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## Argumentation and Dialogue

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Référence à fournir pour toute utilisation

### Introduction

As a particular form of verbal interaction, argumentation is an empirical fact. Practically all transactions, especially instituted ones<sup>1</sup>, include argumentation, e.g., scientific, philosophical, and ethical debates, conflicts (Eisenberg & Garvey, 1981; Miller, Danaher, & Forbes, 1986), negotiations (Firth, 1995), deliberations of committees, discussions, disputes (Gottman, 1979), court trials (Riley, Hollihan, & Freadhoff, 1987), political confrontations (Trognon & Larrue, 1994), and many others social situations (*see* Dascal, van Eemeren, Rigotti, Stati, & Rocci, 2005). In some of these transactions, argumentation is an essential component. For example, the "sincère" consensus that follows deliberation by a committee cannot be obtained without argumentation (Moscovici & Doise, 1992). Another transaction in which argumentation plays a key role is teaching (Bill, Leer, Pontecorvo, Reams, & Resnick, 1992; Cavalli-Sforza, Lesgold, & Weiner, 1992; Chinn, 1995; Garcia, 1980, 1996; Pontecorvo & Girardet, 1993; Resnick, Salmon, Zeitz, Wathen, & Holowchak, 1993). However, the role of argumentation in the teacher-student relationship is still ill-defined despite the pioneering work by Sinclair and Coulthard (1975). Hence, the status of argumentation as a kind of interaction must be clarified (Specogna, 2007), especially since argumentation and debate are taught in many countries, and in France "argumentation is included in an increasingly specific way in the teaching curricula. Confined to courses in rhetoric at the turn of the century, argumentation is [in effect] addressed today, at least in its oral form, to elementary school pupils, and sometimes even to preschoolers" (Garcia-Debanc, 1996: 50).

The aim of this chapter is to review the research on argumentation in the form it takes on during interaction. To argue is to accomplish a discursive act, which we begin here by defining. Then we study what this act looks like in an interaction, first in its surface discursive form and then in its logical forms. Finally, we look at how people grasp argumentation when they use it.

### 1. Argumentation: A Discourse Act

Toulmin (1958) is most certainly the one to have given argumentation its most developed form (*see below*). Expressed in the simplest way, argument U (Greenan, 1997) is an "intervention" (Roulet et al., 1985) or more specifically, a conditional assertion (Ghiglione & Trognon, 1993). Argumentation thus constitutes a complex speech act or discourse act, in Vanderveken's sense of the term (1997). Although

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<sup>1</sup> A transaction is a series of discourse acts that form a collective action. Some transactions are ritualized, e.g., a wedding.

this author mentioned argumentation only in passing<sup>2</sup> in his discourse logic — nonetheless designed as "a rational classification of the different types of discourse [and as an analysis of] the logical structure and success conditions of conversation" (1997: 67, our translation) —we do not see why argumentation would not be included in the set of discourse acts.

As a discourse act, then, an argumentation is made up of at least two utterances. The first utterance (or set of utterances) constitutes the argumentation premise(s). The second utterance constitutes the conclusion. The premise(s) and the conclusion constitute *the* propositional content of the argumentation (Greenan, 1997). This very simple formalization is the one presented by Walton and Krabbe (1995: 128): the premise(s) and conclusion are explicitly or implicitly linked by an argumentative connector. This gives the following elementary argumentation:

$$\frac{R_1 \ \& \ \dots \ \& \ R_n \quad (n \geq 1)}{C}$$

All premises ( $R_1, \dots, R_n$ ) and the conclusion  $C$  in this formula are utterances in language  $L$ . This language, introduced by Walton and Krabbe (1995) to describe the constituents of argumentation, just happens to be a language for propositional logic. The constituents, premise(s), and conclusion, as well as the implicit premise or warrant ( $R_1 \ \& \ \dots \ \& \ R_n \rightarrow C$ ), are the elements of argumentation  $U$ .

Like all other discourse acts, argumentation is assigned success conditions and satisfaction conditions<sup>3</sup>. Argumentation thus has:

- a goal: when speaker  $S$  utters an argumentation, he is attempting to convince listener  $H$  that conclusion  $C$  is epistemically acceptable given the premise(s)  $P$ ;
- propositional content conditions: a formal<sup>4</sup> or informal<sup>5</sup>, monotonic or non-monotonic, inference, via a *topos*, for instance;

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<sup>2</sup> "A complete discourse, such as a theoretical debate, consists of a number of different linguistic exchanges [...]. From a theoretical standpoint, one must distinguish, in discourse, "interventions" like these from simpler illocutionary acts expressed during the enunciation of utterances [...] I think that such interventions are discourse acts too. However, they are more complex in nature than the auxiliary illocutionary acts of which they are comprised. They are second-level discourse acts whose accomplishment requires a series of several illocutionary acts. The speakers, alone or with others, several utterances in each intervention. [...] most often, linguistic exchanges and interventions in a discourse have a function: they satisfy what Dascal calls conversational requirements. At a given time in a conversation, the speakers understand that they need to supply *arguments*, to justify their statements, to explain and clarify their ideas or repeat earlier utterances. They thereby accomplish the interventions' auxiliary illocutionary acts, with the intention of having them play a different role in the conversation from the one determined by their own logical form. As such, the discursive intentionality is greater than the sum of the intentionalities of the individual illocutionary acts (Vanderveken, 1997: 66, our italics, our translation).

<sup>3</sup> We are keeping close to Greenan (1997) but within the Searle and Vanderveken version of speech act theory (Searle & Vanderveken, 1985; Vanderveken, 1990), whereas Greenan refers to Searle (1969).

<sup>4</sup> A "formal inference" here means "a well-written formula" in a logic system that is based on a minimal, classic, intuitionist logic of propositions, predicates, relations, etc., or even on a logic of "contents" in Plantin's (1996) sense of the term, a "natural" logic in its different acceptations (Grize, Hintikka), or even of a "mental" logic (Braine, Rips, Johnson-Laird). Defending this thesis, that all logic systems are derived from the usage of a natural language, we do not see why we would prefer one system over another

<sup>5</sup> A dialogical pragmatics requires a default logic (Reiter, 1980) insofar as the interpretation of a sign is no longer the interpretation of a speaker, as in a monological pragmatics, but the interpretation the interlocutors think is the speaker's interpretation (Clark, 1996; Trognon, 2002; Trognon & Batt, forthcoming). Walton and Krabbe (1997: 180)

- a context-dependent mode of accomplishment;
- non-defective conditions, i.e., preparatory conditions and sincerity conditions. The preparatory conditions are, firstly, that S believes that H does not accept or fully accept C, and secondly, that S will accept P as an adequate logical argument in favor of C. The sincerity conditions are that S believes that P is epistemically acceptable and constituted a "correct" logical basis for C.

Argumentation is successful only if the first three conditions are satisfied. The non-defectiveness is indeed not necessary for success: a speaker who makes a reasoning error or a speaker who utters a sophism is nonetheless forwarding an argumentation. The *uptake* of a argumentation is thus achieved if, for H, U is S's attempt to convince him "that C on the grounds of the logical support that S regards P as providing for C. H's recognition of this intention is brought about by means of H's knowledge of the rules governing P and C and any argument indicator terms occurring in U. (This condition is required to ensure that the successful communication occurs through linguistic meaning, excluding cases in which success comes about fortuitously, for example, by guessing)" (Greenan, 1997: 12).

An argumentation is satisfied only if (i) H did not accept C before S was stated, (ii) H accepts P, and (iii) H feels that P adequately supports C. On this topic, Greenan quite relevantly notes that it is perfectly rational to be convinced of C because P, when the probability that P is true ( $\text{prob}(P)$ ) and the probability of C given P ( $\text{prob}(C/P)$ ) are less than 1<sup>6</sup>. It suffices that the product ( $\text{prob}(P) \times \text{prob}(C/P)$ ), i.e., the "unconditional" probability that P is true, multiplied by the conditional probability that C is true given P, be significantly higher than the unconditional probability  $\text{prob}(C)$  that C is true.

## 2. Argumentation: an Interaction

### 2.1. The Study of Argumentation as an Interaction

Studying argumentation as a verbal interaction implies seeing it as the outcome of the cooperation of several agents driven by a collective intentionality (Searle, 1990). This issue, which is part of the pragmatization movement in argumentation research trend since the end of World War II (Plantin, 1996), "is as old as rhetoric and dialectics" (ibid: 10) but it has been benefitting "since the early 1980's, [...from the] development of verbal-interaction theories" (ibid: 10). The question, then, is whether this kind of collective intentionality can be delineated. Searle has not doubts about it; he makes conversation the paragon of collective intentionality<sup>7</sup> (1992). Neither does Vanderveken who expands the logic of speech acts to a logic of discourse actions.

In this approach, the notion of "game" quite naturally offers a suitable framework for studying discourse acts, particularly argumentation. In fact, seeing language as a goal-oriented process and comparing it to a

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propose a definition of default argumentation that is quite easy to understand. In Perrault (1990), we find a default system for generating the principal speech acts, and Trognon and Coulon (2000) give us default rules for generating indirect acts and implicatures in an interlocution

<sup>6</sup> Greenan (1997) refers to a fuzzy logic of truth and develops a Bayesian theory of the truth value of an argumentation.

<sup>7</sup> A collective intentionality is an intention "of the form 'We have the intention to perform action A' [...] that could exist in the mind of each individual agent who acts as part of a collective. In cases like that of a soccer team, each individual will have an additional intentional content that he could express, in ordinary French, using the following formulation: 'I accomplish act A as part of our accomplishment of act B'. For example, 'I get free, and I do so as part of our execution of an indirect free' (Searle, 1991: 233).

game is not a new approach. Saussure himself, the creator of structural linguistics, relied on this metaphor in his *Cours de linguistique générale*. However, in language matters, the notion of game suffers from some degree of confusion. The term game is applied to language in general, to the semantics of languages, and to discourse, notably dialogue. These three orientations overlap in multiple ways. For example, some of Hintikka's pupils, like Carlson (1983), tried to integrate Hintikka's semantics games into the dialogue games. We will attempt to describe each of these concepts.

### 2.1.1. LANGUAGE GAMES

The notion of game applies to language in general, with the concept "language game" first described by Wittgenstein after his breakaway from the logicism of the *Tractatus*. A "language game", for Wittgenstein (1953), exists when language is applied to a set of activities associated to its use (1953: section 7). Any element of the language will thus have a class of activities. The meaning of a word, for example, will correspond to the set of activities "where the word lives" (1953: section 43), i.e., in which it is used. For Wittgenstein, the primitive language of a child is the best illustration of a language game. Anticipating Bruner, he writes "The study of language games is the study of primitive forms of language or primitive languages. If we want to study the problems of truth and falsehood; or of the agreement and disagreement of propositions with reality, of the nature of assertion, assumption, and question, we shall with great advantage look at primitive forms of language in which these forms of thinking appear without the confusing background of highly complicated processes of thought. When we look at such simple forms of language the mental mist which seems to enshroud our ordinary use of language disappears. We see activities, reactions, which are clear-cut and transparent. On the other hand we recognize in these simple processes forms of language not separated by a break from our more complicated one. We see that we can build up the complicated forms from the primitive ones by gradually adding new forms." (*Blue Book*: 17).

However, Wittgenstein never operationalized his notion of language games, settling for presenting a variety of lists. In paragraph 23 of *Philosophical Investigations* (1958), for example, he proposes the following list: "giving and obeying orders; describing the appearance of an object, or giving its measurements; constructing an object from a description (a drawing); reporting an event; speculating about the results of an experiment in tables and diagrams; making up a story and reading it; play acting; singing catches; guessing riddles; making a joke; telling a joke; solving a problem in practical arithmetic; translating from one language to another; asking, thanking, cursing, greeting, praying. This is a deliberately chaotic list, explicitly designed to elude capture by any single classificatory scheme" (Rowe, 1998: 451). In effect, Wittgenstein doubted that a single concept could overarch all the games we know: "if you look at them you will not see something that is common to *all*, but similarities, relationships, and a whole series of them at that" (PI: §66). And he also doubted that language games could be entirely explained by rules.

### 2.1.2. SEMANTIC GAMES

The notion of game also applies to language semantics, i.e., to the relationships between formal or natural languages and the world. This relationship is described in the theory of "semantic games" set forth by Hintikka as early as 1973 and then developed by himself and his pupils until today. The theory of semantic games can be regarded as the operationalization of Wittgenstein's theory of language games -- in the theory of language games, a word's meaning is the class of activities in which the word is employed; in the theory of semantic games, the meaning of an utterance in natural language, or its semantic evaluation, takes place within a dialogical game. The basic semantic relations that link the language and the world are immanent to the verification and falsification processes. In this way, the

truth of sentence S is defined as the existence of a winning strategy for one of the players, called Myself in a given game G associated with S [G(S)]. G(S) would be an attempt Myself would make to verify S against the machinations of an opponent called Nature. If the game ends with a true primitive, Myself wins; if it end with a false primitive, Nature wins. For instance, if Myself is in charge of verifying a thesis, Nature's role is to falsify it. The dialogue unfolds according to rules specific to the structure of the utterance being considered. Accordingly, Myself wins the game if he manages to verify the thesis he is asserting (and so Nature loses), and nature wins if she manages to falsify the thesis uttered by Myself (and so Myself loses). The grounding idea here is that sentence S is true if and only if it is verifiable in the universe under consideration. In other words, sentence S is true if and only if Myself (the initial verifier) has a winning strategy in the correlated game we will call G(S). Sentence S is false if and only a winning strategy for Nature in the game G(S) exists. In Hintikka's semantic game, a strategy is a rule that tells a player what move to make in each situation that could occur in the course of the game.

Semantic-game theory has been applied to natural language to account for many phenomena, including quantifiers, anaphors, modalities, questions, etc. "In close analogy with the game rules for predicate logic, GTS rules for a natural language like English are stated as surface structure transformation rules taking English sentences to other such sentences together with instructions about the roles and options for the two players Myself and Nature" (Carlson, 1998: 449). Let us look at one Carlson's examples illustrating quantifier use. Suppose that while playing game G(S; M), i.e., a game about utterance S in language L of which M is a model, the interlocutors arrive at an utterance like "Z – an X who Ys– W", which could stand for "nowadays – a student who studies – succeeds". This utterance includes the quantified constituent "a X who Y". A rule (R. a) applies in this game, G. It stipulates that the verifier can change the game from the state (G (Z – a X qui Y – W); M) to the state (G (Z – b–W, b is a X & bY); M), i.e., "*nowadays – b succeeds, b is an X individual and b studies*". This amounts to allowing the verifier to choose an individual (we will call b) from the appropriate domain. A rule of a semantic game thus has two properties: (i) it converts an expression into one or more other expressions that are easier to manipulate semantically, and (ii) the rule is a strategy.

### 2.1.3 DIALOGUES GAMES

Lastly, the notion of game applies to discourse, particularly the discourse genre "dialogue", since this is especially where the concept of "dialogue game" is found . This third voie is much older than the other two. Socrates's maieutics, as a method of questioning, is a competitive question-answer game. The *obligationes*, a class of question-answer disputation games, formed the principal methodology of medieval philosophy. Finally, the study of dialogue games has grown vigorously during the last century; both in logic (Lorenzen, 1967; Hintikka & Kulas, 1983) and in rhetoric (Hamblin, 1971).

A dialogue game is a dialogue type (or dialectic system) characterized by its rules and its main goal. The main goal of a dialogue game is the state aimed for in accomplishing it. The rules of the dialogue game are the operations that must be carried out to go from its initial state to a final state in which the dialogue goal is reached. Based on a set of considerations like these, Walton and Krabbe (1995) distinguished six basic dialogue types (without claiming to be exhaustive). The persuasion, negotiation, and eristic types of dialogue games begin with a conflict of opinions, interests, or attitudes, respectively. Their main goal in each case is to resolve the conflict by coming to a stable agreement, arriving at a practical arrangement, or managing to temporarily interrupt hostilities, respectively. The inquiry and deliberation types of dialogue games rest on a problem to be solved jointly, a theoretical problem for

the former, with the end being finding the solution to that problem, and a decision for the latter, with the end being reaching a consensus. Finally, the information-seeking type of dialogue game is triggered by a lack of information, and the dialogue is aimed at filling in that gap. These dialogues types are further divided into subtypes. For example, consultation of an expert, a didactic dialogue (as in Bill et al., 1992), an interview, an interrogation, and an examination are subtypes of the information-seeking type of dialogue. Likewise, a quarrel, which typically consists of exchanging criticisms, and bickering are subtypes of the eristic type of dialogue.

In real conversations, different types of dialogues succeeded each other, not always legitimately, as, for example, when a deliberation turns into a persuasion dialogue, then into a debate, and then ends in a quarrel, etc. (see Walton, 2005: 70; Walton & Krabbe, 1995: 107). Reed (1998) recently proposed a program that models the succession of dialectic changes that take place in the course of a dialogue. Dialogue games are embedded. "To say that one dialogue is embedded in another means that the two are structurally connected so that argumentation in one supports argumentation in the other." (Walton, 2005: 69). They are intricately entangled. "From a descriptive point of view, a particular speech event can exhibit two (abstract) types of dialogue throughout that same speech event without there being an explicit shift from one type of dialogue to another. When this is taking place, we sometimes say that there is one type of dialogue that is more explicit and dominant, while the secondary type of dialogue is present in a more subdued or less explicit form. But often it is hard to tell which type of dialogue is dominant, especially as flavours are shifting back and forth throughout the speech event." (Walton & Krabbe, 1995: 82). Finally, dialogue games are combined in different manners, giving rise to mixed types like debate<sup>8</sup>, Socratic dialogue, a committee meeting, or a refutation dialogue (Elenchus). This last type "would appear to be a kind of inquiry which strives to furnish proof of a contended hypothesis by the negative route of showing the discarded hypotheses to be false. However, elenchus is more personal than that: it aims at cleaning the spirit, and, ultimately, at moral improvement [...] Thus a flavor of education, of didactic dialogue, is also present" (Walton & Krabbe, 1995: 85). A committee meeting, on the other hand, is "a generic type of dialogue" "in which the goals of persuasion, negotiation, inquiry, information seeking, and even eristic all show up » (Walton & Krabbe, 1995: 84).

## 2.2. Argumentation as a Dialogue Game

From descriptive standpoint, a dialogue game is an observable structure in the potentially infinite flow of natural-language utterances produced by speakers in interaction. From this angle, the dialogue game of argumentation is firstly a superficial discursive form and is only a "logical" form after that. We will examine these two aspects separately, in reference to the work by Rips et al. and Walton and Krabbe, respectively.

### 2.2.1. ARGUMENTATION DIALOGUE GAME: ITS GRAMMAR

Fundamentally, Rips's (1998) theory is a theory about how argumentative conversations are understood, although it can also be seen as a theory of how argumentation is produced in conversation. In line with the approach generally implemented in discourse analysis, Rips (1998) represents argumentative discourse as a set of *rewriting rules*. In this new, the exchanges in an argumentative dialogue are thus governed by a set of conventions: assertions can be followed by concessions, requests for justification,

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<sup>8</sup> Trognon (1990, 1991) and Trognon and Larrue (1994) present some analyses of political debates. Trognon (1990) proposes an experimental framework for assessing the empirical value of analyzing the results of a debate.

or rebuttals; rebuttals can be followed by concessions or counter rebuttals; requests for justification can be followed by justification; and so on. Faced with an assertion, then, an interlocutor might reply by going along with it, rejecting it, or even challenging the speaker to support it. The thing that gives an argumentative dialogue its typical look is the way these moves are ordered. The grammar of argumentative dialogues contains recursive rules for embedding argumentative dialogues inside other argumentative dialogues<sup>9</sup>, ad infinitum, while ensuring the discourse's overall coherence. According to Rips (1988: 416), "People hearing and reading an argument extract some structure analogous to the one these rules generate." So, the hierarchical organization of argumentative dialogues affects the weight of the proof observers assign to the dialogue protagonists, with the utterer of the first assertion -- according to the subjects of Bailenson's (1997) experiment -- bearing the heaviest load (Rips, Brem, & Bailenson, 1999)<sup>10</sup>.

The first step of the structural analysis of an argumentative discourse thus consists of bringing out the typical nesting of arguments and subarguments it contains. For example, with the Rips system, we would derive the following dialogue between two girls solving a problem together as shown below. This dialogue is taken from a recording of a dyad of children, Vanessa and Audrey, who are in the process of solving the Hanoï Tower problem with four discs. It is studied in the interlocutory-logic framework (*see below*) (Trognon, Sorsana, Batt, & Longin, 2008).

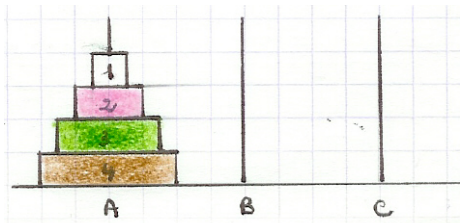


Figure X. The Tower of Hanoï with four discs

(...)

11Va: on the green (disc 3)

12Au: on the brown (disc 4)

13Va: no, on the green (disc 3)

14Au: no, let's put the pink one there (disc 2)

15Va: wait, wait (looks at the experimenter) let's put it on the green (disc 3)

16Au: no, afterwards let's put that one there (disc 2 on disc 3)

17Va: yes, but we must build the tower there (peg C), ah yes, that's it

18: co-action (disc 1 on disc 4 on peg A)

19: co-action (disc 2 on disc 3 on peg B)

20Va: OK!

21Au: (smile)

<sup>9</sup> Comparing his formalization with the rules of the permissive persuasion dialogue game (Walton & Krabbe, 1995), Rips (1998: 412-413) writes: "It is difficult to continue the description of [an] Argument [...] in this fashion because of limitations of the Walton-Krabbe system. [...] In general, the dialogue-game framework makes it difficult to represent the embedded or recursive structure of support that is often typical of argumentation. Nearly any statement that is introduced into an argument can itself become the argument's focus and generate additional justification and criticism" (413)

<sup>10</sup> Trognon (1991) observed an analogous phenomenon in political debates on television.



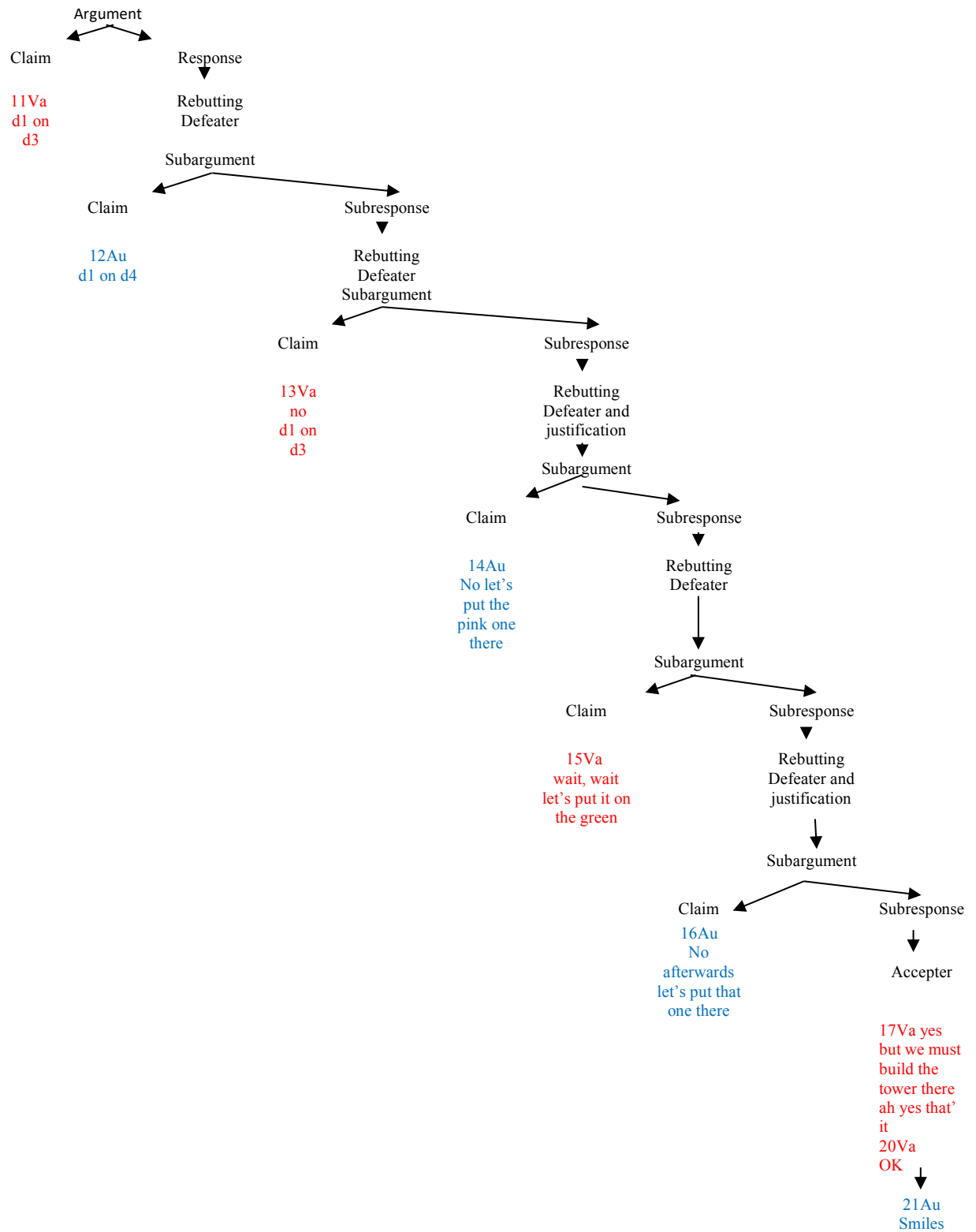


Figure 1. Structure diagram applying Rips's (1998) rules to a dialog analysed in Trognon, Sorsana, Batt, & Longin (2008)

This sequence sets the stage for a disagreement between the two children. From this disagreement, an inter-comprehension process emerges and then leads to an agreement. Even though, from 11Va to 16Va, the disagreement is about where to put  $d_1$ , it is Audrey's reasoning, in 14Au and 16Au, that ends up taking over, as illustrated by what Vanessa says in 17Va. The disagreement between Audrey and Vanessa appears in 12Au after Vanessa proposes, in 11Va, to put disc 1 on peg B, while for Audrey, it goes on top of the brown disc ( $d_1$ ) on peg A. We can see that before the agreement, Vanessa's proposals are repeated twice, that Audrey rejects them a first time before reiterating her initial proposal, and then again by giving a justification after her refusal. In this excerpt of argumentative dialogue, we find a series of *Rebutting Defeaters*, themselves followed by three repetitions of justifications, all in the assertive mode.

Rips describes various possible arrangements by listing some of the structural rules that apply to argumentative dialogue between two persons. In every rule, the discourse component on the left can be broken down into those on the right, as in other rewrite rules. However, the plus signs in Rules A, C, and others indicate not only the order of the components, but also a change of turn from one speaker to another. Thus, Rule A means that an argument consists of a claim by the first participant (labelled with the subscript 1) followed by a reply by the second participant (subscript 2). An asterisk following a component indicates that the constituent can be repeated. Thus, after the first participant's claim, the second participant can produce more than one reply (e.g., several attempts to refute the original claim). Bracketed items separated by vertical bars, as in A-G, are alternative constituents, only one of which can be selected on a given turn.

A. Argument	→ {Claim + Response* / Claim + Ø}
B. Response	→ {Challenge / Rebutting Defeater / Acceptor}
C. Subargument	→ {Claim + Subresponse* <sub>1</sub> / Claim + Ø}
D. Subresponse	→ {Challenge / Rebutting Defeater / Undercutting Defeater / Acceptor}
E. Challenge	→ {Justification Query + Justification* <sub>1</sub> / Justification Query + Ø / Conclusion Query + Conclusion* <sub>1</sub> / Conclusion Query + Ø}
F. Justification Query	→ {Why? Why do you think so? / How come? / ...}
G. Conclusion Query	→ {So? / What's the point? / What do you say that for? / ...}
H. Justification	→ Subargument
I. Conclusion	→ Subargument
J. Rebutting Defeater	→ Subargument
K. Undercutting Defeater	→ Subargument
L. Acceptor	→ {That's right / You're right about that / I agree / ...}

Table 1. Structural Rules for Two-Person Argumentation (Rips, 1998).

Subscripts on constituents indicate the first speaker ( $i = 1$ ) or the second speaker ( $i = 2$ ). The expression 3-1 indicates a change of speaker (if  $i = 1$ , then  $3 - i = 2$ ; if  $i = 2$ , then  $3 - i = 1$ ). Asterisks denote possible repetition of the same constituent. Acceptors and null responses (Ø) can appear only on the right-most branch of the lowest argument or subargument that dominates them.

We can wonder, however, whether the rules presented in Table 1 correctly formalize argumentations that actually take place in real daily life. Can they distinguish argumentative dialogues from other

dialogue games like giving advice or trying to get permission? Rips sheds some light on these questions (1998). He states, for instance, that students can easily recognize the main constituents of these rules as belonging to excerpts of legal trials. Moreover, the rules are nearly identical to the ones identified by Muntigl and Turnbull (1998) in their recordings of argumentation occurring in families or between students.

## 2.2.2. THE ARGUMENTATION DIALOGUE GAME: ITS LOGICAL FORM

Every argumentative dialogue has a *degree zero*, rightly named a *dialogue of the deaf*. If it had a higher degree, an ideal type, it would certainly be represented by the permissive persuasion dialogue. Indeed, the (conventional) goal of an argumentative dialogue game is not to force, threaten, or trick someone into subscribing, no to influence that person, but rather to convince him. As Carlson (1983: 7) wrote, "A player can add to his set of assumptions any logical entailments of those assumptions without fear of violating his epistemic maxims. If the premises are true, so are the consequences; and no new inconsistencies can be created which were not already implicit in the assumptions. To the contrary, a player could not deny any entailment of what he already accepts without falling into inconsistency, and failing to accept them would go against the maxim of cogency" by generating a feeling of dissonance (Festinger, 1957)<sup>11</sup>. It follows that the best way of convincing someone of a thesis consists of proving that it follows from his own assumptions. The persuasion dialogue formalizes this manner of attaining the goal of the argumentative dialogue.

### 2.2.2.1. The Permissive Persuasion Dialogue

"One of the most common types of dialogue occurs when each party's goal is to persuade the other. In this type of dialogue, each participant endorses a particular proposition called -- or declared to be -- his *thesis*; which he must prove or argue for. The thesis of each party must be proven solely on the basis of the premises (or commitments) *of the other party*, by means of inferential moves allowed by the rules. This type of dialogue is called a *persuasion dialogue* (or *critical discussion*)" (Walton, 1991: 247). Walton and Krabbe's (1995) book is an in-depth analysis of the above definition. They propose two versions of the persuasion dialogue: the permissive persuasion dialogue (game) (PPD) and the rigorous persuasion dialogue (game) (RPD), which they present in their book using language of the propositional logic<sup>12</sup>. The first is a game à la Hamblin (1970); the second, à la Lorenzen (1967) and is included in PPD. A PPD type of dialogue switches to a RPD type of dialogue when a player thinks the partner disagrees with an idea that follows from his own premises (i.e., the partner's) and requests that this hypothesis be evaluated directly.

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<sup>11</sup> Dissonance can have the paradoxical effect of causing the person who has this feeling to change his/her initial attitudes in order to make them fit with the behavior that triggered the dissonance. This process is called "dissonance reduction"

<sup>12</sup> The choice of this language "is purely conventional and intended to serve illustrative purposes. The same holds for our choice of rules of inference" (1995: 127). The key point is that "together these rules constitute an incomplete deductive system [...]. The incompleteness is intended to reflect the (very likely) situation that the discussants, though they avail themselves of a logically rich and complex language [...] and of a number of rules of inference pertaining to that language, are unacquainted with any complete system of rules of inference for that language" (ibid: 127).

The operationalized version of PPD or PPD<sub>0</sub>, which is played by two players, B and W, has four types of rules<sup>13</sup>.

(1) Locution rules define the game's legal locutions and how they can be combined in a move. The legal locutions in the game are:

- (i) Initial moves. These are propositions (P) which are:
  - assertions (aP),
  - concessions (cP), or
  - assertion or concessions that belong to an elementary argumentation ( $\Delta_{\infty}$ P)
- (ii) Counter moves, which are:
  - questions (conP ?),
  - partner questioning about:
    - his sincerity (seriousP ?)
    - his consistency (resolveP ?), or
  - challenges (P ??)
- (iii) Withdrawals, of either:
  - commitments (ncP) or
  - assertions (naP)

As the mere reading of this classification immediately brings out, the permissive persuasion dialogue game is played in three stages: (i) a thesis (ii) is questioned (iii) with consequences for speaker who asserted it. Part (i) of the rules is at the heart of the process. One notices here that the questioning stems from the non-defectiveness conditions of the partner, including his sincerity (seriousP ?) and consistency (resolveP ?) and hence their proximity to the conditions of assertion success in speech act theory. In this respect, the permissive persuasion dialogue is the dialectic correlate of the illocutionary act of assertion.

A move can include all legal locutions or only a part of them. In the permissive persuasion dialogue, all players have the same set of available moves. In a PPD, all players have the same set of available moves and their relationship is symmetrical.

(2) Commitment rules attribute players with three sets of commitments and they govern the content of these sets as the dialogue moves are made. *These sets are specified before the persuasion dialogue begins*, that is to say, they are elaborated along with the premises of the persuasion dialogue.

- (i) The first set (AX) is made up of the *initial assertions* of one of the *players*
- (ii) The second is the set of all *light-side commitment* of a player. This set contains:
  - All initial assertions of one of the players
  - All of his concessions (CX)

The set of initial concessions contains all initial assertions. Concessions that are not assertions are simple concessions. Indeed, asserting a proposition is conceding it, but the opposite is not true, insofar as one can concede a proposition without adhering to it, simply for argumentation purposes.

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<sup>13</sup> For the sake of comparability with other approaches to dialogue, our presentation is slightly different from Walton and Krabbe's

(iii) The third set of commitments assigned to a player is the set of his *dark-side commitments*. This set contains the commitments of which the player is not aware, no more than is his partner, but which can nonetheless be revealed to him during the dialogue<sup>14</sup>.

Assertions and concessions are declarative utterances understood by both interlocutors. A player who asserts a proposition is committed to that proposition, so it is immediately added to the set of light-side commitments of that player. A player committed to a proposition must support it by an argument when it's his turn to speak if the opponent challenges him for a proof, which he cannot do unless that "proof" is in his set of light-side commitments. *In a persuasion dialogue game, this is the only way to introduce new propositions into the dialogue.* On the other hand, a player who has obtained concessions from his opponent does not have to defend them. If the "receiver" of an assertion does not challenge its "emitter" then he is considered to have conceded, so the assertion is added to the receiver's set of concessions.

The dialogue starts when the emitter of an initial assertion is challenged to support it. The initial state of a permissive persuasion dialogue thus looks like this (W and B are the conversing partners in the game; each partner has four columns listing his dark-side propositions, simple concessions, light-side commitments, and moves<sup>15</sup> made by the players, respectively). T<sub>B</sub> is B's thesis. W challenges him (T<sub>B</sub>??) to prove this thesis. This is the first move (1W) of the dialogue. B replies to his partner by challenging him to prove his own thesis (T<sub>w</sub>??). At the same time, he presents a proof of T<sub>B</sub>, as required by the rules of the game. We can see that this proof is set forth in two steps, by way of two arguments (F<sub>1</sub>, F<sub>2</sub>)soE and (E, A<sub>1</sub>)soT<sub>B</sub>. In doing this, B adds three premises to the dialogue. One was borrowed from W and belongs to his set of dark-side commitments (DW). The other two, F<sub>1</sub> and F<sub>2</sub>, are new to the argumentative dialogue and are to be put into the B's set of light-side commitments.

	W			B		
	DW	Light-side commitment		Light-side commitment		DB
		CW	AW	AB	CB	
Initial State	A <sub>1</sub> A <sub>2</sub>	B <sub>1</sub>	T <sub>w</sub>	T <sub>B</sub>	C <sub>1</sub>	D <sub>1</sub>
1W:T <sub>B</sub> ??						
				F <sub>1</sub> & F <sub>2</sub>		2B: T <sub>w</sub> ??
						F <sub>1</sub> & F <sub>2</sub> →
						E & A <sub>1</sub> →
						T <sub>B</sub>

Table 2

Table 3 below summarizes the moves that can be made by a player at step t<sub>i</sub> of the game (middle column), the conditions that must be satisfied for the moves to be made (left-hand column) and the strategies the partner has available on the next step t<sub>i+1</sub> (righthand column). The speaker is always X.

<sup>14</sup> "Self-awareness" generated in the course of a PPD is based on this set. Its operator is the commitment-extractor rule: serious(P)? "If a player states 'No commitment A, and A is in his dark-side commitment set, then A is transferred to the light side. This rule would not be normative, but descriptive. It would reflect the fact that we sometimes become aware of our deeper commitments as we catch ourselves in the act of denying them" (146). "In a PPD type of game, winning is not everything. The side benefit of maieutic insight gain is, in some respects, more important for the value of a dialogue. This maieutic function does bring in Hamblin's idea of a gain in information, but does so in a more special way than Hamblin may have had in mind. [...] The primary goal is persuasion for each player, but successful persuasion brings with it, and also requires, a maieutic aspect of having empathy for the other party's commitments. Internal information is brought to the surface in the successful playing of a PPD game" (146).

<sup>15</sup> This representation is a little different from Walton and Krabbe's (1995: 141).

Move conditions at $t_i$	Move at $t_i$	Move at $t_i$
$P \notin CX$ and $((P \in AY) \text{ or } (\text{con}(P)? \text{ or } \text{serious}(P)?) \in m.)$	$c(P)$	
$(\text{con}(P) \text{ or } \text{serious}(P)) \text{ or } P \in CX$	$nc(P)$	
$P \in AX$	$na(P)$	
$P \notin CX; P \in AY$ and was not challenged	$P??$	$\Delta_{so}P \text{ or } nc(P) \text{ or } na(P)$
$P \notin CY$ and one of speaker's assertions $\notin$ to $CY$	$Con(P)?$	$c(P) \text{ or } nc(P)$
$nc(P) \text{ or } P??$	$\text{serious}(P)?$	$c(P) \text{ or } nc(P)$ , unless $P \in DX$ , in which case $c(P)$
$(P \text{ and } Q) \in CY$ and are contradictory	$\text{resolve}(P, Q)$	$n(P) \text{ or } nc(Q)$
$P \notin CY$ and An earlier move contains $P??$	$\Delta_{so}P$	For all $Q \in \Delta_{so}P$ and is neither $c(Q)$ nor $\text{challenge}(Q)??$ then $c(Q) \text{ or } Q??$

Table 3

On each move, the use of  $nc(P)$  or  $na(P)$  or  $c(P)$  or  $P??$  must lead to the following situation: (1) Each assertion of the listener for which he was not challenged is also a concession of the speaker; (2) for each of the listener's elementary argumentations  $\{P_1, \dots, P_n\}$  so  $C$ , if  $P_1, \dots, P_n$  and  $(P_1 \wedge \dots \wedge P_n) \rightarrow C$  are concessions of the speaker, then the conclusion is also a conclusion of the speaker. (3) For each of the speaker's base argumentations  $\Delta$  and for all  $Q \in \Delta$ , if  $Q$  is withdrawn by the speaker, then all immediate implicit and explicit premises of  $Q$  must be withdrawn. If  $Q$  itself acts as an immediate premise of  $P$ , every copremise of  $P$  must be withdrawn. This procedure is recursive. Once an initial thesis is withdrawn, it cannot be set forth again.

*There is a limited number of symbols that can be used in a move or in a dialogue.* At the end of the dialogue, if  $X$  has withdrawn his initial thesis  $P$ ,  $X$  loses and  $Y$  wins (as far as  $P$  is concerned). On the other hand,  $Y$  loses and  $W$  wins if  $Y$  introduces  $P$  into his concession before the end of the dialogue. The game is a tie in all other cases. The game is a tie in all other cases. "PPD is a type of persuasion dialogue, and the aim of the first party is to persuade the second party that the first party's thesis is right. How this is done is by getting the other party committed to propositions that can be used to construct a chain of arguments leading from the other party's concessions or commitments to a conclusion which is the first party's thesis. This chain of arguments is the basis for a player's strategy of persuasion" (Walton & Krabbe, 1995:135).

#### 2.2.2.2. *Shifting from a Permissive Persuasion Dialogue to a Rigorous Persuasion Dialogue: the Complex Persuasion Dialogue*

The theory of complex persuasion dialogue games, —in which a rigorous persuasion dialogue game is included *within* a permissive persuasion dialogue game— is doubly useful here. Firstly, PPD is a (hypothetical) model of the minimal organization of a conversation when it takes on an argumentative operating mode. Secondly, the fact of incorporating RPD into PPD shows how it is possible to shift in the course of a conversation from a relatively free form of argumentation (PPD) to a more constraining form RPD).

To get out of the situation in which a  $nc(T)$  reply is received after a  $\text{serious}(T)?$ , the receiver can initiate a PPD dialogue game within the RPD dialogue game. This will force the emitter of  $nc(T)$  to withdraw this utterance if the receiver manages to establish that  $T$  is implied by the emitter's discourse.

In other words, by forcing an RPD game on the emitter, the receiver of  $nc(T)$  "pins the emitter down" to one of his dark-side commitments. Once back in PPD, the emitter will have to add  $c(T)$  to his set of light-side commitments. Of course, he can withdraw it again, but this will weaken his position with respect to his contradictor and thereby strengthen that of his contradictor.

Unlike permissive persuasion dialogue, rigorous persuasion dialogues separate the roles<sup>16</sup>. Proponent advances the initial thesis; Opponent, makes the initial concessions. Their moves are also different. Proponent can make an assertion, ask questions, do both, make a final remark, or drop out of the game. Opponent can answer (Proponent's questions), challenge Proponent to support his assertions, do both, or drop out of the game. The only move both partners can make is to quit playing, but whoever quits loses the game.

The only strategy available to Opponent (once he has attacked Proponent's thesis) is to react to Proponent's previous move: if Proponent asked a question, Opponent must answer; if Proponent just made an assertion, Opponent must challenge him to support it; if Proponent asked a question accompanied by an assertion, Opponent can choose between answering the question or challenging Proponent to support the assertion. Proponent's goal is to get Opponent to concede the thesis. To do so, he asks Opponent questions that force him to propose concessions backed by a line of reasoning that could prove the thesis.

Table 4 illustrates how Proponent wins in a dialogue where he supports thesis  $P_1$  and Opponent concedes ( $\neg P_1 \rightarrow P_2$ ) and  $\neg P_2$  (Walton & Krabbe, 1995: 163).

	Opposant (O)	Proposant (P)	Comments
	$P_1 \rightarrow P_2$ $\neg P_2$	$\neg P_1$	Concession by O Concession by O P's thesis
1	( ?? ) $P_1$	{ $\perp$ }	The proponent's thesis is "challenged". In this case, Proponent has defense $\perp$ at his disposal (shown in parentheses)
2		$\perp$	And Proponent does use this defense. This defense means that the opponent's set of concessions is inconsistent
3	??		Opponent challenges the inconsistency assertion
4	{ $P_2$ }	$P_1$ ( ? )	Proponent asks a free question (Are you willing to concede $P_2$ ?) $P_2$ is added to Proponent's concessions $P_2$ is added to Opponent's defenses
5	??		Opponent "challenges" $P_1$ (since it is now one of Proponent's concessions). "Each challenge by O of an assertion by P starts a new local discussion with this assertion as its local thesis" (156). Consequently, $P_1$ becomes a new local thesis.
6	{ $P_2$ }	( ? ) $P_1$	$P_1$ questions ( $P_1 \rightarrow P_2$ ) by asserting $P_2$ $P_2$ is added to Proponent's concessions The defense available to O is $P_2$ .
7	$P_2$		O concedes $P_2$ .
8		!	In 5, $P_1$ has become a local thesis. "If and only if the sentence figuring as local thesis is also found among O's concessions can P conclude the dialogue using the final remark 'You said so yourself!'" (156). "If P makes an (appropriate) statement of <i>You said so yourself!</i> P wins the dialogue and O loses it" (161). Whoever wins the last local discussion wins the entire discussion. P thus wins the game.

Table 4. A rigorous persuasion dialogue game won by Proponent

<sup>16</sup> see above (Baker).

(taken from Walton & Krabbe, 1995: 158-163)

When a player has stated  $nc(T)$  or  $T$  ??, if  $T$  is not a concession of  $X$ , and the other player,  $Y$ , suspects that  $T$  is implied by  $X$ 's discourse, then  $Y$  can request an RPD game to clarify the status of  $T$ , by simply saying "your position entails  $T$ ". PPD is then interrupted and the players start an RPD.  $T$  is the initial thesis,  $X$  acts as the proponent and  $Y$ , the opponent, with his concessions being the set of concessions he granted in PPD. Once the RPD game is won by one or the other of the players, they come back to the PPD game. All concessions made by  $X$  in RPD are transferred to PPD. If  $X$  won,  $Y$  makes the first move; if  $Y$  won,  $X$  must begin by stating  $c(T)$ . The outcome of RPD is not inconsequential for  $X$  when he returns to PPD. He can no longer state  $nc(T)$  unless he withdraws at least one of the initial concessions that were actually used by  $Y$  in RPD. This may entail other withdrawals that end up jeopardizing his own thesis.

### 2.2.2.3. *Shifting from a Rigorous Persuasion Dialogue to a Demonstration Dialogue Game*

A shift from a rigorous persuasion dialogue game to a demonstration dialogue game occurs whenever the dialogue components produced are based on logic systems. This is the main type of demonstration dialogue studied within the past few years in interlocutory logic.

Interlocutory logic is a theory about the psychosociocognitive structures of interlocutory events produced when a natural language is used in an interaction. As a formal theory, it is a system of logical methods selected for their ability to reflect the phenomenal properties of interlocution. Two properties are particularly important: sequentiality and distributivity. Sequentiality is the fact that the interlocutory productions form a sequence. Distributivity is the fact that the productions are distributed across the agents contributing to the interlocution. The logical methods utilized in interlocutory logic must exhibit these two properties, which is why natural deduction methods and dialogical methods are so often used.

Analyzing an interlocution fragment in interlocutory logic thus amounts to breaking the fragment down into a sequence of utterances. Each utterance is represented by an expression  $\Phi$  that belongs to the system:  $\langle M_i, \{M_{i,k}\}, \{M_{i,k}\} \vdash M_i, RD, DG \rangle$ , where  $M_i$  is the conversational move accomplished by the utterance in question, such as provide an answer to a question or grant a position taken,  $\{M_{i,k}\}$  is the union of all conversational moves that precede move  $M_i$  and to which it is chained. For example, in the following dialogue (Carlson, 1983) where  $A$  accepts intervention  $p$  "in his thoughts" (in his cognitive environment, as Sperber and Wilson, 1989, would say), (iii) is an inference made from both (ii) and  $p$ , at the same time as it is an answer to the implicit question *Who won?* Likewise (v) is an inference made from (ii) and (iv), at the same time as it is an argument against the acceptance of these premises relative to  $p$ .

$p$  =  $A$  accepts (if someone wins, it is Jack or Bob. Someone won. Who won?)

- |    |                              |       |
|----|------------------------------|-------|
| 1A | : <i>Did Jack win?</i>       | (i)   |
| 2B | : <i>No</i>                  | (ii)  |
| 3A | : <i>Then Bob won</i>        | (iii) |
| 4B | : <i>No</i>                  | (iv)  |
| 5A | : <i>so then no one won!</i> | (v)   |



The pair  $\{M_{i-k}\} \vdash M_i$  expresses what we call "a dialogue sequent" in interlocutory logic (see Trognon, Batt, et al., 2006) of a given dialogue (DG). Indeed, (iii) comes from two sources in the above dialogue above. *Simplifying greatly*, one can say that it is deduced first from the disjunction of "Jack or Bob" and "not-Jack":  $\{p, (ii) \vdash (iii)\}$ ; and (iii) is also deduced from the question *Who won ?*:  $\{\text{Who won ?}\} \vdash (iii)$ . RD is the set of dialogue rules used by the interlocutors to make their moves in the dialogue. For example, 3A comes partly from  $((p \vee q) \& p \vdash q)$ . Finally DG is the dialogue game played by the interlocutors in the fragment under study, which here, among others, is a Question-Answer dialogue game.

To spell out the reasoning which, from  $\{M_{i-k}\}$  to  $M_i$ , builds the *dialogue sequent*  $\{M_{i-k}\} \vdash M_i$ , interlocutory logic relies on a method of natural deduction. The advantage of this method is that it reconstructs the logical form of interlocutory events as they occur phenomenally, since it follows the sequential chain of conversational moves in the interaction.

Any move  $M_i$  is an expression in the system  $\langle F(P) \rangle$ , insofar as interlocutory logic includes general semantics (Searle & Vanderveken, 1985; Vanderveken, 1990) as one of its primitive components.  $F$  is the force of the speech act accomplished by uttering the utterance.  $F = \langle f_1, f_2, f_3, f_4 \rangle$ .  $f_1$  is the force expressed literally,  $f_2$  the indirect force of the act (if any),  $f_3$  the implicatures of the act, and  $f_4$  the conversational function of the act<sup>17</sup>.  $P$  is the propositional content of the speech act accomplished by move  $M_i$ . This propositional content is described by expressions in first-order, quantified modal predicate logic, amended as suggested by Hintikka in order to adapt it to the "natural logic of discourse".

Semantic games thus play a crucial role in interlocutory logic because they spell out the *primitive semantic* operations implied by the *natural logic* underlying the use of natural language during interaction. Because they are situated at the interface of the argumentative and the logical, they are the key to teaching practices, so it is worthwhile to look at their structures in some detail. We will do this by following Denis Vernant's (2001: 328 and sq) way of presenting them<sup>18</sup>.

Remember that semantic games are zero-sum games between a person named *Me* whose goal is to *verify* something in a well-delineated domain of individuals (or *World*) and *Nature* (possibly personified by a *Master*) who can only *falsify*.

The rules of the game are as follows:

1. Disjunction rule: *Me* chooses one of the disjunctive propositions
2. Conjunction rule: *Nature* chooses one of the conjunctive propositions
3. Conditional rule: *Me* chooses the negation of the antecedent or the consequent
4. Existential proposition rule: *Me* chooses a suitable individual from the domain of individuals  
the existential is verified by an example)

---

<sup>17</sup>  $f_1, f_2, f_3, f_4$  are not given simultaneously in the discourse. They result from a process of intercomprehension sharing that transforms the "speaker's meaning" into the "interlocutors' meaning" (Clark, 1996), according to a process described in Trognon & Saint Dizier (1999) and in Trognon (2002).

<sup>18</sup> see also Batt, Trognon, & Vernant (2004), Trognon & Batt (2004), Trognon & Batt, (2007), Trognon, Batt, & Laux (2006, 2007)

5. Universal proposition rule: *Nature* chooses any individual from the domain (the universal is falsified by a counter-example: no individual that does not satisfy the predicate (or the relation) can be found
6. Negation rule: the roles of *Me* and *Nature* are reversed
7. Truth: *Me* wins if he asserts an atomic proposition that is true in the world being considered; otherwise he loses.

Vernant takes the example of a world made up of the numbers 1, 2, 3, 4 and the relations  $1=1, 2=2, 3=3, 4=4; 1<2<3<4$ . Relative to this world, *Me* supports the proposition:  $(x) \exists y (x \leq y)$ . The unfolding of the game is presented in the table below, where the first column describes the steps of the game and a last column lists the rule used on each step:

Steps of the game	<i>Nature</i>	<i>Me</i>	Rules used
1		$(x) \exists y [(x < y) \vee (x = y)]$	
2	?1	$\exists y [(1 < y) \vee (1 = y)]$	Règle 5
3	?	$[(1 < 2) \vee (1 = 2)]$	Règle 4
4	?	$(1 < 2)$	Règle 1

Table 5

In 2, *Nature* chooses a universal instantiation that *Me* must apply. In 3 she requires an example, which *Me* has to choose. In 4, *Nature* casts doubt on the disjunction, and *Me* chooses the first disjunct. This proposition is true in the world under consideration: *Me* wins.

Numerous publications within the past few years have used interlocutory logic as a basis for analyzing the emergence of various kinds of knowledge in dialogue: (1) knowledge about the correct positioning of a cursor during learning on a word-processing tutorial (Trognon & Saint-Dizier, 1999), (2) knowledge about how to handle a pneumatic drill during a work-study apprenticeship (Sannino, Trognon, Dessagne, & Kostulski, 2001; Sannino, Trognon, & Dessagne, 2003), (3) proofs of conservation of volume (Marro, Trognon, & Perret-Clermont, 1999), (4) during school learning of division (Trognon, Saint-Dizier of Almeida & Grossen, 1999) and proportionality (Trognon, Batt, Schwarz, Perret-Clermont, & Marro, 2003, 2006), and (5) during hypothetico-deductive reasoning applied to an empirical problem (Trognon & Batt, 2003), a logic problem (Trognon & Batt, 2004, 2007), or a diagnosis procedure (Brixhe, Saint-Dizier, & Trognon, 2000), or the notification of a medical diagnosis (Batt, Trognon & Vernant, 2004 ; Batt & Trognon, 2009, 2010).

Below is an illustration showing how interlocutory logic is used to analyze part of a dialogue between two undergraduate psychology students performing Wason's famous selection task, which they were assigned in its most abstract form (Trognon, Batt, & Laux, 2006, 2007; Laux, Trognon, & Batt, 2008).

The experimental materials consisted of four cards with, respectively, E – 4 – K – 7 printed on their visible sides; a card showing the rule: "If a card has a vowel on the front it has an even number on the back". The four cards are placed on the table in the following order: E – 4 – K – 7. The card showing the rule is also laid on the table. The experimenter gives the following instructions orally: "Here are 4 cards: E – 4 – K – 7. The rule written on the card laid on the table applies to these four cards only. Your task is to state which cards, and only those cards, that have to be turned over to determine whether the

rule is true or false". The experimenter [...] adds: "You must solve the problem together by making your partner understand you as well as possible."

[...]

21B: so... uh... are these ("K", "7") these are consonants and an odd number... you see

22A: that's it... (9-second pause)

23B: so, uh I'd say you have to turn over these two ("E", "4") and you?

24A: well that one ("E") for sure... but this one ("4") I don't know [...]

25B: but in any case... even if we turn over these ("K", "7") there's an odd number and a number... uh... no a consonant and an odd number so... uh...that's not part of the rule the implication (12-second pause)

26A: then if we turn over uh if have to turn over the "7" and it can't have a vowel next to it

27B: hmm... no but/

28A: because if we turn over the "7" and there's a vowel underneath then it's false... you get it?

29B: hmm

30A: so, have to turn over the "7" and the "E"

[...]

The interlocutors have just agreed on turning over the "E" but they disagree about the "4". B wants to turn over this card, A doesn't. In 21B, B mentions two new cards in the domain: "K" and "7". She refers to these cards twice, in 21B and then in 25B. The first time B mentions them, it's as an argument (rather elliptic) for a conclusion (23B) she asks A to evaluate. The second time, it is to further specify her argument, i.e., by concentrating her discourse on the properties of those two cards. So, her reference here to "K" and "7" is subordinate to 21B-23B, whereas it is a virtually direct reference in 25B. As a result, the dialogical contributions requested of A in the two situations differ. First, the reply expected by A is that she takes a position about conclusion 23B, whereas what is expected of A after that is a reaction to the assertion about a property of these cards. In short, A's evaluation of the discourse about the "7", i.e., here uptake of it as a hypothesis is called for by 25B more than by 23B. To summarize, between 21B and 25B, the move B expects of A at this point in the dialogue changes from an evaluation of the conclusion in 23B (a Rebutting Defeater of 23B or an Undercutting Defeater of 21B to 23B), to an evaluation (this time a Rebutting Defeater) of 25B, a reply that constitutes a sort of paraphrase of 21B. The mental attitude required of A changes too: in interval [21B, 23B], "K" and "7" are in the periphery of A's attentional field; in [25B], these objects are brought directly to her attention. A's perception of objects (i.e., her intentionality, her mental "attitude") thus changes along with her position in the dialogue (i.e., her contribution to their joint activity, to their collective intentionality).

We can't help but notice that the turn taken by A in 26A perfectly satisfies the constraints 25B imposes on what follows. In thinking about B's idea, A fully satisfies B's request. Taking up on this idea back at its *starting point* -- the first *if* in 26A, a "monological" conditional *if* -- A arrives at a conclusion that contradicts the one B arrived at herself. It is clear that the lines of reasoning of the two women are very different. For example, B added a constraint to the choice of cards that did not exist in the instructions and that A completely ignored. The second *if* in 26A, a dialogical, adversative *if*, which opposes B's conclusion to *not* turn over the "7", is thus a marker of this contradiction between conclusions drawn by A and B.

A's reasoning starting from B's idea, reduced to the *propositional content of the discourse acts* that comprise it (Trognon & Batt, 2007), is described below in terms of the following natural deduction:

1	$\neg P$	Premise	(26A, 28A)	1st part:
2	$(x) V_i \supset P_i$	Hypothesis		
3	$V_i$	Hypothesis		Imagining the hidden side of the "7" that confirms the rule
4	$(x) V_i \supset P_i$	Reiteration of 2		
5	$V_i \supset P_i$	Instantiation of 4		
6	$V_i$	Reiteration of 3		
7	$P_i$	<i>Modus Ponens</i> 5-6		
8	$\neg P_i$	Reiteration of 1		
9	$\neg V_i$	introduction 3-8	(26A)	
10	$[(x) V_i \supset P_i] \supset \neg V_i$	Discharge 2-9	(28A)	2nd part:
11	$V_i$	Hypothesis		
12	$(x) V_i \supset P_i$	Hypothesis		
13	$(x) V_i \supset P_i \supset \neg V_i$	Reiteration of 10		Refuting the rule if the hidden side is not the imagined one
14	$(x) V_i \supset P_i$	Reiteration of 12		
15	$\neg V_i$	<i>Modus Ponens</i> 13-14		
16	$V_i$	Reiteration of 11	(28A)	
17	$\neg[(x) V_i \supset P_i]$	introduction 12-15-16	(28A)	
18	$V_i \supset \neg[(x) V_i \supset P_i]$	Discharge 11-17		

Table 6. Natural deduction of the choice of "7"

Actually, A's reasoning, as it is expressed in her discourse, does not begin until line 10. Everything between the premise and 10 does not show up in the discourse. However, it is still not unreasonable to think that she is reasoning as shown in lines 2 to 9, since this is how A and B reasoned in regards to card "E" (see Trognon, Batt, & Laux, 2006, 2007; Laux, Trognon, & Batt, 2008). Whatever the case may be, the *dialogical* process leading to the selection of "7" deserves further attention. It is a testimony to (1) the extreme entanglement of cognitive processes and intersubjective processes in the dialogue and (2) the fundamentally contingent (or situated) nature of the dialogue's impact on the elaboration of cognitions, a property often stressed by the Vygotskian followers of Piaget (Doise, 1988; Light & Perret-Clermont, 1989). (3) it illustrates what we call *learning through-interaction*. Learning-through-interaction is seen here as occurring when a person integrates into his own cognitive domain propositions taken from his interaction partner but entertained at first as mere hypotheses (Trognon & Batt, 2003; Trognon, Batt, Schwarz, Perret-Clermont, & Marro, 2006). As a form of integration "of the intersubjective into the intrasubjective", learning through interaction is thus theorized "as the discharge of a hypothesis in a natural deduction" (Trognon, Batt, Schwarz, Perret-Clermont, & Marro, 2006: 178). Its canonic form looks as follows:

Proposition Ranking	Speaker 1	Speaker 2
(...)		
R <sub>i+k+1</sub>	$p \supset q$	
R <sub>i+k+1+1</sub>	$r$ Hypothesis	

Ri+k+1+2	$p \supset q$	Reiteration	
Ri+k+1+3	$r \supset (p \supset q)$	Discharge	
Ri+k+1+4			

Table 7. Formalization of learning through interaction

In the corpus studied here, the natural deduction representing learning-through-interaction takes on the form shown below:

1	if we turn over uh If ! Have to turn over the "7" And it can't have a vowel Because	Hypothesis Reply to 25B Injunction Obligation	
10	If we turn over the "7"	Hypothesis	
11	And if there's a vowel underneath	Hypothesis	
17	Then it's false	Conclusion	
18	28A $\supset$ 28A	Discharge 11-17	

Table 8.

Natural deduction of the choice of "7" representing learning through interaction

26A<sub>1</sub> is an "idea" of B's. The dialogue situation established at that moment allows A to « to grab » it as if it were a hypothesis and use it as the basis for an auxiliary line of reasoning, which she then states (lines 11-18) to justify her reply to B. So 26A<sub>2-4</sub> is the verbalization, in dialogue move format, of the cognitive processing, triggered by B's idea.

### 2.2.3. ARGUMENTATION DIALOGUE GAMES: THEIR PSYCHO-PRAGMATICS

Practically all theories proposed so far rely on sets of commitments. "Hamblin (1970) defined a commitment store as a set of statements attributed to a participant in a dialogue based on the moves he has made in the dialogue, as recorded. As the dialogue proceeds, statements can be added to his store or deleted from it, according to the commitments rules. For example, if an arguer asserts a statement, then that statement can be inserted into her commitment store by the commitment rule governing assertions. An arguer can also retract \_commitment to a statement, deleting it from her commitment store. As noted above, rules for retraction can vary for different types of dialogue." (Walton, 2005: 63). A set of commitments, then, involves a sort of mental compatibility process that associates to each utterance in a dialogue the participant's attitude toward it: acceptance, rejection, or neutrality. Each of these attitudes entails obligations. For example, a participant will be required, *a priori*, to defend an assertion that he accepted if his opponent challenges him to support it. Principles governing the assignment of utterances to commitment sets, some of which can be regarded as basic principles, are adopted by practically all theories set forth. A case in point is the "principle of assertion" proposed by Rips (1998), which we find in one form or another in other theories (Carlson, 1983; Walton & Krabbe, 1995; Walton, 2005).

In his theory, Rips's (1998: 420) proposes seven major principles, which can be assumed to govern the commitments made in the argumentative dialogues between two persons<sup>19</sup>: (1) an assertion principle,

<sup>19</sup> see Rips, 1998: 420, Table 3. Some Principles of Commitment in Two-Person Arguments.

(2) an acceptance principle (a speaker who utters an accepter, such as "I agree", accepts the previous claim), (3a-b) two refutation principles, (4a-c) three justification principles, ones stipulating that "in informal reasoning, commitment to a justification implies default commitment to the justified claim" (1998: 419), (5a-c) two conclusion principles, (6a-f) six inference-rejection (or undercutting) principles<sup>20</sup>, and (7) an omission (or skipped-response) principle. Taken together, these principles can be used to demonstrate important theorems, which can in turn be evaluated experimentally. In his system (Appendix A, pp. 439-441), for example, Rips demonstrates a determination theorem (an argumentation is determined if each participant either accepts or rejects the assertion) and a mutual determination theorem (in this case, the assertion is either accepted or rejected by both participants), which in certain conditions<sup>21</sup>, explains why "no matter how many times participants disagree within a line of argument, eventually that line must come to an end. The end could come through an accepter or it could come through silence (a skipped response), but because the skipped response principle equates these options, the line always ends in agreement. The remaining rules propagate the agreement to higher levels of the argument." (1998: 424).

In reality, not all people participating in everyday argumentative dialogues abide by the same sets of commitment rules. According to Rips, there are three types of people. "Conservative" types adopt Principles 1 and 2 only. They accept their own claims obviously, but they only accept from others those claims that they explicitly grant them. "Moderate" types adopt a slightly larger set of rules, namely (1), (2), (3a), (4a), (5a), and (6). "Liberal" types rely on the whole set of principles, with a liberal "policy" whereby the participants in an argumentative dialogue must adopt the same attitude toward all claims, forcing a consensus as it were.

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- (1) Assertion Principle. A participant who asserts a claim accepts that claim.
  - (2) Acceptance Principle. A participant who utters an accepter (e.g. "I agree") accepts the previous claim.
  - (3) Rebutting Principles. (a) A participant who accepts a rebutting defeater to a claim rejects that claim, unless the defeater is undercut for the participant. (b) A participant who rejects a rebutting defeater to a claim accepts that claim.
  - (4) Justification Principles. (a) A participant who accepts a justification for a claim accepts that claim, unless the justification is undercut for the participant. (b) A participant who rejects a justification for a claim rejects that claim. (c) A participant who passes up the chance to respond to a justification query for a claim rejects that claim. In these circumstances, the participant uttering the justification query also rejects the claim.
  - (5) Conclusion Principles. (a) A participant who accepts a claim that directly supports a conclusion accepts that conclusion, unless the conclusion is undercut for the participant. (b) A participant who rejects a claim that directly supports a conclusion rejects (\*\*\* rejects \*\*\*) that conclusion. (6) Undercutting Principles. (a) A justification, conclusion, rebutting, or undercutting defeater is undercut for a participant if the claim is followed by an odd-numbered string of undercutting defeaters that the participant accepts. (b) A participant who accepts an undercutting defeater accepts the supporting claim (justification, rebutting defeater, undercutting defeater, or claim supporting a conclusion) of the undercut pair. (c) A participant who accepts an undercutting defeater for a justification (conclusion) rejects the justified claim (conclusion), unless the defeater is undercut for the participant. (d) A participant who accepts an undercutting defeater for a rebutting defeater accepts the claim against which the rebutting defeater was aimed, unless the undercutting defeater is itself undercut for the participant. (e) A participant who rejects an undercutting defeater for a justification (conclusion) accepts the justified claim (conclusion). (f) A participant who rejects an undercutting defeater for a justification (conclusion) accepts the justified claim (conclusion).
  - (7) Skipped-Response Principle. A participant who passes up the opportunity to respond to a claim accepts that claim.

<sup>20</sup> These principles pertain to undercutting defeaters, i.e., utterances that undo the link between an assertion and the conclusion that supports it. In a formal dialogue, this amounts to bringing into question the relationship between a conclusion (the assertion that its emitter was challenged to support) and its premises (the assertion that supports it).

<sup>21</sup> This is the case when the argument is void of conclusion requests, preempted responses, and reactivated assertions. A reactivated assertion is an assertion by X that X later rejects but Y accepts. An example of this kind of assertion can be found in Trognon, Batt, & Laux (2006, 2007).

Of course, "normal" people mix the three arguing styles to varying degrees. Based on such considerations, Rips proposed a model for predicting a player's commitment to an assertion (set forth by the player himself or by his partner) at the end of an argument. In the model, a player's commitment to assertion A is a vector formed by the proportion of subjects who think he accepts A, the proportion of subjects who think he rejects A, and the proportion of subjects who think he is neutral about A. Say player X starts with neutral attitude about claim A made by his partner Y, then rejects it, and finally adopts it at the end of the dialogue. If we submit the dialogue to a set of subjects and ask them to say whether X accepts, rejects, or is neutral about A at the end of the dialogue, and if  $p_i$  is the proportion of liberal subjects,  $p_m$  the proportion of moderate subjects, and  $p_c$  the proportion conservative subjects in the group, then X's commitment to A will be defined by the following three equations, where  $.33(1 - p_c - p_m - p_i)$  is the proportion of subjects who respond at random:

- (i)  $P(X, A, +) = p_i + .33(1 - p_c - p_m - p_i)$
- (ii)  $P(X, A, 0) = p_m + p_c + .33(1 - p_c - p_m - p_i)$
- (iii)  $P(X, A, -) = .33(1 - p_c - p_m - p_i)$

An advantageous feature of this approach is that it allows one to experimentally study and model variations in the dialoguers' commitment to an initial thesis as the argument proceeds. The connectionist network proposed by Rips at the end of his article illustrates this type of approach (1998: 435-436).

Some of these principles have been validated experimentally, namely Principles 1, 2, 3a, 4a-b, 6a-c. Others have not, for example the skipped-response principle (7: a participant who doesn't make use of a chance to respond to a claim accepts it): "subjects do not process skipped responses in the same way as accepters, contrary to the formal models by Hamblin (1970), Rescher (1977), Walton and Krabbe (1995), and others mentioned earlier" (428; cf also 421). "Although the model generally predicts the correct shape of the distributions for the explicit arguments, it overpredicts the committed responses for the second speaker and underpredicts those of the first speaker" (428). Likewise, for the subjects, contrary to Principle 3b, "rejecting a rebuttal to a claim [is not] equivalent to accepting it" (1998: 434). Another experiment also showed that people make a clear distinction between objections to an assertion (rebutting defeaters) and objections to the connection between an assertion and the argument used to back it (undercutting defeaters). "People believe that the participant who makes the first substantive claim acquires the burden of proof, but that his burden can be reduced or eliminated if the opponent concedes other claims" (1998: 434).

Whether they are watching an argumentative dialogue or participating in it, people do not assign the same value to arguments given in support of a thesis. Certain arguments carry more weight than others, such as proofs and explanations, for example, which are often opposed in the literature. For Brem and Rips (2000) empirical relations between a factor and an event belong to the proof category. In this view, correlations, covariations, refutations of a correlation, and analogies are all proofs. Generalized scripts (invoking a possible cause without proving that it exists) and particularized scripts (the possible cause is advanced by giving an example) are explanations. It has sometimes been claimed in the literature (Kuhn, 1991) that, whether speaking or listening, people are not very good at differentiating between a proof and an explanation, at least not in discussions about social issues (e.g., welfare, unemployment, academic success). When people are asked to label arguments as proofs or explanations the criteria differ across individuals even if they are relatively consistent within each individual (Ranney et al., 1994). Moreover people are thought to trust explanations more. Yet Brem and Rips's (2000)

experiments convince us of the contrary. Not only were their experimental subjects perfectly capable of distinguishing proofs and explanations, but they skillfully use these two kinds of arguments skillfully to fit the context of the argumentative dialogue. When they had to convince someone that their point of view was correct, they use twice as many proofs when in an information-packed context than if they are in a context that is limited to their own knowledge. When evaluating the arguments of a peer who is defending his opinion, the subjects prefer proofs over explanations, but they were more willing to accept explanations when the informational environment of their group was poor; they produced more explanations in a context where information was scant than when it was plentiful and more proofs when in a context where information was plentiful than when it was scant. produce more explanations in a context where information was plentiful, than it was scant. The subjects did not give proofs when they had none, in which case they rely on explanations, so "the point at which explanations can be most useful is the point at which we may be most vulnerable to the errors they introduce" (Brem & Rips, 2000: 596)<sup>22</sup>. In sum, "the participants in our study exhibited considerable understanding of the process of argument. They were sensitive to the context in which an argument is offered, and their use of explanations can be seen as a reasonable response to the pragmatics of arguing under uncertainty. Constructing a good argument is not easy, but people may be better prepared to become good arguers than was previously thought." (Brem & Rips, 2000: 597).

## Conclusion

In their book published in 1995, Walton and Krabbe assign dialectics —seen as the study of dialogue in the Hamblin tradition—a dual orientation: formal and descriptive. Descriptive dialectics is the study of the conventions and rules that govern different types of real discussions, whereas formal dialectics is the study of rule systems and the dialogues that follow those systems. These two orientations should be complementary: "descriptions of actual cases must aim to bring out formalizable features, and formal systems must aim to throw light on actual, describable phenomena". This is all the more true, now that we are seeking to better our understanding of the actual role of verbal interactions in the acquisition of knowledge and know-how.

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<sup>22</sup> « Ideally, an arguer could use explanation to lay out a complete causal mechanism, and then back each step in this mechanism with empirical observation or controlled testing. In everyday reasoning, however, the opportunity to construct such an argument is rare [...]. Once we have an explanation to back a claim, we tend to persist in believing that claim, even in the face of discredited and contradicting data [...]. At worst, then, arguers may construct an explanation and then find that explanation so compelling that they terminate the process of searching for and testing hypotheses, and refuse to consider alternatives. Unfortunately, there is reason to believe that this is indeed the case, given the large body of literature documenting the biases explanations introduce. [...] when an explanation is introduced into an argument, the error may not be in mistaking explanations for evidence, but in what happens once the explanation is introduced" (Brem & Rips, 2000: 596).



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