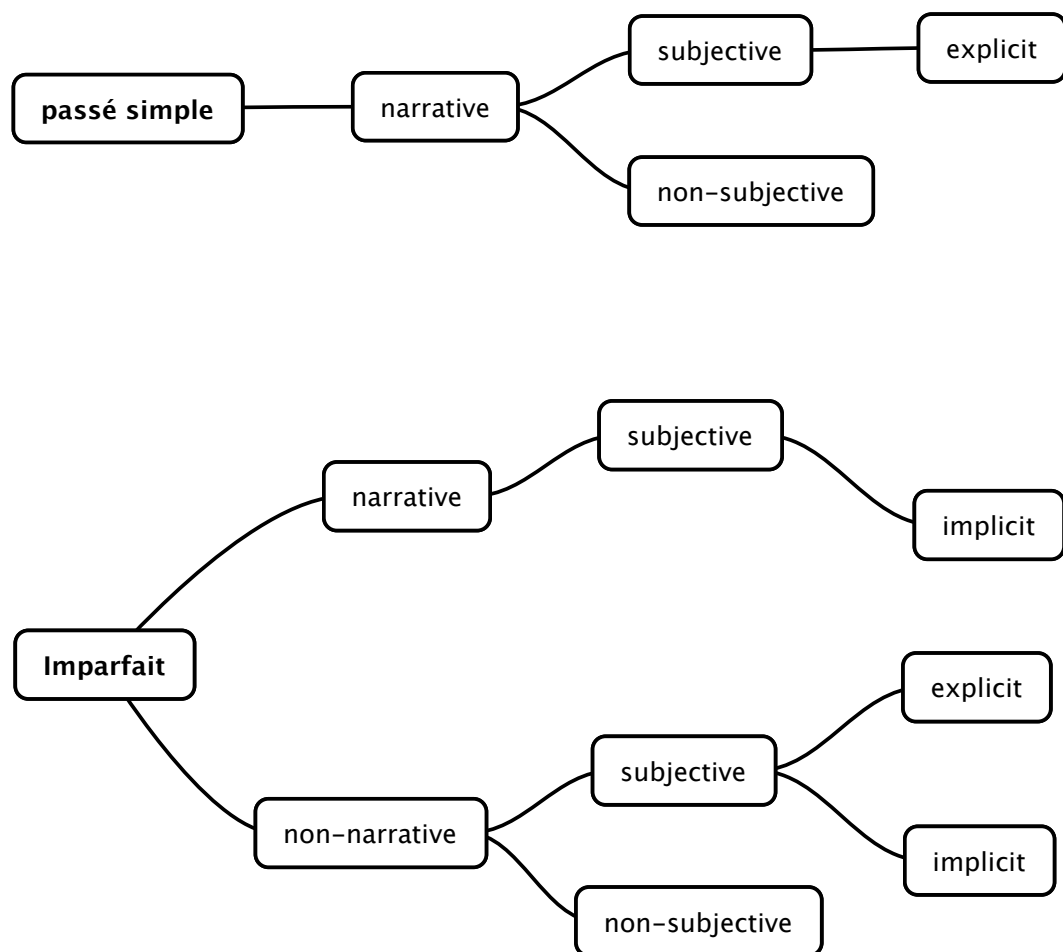


Figure 3: types of uses for French PS and IM