Discourse Relations versus Discourse Marker Relations

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Abstract
While it seems intuitively obvious that many discourse markers (DMs) are able to express discourse relations (DRs) which exist independently, the specific contribution of DMs - if any - is not clear. In this paper, we investigate the status of some consequence DMs in French. We observe that it is difficult to construct a clear and simple definition based on DRs for these DMs. Next, we show that the lexical constraints associated with such DMs extend far beyond simple compatibility with DRs. This suggests that the view of DMs as signaling general all-purpose DRs is to be seriously amended in favor of more precise descriptions of DMs, in which the compatibility with DRs is derived from a lexical semantic profile.

1 Introduction
The idea that discourse markers (DMs) like then or anyway signal underlying discourse relations (DRs) like cause, opposition, contrast, etc., has been adopted in a certain number of works on text and conversation structure (see Roulet 1985, Martin 1992, Knott 1996 for various examples). In itself, the idea is reasonably intuitive and appealing and seems empirically true to a large extent (Knott 1996). However, the linking between DRs and DMs is more intricate than is currently assumed. We show here that some French consequence DMs akin to therefore (donc, par conséquent, alors) are difficult to describe in terms of DRs. We argue that such clashes are due to the semantic profiles of DMs, that is to the way DMs 'see' the left and right argument of the semantic relation they denote. We offer an analysis of the profile of the donc class DMs along the lines of Veltman's update semantics (Veltman, 1996). We conclude that the compatibility of DMs with DRs must be studied by identifying first the relational core of DMs, that is, the semantic relation they denote and the types of arguments selected by this relation.1

2 The profile problem
2.1 Observations
Let us consider the following examples.
(1) a. Je me suis réveillé trop tard. DONC je n'ai pas pu aller à la réunion.
   (I woke up too late. Therefore I couldn't go to the meeting)
b. Jean n'était pas à la réunion. DONC il a dû se réveiller trop tard.
   (John wasn't at the meeting. Therefore he must have waked up too late)
(2) a. Je n'ai pas pu regarder la télé, est-ce que les Red Sox ont gagné?
   (I couldn't watch the TV, did the Red Sox win?)
b. Je n'ai pas pu regarder la télé, DONC est-ce que les Red Sox ont gagné?
   (I couldn't watch the TV, therefore did the Red Sox win?)
c. Je n'ai pas reçu le rapport, DONC est-ce que le département l'a envoyé?
   (I didn't receive the report, therefore did the department send it?)
(3) a. Ouvre la fenêtre, (et) on aura de l'air.
   (Open the window, (and) we will get some fresh air)
b. Ouvre la fenêtre, DONC on aura de l'air.
   (Open the window, therefore we'll get some fresh air)

1In this paper, we consider only the deductive use of donc, in monologal written speech, a use illustrated for example by Paul opened the window, donc we got some fresh air. We ignore here other uses of donc. We will also ignore the other class of consequence connectives (du coup, de ce fait), for which the reader is referred to (Jayez and Rossari, 1998). Unless indicated otherwise, donc, alors and par conséquent are intersubstitutable in the examples. This does not mean, however, that these DMs are synonymous in all contexts (see (Jayez and Rossari, 1998) for the difference between donc and alors).
2.2 Speech acts and semantic profile

DRs, qua relations, bear on arguments of some type(s). We call profile of a DR or DM the types of its arguments. It is possible to express profile distinctions within theories of DRs. For instance, Sanders et al. (1992) use the primitive Source of Coherence with the two values Semantic and Pragmatic, corresponding respectively to a link between propositional contents and between illocutionary meanings (or speech acts). In Cause–Consequence or Consequence–Cause relations, the value of Source of Coherence is Semantic, while it is Pragmatic for Goal–Instrument relations. If we assume that assertions like (2-a) are grounded on a Cause–Consequence relation, the clumsiness of (2-b) can be explained by noting that there is no link between the propositional contents of the assertion and of the question: my watching the TV cannot influence the result of the game. Unfortunately, the same line of argument predicts that (2-a) itself is anomalous. Symmetrically, let us assume that (2-a) is rather a Goal–Instrument relation with Goal = ‘the speaker wants to know whether p’ and Instrument = ‘the speaker asks whether p’. We could explain (2-b) by denying to DONC any compatibility with a Goal–Instrument connection. However, this is not consistent with the possibility of examples like I need a hammer, DONC lend me yours for a minute. Another variant of the same problem occurs when one tries to use commonsense DR categories like justification (Roulet et al., 1985; Mann and Thompson, 1988). DONC normally resists introducing a justification, as in (3-b). But, in some cases, it is able to introduce a speech act justified by a proposition (4-b), while in other cases the very same pattern does not license DONC (2-b).

Knott (1996) proposes that semantic and pragmatic connections are sensitive to intended effects. The semantic intended effect is that the addressee believes the relation associated with the DR to hold between the propositional contents of the arguments. If DONC is semantic rather than pragmatic, we can account for the clumsiness of (2-b) in the same way as Sanders et al.: watching the TV cannot influence the result of the game. However, this is not consistent with the impossibility of (3-b). The pragmatic intended effect is that some relation actually holds between the intended effects associated with the arguments. In (2-a), the intended effect of the assertion is that the addressee believes that the speaker did not watch TV. The intended effect of the question is that the addressee answers the question, if possible at all. The intended effect of the whole is that the first belief causes the addressee to answer the question. If DONC is pragmatic and expresses a consequence relation, the intended effect of the first argument must have the intended effect of the second as one of its consequences. This seems to be the case in (2-b). Yet the linking is not natural.

These hypotheses seem to suffer from calibration problems. The possible profiles they allow us to construct tend to overlicense or underlicense the observed combinations.

2.3 Towards a dynamic notion of profile

The difference between (3-a) and (3-b) hints at what is happening. In (3-a), obeying the command results in a situation in which the window is open. This situation is not real but only potential. Using accom-

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2Such pseudo-imperatives are studied in (Clark, 1993).
realized. In such a version, it is legitimate to con-
clude that we'll get some fresh air. Although the
technical details of accommodation are somewhat
intricate (see Frank 1996 for a recent survey), the
general principle remains constant. Accommodation
gives us the opportunity of importing information in
a possible world.

How is it that DONC seems to block accommo-
dation in (3-b), although there is a clear Cause-
Consequence relation between opening a window
and getting some fresh air? Generally speak-
ing, DONC requires that we construct an inferential
bridge between the representation of the first sen-
tence and that of the second sentence. In (3-b),
obeying the command creates a potential world
where the window is open. Assertions consist basi-
cally in updating a world with the information con-
veyed by the asserted sentence. So, they are func-
tions from a state of some world to another state
of the same world. This granted, there are several
options.

(i) The assertion in (3-b) is evaluated in the poten-
tial world where the window is open. There is no
reason why the sentence should be odd.

(ii) The opening of the window is evaluated in the
world where the assertion is, that is, presumably,
the real world. Again, there is no explanation for
the oddness of (3-b).

(iii) The opening of the window and the assertion
are evaluated in different worlds. This could explain
the oddness of (3-b).

So, the option (iii) seems to be the right candidate,
but the only difference between (3-b) and (3-a) is
the occurrence of DONC in the former. Therefore,
DONC must be responsible for the phenomenon.

Specifically, we make two assumptions.

(i) DONC signals some consequence connection be-
tween two semantic constructs.

(ii) This connection is evaluated in one type of world
at one time. It may not link two constructs from two
different types of world at the same time.

(i) is unobjectionable. One of the roles of a con-
sequence DM is to signal a consequence relation.
Which notion of consequence is appropriate remains
to be seen, however. From (i) we derive the obser-
vation that the left construct must have the type of a
proposition (or, more generally, of a judgment). (ii)
explains why we cannot freely mix speech act types
with DONC. We can go from assertions to assertions
or from imperatives to imperatives because we stay
in the same type of world. We can go from assertions
to imperatives because there is some reflection of the
world of assertions in that of imperatives. This is
as expected if we consider that, in a consequence re-
lation, the premise and the conclusion must have the
same modal status (belong to the same world).

Condition (i) echoes the current belief that ques-
tions do not introduce propositions, that is, semantic
constructs evaluated as true or false (in some world).
If consequence DMs need propositional premises,
they cannot follow questions. That imperatives
have a propositional behavior, on a par with assert-
tions and in contrast with questions, is evidenced by
the following contrasts.

(5)

| (a) | Il a ouvert la fenêtre, ce qui a rafraîchi la pièce |
| (b) | Ouvre la fenêtre, ce qui rafraîchira la pièce |
| (c) | Est-ce qu’il a ouvert la fenêtre? |

Did he open the window? Which will cool the room

The remaining problem is that DONC accepts ques-
tions on its right, as in (2-c). DONC does not accept
just any question, however, but only those questions
which convey some propositional link between one of
the possible answers and the proposition/judgment
on the left. In (2-c), in view of the fact that the
speaker did not receive the report, it is more plau-
sible, other things being equal, that the department
did not send it than the contrary. The constraint
that the proposition on the left should impinge on
the possible answers to the question explains why
(2-b) is strange. My (not) watching the TV can-
not possibly exert any influence on the result of the
game. The observations show that DMs of the DONC
class connect speech acts only if the left speech act is
a judgment and conveys information which renders
the right speech act propositionally successful. We
define a speech act to be propositionally successful
if the states of affairs it represents as true or pre-
supposes to be possible in a given (set of) world(s),
by means of its propositional content, are actually
true or possible in this (these) world(s). The restric-
tion by means of its propositional content is essen-
tial. It distinguishes between propositional success

3Concerning if-clauses, there is a sharp difference between
ALORS and DONC and PAR CONSÉQUENT whose compatibility

4Recall that we consider here the deductive use of donc. As
shown in (Rossari and Jayez, 1997), donc may follow ques-
tions when it has a rephrasing use corresponding to in other
terms (Tanaka, 1997). Deductive consequence connectives,
however, are strange after questions.
The question in (2-a) is felicitous if we assume that the speaker does not know the answer. But it is not necessarily propositionally successful given the first assertion  I couldn't watch the TV. The possibility that the Red Sox won is neither implied nor entailed in any reasonable sense by the first sentence. DONC resists the consequence relation in this case because it does not 'see' speech acts as such, but their underlying informational structure. So, the semantic/pragmatic distinction is of no avail in the case of DONC. We need to construct specific objects to which DONC is sensitive. This sensitivity constitutes the profile of DONC and of its mates (alors and par conséquent).

The difference on the left between questions and the other speech acts points to a notion of dynamicity: assertions and imperatives update information structures, questions just test them, that is, check that certain conditions are satisfied. Veltman's update logic (Veltman, 1996; Groeneveld, 1995) provides a convenient framework for studying the dynamics of information at an abstract level. Roughly, updating an information state with an expression $\phi$ amounts to suppress all worlds where $\neg \phi$ is true. An expression $\text{Might}\ \phi$ holds in an information state if the state is consistent with $\phi$. Unfortunately, the difference between a possibility $\text{Might}\ \phi$ introduced by an assertion and that associated with a question is extremely difficult to express in this framework. There is no substantial difference between the static truth of $\text{Might}\ \phi$ (a test triggered by a question) and a dynamic update with $\text{Might}\ \phi$ (an assertion of possibility, as in Mary is late, so she might have missed the train). In the next section, we describe informally a modification of the framework which allows us to take into account this difference.

### 2.4 Speech acts and DONC

An information state is a set of worlds (epistemic alternatives, possibilities). We consider the basic epistemic objects to be sets of information states. Information states and updates in Veltman's sense are called V-states and V-updates. Non-modal assertions (without $\text{Might}$) update a set of states by V-updating each member of this set (i.e. each V-state). Imperatives have a similar effect, but they bear on a set of ideal future V-states. $\text{Might}\ \phi$ assertions update states by withdrawing every V-state where $\text{Might}\ \phi$ is false. Questions only test whether there is some V-state in which a given appropriate answer is possible. So, they do not update anything in a strong sense (they are static or non-eliminative). However, questions, like genuine updates, are functions: applied to a state, they return this state or the absurd state (the empty set of V-states). Consider the two examples below.

(6) a. It's not Paul, neither Henry, so who did it?

b. This is obvious, so who would say the contrary?

In (6-a) and (6-b), the speaker seems to be prepared to accept Nobody you might know and Nobody as appropriate answers. It is often the case that questions impose a hierarchy of speaker–oriented expectations on the set of appropriate answers. We will speak of expected answers in this case. The effect of questions is to test whether appropriate answers are possible. When the question does not imply some preference of the speaker, the set of expected answers and the set of appropriate answers coincide.\(^5\)

Let $O(\phi)$ DONC $O'(\psi)$ be the logical form of a X DONC Y construction, where $O$ and $O'$ are operations (updates, etc.) on $\phi$ and $\psi$. DONC signals that there is some set of rules, say $R$, such that the possibility of updating/testing successfully the way we do on the right ($O'(\psi)$) is predictable from the update on the left ($O(\phi)$). DONC warns us that, for some $R$, $R$ and $O(\phi)$ jointly predict that $O'(\psi)$ cannot always fail.\(^6\) In other terms, DONC connect operations of certain kinds, not propositional contents, nor speech acts in the traditional sense. This is because speech acts signal operations that they are sometimes (mis)taken for the arguments of the DONC–relation.

### 3 A dynamic model of profile

#### 3.1 Basics

In update semantics, information states are sets of worlds. Updating an information state with some formula $\phi$ consists in eliminating from the information state all the worlds where $\phi$ does not hold.

**Def. 1 — Information states and updates**

Let $P$ be a set of atomic propositions $p, q, \ldots$ and $B(P)$ the set of boolean combinations of members of $P$. Members of $B(P)$ are called expressions and are denoted by $\phi, \psi, \ldots$. A world $(w, w', \ldots)$ is a set of expressions. A V-state $(s, s', \ldots)$ is a set of worlds.

An expression $\phi$ holds in a world $w$, in symbols $w \models \phi$, iff $\phi \in w$. There is no expression $\phi$ and no world $w$ such that $w \models \phi$ and $w \models \neg \phi$.

The update of $s$ with $\phi$, in symbols $s + \phi$, is defined by: $s + p = \{ w : w \in s \land w \models p \}$, $s + \neg \phi = s - \{ w : w \models \phi \}$, $s + \phi \lor \psi = s + \phi \cup s + \psi$. Usual boolean equivalences hold. $\phi$ is called the update expression. A V-state $s$ accepts an expression $\phi$, in symbol $s \Vdash \phi$, iff $\phi \in s$. A V-state $s$ tolerates an expression $\phi$ iff $s + \phi \neq \emptyset$.

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\(^{5}\)In a series of works, Ginzburg has proposed to extend the notion of appropriate answer used in the current literature on questions (see Ginzburg 1998 for a global presentation). Assessing the (possible) usefulness of this extension for our current purpose is beyond the scope of this paper, however. We ignore also, for space reasons, the problem of the 'negative value' of questions (Ducrot 1984, 227–228).

\(^{6}\)That the DONC sentence does not (always) sound redundant comes from the fact that the rules are not explicitly indicated, but are to be reconstructed via some abductive process.
Note that the empty V-state (or absurd V-state) accepts anything and tolerates nothing.

This basic language is extended by considering expressions of possibility of the form Might φ. The update notion is extended as follows.

Def. 2 — Update for Might expressions
s + Might φ = s if s + φ = s, s otherwise.

 Obviously, for s ≠ 0, s tolerates φ if s tolerates Might φ, and s accepts Might φ if s tolerates Might φ.

3.2 Information states

An information state (henceforth simply state) is a set of V-states. We distinguish two types of states corresponding to assertions and imperatives. They are noted Sassert and Simp respectively. A boolean expression without Might is called classical. A state accepts φ if each of its V-states accepts φ.

Def. 3 — Assertive and imperative updates

The update of Sassert with a classical expression φ, noted Sassert + φ, is the set of non-empty V-states s such that, for some s' in Sassert, s = s' + φ.

The update of Sassert with Might φ, where φ is classical, noted Sassert + Might φ, is the set of V-states s in Sassert such that s tolerates φ.

The update of Simp with φ, noted Simp + φ, is defined as in the Sassert case, provided that Simp does not accept φ, in which case the update returns the empty set.

The conditional update of Simp with φ, noted Simp +φ = φ, returns Simp itself if Simp accepts φ, and Simp + φ otherwise.

The conditional update of Sassert is not different from the standard update: Sassert +φ = φ.

When the update of S with φ is (not) the empty set, we say that the update fails (succeeds). When S + Might φ succeeds, we say that S tolerates φ. φ is called the update expression.

Assertive updates with classical expressions consist in V-updating each member of the state with the expressions. For Might φ expressions, we keep only the V-states where φ is not a priori excluded. Imperative updates with φ also amount to force the realization of φ, whenever it is not already accepted.

A global state S is a pair (Sassert, Simp). Global states are subject to two conditions on imperative states. A faithfulness condition ensures that imperative states reflect assertive states: every expression accepted in an assertive state is also accepted in the associated imperative state. So, imperative states are 'realistic': they take true states of affairs into account. To avoid conflicts, we use conditional updates for imperatives: Simp is not updated with φ if it contains φ. The second condition, labelled Must ⇒ Might, stipulates that an obligatory state of affairs is always possible. In a more intuitive form, one does not issue commands which cannot be executed.7

Def. 4 — Must ⇒ Might

If S accepts Must φ, S + Might φ succeeds.

Def. 5 — Global states

A global state S is a pair (Sassert, Simp) where every expression accepted in every V-state of Sassert is accepted in every V-state of Simp. A global state (S, S') is degenerate when S or S' is the empty set. It accepts an expression φ when S and S' accept φ.

Def. 6 — Propositional denotation

The propositional denotation of a sentence P, noted [P], is a set of pairs of global states, where the second member of each pair is obtained by updating/testing the first member.

1. A rule is an implicative structure of form φ1 ∧ ... ∧ φn ⇒ ψ, with its traditional semantics: ψ is true whenever φ1 ... φn are.
2. The set of rules does not form a theory in any logically interesting sense. It is just a package of resources. We can freely use any subset of rules to obtain a given conclusion and we have no warranty that the set of rules is classically consistent.8

7 See (von Wright, 1971) on this and related topics. Must φ expressions are considered to be classical in the context of this paper.

8 A well-known cause of inconsistency is the coexistence in a rule database of monotonic rules like R1 and R2: R1 = φ ⇒ R2 = φ ⇒
can remedied by imposing a non-monotonic structure on the inferential relation \( \Rightarrow \) as in (Veltman, 1996). However, this is not a move we will consider here. We will rather focus on the definition of an appropriate entailment relation. We need a slightly more subtle notion than that of entailment between expressions. The next definition says that some operation (update/test) entails some other operation modulo \( \mathcal{R} \) whenever successfully executing the first entails modulo \( \mathcal{R} \) that we can successfully execute the second.

**Def. 7 — Operation entailment**

Let \( \mathcal{R} \) be a set of rules and \( O(\phi) \) and \( O'(\psi) \) two operations of update or test with \( \phi \) and \( \psi \), we say that \( O(\phi) \mathcal{R} \)-entails \( O'(\psi) \) iff, for every global state \( S \), applying \( O(\phi) \) to \( S \) results in a state \( S' = O(\phi)[S] \) for which there exists a rule \( r = \phi \Rightarrow X \in \mathcal{R} \) such that, if \( S'' = S' \oplus r \) is non-degenerate, \( O'(|S''|) \) is non-degenerate.

Since operations correspond to sets of pairs of global states which themselves correspond to sentences, the last definition readily extends to sentences and practically gives us the denotation of DONC.

### 3.4 DONC semantic profile

We now define the denotation of a sentence pair of form P DONC Q, where DONC has its deductive sense. It is the set of pairs of global states \( (S, S') \) such that there is an intermediate global state \( S' \) that one reaches from \( S \) by a conditional P-update and whose update by a finite subset of \( \mathcal{R} \) warrants a successful conditional Q-update or Q-test. We require the operations to be conditional because we want to draw a distinction between cases where imperative speech acts are infelicitous in view of the context and cases where conditions on DONC are not satisfied. E.g., a command that \( \phi \) is infelicitous if \( \phi \) already holds. However, the same command is not necessarily incompatible with the constraints on DONC.

**Def. 8 — DONC semantic profile**

Let \( \mathcal{R} \) a set of rules, \( \phi \) and \( \psi \) two expressions. [P DONC Q] with respect to \( \mathcal{R} \), \( \phi \), \( \psi \), the set is pairs \( (S, S') \) such that:

a. \( O(\phi) \) is the conditional version of the operation associated with \( P \) and is an update, \( O'(\psi) \) is the conditional version of the operation associated with \( Q \).

b. There exists \( S' \) such that \( (S, S') \in [P]^{\phi} \) and \( (S', S'') \in [Q]^{\psi} \).

c. \( O(\phi) \mathcal{R} \)-entails \( O'(\psi) \).

To motivate informally this definition, consider (2-b) again. The first assertion results in updating \( S_1^{\text{assert}} \) and \( S_1^{\text{imp}} \) with an expression not watch TV. This results into a state \( (S_2^{\text{assert}}, S_2^{\text{imp}}) \) which accepts not watch TV. Let us assume that we have a rule

\[
\psi, R2 = \phi \land \chi \Rightarrow \neg \psi. \quad \text{When } \phi \text{ and } \chi \text{ are both true } \psi \text{ and } \neg \psi \text{ are both true.}
\]

\[
\text{Actually, we could eliminate this condition by defining a more general notion of stability, but this would require some extra technical machinery.}
\]

in \( \mathcal{R} \): not watch TV \( \Rightarrow \) not know result. Then, updating \( S_2^{\text{assert}} \) and \( S_2^{\text{imp}} \) with the rule results in a global state where the two members accept not know result. The question Did the Red Sox win is interpreted as connected with answers like Red Sox win or Red Sox not win. But, clearly, the fact that not know result is accepted does not warrant that Red Sox win is tolerated by any V-state in the question test on \( S_2^{\text{assert}} \). The same holds for Red Sox not win. So, we are in no position to conclude that the test will be successful, unless we ascribe to the sentence some contrived interpretation.

The definition distinguishes between (i) the conditional operations which are used to check out \( \mathcal{R} \)-entailment and (ii) (absolute) operations associated with P and Q. This allows for situations in which \( \mathcal{R} \)-entailment holds, but there are still problems with P and/or Q, which is precisely the case in (4-c). In the next section, we show how the proposed constraints shed light upon other observations.

### 4 Applications

**Assertion-Imperative**

This the (4-b) case.

You are late: \( (S_2^{\text{assert}}, S_2^{\text{imp}}) \rightarrow (S_2^{\text{assert}} = S_1^{\text{assert}} \oplus \text{late}, S_2^{\text{imp}} = S_1^{\text{imp}} \oplus \text{\text{c late}}) \) (by def. 6 and 8).

We assume a rule \( r: \text{late} \Rightarrow \text{Must highway} \). When somebody is late, she must take the highway (in certain circumstances).

\( (S_2^{\text{assert}} \oplus r, S_2^{\text{imp}} \oplus \text{\text{c late}}) \) accepts Must highway.

Take the highway: \( (S_2^{\text{assert}} \oplus r, S_2^{\text{imp}} \oplus \text{\text{c highway}}) \rightarrow (S_2^{\text{assert}} \oplus r, S_2^{\text{imp}} \neq \text{\text{e}}) \).

Success is warranted because the principle Must \( \Rightarrow \) Might entail that any conditional update with highway will be succesful. Of course, (4-b) could be issued in a context where the addressee is already on the highway. It would then be infelicitous, but DONC is not responsible for this communication clash.

**Imperative-Imperative**

Let us explain the contrast (4-c)-(4-d). In (4-c), we have:

Be on time: \( (S_1^{\text{assert}}, S_1^{\text{imp}}) \rightarrow (S_2^{\text{assert}} = S_1^{\text{assert}}, S_1^{\text{imp}} \equiv \text{\text{c on time}}) \).

We assume there is a rule \( r: \text{on time} \Rightarrow \text{highway} \). This rule is intended to mean that somebody who is on time is on the highway or took the highway.

\( (S_2^{\text{assert}} \oplus r, S_2^{\text{imp}} \equiv \text{\text{c highway}}) \).

Take the highway: \( (S_2^{\text{assert}} \oplus r, S_2^{\text{imp}} \equiv \text{\text{c highway}}) \rightarrow (S_2^{\text{assert}} \oplus r, S_2^{\text{imp}} \neq \text{\text{e}}) \).

\( \mathcal{R} \)-entailment holds, but the imperative update associated with Q (= take the highway) is bound to fail, since \( S_2^{\text{imp}} \) accepts highway. This is a case where satisfying the DONC constraint amounts to an
Illocutionary suicide: the rule which licenses DONC forbids us to update non-conditionally on the right sentence. A similar explanation goes for (4-e). If the rule links the event of taking the highway and its result (being on time), any update with on time fails or is infelicitous, since the addressee is asked to obtain a result (being on time) which is anyway, in the imperative world, an unescapable consequence of what she ‘did’ (taking the highway) in the same world.

In (4-d), we have:

Try to be on time: \((S_1^{assert}, S_1^{imp}) \rightarrow (S_2^{assert} = S_1^{assert}, S_2^{imp} = S_1^{imp} \circ \text{try on time})\).

We assume that there is a rule \(r = \text{try on time} \Rightarrow \text{Must highway} \), which is intended to mean that somebody who wants to be on time is going to take the highway.

\((S_2^{assert} \circ r, S_2^{imp} \circ r)\) accepts \(\text{Must highway}\).

Take the highway: \((S_2^{assert} \circ r, S_2^{imp} \circ r \circ \text{highway}) \rightarrow (S_2^{assert} \circ r, S_2^{imp} \neq \emptyset)\). Success is warranted because of the \(\text{Must} \Rightarrow \text{Might} \) constraint of definition 4.

As noted above, questions on the left are not updates and are thus blocked by def. 8. In contrast, \(\text{Might} \) assertions are treated on a par with assertions. So, Paul might come, DONC he might meet Henry would analyzed with the help of rules like \(\text{Might come} \Rightarrow \text{Might meet} \), possibly based on non-modal rules like \(\text{come} \Rightarrow \text{meet} \) in \(R\). Finally, assertion-assertion structures are essentially unproblematic.

5 Conclusion

Although the analysis presented here is limited, it shows that the view of DMs as manifestations of very general communication-oriented DRs is oversimplifying. Some DMs are able to signal DRs only insofar as their own lexical constraints are satisfied. These constraints pertain to the semantic relation and to the argument types associated with particular DMs. An open question is whether the importance of semantic profile is particular to some class(es) of DMs. Consequence connectives are inferential, in the sense of (Jayez and Rossari, 1998). The other classes of inferential DMs are opposite \((\text{yet}, \text{however})\) and rephrasing \((\text{anyway})\). In subsequent work, we will address primarily the following questions. Is the importance of a specific semantic profile particular to the category of inferential DMs? Are the profile restrictions inside the class of inferential DMs just the reflection of the inferential processes these DMs signal, or have they a (partly) independent status?

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