Relevance and Utility in an Argumentative Framework: An Application to the Accommodation of Discourse Topics

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In this paper, we address the question of the exact place one should attribute to game theory in the analysis and modelisation of meaning in natural language. One can think of at least three possible positions with respect to this issue :

1. Game theory is not inscribed at all in the grammar, but is an effective framework to describe effects of language use (that is, a formal method of dealing with pragmatics) [1].

2. Every aspect of game theory has grammatical effects, i.e. any kind of pay-off is inscribed in the semantics of linguistic items.

3. Grammar deals with a specific type of games. If this should be the case, linguists need to identify the relevant subpart of game theory.

We will focus in our paper on positions (1) and (3). A plausible candidate for a linguistic phenomenon that can be successfully modeled by a subset of game-theory is *argumentation* (cf. Ducrot (1980)). Argumentation concerns aspects of the meaning of sentences (words) that are not reducible to truth conditions. As such, one may ask whether these aspects are properly grammatical (i.e., encoded in the linguistic system), or pertain to the realm of pragmatics (i.e., contextual effects).

In order to sort these things out, we investigate the link between the notions of *relevance* (in a theory of argumentation, as implemented in Merin's decision-theoretic pragmatics) and the notion of *(expected) utility* in a game-theoretical framework of pragmatics. Crucially, our aim is to see if those two notions can and should be unified, which can only mean that relevance should be reduced to the expected utilities of the discourse participants — which would bring us to position (1), above. We will present arguments against such a move.

To illustrate our point, we will study the accommodation of discourse topics in dialogues. We will show that relevance in an argumentative sense can easily be linked to the establishment of a discourse topic, since both notions are meant to relate to the point of discourse or to what the discourse is all about.

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[1] This stance would naturally need to exclude for instance game-theoretic formulations of logics that can be used to represent truth conditions of natural language semantics, as proposed by Hintikka & Sandu (1997).

Our hypothesis is that full-fledged game theory, as a very general and powerful theory of the strategic interaction of (rational) agents, should be left to deal with particular tokens of utterances in particular situations. That is, we take it to serve best as a formal theory of pragmatics. Argumentation theory, however, is concerned with general linguistic properties of utterances, that is with the types of utterances, and can yield predictions in the *grammar* of a given language, which in principle is blind to a speaker's utility.

1   Utility and Relevance

1.1   Argumentation and Argumentation Theory

The notion of argumentation in the sens of argumentation theory (as developed by Anscombre and Ducrot, cf. Ducrot (1980), Anscombre & Ducrot (1983)) describes some regularities in natural language that cannot be straightforwardly treated through truth-conditional considerations alone. One classical example of a word with argumentative properties is *almost*. Clearly, *almost P* entails $\neg P$. However, *almost P* argues for the same conclusions as would P, and not for the conclusions that would induce $\neg P$.

In (1-a), even though the first part of the utterance conveys that it is not dark yet, this does not support the targeted conclusion, namely that more than sidelights would be too much. In this respect, (1-a) is identical to (1-b), which has rather different truth conditions. On the other hand, (1-c), which is truth-conditionally nearly equivalent to (1-a), is very different in the targeted inference it licenses.

(1)   a.   #It's almost dark, so turn on only your sidelights.
        b.   #It's dark, so turn on only your sidelights.
        c.   It's not yet completely dark, so turn on only your sidelights.

Example (2) shows as well that two seemingly contradictory statements can be part of the same utterance and serve the same conclusion.

(2)   A : Is the dinner ready ?
        B : Yes, almost.

Once again, if the dinner is *almost* ready, then it is *not* ready, but that does not prevent *B* to present this state of affairs as being identical to the one of being ready, at least for the purpose of that particular context.

Based on examples like (1) and (2) it has been argued that the concept of *argumentation* reveals a dimension of discourse that is distinct from and orthogonal to truth-conditions.

Argumentation *theory*, a development which focuses on and seeks to account for such types of effects, has developed two central hypotheses : first, speakers always speak to a point, such that all conversation is argumentative ; and second, that argumentative properties are hardcoded in the grammar of natural languages. Such a theory makes clear that argumentative goals must be somehow present and modeled in a framework of dialogue ; the whole question is *how* precisely this should be done.

Argumentation can be explicated by the notion of *Relevance*, for example as in the probabilistic Discourse Theoretic Semantics framework of Merin (1999) (or in

comparable ways, e.g. see van Rooij (2004)). Merin framed his work in decision theory, which is a subpart of game theory.

Merin states that a sentence E positively (resp. negatively) argues for a conclusion H if and only if the probability of H after learning E is raised (resp. lowered). The higher the (positive or negative) effect on the probability of H, the more relevant is the uttered proposition E. A proposition is relevant to a *question* if it is relevant to at least an element of π_Q (the partition induced by the question in Hamblin style semantics). A question is relevant to another question if at least one element of the partition induced by the first is relevant to at least one element of the partition induced by the second.

Depending on the discourse situation the argumentative goal might be explicit (e.g. after an imperative), or needs to be induced somehow from the semantic meaning of the speaker's utterance. According to Merin, this is one part of what conversation is all about. Inducing such a goal amounts to finding the proposition H^* in the set of all propositions for which the uttered proposition E is an argument, i.e. $H^* \in \{H | r_H(E) > 0\}$ (where $r_H(E)$ is the relevance of E to H). Decision theoretic considerations on the argumentative goal can be used to derive a variety of pragmatic effects (e.g. conversational and conventional implicatures, presupposition...)

In such a framework, the relevance of an utterance is always defined with respect to an argumentative goal. It is, however, not quite clear whether the argumentative goal is a proposition or a disposition to act (of one of the discourse participants). As far as Merin is concerned, it seems that he identifies the fact of believing a proposition with the disposition to act in a specific way, citing Ramsey (1926) as inspiration.

1.2 Argumentation and Game Theory

At first sight, the question of how to represent argumentative goals may look like somewhat orthogonal to what *is* relevance, and that this is rather about what it means to believe a sentence. However, we do not think that these issues are entirely unrelated, given our initial question of whether argumentation could or should be treated as a part of pragmatics.

The theoretical issue at stake can be stated as follows : if an argumentative goal is to be modeled as a disposition to act of the discourse participants, relevance can be an instance of the expected utility of the speaker in the usual game-theoretical sense, that is, an indication of speaker preferences that will further dictate their actions, assuming rational behaviour. By uttering a sentence, the speaker will induce (under certain circumstances) the addressee to react in a certain way, and the utilities of a given sentence would be the utilities the speaker receives from the (re)action of the addressee upon hearing that sentence.

Conceived in such a way, relevance and expected utility would be two instances of the same phenomenon, and fall into what one may call the *use of language* in a broad sense. In any way, relevance falls out of the *langue* under such a perspective. If the argumentative goal is to be modeled as a proposition, the identification of relevance and expected utility is not possible. But this leaves open the possibility that relevance (and argumentation) are part of the *langue*. As such, it is rather clear that relevance should not be directly encoded in a sentence. What we are looking for are rather "relevance-conditional" semantics, that impose conditions on relevance, than direct reference to pay-offs. This is

the same as truth-conditional semantics, which does not deal directly with truth or falsity of propositions, but the conditions which would render them true or false.

Maybe surprisingly, given his stance on belief, Merin (1999) is quite explicit about the technical side of the issue : for him, relevance is a relation between two propositions and an epistemic state (what he calls the 'epistemic context'). The two propositions involved are the argumentative goal H and the proposition that is uttered, E. The epistemic context provides a probability distribution over propositions, including the argumentative goal H.

Merin's way of dealing with relevance has several highly attractive consequences. First, relevance as a relation between propositions given a certain context makes it possible to conceive that items in the *grammar* may be sensitive to such relations, or even manipulate, constrain or order the possible relevance-relations between an uttered proposition and a given or inferred proposition H. Thus, it becomes possible to conceive argumentative properties as based in the *langue*, rather than as being by-products of the *use* of a language. Such a position seems to be necessary in order to account for a certain type of data (e.g., *almost*, as we have seen above, and adversative conjunctions, cf. below). There is thus a good reason for grounding relevance in purely epistemic terms, as far as it enables one to make predictions on the type of utterances. Nevertheless, some properties related to token utterances cannot be accounted for by epistemic means alone, and we argue that those context-specific issues are the ones that benefit from a game-theoretic approach based on a notion of utility distinct from the epistemically based notion of relevance advocated by Merin.

Second, the fact that propositions can be assigned a quantified amount of relevance allowed Merin (2003) to develop relevance-scales, which are able to cover more empirical ground with respect to implicatures than traditional entailment-scales (e.g., like the ones proposed in the neo-Gricean tradition, notably by Horn (1989)).

Having said that, is such an approach conclusively opposed to a direct encoding of expected utilities of the speaker ? No. Merin's position is not inconsistent. One may indeed still identify the utility of the speaker with the relevance of a proposition E to a given goal H : believing H (or coming closer to it) will influence the disposition to act of the players, from which one can derive straightforwardly their utilities. However, assuming this identity makes it difficult to imagine how a grammatical item (belonging to some *langue*) should manipulate such a volatile and contextual entity such as a given goal H. As already mentioned, argumentation and relevance do have proper linguistic characteristics, that bear on the felicity and interpretation of utterances. We will examine this proper linguistic characterisation further in the next section with respect to the issue of discourse topics.

While relations between propositions are quite standard elements in a semantician's toolbox, it is not an obvious move to state a grammatical relation between an utterance and a disposition to act. A proposition, whatever may be the precise way in which one wishes to define it, clearly is a linguistic entity. A disposition to act is not a linguistic item, and it is delicate to assume that there could be words sensitive to such an entity [2].

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[2] One could certainly model a disposition to act as a set of propositions, but this is a way of not addressing the basic problem.

Setting aside the theoretical issue of what one's position may be with respect to the technical side of representing the argumentative goal H, there is an empirical issue with respect to H, namely that H is not always expressed *expressis verbis*. Yet, figuring out H plays a considerable role in establishing the contextual meaning of a sentence. The question that needs to be addressed is thus the following : are there any rules (or constraints) in the inference of H ? And can we link this process to other processes in discourse interpretation, like the inference of a discourse topic ?

2   The Point of Talking

As is well known, what is said often stands in a rather indirect relation to what is meant. The following example (adapted from Beyssade & Marandin (2002)) illustrates this :

(3)   A :   Who has been invited ?
       B :   The post is on strike.
       A :   Alright, we cancel.

Pragmaticians like Grice (1975) have insisted on the fact that figuring out out what the speaker had in mind is a central element in determining the contextual meaning of a sentence. This procedure of second-guessing the speaker's intention is certainly not grounded in the grammatical rules of a language, and is clearly pragmatic in nature. This 'point of talking' has been called the discourse topic.

Most often, the notion of Discourse Topic (now *D-Topic*) has been worked out from a different perspective than the notion of an argumentative goal.

However, the two concepts have in common that they somehow embody the point of an utterance : either the (possibly implict) question to which an utterance answers in the case of D-Topics or the objective the speaker has in mind when asserting his utterance. We will consider both types of approaches in the remainder of this section. First, we will give a brief reminder about the notions of D-Topic and argumentative goal, and then give our technical argument to link the two. We conclude the section with an application of our proposal to adversative conjunction.

Before moving any further, we should mention however that there are out-spoken opponents to the notion of discourse topics, for instance Asher (2004). He advocates against a unified approach to discourse topics, arguing that the various cases requiring a notion of discourse topic have different, and sometimes incompatible, requirements on what a discourse topic should be. It is not our aim to tip the balance towards a unified or multifarious approach to discourse topics, even though we assume that all utterances do have a discourse topic related to their argumentative orientation.

It is, however, worth noting that Asher acknowledges that there are grammatical devices (such as contrastive accents) which help to disambiguate discourse topics. His central claim is that contrastive accents are not sufficient to clearly identify a single topic (e.g. when accents are omitted). We share the same intuition and our proposition is that other cues are available to single out a discourse topic. However, the crucial point we wish to make is the following : the pragmatic inference of a D-Topic is not only costly, but extremely difficult ; grammatical means of restricting the search space will therefore be more than welcome.
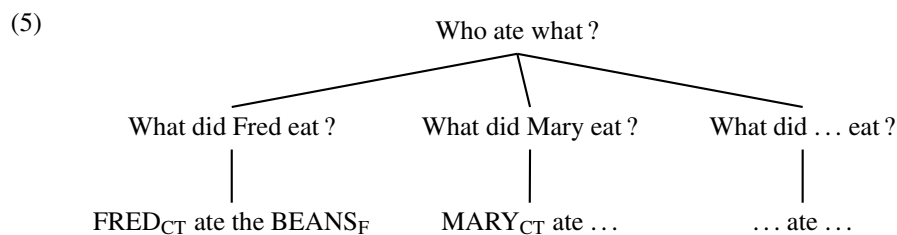
2.1 Discourse Topics

Inspired by the works of Roberts (1996), Büring (e.g. Büring (2003)) represents the structure of discourse as a tree whose nodes are *moves* representing declarative or interrogative sentences. This, he calls a *D-Tree*. A grammar of discourse is then a grammar of well-formed *D-Trees*. Crucially, questions in a *D-Tree* can be implicit and accommodated. This allows for a close match between the informational structure of an utterance and the question(s) it answers in a *D-tree*. Chiefly, a declarative sentence must be congruent to its question, otherwise the *D-tree* containing it is ill-formed. The informational structure of an utterance is often represented in the form of a question, and thus, congruence is here defined by comparing the informational structure of the actually uttered utterance with the *D-tree*.

More precisely, *Contrastive Topic* (now : CT) accents and *Informational Focus* accents are linguistic marks that indicate the exact *strategy* used by a speaker. When an utterance is uttered out of the blue, these marks indicate which questions a hearer has to accommodate in order to figure out the speaker's strategy [3]. In the case of overt question, the resulting tree has to match the actual question. The exact marking of these features differs from one language to another : in English *CT*-marking is done with a *B-accent*, whereas in French it is done with a *C-accent* (see Marandin et al. (2002)).

The classical example (4), reproduced in Büring (2003), illustrates the effect of *CT* in discourse.

(4)   FRED$_{CT}$ ate the BEANS$_F$
   a.   **Step 1 :** What did Fred eat ?
   b.   **Step 2 :** What did Fred eat ? What did Mary eat ? ... = Who ate what ?

Example (4) is first interpreted as an answer to a question obtained by replacing the informational focus by a wh-word, i.e. (4-a). Next, *CT*-marking indicates a more complex strategy, *i.e.* that the first question is subsumed by a larger one, given by an abstraction of the first question over the *CT*-marked item : (4-b). This will lead us to the representation of a *D-Tree* as follows :

(5)


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                            Who ate what ?
              ┌──────────────────┼──────────────────┐
     What did Fred eat ?   What did Mary eat ?   What did ... eat ?
              │                  │                  │
     FRED_CT ate the BEANS_F  MARY_CT ate ...    ... ate ...
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In a nutshell, Büring's approach is one that tries to constrain the possible discourse topics one could infer for an utterance, by using the informational structure of that utterance.

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[3] The speaker strategy is the set of questions that subsume the utterance in the *D-tree*.

2.2   Argumentative Goals

The notion of Discourse Topic is also used in argumentation theory, albeit in a different way.

Merin (and works in the argumentative perspective in general) considers a special case of non-cooperative discourse situation, characterized by speaker and addressee having opposite preferences regarding a given goal H. In this case, Merin calls the partition $\{H, \bar{H}\}$ the *issue* of the game and he calls H the *Discourse Topic*. To avoid confusion between theories, we will name the discourse topic in such a setting the *Relevance-Topic (R-Topic)*. The *R-Topic* is meant to be the descriptively most convenient element of the bipartition and is intended to be a neutral term regarding the participants. Given an utterance E of the speaker, the *Protentive Speaker Meaning* (PSM) is that element of the issue for which E is an argument.

Although most argumentative theories deal with non-cooperative discourses, this does not need be so, as acknowledged in Merin (1999). When participants do not have opposite preferences, notions of *PSM* and *Relevance Topic* still have intuitive sense and we extend the definitions to the general case. By *PSM* we will thus mean the goal supported by the speaker, independently of the preferences of the addressee. What we intend to show is that the *R-Topic* is related to the notion of *D-Tree*, and that the two theories have independent contributions to the establishment of the general notion of *Discourse Topic*.

2.3   Linking the Two Perspectives

At this point of our discussion, we will adopt without discussion the view of communication as conceived of in argumentation theory, namely that linguistics items are related by argumentative relations, and that, in speaking, speakers argue for certain conclusions.

In the argumentative perspective, the dichotomic bi-partition $\{H, \bar{H}\}$ is reminiscent of the semantics of polar questions in a Hamblin-style approach[4].

In a non-dichotomic situation, similar parallels can be drawn between a set of possible argumentative goals $\{H_0, \ldots, H_n\}$ and the representation of the meaning of questions as sets of propositions.

Hence, instead of taking the most descriptively convenient element of the partition as the *R-Topic*, we propose to identify the *R-Topic* with the question whose semantics are the set of argumentative goals.

Büring's approach can thus be refined in the following way. When accommodating a question in a *D-Tree* it seems plausible to assume that the question must reflect the argumentative properties of the utterance from which it is derived. More precisely, the inferred question is the question whose semantics match the partition induced by the argumentative situation at hand, that is, the *strategy* (in Büring's sense) must contain the *R-Topic* inferred from the argumentative properties of the sentence.

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[4] This is actually independent of the choice of representation for questions. A similar point can be made in a structured meaning approach to questions. The set $\{H, \bar{H}\}$ would be obtained by applying each member of the restriction to the background of the question.

Given that, usually, utterances are not congruent to the *R-Topic* one infers from them, the *R-Topic* needs to be accommodated at the top of the *D-Tree*, thus indicating the starting point of the speaker's strategy.

In the case of overt polar questions such as (6-a), no accommodation would be required.

(6)　　a.　*A :* Do you like beer ?
　　　　b.　*B :* I do

From (6-b), one can infer the *R-topic* : {*B* likes beer, *B* doesn't like beer} which matches the question in (6-a). Furthermore, (6-b) meets the requirements of congruence imposed by its information structure, which means that the whole dialogue is predicted to be fine without any accommodated strategy.

A more complex example that illustrates our point involves adversative coordination, as marked by the connective *but*. Adversative coordination is often treated in argumentative terms. As observed in Anscombre & Ducrot (1977), sentential *but* connects two propositions E and F such that $r_H(E) > 0, r_H(F) < 0$, i.e. such that they are arguments for opposite conclusions, and thus establishing a dichotomic situation.

(7)　　This ring is beautiful, but it is expensive.

It is not clear which exact strategy should be inferred from (7) in Büring's framework alone. Probably, what should be inferred is a multiple polar question such as *Is this ring beautiful and is it expensive ?* Yet, this does not account for the presence of *but*, nor for the intuitive *R-topic* that comes out of the argumentative properties of (7).

According to our proposition the *R-topic* is constructed out of the argumentative orientations of each segment. These do not stem from lexical properties but depend on the discourse situation. In our example (7), H', that is, the question which is forming the *R-topic*, must belong to the set of propositions satisfying the argumentative configuration of (7), i.e. $H' \in \{H | \text{sign}(r_H(E)) \neq \text{sign}(r_H(F))\}$. Out of all the propositions in the set, H' is chosen as the one with the highest values of relevance. In the context of (7) a likely candidate for H' would be the purchase of the ring and the *R-topic* would then be *"Should we buy this ring ?"*. The first segment of the utterance would be understood as supporting an affirmative answer to the question, while the second segment supports a negative answer.

Adding the *R-topic*, and allowing in this way for enriching the final *D-tree*, leads to a better representation of the actual meaning of the utterance in (7).

A similar observation has already been noted in Umbach (2005) for example such as (8).

(8)　　What did John and Mary do ? (Did they do the same ?)
　　　　a.　$[\text{John}]_{CT}$ $[\text{prepared the dinner}]_F$, but $[\text{Mary}]_{CT}$ $[\text{washed the dishes}]_F$.

Umbach's proposal is that *but*-coordinations with *CT*s answer (negatively) an implicit *quaestio* asking whether both *CT*s are subject to the same predication (indicated in parenthesis in the example). The exact working out of this particular *R-Topic* is feasible, but too complex to fit in this space. What is interesting is that in this case informational

structure helps to disambiguate the argumentative goal of the utterance, rather than the other way around (as in (7)).

2.4   Intermediate Summary

So far we have shown how to link argumentative approaches to information structure based accounts of discourse.

Our claim is that the argumentative properties of an utterance constrain the accommodation of discourse strategy, just like the presence of a *CT*-accent does. However, while *CT* define a strategy rather non-ambiguously, argumentative constraints are broader in the sense that they do not identify a single discourse topic. What is interesting about the latter constraints is that they apply to any utterance, and help to retrieve meaning related to speaker's intentions.

3   Where Relevance and Utility Need to be Kept Apart

In the previous section, we have addressed the question of the relation of *R-Topics* and *D-Topics* in the inference of the point of talking. We have argued that *relevance* in Merin's sense is encoded in the grammatical properties of some linguistic items, and allows to pin-point the speaker's strategy with greater accuracy than by recurring to information-structural criteria alone.

We did not use the game-theoretic notion of an expected speaker/hearer utility — or game-theory for that matter —, since relevance on its own could account for everything required in the examples discussed, and since our discussion did not focus on the actual behaviour we would expect from discourse participants. For instance, in some cases, though an addressee is very well able to identify the speaker's strategy, he will want to modify it, and not in the strictly opposing way of partitioning assumed in Merin (1999).

Therefore, in the present section, we will drop the requirement that all instances of conversation are conflictual, that is, assimilable to strictly opposing zero-sum games. Instead, we will suppose with van Rooy (2001) that conversation may take place in a purely cooperative, strictly opposing, or in a mixed setting.

In the remainder of this section, we will study some of these settings. Relevance and expected utility may diverge, and even conflict. More precisely, we will look at situations where the notions of relevance and utility both play a role, albeit a different one, in order to establish a discourse topic or unify the properties of the utterance with an overt discourse topic.

3.1   Bi-partisan Relevance

Abandoning the idea of a strictly opposing setting, it becomes necessary to define a special kind of relevance, that one may call *bi-partisan relevance*. The idea is the following : bi-partisan relevance is the absolute (Merin-)relevance of a proposition with respect to the discourse-topic (identified to H). Assume for instance that speaker and addressee want to know whether H is the case, and that neither of them has any particular stake with respect to H or $\bar{H}$. In such a (purely cooperative) setting, the relevance

of a proposition E is the greater, the more it drives to either H or $\bar{H}$. That is, if confronted with the choice between an E_1, which would be positively pertinent to a degree $r_H(E_1) = n$, and an E_2, which would be negatively pertinent to a degree $r_H(E_2) = -k$ with $|k| > |n|$, both speaker and addressee should prefer E_2. The reason is that E_2 allows to sort out the issue with far greater accuracy. Clearly, in such a fully cooperative context, and with two sentences arguing for opposite conclusions, the directionality of the relevance-relation is not helpful, and must be neutralized.

As an example consider (9), and imagine that both A and B are honest law-abiding policemen, whose unique goal is to establish the identity of Sue's killer.

(9) A *: Did John kill Sue ?*
    a.   He was the last one to see her $= E$
    b.   He was in Tokyo at the time of the murder $= F$

H can be considered to be set by A's utterance to *John killed Sue*. Then, it will be the case that $r_H(E) > 0$ and that $r_H(F) < 0$, i.e. that E and F argue for oppposite conclusions. Furthermore F appears as a better argument for $\bar{H}$ than E for H. So we have : $|r_H(F)| > |r_H(E)|$. In that case, if B knows that E and F are both true he should utter F given that it resolves the issue better than E, even though E is relevant to the issue.

3.2   Changing Goals

The fact of teasing apart relevance and utility furthermore allows us to give an analysis of situations where the inference of an argumentative goal is subject to modification because of the participants' preferences.

Consider the dialogue in (10).

(10)   (At the restaurant, after receiving the tab)
    a.   *A :* I know someone from Austria who will lend me 5 euros.
    b.   *B (himself Austrian) :* Yes, Kurt will be happy to do it.

Let's assume that the intended goal of A's utterance is $H_0 =$*B will lend 5 euros to A*. Let's further assume that participants preferences are represented by the amount of money they gain (positive preference) or lend (negative preference) in the described situation. Hence B's preference for H_0 is -5. Among the compatible argumentative goals of (10-a) is $H_1 =$*Kurt will lend 5 euros to A*. B's preference for H_1 is 0 which means that he prefers it over H_0. Ultimately, A is neutral between H_0 and H_1, and hence he's prone to accept the shift in argumentative goal imposed to him by B.

Therefore, in this situation, the argumentative goal is conjointly established by the participants, given their actual preferences in a game-theoretical kind of approach.

3.3   Mixed Motive Games

A last argument against an identification between relevance and expected utility — which would mean, as we have said before, that belief must be reducible to a disposition to act — comes from the considerations of van Rooy (2001) with respect to mixed

motive games. In such contexts, it may occur that, even though somebody believes some information to be true, he will not act according to this belief.

The setting of the games he considers is a quite different one from what we have seen so far, which were signalling games. In this precise case, we are facing a game with communication preceding it, and the result of the communication may influence the pay-offs of speaker and addressee in the game that follows.

Van Rooy (2001) stresses the fact that the common ground (i.e. the set of mutually, and generally accepted information) does not just serve to determine the choice of words of the speaker, and the choice of interpretation of a hearer. The common ground also determines the actions of the discourse-participants in a game that follows the exchange of information.

The scenario goes as follows : a rational speaker will assert a proposition E — which means : risking E to become part of the common ground, and as such influencing the established payoffs for the speaker and addressee — only if E is as least not defavorable to his expected utility. But the addressee has a strategy, too : he will not accept an utterance to become part of the common ground if this reduces his expected utilities. This holds even if he believes the asserted information to be true. And clearly, the addressee must play the resulting game with respect to his old beliefs, because otherwise he would jeopardize the expected utilities.

Let us consider an (invented) example. In the fictive country of Franconia, the prime minister and the minister of the interior compete for the office of the president of Franconia. The prime minister is sent a listing claiming that the minister of the interior has a substantial amount of money in a foreign bank. The prime minister therefore sends the secret service to investigate this claim. Assume that the situation is the following : it would be greatly damaging the campain of the minister of the interior if he had such a bank account, and therefore, a great help for the prime minister. Some months later, the prime minister receives the message :

(11)   The minister of the interior does not have a bank account in this foreign bank.

As a rational player, the situation being as put above, the prime minister should not take into account this information, since it would harm his expected outcome in the presidential election.

Now, the proposition in (11) is highly relevant (depending on the person, positively or negatively), in that it might provoke a considerable shift in the outcome of the game. Yet, one must see that it does not affect a preceding disposition to act in any way.

Therefore, such a configuration again shows that belief in a game-theoretic setting cannot be reduced to a disposition to act.

4   Conclusion

In this paper, we have examined the applicability of (parts of) game theory for the semantics (i.e., for the grammatically encoded parts of meaning) of natural languages. We have argued that relevance should be represented explicitly in the grammar of natural languages, and that decision theoretic semantics (as developed in Merin (1999, 2003)) is a possible way to go, making use of a subpart of game theory.

We have also examined the possibility of reducing the phenomenon of argumentation to pragmatics (i.e., purely contextually parts of meaning), and argued against the identification of the concept of *relevance*, as used in argumentative approaches, with that of *expected utility*, as defined in more general game-theoretical settings. Such a reduction could be achieved through the identification of belief with a disposition to act.

Our arguments to oppose such a reductive approach were partly theoretical and partly based on practical considerations regarding the accommodation of a *discourse topic*. We have shown how the two concepts can both contribute independently to the establishment of a given topic, and that from a linguistic perspective, there are good reasons to keep them apart.

Among the perspectives of this work is the integration of our considerations into a formal model of dialogue, especially with respect to relating argumentation and speaker's utility to the concept of *grounding* (e.g. as used in Ginzburg (to appear)) in the case of mutually agreed upon changing goals (as exemplified in section 3.2).

Another direction of research is to find other cues and constraints for the accommodation of discourse topics, that is, what additional elements besides informational structure, argumentation and utility allow us to infer what a speaker wants to convey.

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