



## Is there a burden of questioning?

DOUGLAS WALTON

*Department of Philosophy, University of Winnipeg, Winnipeg, Manitoba, R3B 2E9, Canada*  
*E-mail: d.walton@uwinnipeg.ca*

**Abstract.** In some recent cases in Anglo-American law juries ruled contrary to an expert's testimony even though that testimony was never challenged, contradicted or questioned in the trial. These cases are shown to raise some theoretical questions about formal dialogue systems in computational dialectical systems for legal argumentation of the kind recently surveyed by Bench-Capon (1997) and Hage (2000) in this journal. In such systems, there is a burden of proof, meaning that if the respondent questions an argument, the proponent is obliged to offer some support for it give it up. But what should happen in a formal system of dialogue if the proponent puts forward an argument and the respondent fails to critically question it, and simply moves on to another issue? Is this some kind of fault that should have implications? Should it be taken to imply that, by default, the respondent has conceded the argument? What, if anything, should be the outcome of such a failure to question in a formal dialogue system of argumentation? These questions are considered by examining some legal cases of expert opinion testimony in relation to rules for formal dialectical argumentation systems.

Defeasible arguments are inconclusive. They hold only tentatively in an investigation, and are subject to defeat if new evidence should come in that rebuts the argument or undercuts it by posing criticisms of it (Pollock 1995). A central problem for argumentation studies is how such a defeasible argument, when it is good one, should be binding on a respondent.<sup>1</sup> Should the respondent be free to ignore it altogether, with no penalty or loss of probative weight for his side? There is a burden of proof on the proponent's side. Should there also be a burden of questioning (or challenging) on the respondent's side? If not, it would seem that defeasible arguments need not be rationally binding on a respondent and thus may have no real force, weight or impact as reasons in the argumentation in a dialogue. The problem is how a rational argument put forward by one party in a dialogue should be binding on the other party. This problem arises for deductively valid arguments. It is a general one for formal or abstract models of argumentation of the kind proposed by Hamblin (1970, 1971), van Eemeren and Grootendorst (1984, 1987, 1992) and Walton and Krabbe (1995). But it arises in a form that is even more difficult to solve when defeasible arguments are considered.

Legal evidence is largely made up of defeasible arguments (Verheij 1996; Bench-Capon 1997; Prakken 1997). One common defeasible argument of this sort is the appeal to expert opinion of the kind often used as testimony in trials (Walton

2002). The problem of the burden of questioning can be posed in a pointed way using illustrations of arguments based on expert opinion testimony. Especially interesting is the kind of case where strong expert opinion testimony is presented by one side in court and the other side fails to challenge, to rebut, or even to cross-examine this hostile testimony.<sup>2</sup> What should be said about the kind of case in which a jury ruled in a manner indicating their rejection of strong and convincing expert testimony by a credible expert whose testimony was not contradicted and whose credibility was not questioned? This type of failure to question or challenge a strong defeasible argument could be seen as simply poor advocacy or poor trial strategy on the part of an attorney. But could such a failure to respond appropriately also be modeled as a fault of rational argumentation? The jury's ruling indicated their rejection of the appeal to expert opinion, but the failure to question it seems to imply that the argument was taken to be acceptable. Is this a contradiction, or logical lapse of a kind that violates a standard of rational argumentation? Should there be a burden of questioning? Should a respondent's failure to discharge this burden, when presented with a strong defeasible argument, be taken to imply his or her acceptance of the argument?

### 1. Applying formal models of dialogue to legal argumentation

Evaluating argumentation in a dialogue model in which two parties question each other and advance arguments directed to those of the other, is an old idea that goes back Plato and Aristotle, and even before them to the Sophists. But it wasn't until the research program of the Erlangen School in Germany that efforts were made to carry out a systematic program for constructing formal systems based on the dialogue model.<sup>3</sup> This research never caught on, however, and was not carried forward. But independently, Charles Hamblin (1970, 1971) constructed mathematical models of dialogue for the practical purpose of providing methods for evaluating fallacies of a kind that had been for a long time of practical interest to logicians. On his model there are three fundamental formal components of a system of dialogue for representing rational argumentation. First, there are two participants (parties), usually called the proponent and the respondent, or White and Black respectively. Second, there is a set of moves made by each party in which the party puts forward a so-called locution, like making an assertion or asking a question. Nowadays these locutions are called speech acts. By convention, White moves first, and then the two take turns. Hamblin (1971, pp. 131–132) showed how are these three components are combined to define the concept of a dialogue as an orderly sequence of moves. Such a sequence (Hamblin 1971, p. 130) is a triple,  $\langle n, p, l \rangle$ , where  $n$  is a number representing the length of the dialogue (the number of moves so far),  $p$  is a participant, and  $l$  is a locution. Accordingly, each move in a dialogue is a triple  $\langle n, p, l \rangle$ . Hamblin (1971, p. 131) gave the following example to illustrate a dialogue.

DIALOGUE 1.  $\langle 0, P_0, L_4 \rangle, \langle 1, P_1, L_3 \rangle, \langle 2, P_0, L_2 \rangle$

In dialogue 1, at the first move (move zero), the first participant  $P_0$  put forward a locution,  $L_4$ . At the second move, the other participant  $P_1$  put forward another locution,  $L_3$ . And then at the third move, the first participant  $P_0$  replied by putting forward another locution  $L_2$ . Thus according to Hamblin's definition, a dialogue can be modeled in this way, as a numbered sequence of moves. One type of move is the putting forward of an argument. Thus the argument in any given case, as found in a text of discourse, can be modeled not only as an inference from a set of premises to a conclusion that has properties like deductive validity and so forth. It can also be viewed as a move that is part of a longer sequence containing prior moves and subsequent moves. Another notion that Hamblin introduced is highly characteristic of the types of dialogues he constructed. This is the notion of a commitment set, or so-called commitment store. As each party makes a move, a statement (proposition) is inserted into or deleted from a set of statements attributed to her and kept track of as the dialogue proceeds.

A natural hypothesis is that such a dialogue model could usefully be applied to legal argumentation. Alexy (1989, orig. German version, 1978) showed how such a dialogue model can be applied to legal argumentation in an influential book. He based his theory on rules practical discourse governing argument moves made by a proponent and a respondent in legal dialogue. For example, one rule is that a speaker may not contradict himself, while another rule states that whoever has put forward an argument is obliged to defend it. These rules show how Alexy had moved to a dialogue model of legal argumentation, founding a program now being carried forward by a group of researchers in AI and law (Loui 1998). Recent surveys of this research have shown how important argumentation has become in AI and Law (Bench-Capon 1997). It has also been shown how dialogue based, or so-called dialectical models, fit well with new developments in AI, especially with new systems used to investigate defeasible argumentation in AI (Hage 2000).

Another development was the growing interest in legal argumentation on the part of those working in AI. Bench-Capon (1995) recognized the crucial role that argumentation plays in legal justification, and showed how the dialogue format of argumentation is highly compatible with computer formalization. Hage et al. (1994) analyzed procedural reasoning of the kind used in argumentation in so-called hard cases in law. They developed what they call a "dialogical reason based logic" through the analysis of the reasoning used to justify conclusions in these hard cases. According to their analysis, legal reasoning needs to be seen in a dialogue framework that can model an adversarial setting in which there are arguments on both sides of a case. But in order to accommodate their analysis, they showed that just thinking of logical reasoning in law as a chain of inferences is not good enough, and that rules governing the moves of dialogue between the two sides also need to be taken into account. They conclude (p. 113) however that there is no one set of dialogue rules governing the argumentation in a case: "there are many concurring sets of rules that govern particular types of dialogue". This analysis,

Table 1. Types of dialogue

Type of dialogue	Initial situation	Participant's goal	Goal of dialogue
Persuasion	Conflict of opinions	Prove your thesis is true	Resolve or clarify issue
Inquiry	Need to have proof	Find and verify evidence	Prove (disprove) hypothesis
Negotiation	Conflict of interests	Get what you most want	Reasonable settlement that both can live with
Information-seeking	Need information	Acquire or give information	Exchange information
Deliberation	Dilemma or practical choice	Co-ordinate goals and actions	Decide best available course of action
Eristic	Personal conflict	Verbally hit out at opponent	Reveal deeper basis of conflict

along with converging developments in AI and law, pointed the way towards a dialectical treatment of argumentation.

Gordon (1995) developed a dialogue model of legal pleading, the pleadings game, used to identify the legal and factual issues of a case (Gordon 1995, p. 109). The pleading stage is the first in a four-stage series of civil proceedings also having a discovery stage, a trial and an appeal stage (p. 110). The plaintiff begins by filing a complaint, and then the defendant may file an answer (p. 111). In the answer, each of the assertions in the complaint can be admitted or denied, or a motion to dismiss can be made (p. 111). The pleadings game analyzes and evaluates legal argumentation within a dialogue format. Lodder (1999) also presented a dialogue model of legal justification that incorporates features of previous dialogue systems, including those of Lorenzen, Barth and Krabbe, Hamblin, and Perelman. Lodder's book summarizes many of these earlier systems and comments on how various features of them can be adapted to the study of legal argumentation. It is clear from Lodder's work that the dialogue approach to the analysis of legal argumentation fits the use of AI into modeling legal argumentation.

Legal argumentation can have many different dimensions, and there is no reason to think any one formal structure of dialogue will fit all contexts. A new characteristic of formal dialogues introduced after Hamblin's time is the idea that the sequence of moves in a dialogue moves towards some goal. The idea is that there can be different types of dialogues and each type has a different goal. Hamblin only made a few remarks on such matters. He wrote (1971, p. 137), that formal systems of dialogue are "information-oriented", meaning that it is assumed that the purpose of the dialogue is the exchange of information among the participants. However, it looks more likely that the formal systems of dialogue constructed in Hamblin (1970) could better be classified as having a goal of rational persuasion of one party by the other through the use of a series of steps of argumentation. In these formal dialogues, the respondent starts out by being uncommitted to some statement, and the efforts of the proponent are directed towards securing the respondent's commitment to this statement through the use of a connected sequence of arguments, one step at a time. It would appear that Hamblin had identified two different types of dialogue, one which seems to have a goal of rational persuasion of one party by the other, while the other type of dialogue is information-oriented. Thus we are led to the question of whether different types of dialogue can be identified.

As an entry point into classifying the main types of dialogue, the classification of the six basic types of dialogue analyzed in Walton and Krabbe (1995) and Walton (1998) is presented in Table I below. These six types are not the only types of dialogue that might be encountered in legal argumentation. However, they are six basic types that have emerged in argumentation theory as the most basic types for studying informal fallacies, and for analyzing and evaluating argumentation generally.

As shown in Table I, each type of dialogue has what might be called a communal goal, and each party in the dialogue has his or her personal goal as a participant.

This typology can be applied to any given case in which an argument was used in a text of discourse, the assumption being that the evaluation of how the argument was used (well or badly) depends on the type of dialogue in which it was used. An argument that may be an appropriate means to fulfill one goal may not be useful to fulfill a different goal that is appropriate for a different type of dialogue. Indeed, in some instances an argument can be used as a deceptive tactic, or fallacy, to block or interfere with a goal of dialogue, even if it appears to be appropriate to the respondent against whom it was used. Fallacies are tricky tactics used to try unfairly to get the best of a speech partner in a dialogue (Walton 1995). Thus formal dialogue systems can be used to study fallacies.

The best way to get an intuitive idea of what persuasion dialogue is supposed to be like is to consider the type of dialogue known in the argumentation literature as the critical discussion. Recently the view has been put forward that the argumentation in a trial can be modeled as a critical discussion (Feteris 1999).<sup>4</sup> In the model of van Eemeren and Grootendorst (1984, p. 34), the purpose of a critical discussion is to resolve a conflict of opinions by means of rational argumentation. On their account (1984, pp. 85–86), there are two parties (participants) and four stages in a critical discussion. At the *confrontation stage* (p. 85), the one participant, a proponent, advances a so-called “point of view”, and the other participant, a respondent, casts doubt on that point of view, or in some cases advances an opposed point of view. A *point of view*, also called a standpoint, is defined as a proposition (statement) and an attitude (pro or contra) with respect to that proposition (van Eemeren and Grootendorst 1992, p. 15). At the *opening stage*, the two parties agree to attempt to resolve the dispute by expressing their points of view, and undertaking to resolve the conflict between them by advancing opposed rational arguments. During the argumentation stage, each side brings forward arguments to support his or her own point of view, and each takes turns questioning and criticizing the arguments put forward by the other side. At the closing stage, the conflict of opinions is resolved.

The following ten dialogue rules govern all moves made by both parties during the argumentation stage. This set of rules was stated by van Eemeren and Grootendorst in their book (1992, pp. 208–209), but can also be found in their article (van Eemeren and Grootendorst 1987, pp. 284–291), as quoted below.

### **Rules for a critical discussion**

*Rule 1.* Parties must not prevent each other from advancing or casting doubt on standpoints (p. 284).

*Rule 2.* Whoever advances a standpoint is obliged to defend it if asked to do so (p. 285).

*Rule 3.* An attack on a standpoint must relate to the standpoint that has really

been advanced by the protagonist (p. 286).

*Rule 4.* A standpoint may be defended only by advancing argumentation relating to that standpoint (p. 286).

*Rule 5.* A person can be held to the premises he leaves implicit (p. 287).

*Rule 6.* A standpoint must be regarded as conclusively defended if the defense takes place by means of the common starting point (p. 288).

*Rule 7.* A standpoint must be regarded as conclusively defended if the defense takes place by means of arguments in which a commonly accepted scheme of argumentation is correctly applied (p. 289).

*Rule 8.* The arguments used in a discursive text must be valid or capable of being validated by the explicitization of one or more unexpressed premises (p. 290).

*Rule 9.* A failed defense must result in the protagonist withdrawing his standpoint and a successful defense must result in the antagonist withdrawing his doubt about the standpoint (p. 291).

*Rule 10.* Formulations must be neither puzzlingly vague nor confusingly ambiguous and must be interpreted as accurately as possible.

In the model of van Eemeren and Grootendorst (1984, p. 86), a successful critical discussion ends with the resolution of the initial conflict by showing that one party's argumentation was successful while that of the other was not. If the conflict was not decisively resolved (1984, p. 86), "it is unclear whether the discussion has had any point". This condition is reminiscent of a trial in law. The purpose of the trial is to resolve the conflict of opinions and, unless it realizes this goal, it is not really successful. Trials have all kind of procedural rules that vary from one jurisdiction to another. But still, the trial itself does have a core dialectical structure representing rational argumentation of a certain sort. According to Feteris (1999) the critical discussion model represents a normative standard or framework in which instances of legal argumentation can be judged as either meeting the standards of the model or failing to meet them.

A central assumption on which the analysis of this paper is based is that the persuasion type of dialogue is at the heart of the argumentation in a fair trial. On this model, the fair trial is supposedly based on a conflict of opinions, and each side has a central thesis or claim to be proved or cast into doubt. The two opposed sides are supposed to present the strongest possible argumentation for each side (Feteris 1999). The model of the persuasion dialogue fits what is often referred to as the advocacy system, held to be the system of dispute resolution in the Anglo-

American trial (Frank 1963). The purpose of the attorney on each side is to win by presenting a more persuasive argument. But the goal of the trial cannot be seen as purely adversarial. It is supposed to provide due process, provided by having a trier (a judge or jury) who listens to the arguments put forward by both sides, and arrive at a decision by ruling on who presented the more persuasive argument. The trier resolves the conflict of opinions, not the participants themselves, and the introduction of this third party makes the trial more than just a persuasion dialogue. It is a complex dialogue, with many participants.

The most obvious way a common law trial differs from the model of the persuasion dialogue is that besides the proponent and the respondent, the trial has additional participants such a judge or a jury, who has powers that influence the outcome. These participants can allocate a burden of proof, and can assess the relevance, probative weight and relevance of arguments, based on rules of evidence and other procedural rules that apply to the argumentation in a trial. For example, even if one side in a civil case disputes everything the other side says throughout the case, she still loses if the jury or judge finds for the other side. Hence it is clear that the common law trial is not simply a persuasion dialogue. The relationship between the two can be clarified by recalling Wigmore's distinction (1931) between what he called the science of proof, or principles of logical argumentation generally, and the trial rules used to judge argumentation in a judicial tribunal. Wigmore held that there should be a relationship between these two aspects if the argumentation used in a given trial is to be evaluated as a rational process of drawing a conclusion meant to seek the truth about an issue. Some idea of the complex nature of this relationship is shown in a passage from Wigmore's *Principles* quoted by Twining (1985, p. 156).

1. That there is a close relation between the Science and the Trial Rules analogous to the relation between the scientific principles of nutrition and digestion and the rules of diet as empirically discovered and practiced by intelligent families.
2. That the Trial Rules are, in a broad sense, founded upon the Science; but that the practical conditions of trials bring into play certain limiting considerations not found in the laboratory pursuit of the Science, and therefore the Rules do not and cannot always coincide with the principles of the Science.
3. That for this reason the principles of the Science as a whole, cannot be expected to replace the Trial Rules; the Rules having their own right to exist independently.
4. But that, for the same reason, the principles of the Science may at certain points confirm the wisdom of the Trial Rules, and may at other points demonstrate the unwisdom of the Rules.

These remarks reveal clearly how the relationship between the general notion of rational argumentation in a persuasion dialogue is abstract and general, representing normative rules of a that determine the kinds of moves that can be made in rational argumentation. The problem is how such abstract rules apply to individual cases



of real argumentation that might occur in an actual trial governed by procedural rules that apply in a given jurisdiction as interpreted by a judge. Such trial rules, as Wigmore observed, have their own right to exist independently as part of an institution. The persuasion dialogue is only an abstract normative (logical) model, whereas an actual trial governed by trial rules is a particular speech event, a case of argumentation used in a social or institutional setting with rules that apply within that jurisdiction.

Another complication is that the persuasion dialogue, at best, only models the argumentation during the argumentation stage. The way evidence enters into a common law trial is a multi-staged process. Gordon (1995) has studied the argumentation mainly in the pleadings stage, where the issue is defined. This stage poses the conflict of opinions that is supposed to be resolved by the argumentation that follows. But surrounding this central persuasion dialogue is an elaborate process of dispute resolution and evidence collection in the common law trial that has nine stages (Park et al. 1998, pp. 4–8). First is the pre-trial litigation stage, including discovery, motions, and hearings. The second stage is that of jury selection. The third stage is the presentation of opening statements to the assembled court by the attorneys for both sides. At the fourth stage, witnesses are called by the plaintiff, and then examined by both plaintiff and defendant. At fifth stage, each side has an opportunity for rebuttal. At the sixth stage, either side can make a motion for judgment. The seventh stage is the putting forward of closing arguments by each side that sums up its case. In the eighth stage, the judge instructs the jury on the law that is the basis for deciding the case. In the ninth stage the jury makes its deliberations and reaches a verdict. The common law trial is a complex nesting of dialogues within dialogues, and no formal model of dialogue can encompass all aspects of it. Still, as exponents of the advocacy system have so often maintained, persuasion dialogue has a central place.

Woven around the central persuasion dialogue, however, are not only other embedded types of dialogue, but also procedural rules of various kinds that determine what is allowed into the central persuasion dialogue as evidence. An important factor is that not all arguments are admissible in a common law trial, because rules of evidence lay down requirements on what sorts of arguments can or cannot be presented. These rules of evidence determine what sorts of arguments are admitted and whether they are held to be rationally persuasive. There is also a second type of dialogue embedded in the persuasion dialogue in a trial. It is the information-seeking dialogue, which enables the collection of facts in a case, enabling the argumentation in the persuasion dialogue central to the case to be based on premises that include the relevant information. The persuasion dialogue is most emphasized as a model of argumentation by lawyers who talk or write about trials in the Anglo-American system, because the goal of the advocate is to win a case. What may be ignored is that a persuasion dialogue may go off the track and come to a wrong conclusion if the argumentation in it is not based on accurate information that really represents the facts of a case.

There is not enough space here to properly support the thesis that the trial in the common law system can be seen as a persuasion dialogue, or to fill out all aspects of how the various types of dialogues in the trial fit together. Nor is there space to comment on the dialectical framework of the trial in continental law, in the so-called inquisitorial system. Anyhow, let's move ahead on the not implausible hypothesis that persuasion dialogue of some sort is centrally involved in the common law trial, as appears to be suggested by the remarks of those, like Judge Frank (1963), who have defended the common law trial as a method for providing due process on the philosophical basis that it represents an adversarial system in which each side brings out its strongest and most persuasive arguments to clash with those of the other side. Even if this hypothesis is granted, there remain questions on precisely what type of persuasion dialogue it is. There are technical problems in building formal models of persuasion dialogue, and the study of these problems have indicated that more than one type of model needs to be considered.

The key technical problem in modeling persuasion dialogue is the management of commitment retraction (Walton and Krabbe 1995). Commitments need to be binding, because the whole purpose of the dialogue is to fix commitment. Thus a participant cannot be allowed to simply retract a commitment at any point, once she begins to run into some sort of trouble attempting to maintain it. On the other hand, commitments cannot be fixed permanently, because tolerance for a certain amount of retraction is necessary. For example, suppose a participant is maintaining a commitment, but it is then shown by the other participant that this commitment is logically inconsistent with some central commitment in the first party's position she had earlier maintained vigorously. Here, the reasonable thing for the participant who has been shown to have inconsistent commitments is to retract one or the other of the commitments that have been cited. The technical problem, as shown by Walton and Krabbe, is to find a system that is loose or flexible enough to allow for such retractions but is also tight enough so that a participant can retract any commitment at any time, even if such a retraction would clearly be at odds with what she is maintaining, or needs to maintain, as her viewpoint in the dialogue.

The solution to this problem worked out by Walton and Krabbe (1995, p. 126) is to introduce two distinctive types of persuasion dialogue, PPD, or permissive persuasion dialogue, and RPD or rigorous persuasion dialogue. PPD allows for a reasonable freedom of retraction, and also for making of moves, while RPD is much more restrictive in these matters. In a PPD there are two parties, called White and Black, who make moves of various kinds (p. 133). There is an initial conflict description, stating the initial assertions and commitments of both parties (p. 133). Each party has a commitment store (commitment set), a set of statements (p. 134). Each move of each party can contain various components: retractions, concessions, requests for retractions or concessions, arguments and challenges (p. 135). In a PPD, a move is a six-tuple, and a party can choose to put forward any or all of these six components at each move. Thus there is a good deal of flexibility in how a party make a move in PPD. In contrast, in an RPD, a party can only put

forward one of these components at each move. In both PPD and RPD, there are rules governing how the second party must respond to each type of move made by the first party. These rules are rigid in RPD, meaning that only a small number of precisely determine responses are allowed, while in PPD the rules are permissive.

## **2. A problem in modeling legal argumentation**

A general problem of legal argumentation can be posed as follows. What happens if a strong argument supporting one side in a trial is not rebutted or even critically questioned by the other side? Does it mean that, inevitably, the argument will be convincing to the trier, and thus undercut the argumentation of the side who failed to cross-examine? Or does it just leave us wondering whether the trier even took the argument into account? To be more specific, consider a case in which a witness presented testimony that would be very convincing evidence to the jury, but the other side failed to cross-examine on this testimony. Would this always be a serious lapse? Should it mean that the side that failed to cross-examine had committed a fault that was so serious that it ought to be seen as a failure of argumentation of a kind that always means that one side has not been adequately represented? Or by default, should it be assumed that the trier accepted the argument, since he (she/they) failed to critically question it? These questions need not be merely psychological ones of how a judge or jury might react to such a failure to question an argument. They can be questions about rational argumentation and how to evaluate it as successful or not according to standards in a normative model of dialogue.

The modeling of legal argumentation proposed in Walton (2002) accepts Feteris' general view that legal argumentation in a trial has the normative structure of a critical discussion, but takes the analysis even further along. In the Walton model, the critical discussion is taken to be subspecies of persuasion dialogue, referring not just to psychological persuasion but to rational persuasion using reasoned argumentation (Hamblin 1970, p. 264). Rational persuasion refers to the goals of the two parties, the kinds of moves they make in arguing, questioning and replying, the rules governing these moves, and the commitments of the two parties. Basic to the persuasion dialogue, and indeed any model of dialogue, is the notion of a commitment set, following the analysis of it attributed to Hamblin in the preceding section. Each party begins with a set of commitments, and these sets are added to, or reduced, as the dialogue proceeds. The goal of the proponent of an argument in a persuasion dialogue is to get the respondent to become committed to a proposition that he was not committed to before, based on premises he is already committed to. The concept of rational persuasion is essentially defined by the transition by means of argument from one point to another. The one point is the participant's initial lack of commitment to a proposition. The other is his subsequent commitment to it.

Of course, the critical discussion is not a formal model of dialogue. It is a set of rules defining a type of dialogue. But formal models of persuasion dialogue have

been presented in Walton and Krabbe (1995). As Rod Girle once observed, a formal dialogue can be viewed as a structure typical of a search procedure of the kind familiar in AI, having three basic components. The first is a start point. The second is a set of rules that can be applied recursively to the start point, transforming it into a next point, and that point into a next point, and so forth, producing a sequence. The third is an end point, or last point in the sequence. In the account of Walton and Krabbe (1995, p. 149), there are four such rules. Locution rules indicate the types of permissible moves. Commitment rules govern which statements go into or out of commitment stores at each type of move. Structural rules determine turn-taking and what kind of reply is required after each move. Win and loss rules define the participants' aims in the dialogue.<sup>5</sup> There can be all kinds of formal models of dialogue, some that are strict and highly regulated, and others that are more permissive, and thus more reminiscent of natural language argumentation.

Note that nowhere in the ten rules of the critical discussion does it say that one party has to address an argument just put forward by the other, say, by critically examining it or arguing against it. Is this an oversight, or does it simply reflect the assumption that each party should be free to adopt any strategy that, in his or her opinion, might be most successful as a means of advocating his or her viewpoint? So far, this is an open question.

The analysis of legal argumentation of the kind typical of a trial is based not just on persuasion dialogue, but on other types of dialogue as well. When a witness presents testimony in the trial, the question-reply sequence is seen as information-seeking dialogue (Walton 2002). When the witness is questioned, this is seen as what is called examination dialogue. 'Examination' means not only looking at something carefully, but also testing it by probing into it by asking critical questions. Thus on this account, one dialogue can be embedded in another. For example, a persuasion dialogue can often be much more successful if based on a prior information-seeking dialogue in which the facts are collected and examined. Thus, for example, a critical discussion on a topic like euthanasia or abortion could be more successful if both parties are well informed about the medical facts relating to the subject. Such a case indicates how a kind of information-seeking dialogue called expert opinion dialogue is often embedded in a persuasion dialogue. Appeal to expert opinion is a very common form of argumentation, both in law and in everyday speech. It has a special form, or so-called argumentation scheme, as explained further below. For the moment, let us see that an appeal to expert opinion can often be a very strong form of argument in law.

Expert testimony has become such a dominant form of evidence in Anglo-American law that many worry that it is overwhelming other kinds of evidence and that this is a problem. For example, a Canadian judge recently spoke out about "hired gun" experts who are biased, because they are paid to testify by the defense or prosecution side in a trial (Dube 2002, p. A1). Standards for expert testimony in law are still in a process of evolution having been modified through decisions in *Frye*, *Daubert* and *Kumho tire* (Safer 2002). *Frye v. United States* (293 F. 1013

(D.C. Cir. 1923) laid down the criterion that scientific expert evidence had to be based on general acceptance in a scientific field. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993) held that expert testimony must be both relevant and reliable, including such factors as whether the scientific theory has been tested, subjected to peer review, whether its rate of error is known, in addition to general acceptance. Thus appeal to expert opinion is a form of argument that is an excellent test bed for examining criteria of how argumentation should be analyzed and evaluated, both in everyday contexts and in legal argumentation. One special legal problem falling under this heading, however, is especially interesting.

In Anglo-American law, the jury's role as fact finder means that they are the judges of whether a witness is to be believed or not. But does this power extend so far that a jury can reject the testimony of a superbly qualified expert, even if that testimony has not been contradicted or impeached? It seems that it might. In a case involving a collision between a motorcycle and a pickup truck (*Mechanik v. Conradi* 139 AD2d 857, 527 NYS 2d 586), it was argued that the jury should be required to accept the plaintiff motorcyclist's expert testimony concerning the speed of the motorcycle, on the ground that the defendant did not present any expert testimony on this issue. The court disagreed, claiming that a jury is free to reject an expert's testimony even if it uncontradicted.

There is another issue to be considered, however. What if a motion for a new trial is made on the ground that, because of the unrebutted expert testimony, the verdict was contrary to the weight of evidence? In a malpractice case (*Calderon v. Irani* 745 NYS 2d 610 3d Dept. 2002), the patient sued the doctor for causing the spread of her cervical cancer by a misdiagnosis. The following summary of the case, where P is the patient and D the doctor, is quoted from the account of Hoenig (2002, p. 4).

P sued D, a gynecologist, for malpractice in causing the spread of cervical cancer by misdiagnosis. P's expert, a gynecologic oncologist, testified that P had an 80 percent chance of long-term survival had the cancer been diagnosed earlier. Instead, the ultimate spread of the cancer was a "death warrant". This causation testimony was undisputed. Nevertheless, the jury returned a defense verdict finding that there was malpractice but that the deviation was not a substantial factor in causing the injuries. The trial judge granted P's motion for a new trial on the ground the verdict was against the weight of the evidence. Since the expert testimony attributing P's decreased survival rate to D's negligence was uncontroverted, "the jury had no basis to conclude as it did on the issue of proximate cause".

This case shows that if a jury entirely disregards an expert's testimony, there can be repercussions in the form of later appeals for a new trial because of this evidence having been ignored. Indeed, the court in the Calderon case found that, in the absence of "reasonable justification of the jury's rejection of the expert's causation testimony, the trial court was correct in setting aside the verdict" (*Calderon* 745 NYS 2d at 612). This case shows that the thesis that jury should have complete

freedom to disregard expert testimony is problematic, and that there are reasons for putting boundaries on this freedom.

The problem posed by Calderon is a specific one for law, but is at the same time a general one of standards binding rational argumentation. The general problem can be expressed simply through the following scenario. Suppose one party in a dialogue puts forward an argument, like an appeal to expert opinion for example, and the other party simply ignores it. He does not critically question it, or try to rebut it, or respond to it at all, even though it is a relevant argument in the dialogue, and simply passes on to some other unrelated argumentation. How should we evaluate the argumentation such a case? Should the respondent's failure to address the argument be taken to imply, by default, that he accepts it? Or should it simply be ignored? Or should there be some repercussions for the respondent? Should there be some penalty laid on him, or should his side of the argument be judged to be vulnerable, or open to criticism for this lapse? This problem is a general one because there are many argumentation schemes, or forms of argument that, like appeal to expert opinion, represent defeasible types of argument, as opposed to deductive and inductive forms of argument. Such arguments are best evaluated on a balance of considerations in a dialogue. Thus the problem is posed of what rules of dialogue should be used to evaluate them. An argument like appeal to expert opinion, if it is a rational argument of some sort, should be binding on a respondent when put forward by a proponent in a dialogue. But how should it be binding since, if it is not deductively valid, the respondent does not have to accept the conclusion even if he accepts the premises?

To those of us studying formal models of dialogue in logic and computing, this unsolved problem will be recognized right away as a central and serious one, but for those less occupied by problems at this level of abstraction, the problem can be posed in a more concrete way in legal argumentation. Suppose one side in a trial brings forward an expert, like a ballistics expert or a DNA expert for example, to testify in support of her side of the case. Suppose the witness is a genuine expert, is highly credible, and his testimony is very convincing, but the other side fails to try to impeach him by attacking his credibility, to bring in an opposing expert witness, or even to try to attack or question his testimony in any way. In Anglo-American law, the jury is held to have the power to decide whether a witness is credible, or how much of his testimony to believe. Thus theoretically, there should be no penalty or curtailment of any sort, if a jury simply ignores an appeal to expert opinion, even a very strong one. But is this way of ruling very satisfactory in all cases? Perhaps not, for the other side could possibly appeal, asking for a new trial on the ground that not all the relevant evidence had been taken into account. Thus this very general theoretical problem about rational argumentation is also a concrete and very real problem of legal argumentation. Before returning to appeal to expert opinion as a special form of argument, it is necessary to situate the problem that has now been posed in a broader context of formal dialogue systems used to model rational argumentation. Most vital are the rules governing commitment.

### 3. The no commitment problem and stability adjustments

Since Hamblin (1970, 1971) first proposed formal dialogue systems as the basis for a method of analyzing and evaluating forms of argument related to fallacies and other logical problems, the problem of retraction of commitment has always been central. Formal dialogue systems, Hamblin showed, are based on what he called commitment sets, as shown in section one above. These are sets of statements representing not only the thesis an arguer is trying to prove, but also commitments she takes on as she makes various moves in a dialogue. Rules for incurring commitments are fairly clear in many instances. For example, if a participant asserts a statement, then she is committed to it, and it goes into her commitment set. Rules for retraction are more problematic however, as indicated briefly already in section one. In a normal persuasion type of dialogue, a participant needs to retract if persuaded by a reasonable argument by the other party. But if he can retract commitments whenever he wants, the other party may have a hard time persuading her to accept anything, once he sees it can be used against him. For these reasons the problem of retraction in persuasion dialogue is not easy to solve.

The general problem is to design commitment rules for various types of dialogue that can regulate retraction in way that is appropriate and productive for that type of dialogue. Of course, there can be many types of dialogue, and the rules for any type need to be suited to the particular requirements for that type. But to at least begin to investigate retraction, persuasion dialogue is the logical place to start. In a persuasion dialogue, there are two participants, called the proponent and the respondent. The proponent has a thesis, a statement he is supposed to prove to the respondent. The respondent's job is to raise doubts about the proponent's attempts to prove her thesis. Or in some instances, the respondent's job is to prove a thesis to the proponent, where that thesis is the opposite (negation) of the proponent's thesis.<sup>6</sup> In such a case, the goal of each party is one of rational persuasion. A participant carries out rational persuasion by presenting a structurally correct argument<sup>7</sup> to the other participant, an argument that also has the property that the other party happens to be committed to all the premises. If the proponent presents such an argument to the respondent, and the conclusion is the proponent's thesis to be proved in the dialogue, then the proponent has succeeded. She wins the game, so to speak, and the original conflict of opinions has been resolved in favor of the argumentation of one side. At any rate, these are the defining characteristics of persuasion dialogue set out in the account of it given in Walton and Krabbe (1995), where the steps taken to deal with problems of retraction of commitments have already been outlined. Now the problem is to extend these steps to deal with dialogue systems containing presumptive argumentation schemes.<sup>8</sup>

A central problem with using formal dialogue systems to model persuasion dialogue was stated as early as Walton (1984). In a persuasion dialogue, the proponent has a thesis, a particular statement that it is her goal to prove by means of a valid argument. The respondent has the role of questioning this thesis. In many cases, the

respondent will himself have a thesis to be proved that is the opposite (negation) of the proponent's thesis. In a formal system there will be rules that define what a valid argument is. To win, the proponent needs to present a valid argument to the respondent with premises that are all commitments of the respondent. This seems simple enough. But there is a fly in the ointment (Walton 1984, p. 135). If the proponent simply asks the respondent to accept such an argument, where the conclusion is the proponent's own thesis, or even looks like it could be used to prove that thesis, the respondent is likely to balk. Once he sees his own imminent defeat, he is going to look for a way out. Hence neither party in a persuasion dialogue will ever be able to achieve the goal set for him or her. Once he or she gets close to success, the other party will simply start retracting commitments. This difficulty for formal systems of dialogue could be called the no commitment problem.<sup>9</sup> The early systems of formal persuasion dialogue (Hamblin 1970, 1971) had no way of dealing with this problem. Somewhat later systems were devised that tried to deal with it (Mackenzie 1981, 1990; Walton 1984), but the solutions now seem *ad hoc*, and do not seem to generalize very well. Certainly problems of retraction are fundamentally important for formal systems of dialogue, and are among the hardest problems to solve.

A better solution to the no commitment problem comes through the device called a stability adjustment in Walton and Krabbe (1995, p. 147). To explain the motivation of this notion, it is best to explain in a little more detail the kind of situation that typically gives rise to this problem. Suppose the proponent has presented the respondent with an argument that is valid, and all the premises of the argument are statements that the respondent has previously committed to. It might seem that the respondent is stuck. He must now accept the conclusion of the argument. But persuasion dialogue requires some freedom to retract one's commitments. There are various reasons for the need for such freedom in a persuasion dialogue (Krabbe 2001, p. 143). One is that the critical discussion, a type of persuasion dialogue, requires retraction as an essential part. A critical discussion can only be successful in its aim of resolving a conflict of opinions by rational argumentation if one party is persuaded by the other to give up his or her commitment to his or her thesis (van Eemeren and Grootendorst 1992, p. 34). Another reason is that formal models of persuasion dialogue will be closer to empirical reality if the participants are free to change their minds once in a while (Krabbe 2001, p. 144). But suppose the respondent who is presented with a persuasive looking valid argument by a proponent is free at any point to retract any of his commitments. What he would normally do, as indicated above, is to immediately retract commitment to one of the premises. That is a natural move, after all. If he is not committed to the conclusion, or is even opposed to it, and he sees that the premises imply the conclusion by a valid argument, how will he normally react? Well, if the argument is valid, he can't contest that very well. So given that he does not accept the conclusion, he will soon begin to think there is something pretty suspicious about one of the premises. The problem posed by cases of this sort is how to fix the commitments of an arguer.



There are two types of stability adjustment described in Walton and Krabbe (1995, Section 4.3.3), an external and an internal stability adjustment. The internal stability adjustment refers to an adjustment of commitments in one's own arguments (Krabbe 2001, p. 149). If an arguer has retracted commitment to a statement *A*, but earlier had offered some premises in an argument supporting *A*, then that arguer will also have to retract commitment to at least one of these premises. For example, consider the following dialogue on euthanasia. Pam is an exponent of euthanasia of the kind practiced in Holland, but Roger is against euthanasia.

### **The euthanasia dialogue**

**Roger:** You have maintained that killing a person is always wrong?

**Pam:** Yes. I do maintain that.

**Roger:** Well then, isn't euthanasia killing a person?

**Pam:** Of course not. The decision is a voluntary one by the patient. Nobody is killing this patient. The doctor is merely helping him to die a merciful and peaceful death.

**Roger:** Yes, that can be true in many cases, where the doctor can give the patient a drug that he can take himself. But what about a case of euthanasia where the doctor has to administer the drug herself, because the patient can't do it? Such cases do occur in Holland, don't they?

**Pam:** Yes, I understand that they do.

**Roger:** So that's a case of euthanasia where the doctor killed the patient. Right?

**Pam:** I suppose it is.

**Roger:** According to your own admission then, some cases of euthanasia are wrong, because you agreed that killing is wrong.

**Pam:** Hold on a minute. I didn't mean to claim that killing is always wrong. Killing can be justified in some cases, for example in war or self-defense.

In this dialogue Pam retracts her earlier commitment to the universal statement that killing is always wrong, once she sees that this statement, along with other commitments that she defends, leads to a conclusion that contravenes her view. Roger's argument can be represented in the argument diagram of figure 1 below.

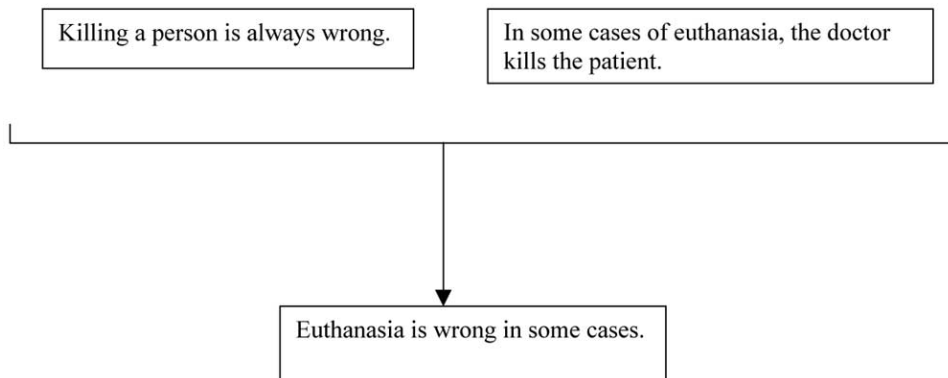


Figure 1.

If Pam commits to the conclusion that in some cases euthanasia is wrong, this admission would contravene her fundamental thesis in the dialogue that euthanasia is a good policy. Thus Roger's argument shows that something has gone wrong in her set of commitments as a whole. She sees that she needs to make a retraction in order to make her commitment set consistent. She needs to make an internal stability adjustment. She needs to retract at least one of the premises in the linked argument in Figure 1. In the case above, she retracts commitment to the statement that killing is always wrong.

This procedure of internal stability adjustment can also be recursive, as can be shown by extending the case a bit. Suppose that Pam had earlier put forth some argument to prove that killing is always wrong. She would then have to go back and retract at least one premise of this argument. Or alternatively, she could start a different line of argument by retracting commitment to the statement in some cases of euthanasia the doctor kills the patient. The recursive rule required to build internal stability adjustment into a dialogue is rule 11.1 (Walton and Krabbe 1995, p. 152).<sup>10</sup> In the euthanasia dialogue, one can see that if Pam does not retract one of the commitments from her position, Roger can argue that her position is inconsistent. Thus the internal stability adjustment becomes especially important in *ad hominem* arguments, or other arguments of the kind where an arguer is confronted with some sort of real or apparent inconsistency in her commitment set.

The recursive procedure of retraction can be quite complex in some cases. If there are many prior arguments supporting this premise in a chain of argumentation, the respondent will have to go through the whole chain and retract commitment to at least one premise in each of the linked arguments in it. Krabbe (2001, p. 155) described the external stability adjustment as follows.

The idea is that a discussant who concedes all the premises of an argument . . . must also concede the conclusion. . . . Consequently, a participant confronted with an argument who wished to withhold or retract commitment to the conclusion of the argument must withhold or retract commitment to at least one

premise. Since this premise may again have been supported by argument, and so on, this will lead to a recursive procedure of retraction.

The effect of putting a rule requiring an external stability adjustment in a formal system of dialogue is that commitment becomes “sticky”. You can retract a commitment at any time, but such a retraction is no longer straightforward or immediate. To effect it, you may have to carry out many other moves in a dialogue first. This stickiness tilts the balance of power in a dialogue by giving the proponent of an argument more power to fix the conclusion into place as a statement the respondent is committed to. It is not so easy for the respondent to retract commitment, once confronted with a conclusion he doesn’t like or support. He can do it, but there is a cost to it.

The external stability adjustment is also important in dealing with the no commitment problem. The term ‘external’ refers to the other party’s argument (Krabbe 2001, p. 155). An external stability adjustment comes into play when a proponent puts forward a valid argument to a respondent and the respondent is committed to all of its premises. The question, as posed by the no commitment problem above, is whether the respondent can retract commitment to the conclusion all by itself, without retracting commitment to any of the premises. If an external stability adjustment is required he can retract commitment to the conclusion, but only if he also retracts commitment to at least one premise of the given argument. An example is the following dialogue about tipping. The proponent takes the view that tipping is a good social practice. The respondent is doubtful about this claim, and is inclined to be against tipping. He has argued that if any practice has negative consequences, it is a bad practice.<sup>11</sup> And he has argued that tipping has negative consequences. For example, he argued that tipping leads to social discomfort.

### **The tipping dialogue**

**Proponent:** Could failure to tip have negative consequences?

**Respondent:** I don’t see how.

**Proponent:** Well, suppose I fail to tip a taxi driver, and he takes this failure to imply that he has somehow failed to provide good service, even though he did his best.

**Respondent:** So?

**Proponent:** Wouldn’t this failure to tip have produced negative consequences?

**Respondent:** How so?

**Proponent:** Being upset about an alleged failure is troubling. It’s a negative thing.

**Respondent:** Yes, I'll have to admit that.

**Proponent:** So it follows that failure to tip is a bad practice.

**Respondent:** Well, maybe.

**Proponent:** So it follows that tipping has to be a good practice.

**Respondent:** I can't accept that. I definitely reject that view of the matter!

This dialogue has led the respondent into a position where he appears to be trapped into a kind of inconsistency of commitments. He wants to reject the conclusion that tipping is a good practice, but he has agreed to all of the proponent's premises leading to that conclusion by a deductively valid sequence of argumentation. If he really wants to reject the conclusion, he has to go back and indicate which premise he now wants to retract commitment to. The external stability adjustment requires it.

In this case, however, there is a weak link in the chain of argumentation. Using the example of the upset taxi driver, the proponent has shown by a chain of argumentation that failure to tip is bad practice in some cases. The respondent reluctantly agrees to this conclusion. But then the proponent claims, "So it follows that tipping has to be good practice". This statement is ambiguous. It could be a universal generalization claiming that tipping is always a good practice. Or it could be a defeasible generalization claiming that tipping is generally a good practice, subject to exceptions. If the latter is meant, the general statement is consistent with the statement that failure to tip is a bad practice in some cases. Only if the former is meant is there a real inconsistency in the respondent's commitment set. So in this case there is a kind of problem or fallacy involved.<sup>12</sup> It may look like there is a need for a retraction and an appropriate stability adjustment. But there may not be, until the ambiguity is resolved.

#### 4. Presumptive argumentation schemes

The devices of internal and external stability adjustments were put forward in Walton and Krabbe (1995) as possible solutions to the no commitment problem in relation to the use of a deductively valid argument used by one party in a persuasion dialogue to try to persuade the other party. But how could one solve the problem in relation to other kinds of arguments, like inductive arguments or presumptive arguments that are not deductive in their structure? Deductive logic is based on forms of argument like *modus ponens* and hypothetical syllogism that close off commitment in the following sense. When a proponent presents an argument having one of these forms, and the respondent is committed to all the premises, then in order to be rational he must also commit to the conclusion. Otherwise he contradicts

himself. Thus there is a strong need for retraction when dealing with deductive arguments. However, in addition to deductive forms of argument, many inductive and presumptive forms of argument have also been recognized. The problem of retraction affects these kinds of arguments in a different way in dialogues. Our concern here will be with the presumptive forms of argument, especially those already recognized in the literature on argumentation schemes. Some of these forms are identified in the list of presumptive argumentation schemes given in Walton (1996). Perelman and Olbrechts-Tyteca (1958) identified even more of them in a less formalistic way. Hastings (1963) built the first systematic taxonomy, aside from Aristotle's account of the so-called topics, or argument commonplaces. Kienpointner (1992) has set out a fairly comprehensive list of argumentation schemes, including deductive and inductive forms among many presumptive argumentation schemes. The list of presumptive schemes in Walton (1996) includes forms of argument like argument from sign, argument from example, argument from commitment, argument from position to know, argument from expert opinion, argument from analogy, argument from precedent, argument from gradualism, and the slippery slope argument.

One of the rules of the critical discussion (van Eemeren and Grootendorst 1987, p. 289) provides a way of fixing commitment. Their Rule 7 reads: "A standpoint must be regarded as conclusively defended if the defense takes place by means of arguments in which a commonly accepted scheme of argumentation is correctly applied". This rule seems to suggest that if the proponent of an argument defends it by correctly applying an argumentation scheme, then the respondent has to accept the conclusion. But can the respondent later retract commitment to that conclusion? If the standpoint has been conclusively defended, it would seem not. If not, then this rule is a way of fixing commitment. But as noted above, it is very important that a critical discussion allow for retraction of commitment in some instances. Hence in order to explore how the critical discussion could be modeled in a formal dialogue system with commitment rules, the problem of how to formulate precise rules of retraction must be addressed.

The following dialogue presents an example of an argument based on the argumentation scheme for appeal to expert opinion.

### **The cholesterol dialogue**

**Proponent:** Eating food containing high levels of fat causes high cholesterol.

**Respondent:** How can you prove that claim?

**Proponent:** Dr. Sheila says so, and she is an expert.

**Respondent:** What field is Dr. Sheila an expert in?

**Proponent:** Medicine. She is a doctor.

The proponent, it seems, has won this round. The respondent should have to commit to the claim made in the first move by the proponent. If the argumentation scheme for appeal to expert opinion has been correctly applied in this case, then according to Rule 7 of the critical discussion, the argument has been conclusively defended. Hence the respondent must accept it, and presumably he can't try to retract commitment to the argument or to one or more of the premises. But of course the respondent should have some other options before committing to the proponent's claim. He should be able to ask some critical questions. An appeal to expert opinion could be deductively valid if epistemic closure is achieved, meaning that the expert can be treated as omniscient. But in the typical case, appeal to expert opinion should be treated as a defeasible form of argument. Experts can be wrong. If so, it is the presumptive type of argumentation scheme that should be applied to cases like the one above.

The structure of how arguments like the one in the cholesterol dialogue should be evaluated can be based on the argumentation scheme for appeal to expert opinion formulated in Walton (1997, p. 210). A source is taken to represent a knowledge base that can be questioned so that knowledge, advice or information can be extracted from it.

### **Argumentation scheme for appeal to expert opinion**

**Major Premise:** Source *E* is an expert in subject domain *S* containing proposition *A*.

**Minor Premise:** *E* asserts that proposition *A* (in domain *S*) is true (false).

**Conclusion:** *A* may plausibly be taken to be true (false).

According to the analysis in Walton (1997), appeal to expert opinion is, in typical cases, a presumptive form of argument. There is quite a natural tendency to respect experts, but in many cases, it is best to critically question an expert opinion before accepting it. Thus appeal to expert opinion should be seen as a presumptive form of argumentation that is open to critical questioning. The six basic critical questions matching the appeal to expert opinion, as indicated in Walton (1997, p. 223), are listed below.

1. *Expertise Question:* How credible is *E* as an expert source?
2. *Field Question:* Is *E* an expert in the field that *A* is in?
3. *Opinion Question:* What did *E* assert that implies *A*?
4. *Trustworthiness Question:* Is *E* personally reliable as a source?
5. *Consistency Question:* Is *A* consistent with what other experts assert?
6. *Backup Evidence Question:* Is *E*'s assertion based on evidence?

In the cholesterol dialogue, the respondent asked the field question. The proponent gave an appropriate and plausible answer. So the proponent has the upper hand for the moment. But perhaps the respondent could go on to ask other critical questions on the list. The device of critical questions shows how presumptive appeals to expert opinion need to be evaluated in a dialectical way. If a given argument meets the requirements of the argumentation scheme, and the respondent accepts the premises as commitments, then the respondent should commit to the conclusion. But the respondent should have the right to ask any of the appropriate critical questions indicated above. When he does that, the weight of presumption shifts back from the proponent's side.

There is a problem here, however.<sup>13</sup> The shift in the burden of proof, as described above, may not always happen. In some cases, it may be that a positive answer to a critical question can be assumed. In such a case, asking a critical question may not be enough, and the respondent has to provide an argument to show why the critical question has a negative answer. Thus for example in a case of an appeal to expert opinion, the expert may be very credible, and both parties to the dialogue may know and accept that she is highly credible expert. In such a case, asking the expertise question may simply not be enough to shift the burden of proof back against the proponent of the appeal. It is not clear yet how this problem should be dealt with. Generally, in any given case, one critical question may have much more impact than others. The others may have already been answered or addressed quite well in the previous dialogue, or by the common knowledge shared by both parties in the dialogue. Thus it seems that this shifting of the burden of proof tends to work only with some critical questions and not others.

An important part of the new research on argumentation schemes is to try to grasp how the schemes fit into formal systems of dialogue (Reed and Walton 2001, 2002). Many of the most common schemes have a question-reply format of a kind that seems readily adaptable to a dialogue format. And it seems that some understanding of how argumentation schemes can be used to evaluate argumentation and fallacies in natural language texts of discourse will only come through fitting the schemes into formal systems of dialogue. But many of the most basic questions regarding such fittings have barely even been asked. Below, some of them are posed in the form of fundamental problems. It seems to be early in the game to offer definitive solutions to them, but even so, framing the problems in a clear and orderly way is a worthwhile first step. Even the first step of trying to classify different types of argument into deductive, inductive, and some third category, is highly difficult to take without running into unsettled questions and controversies.

In deductive logic, deductively valid forms of argument like *modus ponens* and disjunctive syllogism have the property that if the rational respondent commits to the premise he must also commit to the conclusion. The problem for deductive arguments, as indicated above, is that the respondent, at least in a normal persuasion dialogue, should have the right to retract commitment to one of the premises. One solution is to require a stability adjustment in such a case before the retraction can

be made. But suppose the proponent puts forward an argument that has the form of one of the presumptive argumentation schemes. A probative weight is transferred from the premises to the conclusion, but probative weight is defeasible.<sup>14</sup> The respondent may be committed to the premises, but that does not necessarily mean he must also commit to the conclusion. He can ask critical questions. And indeed, he should ask them. As Prakken (2002, p. 5) noted, most AI and law models of legal procedure have incorporated formal dialogue systems, but have extended them by making argumentation in them defeasible. And presumptive argumentation schemes represent defeasible forms of argument. Thus the no commitment problem for presumptive argumentation schemes arises in a different form in legal argumentation that doesn't seem to be amenable to solution by imposing internal or external stability adjustments on argumentation in a dialogue.

### 5. The RIB problem

In Walton (1996), twenty-five argumentation schemes for presumptive reasoning have been identified and analyzed. Matching each scheme is a set of critical questions. An argument is evaluated by weighing evidence on both sides at the given point in a dialogue where the argument was used. If the respondent is committed to all the premises, and the argument put forward by the proponent has the form of a known argumentation scheme, then that is a reason for the respondent to commit to the conclusion. But it is not a conclusive reason. He can still ask a critical question, and indeed, that is what he is supposed to do. But here too, as in the case of deductive arguments, there seems to be a no commitment problem. Why should the respondent have to accept the conclusion, or even pay any attention to the argument at all? A stability adjustment could be the solution to this problem, but an even more direct solution seems to be available. This solution is to rule that the respondent should have only the following three options when confronted by an argument that has the form of one of the presumptive argumentation schemes.

1. Question one of the premises.
2. Ask an appropriate critical question.
3. Accept the argument (at least tentatively).

The rule that the respondent is bound to respond to an argument with one of these three options could be called the three-option reply rule or TOR rule.<sup>15</sup>

#### 5.1. THE TOR RULE

If a proponent puts forward an argument that has the form of a presumptive argumentation scheme, at the next move the respondent must (1) question one of the premises, (2) ask an appropriate critical question, or (3) accept the argument (at least tentatively). The respondent is not allowed to make any other kind of



move, like putting forward a counter-argument, until he has made one of these three moves.<sup>16</sup>

The TOR rule seems attractive because it looks like a good way of dealing with the no commitment problem without having to introduce devices like stability adjustments. But the TOR rule raises another question. What about the option of bringing forward another argument that defeats the appeal to expert opinion that was just put forward by the proponent? Should the respondent have that option right away? Or should he have to wait? This question expresses what could be called the right to immediately rebut (RIB) problem.

The RIB problem can be illustrated by adding another move to the cholesterol dialogue above. Suppose the respondent were to make this move.

**Respondent:** Your claim is just wrong. It's the saturated fats that cause high cholesterol, not the unsaturated fats.

In this kind of case, the respondent has done an end run around the proponent's appeal to expert opinion argument. Instead of trying to attack this argument, or ask further critical questions about it, he attacks the proponent's thesis directly. But should he be allowed to do this? It seems initially reasonable that he should be.

The rules of PPD<sup>17</sup> in Walton and Krabbe (1995, pp. 133–140) allow a respondent to bring forward a counter-argument at the next move after a proponent's argument. But if the TOR rule were imposed, the right to rebut immediately would disappear. Thus a big question concerning the relationship of argumentation schemes to formal systems of dialogue remains open. This is the question of how binding the argumentation scheme should be in a dialogue. Should it force the respondent to either accept the argument or critically question it?<sup>18</sup> Or should it leave him free to rebut by posing a counter-argument? These options for dialogue rules could be called the tighter versus the looser approach.<sup>19</sup> Most observers would possibly opt for the looser approach, since it leaves more freedom to express opposition to a proposed argument. But there is an argument for the tighter approach. This argument is based on a holistic approach to argumentation evaluation that can be explained as follows.

In a dialogue like a protracted critical discussion many defeasible arguments tend to be put forward by both sides. Each, by itself, gives only a small weight of evidence for or against the theses at issue globally in the dialogue. It's only when you put them all together at the end of the dialogue that you get a decisive tilting of the burden of proof to one side or the other. The resolution of the issue in a dialogue doesn't work by pitting one single argument against another.<sup>20</sup> Evaluation should be holistic, and at the end of the dialogue, when all relevant arguments are weighed together (Fox and Das 2000). If we adopt this holistic point of view, it provides an argument for supporting the tighter approach. The reason is that when a proponent puts forward one argument, it is of no immediate significance that the respondent pits it against an attacking argument that has the opposite conclusion. For example,

suppose the proponent puts forward an appeal to expert opinion for conclusion *A*. Suppose at the next move he puts forward an argument from analogy with the conclusion *not-A*. Is this a useful or appropriate response? On the one hand, it seems so, because the respondent is indicating his reason for disagreeing with *A*. But on the other hand, it may be irrelevant, because the appeal to expert opinion has been left dangling, and the argument from analogy may take the dialogue away to a completely different direction. Also, the opposition between the appeal to expert opinion and the argument from analogy is unimportant in the end, on the holistic view. For the issue will be decided when all arguments on both sides are weighed up together in the mass of evidence collected through the dialogue. What is more important is that the respondent should address the argument from expert opinion, indicating whether he accepts it, or can find a weakness in it. Thus the argument from evaluation at the closing stage of a dialogue suggests that the TOR rule is justifiable.

Still, even those who like the holistic view may have reasons for questioning whether it supports the tighter approach. Henry Prakken, in comments to the author, gave four reasons for questioning this support. The first is that even if the holistic view is adopted, the dialogue rules should allow the stating of counterarguments at some point, and what is a more natural point than immediately after the attacked argument? The second is that logics for defeasible argumentation partly capture the holistic viewpoint anyway, since they evaluate an argument in light of all relevant arguments and counterarguments. The third is that there is currently an unresolved problem of evaluating sets of arguments and counterarguments. Pollock (1995) has argued that arguments do not accrue, and if there is more than one reason for a conclusion, they should be combined into one argument. On the other hand, in everyday dialogues, people often speak as if they added up arguments. Thus evaluation at the closing stage, while it might work well for different kinds of formal dialogue, is not a very natural approach to empirical argumentation. For in real cases of conversational argumentation in natural language, putting forward a defeater in response to another party's argument is quite a common move. Finally, the tighter approach won't seem to work for legal argumentation, where one argument is often attacked in court by posing a counter-argument. For example, an argument based on witness testimony may be attacked by an opposed argument based on the testimony of a different witness.

There is an additional reason for thinking that the TOR rule is too strict. This reason is that the respondent, when confronted by any argument put forward by a proponent, should have the right to make other kinds of moves. He might not want to question the probative strength of the argument, but he might want to question whether it is relevant as a move in the dialogue at that point. Or he might want to question one of the terms used in the argument. For example, he might want to argue that a term is ambiguous, or overly vague. Or he might want to argue that the term is emotive language of a kind that needs to be questioned or defended. Surely this kind of move should be allowed. If so, restricting the respondent's next move

to asking one of the formatted critical questions (ones formulated as appropriate critical questions matching the scheme) is too restrictive.

Putting all these reasons for doubting the usefulness of the TOR rule into a balance of considerations, serious doubts are raised about whether the tighter approach will really work very effectively, especially as applied to cases of argumentation in everyday discourse and legal argumentation. It seems like there are too many factors for questioning the applicability of the TOR rule to make it useful as a general rule for managing argumentation in dialogues. The TOR rule is too strict if it bars all other kinds of moves, including counterarguments, until all the critical questions have been dealt with appropriately or until the respondent concedes the proponent's argument. On the other hand, there still seems to be a place for some rule that takes the asking of the critical questions into account in evaluating an argument. Even if the dialogue rules allow for counterarguments, they should as Prakken put it, "in some way force attention to the critical questions of the original argument".<sup>21</sup> The problem is how to formulate a rule of this sort. But even if such a rule could be formulated, one that would meet all the objections to the TOR rule, there are reasons for thinking that it would not be universal. It would only be appropriate in a special type of dialogue.

## 6. QPD: A new system between RPD and PPD

The contrast between RPD and PPD in *Commitment in Dialogue* was useful as a starting point in examining some important properties of formal dialogues. But it represents two extreme poles, so to speak. RPD is nicely amenable to formalization, and it certainly allows the proponent of an argument to pin the respondent down to some fixed options so he can't waffle around by refusing to answer, go off on irrelevant tangents, and use other escape routes. But RPD is too rigid to represent cases of real dialogue. PPD is much more flexible, and hence much more realistic as a way of representing cases of real dialogue. But this flexibility introduces a fundamental problem of pinning down commitment. The respondent has a lot of flexibility. So when the proponent presents a valid (or structurally correct) argument and the respondent doesn't want to accept its conclusion, he can just not accept the premises. Or if he was previously committed to the premises, he can just retract commitment to one or more of them now. Thus the proponent has a problem. How can he "pin down" a respondent who always retracts commitments when it appears that he might be in danger of losing the argument? Walton and Krabbe (1995) dealt with this problem by the devices of internal and external stability adjustments. But these stability rules seem to represent a higher level of rationality than one might always wish to impose on a dialogue. If we could get by without the stability rules in PPD, it might be possible to have a simpler system that would show more clearly how argumentation schemes have an effect on commitment. One such simple rule discussed above is the TOR rule. It says that if the respondent accepts the premises of the proponent's argument and the

argument is structurally correct (by having the form of a known argumentation scheme), then the respondent should either have to accept the conclusion or he should have the burden of asking an appropriate critical question.<sup>22</sup> The TOR rule gently forces the respondent to take on commitments. Or at least it prevents him from dodging around by refusing to answer, or going off on an irrelevant tangent. The implementation of the TOR rule as suggested above is too restrictive, as shown by Prakken's doubts about it as a general rule. Could there be some other less strict dialogue rule that allow for counterarguments yet still draws the respondent's attention to the critical questions so that he is rationally required to take them into account before proceeding further in the dialogue?

The problem is to allow a respondent an appropriate degree of freedom and flexibility in replying to an argument, while finding some kind of rule that requires him to take the critical questions appropriate for the scheme into account. Any system of dialogue having such a rule would not be as free as a PPD type of dialogue. But then it would not be as restrictive as an RPD dialogue either. It would be somewhere in between. It could be called a QPD type of dialogue. It is in this special type of dialogue that something like the TOR rule, or a more flexible version of it, might be useful.

QPD is a simplified version of PPD (permissive persuasion dialogue), sharing some features of PPD given in Walton and Krabbe (1995, pp. 133–140). In PPD, there are three kinds of commitments. The first two kinds are called concessions and assertions. An assertion is a commitment that a participant is obliged to defend if challenged (p. 186). In other words, it has a burden of proof attached. In contrast, a concession is a statement a participant is committed to only in a weak sense, meaning that she is not obliged to defend it if it is challenged (p. 186). Those of the third kind are called dark-side commitments. These are "off-record" commitments. They represent an arguer's position in a dialogue, but were not explicitly stated anywhere in the dialogue by the arguer. There are merely implied by what he said or didn't say. In the description of QPD below, the term 'commitment' is used in a broad sense, referring to any of the above three kinds of commitments.

The main difference between PPD and QPD is that in PPD, a party can make several moves concomitantly, so to speak. She can ask a question, for example, and in the same move, make an assertion and put forward an argument. In QPD, each move must be made up of only a single speech act (locution). Thus if a party asks a question, then that is the only thing she can say at that move. She has to wait to see how the other party replies before making another move. In that respect, QPD is comparable to RPD (rigorous persuasion dialogue), because a participant's has less freedom than in PPD. In PPD, a move can contain any or all of the following components: retractions, concessions, requests for retractions, requests for concessions, arguments and challenges. In QPD, each move can contain only one of these locutions. The following general features define QPD as a type of dialogue.

**Features of QPD as a type of dialogue****Feature 1**

There are two participants (parties), White and Black, who take turns making moves. White moves first.

**Feature 2**

Each has a commitments set, including a set of initial commitments that each starts off with at the opening stage of the dialogue.

**Feature 3**

Each party has a special commitment, designated at the opening stage as his or her thesis. Each party has the goal of proving this thesis to the other party, by using rational arguments based exclusively on premises that are commitments of that other party.

**Feature 4**

Each party can only put forward a single locution at each move.

**Feature 5**

The TOR rule governs a party's next move whenever the other party puts forward an argument that has the form of a presumptive argumentation scheme.

**Feature 6**

The commitment rules determine the commitments of each party at each move, depending on what type of move it is.

**Feature 7**

Each party may demand the resolution of an explicit inconsistency found in the other party's commitments.

**Feature 8**

When one party has successfully proved her thesis, the other party must concede this thesis at his next move, and the dialogue ends in the first party's favor at that move.

These features are very general. Various problems discussed below will suggest how more specific rules might be formulated. QPD dialogue is generally similar to a PPD in that both represent persuasion dialogue. In both types of dialogue, the proponent's aim is to persuade the respondent by rational argumentation to commit to her central thesis in the dialogue. The respondent's aim is either to raise doubts about the proponent's line of argumentation or to persuade the proponent to commit to a thesis that is the opposite of her central thesis. The kinds of rules

for both types of dialogue are similar, except for features 4 and 5. In QPD each party can only put forward a single locution as a move, while in PPD, a party has a choice of putting forward any or all of six locutions at one move. The other difference is that, in QPD, if that locution is a presumptive type of argument, the response of the party is bound by the TOR rule.

A question is whether the rules of QPD allow for what is called backtracking (Prakken 2002, p. 12). Backtracking is making an alternative reply to the same argument, or other locution put forward by the other party. An interesting question is thus posed. Suppose a proponent puts forward an argument, the respondent asks some critical questions about it, and then the dialogue moves on to consideration of other arguments. Can the respondent, at such a later point, come back to the original argument and ask some more questions about it, or even make a counter-argument aimed at rebutting it? The answer is that backtracking is allowed in QPD.<sup>23</sup>

Henry Prakken posed some problems by questioning how can certain types of responses be allowed in QPD, given that a move may contain just one speech act. Suppose a party wants to concede one premise of an argument but challenge another, for example. Or suppose he wants to concede the argument's premise but ask a critical question. In QPD, he can't make such moves. Do these restrictions pose problems? Certainly they impose limits, but it seems like they are limits that a respondent can live with. The respondent must simply choose which move he wants to make. If you have to make a concession at your next move, according to the rules, then that will be your move. But generally in persuasion dialogue, taking on a commitment can be a risky move. So normally, it would be a priority to ask questions and put forward challenges, rather than taking on commitments. In QPD, one would normally ask critical questions first, and then later one could make concessions, if making them helps one's strategy. Since backtracking is allowed, a party can concede one premise and then at a later move challenge another premise. Thus I think these kinds of problems can be dealt with in QPD. But they do show that there are certain kinds of moves that you can't make in QPD that would normally be allowed in everyday conversational argumentation.

QPD recognizes presumptive argumentation schemes, as well as deductively valid forms of argument, as binding argument structures. It could be a useful feature of the QPD type of dialogue that some restriction like the TOR rule could be applied when the proponent puts forward an argument that fits one of the argumentation schemes. Suppose the proponent puts forward such an argument at a given move. In QPD, if the respondent is committed to all the premises of the proponent's argument at that move, he should have the option of critically examining the argument by asking one or more of the appropriate critical questions. As indicated above, he should have other options as well. But if he fails to take advantage of the option of asking critical questions, that should have some consequences. Maybe all that it means is that he has failed to challenge the argument because he agrees with it, or at least does not want to question it using the formatted questions because he has other objections and wants to proceed directly to a counter-argument. The

problem is to find some rule that would allow for these freedoms while still taking into account the respondent's failure to critically examine the examine in the standard way. The value of the formatted critical questions derives from the fact that it is sometimes very hard for an arguer to think up strong counter-arguments or other objections that may require knowledge of the subject-matter of a dispute. The questions perform an inventive function by offering a standardized list that may automatically enable a respondent to search for weak points in an argument. But as noted above, there is no reason to think that such lists of critical questions are complete, or that they have to preempt other moves. The problem is to find a QPD rule that achieves the needed balance.

There is another problem to be considered in QPD as well. What happens when the respondent runs out of critical questions? At that point, does he have to concede the conclusion of the proponent's argument? This question formulates what could be called the completeness problem for QPD. The answer is that critical questions for presumptive argumentation schemes can contain critical subquestions. Thus the respondent should have the right to ask an appropriate subquestion, having previously asked a main critical question. In principle, therefore, the dialogue could go on and on, as long as subquestions are there to be asked. On the other hand, there is nothing to prevent some limit being imposed on the length of such critical questioning intervals. The list of appropriate subquestions is surely finite. And in many instances, it may not be all that long.

Another problem stems from the defeasibility of argumentation schemes (or many of them, anyhow). In such cases, an argument should be subject to defeat if new counter-arguments come in later that defeat (refute) the argument. Even though the TOR rule above only required that the respondent "tentatively" accept the conclusion, it seemed too restrictive because it categorically rules out other options. But it still leaves some options open. It leaves open the possibility that the respondent could later retract commitment to the conclusion, even after he has asked all the critical questions and the dialogue has run along further. This kind of freedom should be open to the respondent in all cases where he is responding to a defeasible argument, because a defeasible argument is subject to defeat if new evidence comes in at any point in a dialogue. Thus there is a general dialogue rule that applies to all instances of defeasible argumentation.

*New Evidence Rule.* Once the respondent has accepted all the premises of an argument that is defeasible and asked all the appropriate critical questions, he may be rationally bound to tentatively accept the conclusion in some way. But such acceptance should be regarded as provisional, meaning that he can later retract it, provided new, relevant information that defeats the conclusion has come into the dialogue.

The New Evidence Rule would enable presumptive argumentation schemes to have some impact on commitment, but would at the same time be compatible with the

defeasibility of the presumptive argumentation schemes. The new evidence rule works for presumptive argumentation comparably to the way a stability adjustment works for deductive argumentation in a persuasion dialogue. It may suggest a way of coping with the no commitment problem when allied with some qualified version of the TOR rule, but it is not so drastic that it completely forbids retraction. It may make a respondent temporarily commit to the conclusion of a proponent's argument in some way, even though the respondent can retract that commitment later in the dialogue provided he makes the right moves.

These problems suggest that some rule comparable to the TOR rule could still be useful in the setting of QPD dialogue. But it needs to be less restrictive. An argument fitting an argumentation scheme needs to have some effect in a dialogue in line with its being a rational argument that the respondent should have to respect. But it can't be so binding on the respondent that it unfairly restricts his capability for making retractions of a kind that are reasonable, or for making other kinds of moves that should be allowed.

## **7. The TORC rule in formal dialogue systems**

There seem to be two ways to go in setting up a framework for analyzing and evaluating arguments using argumentation schemes. One is to go with a PPD system that has internal or external stability adjustment rules. The other is to go with a QPD type of dialogue that is more restrictive but still fairly flexible in how it allows a respondent to react to an argument. Of course, a QPD dialogue could have internal or external stability built into it as well. An asset of such a QPD system is that it could be used to make a respondent take on some kind of rational commitment, even of a very provisional sort, in response to an argument fitting a scheme put to him, assuming he does not dispute the premises. Such a QPD system represents a higher kind of rationality than one might always find in many instances of real argumentation, where critical questions are not considered, or an argument that should require critical examination is even ignored. In real cases, one might expect to find all kinds of violations of any rule that would require the asking, or the failure to ask critical questions, into account. But it seems reasonable in some cases that a failure to take up the option of asking an appropriate critical question, where a critical examination is called for, should be seen as a default.

In the end, how these problems need to be solved is by having different systems of dialogue representing different levels or kinds of rationality. Thus we might have many different systems, and have to make and justify decisions about whether a given normative system applies to a given empirical case. This multiple systems approach is by no means incompatible with the approach that has been taken in formal dialogue systems to this point. Hamblin (1970, 1971) clearly advocated a plurality of different formal systems of dialogue for different purposes, and leading works in the field have followed this approach (Mackenzie 1981, 1990; Barth and Krabbe 1982). Thus to require the asking of the right critical questions, and to



see the failure to ask them as a deficiency in the respondent's performance in a dialogue certainly represents some kind of rationality assumption. But what kind of rationality does it represent, and what sort of rule could be formulated for QPD that would concede with the default, but at the same time not restrict other options that the respondent should have?

The way argumentation is guided by procedural rules for handling evidence in legal contexts offers a clue on how this kind of problem should be dealt with. When one side puts forward an argument, say an argument based on an appeal to expert witness testimony, the other side has the right to cross-examine the witness. But the other side also has the right to waive the exercise of that right. Sometimes, for example, the side who has the right to cross-examine will simply say, "No further questions". This failure to question may be a lapse, if the appeal to expert opinion was weak in some respect, and should have been critically questioned to bring out this weakness. But in other cases, the failure to ask critical questions may turn out to be insignificant. For example, the side who fails the examine may know that he has such strong evidence that he will bring forward at a future point in the trial that the other side's appeal to expert opinion will fade into insignificance. It will be rebutted, and thus there is no real need to ask critical questions of the appeal to expert opinion argument.

We have to inquire further into what is happening in such a case, from a dialectical point of view. The lawyer waived her right to ask critical questions, because she could have felt, for a variety of reasons, that asking such questions would not help prove her ultimate claim (fulfill her *onus probandi* or burden of proof) in the case. She should have this right. But when she waives it, she is making a kind of concession. She is, in effect, conceding the argument from expert opinion, by not challenging it. This move represents the taking on of a kind of commitment. She is not committed to the argument from expert opinion, or to its conclusion, as propositions she advocates. She is not taking on a burden of proof. She should not have to defend this argument or this proposition if her commitment to them is challenged. Instead, she is conceding them "for the sake of argument". Here it is useful to invoke a distinction between two kinds of commitments made in Walton and Krabbe (1995, p. 186). A commitment of one type is incurred by making an assertion. This type of commitment is one that a party in a dialogue is obliged to defend if the other party requests that she justify it. A commitment of another type is incurred by making a concession. This type of commitment has no burden of proof attached. It is a weaker type of commitment, representing a commitment incurred for the sake of moving the sequence of argumentation along in a dialogue. It can also be described as a negative kind of commitment. It means that you agree not to dispute something. It means that even though you may not accept the statement in question as part of your own position (viewpoint) in the dialogue, you are willing to waive your right to attack it.

The sequence of argumentation in a QPD dialogue can be structured by using this negative kind of commitment as a kind of default. If a respondent fails to

**DIALOGUE DEFAULT SEQUENCE FOR ARGUMENTATION SCHEME**

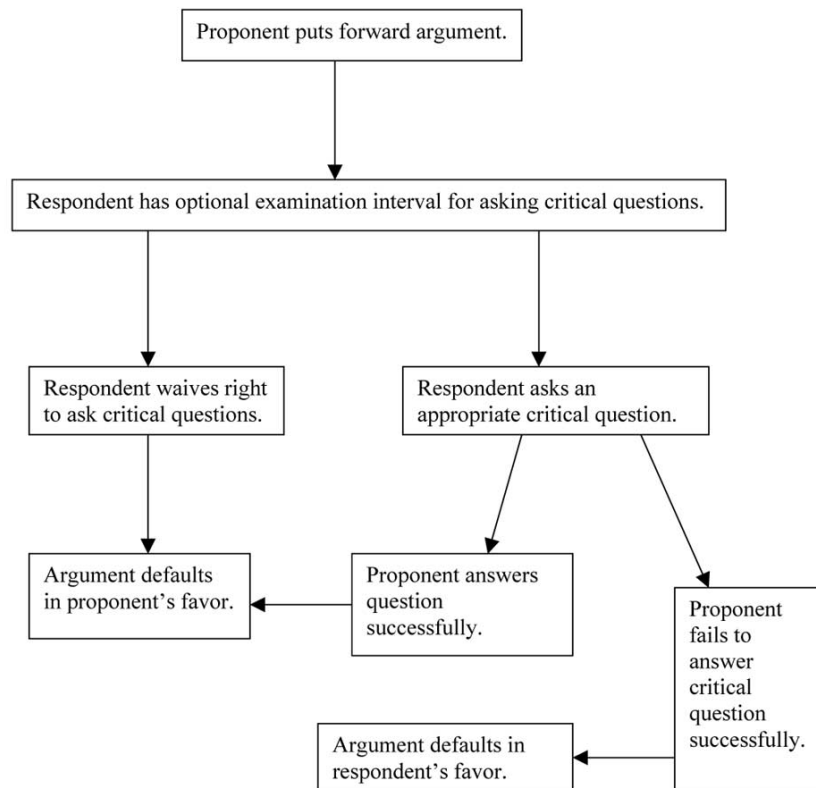


Figure 2.

exercise his right to critically question a proponent's argument, then the argument defaults in the proponent's favor. This means that the respondent has to temporarily accept the argument, but only in the sense of negative commitment, meaning he has agreed for the present not to examine it by critical questioning. However, if the respondent does exercise his right to ask a critical question, either the proponent has to provide an appropriate answer or she agrees to temporarily give up the argument. This means that the argument defaults in the respondent's favor. So such an argument can default to the one side or the other, depending on the moves made in the dialogue. This dialogue sequence of default for an argumentation scheme is represented in Figure 2.

This weaker or negative kind of commitment that functions as a default is a useful device because it can help an argument move along without delaying to dwell on critical examination that may not be turn out to be useful or necessary as the dialogue moves along through its argumentation stage. Could this form of commitment be useful also for devising a rule that could deal with the kinds

of problems of critical questioning a retraction of commitment discussed above? Possibly it can, but another problem needs to be dealt with first.

An underlying problem concerns the apparent differences in the different kinds of arguments. Deductive arguments make the no commitment problem apparently simpler, because the list of options for the respondent is shorter. Inductive arguments have not been explored in relation to the problems posed above, but they may be more difficult to deal with. Presumptive arguments seem to be the most difficult of all to deal with, because they are more open-ended. They are defeasible, and have to be open to new evidence. They need to leave the respondent room for asking critical questions before taking on a commitment. But they also need to leave him room for other moves that might also be appropriate. It is perhaps for this reason that QPD seems initially to be a good fit for presumptive argumentation schemes. It may be too soon to provide definitive formal solutions to these problems, but there is one possible solution for presumptive argumentation that should be considered. This is to apply a TOR type of rule in a QPD dialogue, but make the rule less restrictive in ways to allow for the options discussed above. It is combined with the stability adjustment mechanism, and in a way that leaves the respondent room for making other kinds of moves. This revised version to the TOR rule is called the TORC rule.

*TORC Rule.* When the proponent puts forward an argument that has the form of an argumentation scheme accepted as structurally correct, and the respondent is committed to all the premises, then the respondent must (i) negatively commit to the conclusion as presumptively plausible, (ii) retract one of the premises, (iii) ask an appropriate critical question, or (iv) if he chooses (iii), he can go on asking appropriate critical questions until he runs out of them. If he chooses option (i) or (ii), the proponent can call for a stability adjustment.

The expression 'negatively commit' in clause (i) refers to the weaker kind of commitment described above, referring to the distinction between assertions and concessions made in Walton and Krabbe (1995, p. 186). According to the TORC rule, a respondent confronted with a proponent's argument can waive his right to ask critical questions. But if he does, or does not directly examine the argument by one of the other avenues cited in the TORC rule, he concedes the argument. This means that he has agreed not to dispute it, for the moment anyhow, and therefore that he incurs a weak commitment to its conclusion as a proposition that is plausible, based on the argument that was put forward. The rules of QPD allow for backtracking, thus leaving room for counter-arguments later in the dialogue. Even at the next move, the respondent can put forward a counter-argument. But if he does so, then by waiving his right to critically examine the other party's argument just put forward, he weakly concedes the argument. Such a commitment is a negative one, however. It means that he has agreed not to challenge the argument just now, in order for the dialogue to move on.

How does the TORC rule deal with the general problem of retraction? The TORC rule prevents the respondent from simply retracting the conclusion of the proponent's argument, or one of the premises and with it the conclusion, every time it looks like he has to accept a conclusion that may be inconvenient for him or that seems to go against his viewpoint. On the other hand, it still allows for retraction. It's just that the retraction has a cost, and cannot be carried out in one fell swoop. Adopting the TORC rule, as stated above, may not be the only way to solve the problem of retraction for dialogue systems with presumptive argumentation schemes. It is a first step that may point the way to better solutions as new formal dialogue systems come to be developed.

The TORC rule could be modified by allowing for other forms of criticism as well. In addition to asking critical questions matching a scheme, a respondent might want to ask critical questions, for example, about the meaning of a term used in the proponent's argument. What this type of rule suggests is that when a proponent puts forward an argument in QPD, the respondent has the right to an examination interval in which he can ask critical questions. During this interval, he may also have the right to ask for clarifications, or to request that the proponent define a key term used in the argument. The function of such an examination interval is to offer the respondent a chance to critically probe into the proponent's argument and ask questions about it, before having to decide whether to accept it or try to argue against it.

## **8. Should there be a burden of questioning?**

In the case of *Calderon v. Irani*, appeal court ruled that a jury's rejection of an expert opinion "cannot be made arbitrarily" but "must be supported by other testimony or by the cross-examination of the expert".<sup>24</sup> It was ruled that in the absence of any reasonable justification for the jury's rejection of the expert testimony, the trial court was correct in setting aside the verdict (Hoenig 2002, p. 4).<sup>25</sup> But what does this ruling imply? It seems to imply that the court assumed that the jury must have rejected the appeal to expert opinion, based on two grounds. One is that they failed to challenge or to critically question it. The other is that they ruled, in their verdict, in such a way that can be taken to imply that they didn't accept the argument. It appears that the appeal court assumed, judging from the outcome of the trial, and from the jury's finding that the deviation was not a factor in causing the injury, that the jury failed to accept the argument from expert opinion. From this information, however, we can't really say for sure what the jury really thought, or whether they accepted or rejected the appeal to expert opinion. The best that can be said is that they ruled and drew conclusions in a way that is consistent with their non-acceptance of it. And since the argument was (evidently) strong, their non-acceptance of it may suggest that they ignored it, not even taking it into account.

It is evident from the Calderon case, and similar cases cited by Hoening (2002), that there is no procedural rule in Anglo-American law that requires the asking of critical questions or the putting forward of counter-arguments in reply to an appeal to expert opinion. There is no such binding rule, even if the argument appears to be quite a strong one. The proponent incurs a burden of proof in putting such an argument forward. But the respondent, whether jury or a cross-examiner, has no burden of questioning or challenging such an argument. If the respondent fails to critically examine the argument, or to try to refute it by putting forward a counter-argument, there is no penalty. There is only the potentially bad consequence that an appeal might be launched for a new trial.

The same is true of the critical discussion as a type of dialogue, and of the formal models of persuasion dialogue of the QPD family considered above. There is no burden of questioning, or obligation to critically question, as it might be called, that applies to a respondent when he replies to an argument. Adding the TORC rule to a QPD dialogue would remedy this lack. The TORC rule puts pressure on a respondent to reply to an argument, once it has been put forward by a proponent, in one of the four ways allowed by the rule. In effect, the TORC rule creates a burden of questioning. It makes the respondent at least confront the argument and react to it some way. Of course, the TORC rule, as stated above, may be too narrow. Maybe the respondent should be allowed to ask for clarifications of various kinds, or to pose counter-arguments of various kinds, in addition to the four options expressed in the current rule. What such a rule requires is that the respondent react appropriately, by telling the proponent whether he at least provisionally accepts it for the sake of argument, or if not, or by giving his reason for not accepting it. The intent of the rule is the respondent should have an obligation to express his reason for doubting an argument, and for not accepting its conclusion, if he has such reasons. So should the TORC rule, or some variant of it, be applicable to argumentation?

As far as the theory of formal dialogues goes, there is no harm in constructing a QPD system with a TORC rule built in. It represents a special type of dialogue. The normal persuasion dialogues considered so far in the literature have no burden of questioning requirement of the kind stipulated by the TORC rule. But QPD with TORC could be an interesting type of dialogue for some purposes. In contexts of dialogue where critical examination of arguments is very important, this type of dialogue might be a good model. Would it be applicable to legal argumentation? So far, the only evidence that there are special contexts of legal argumentation where QPD with TORC is a good model are the cases cited above. These suggest there might be some advantages to having a generally applicable evidence rule in law that would forbid the ignoring of a strong argument like an appeal to expert testimony. But then again, imposing such a sanction on a jury or a cross-examiner might be a burden that would be impractical, or not worth the cost and effort that it would impose on a trial. Still, such a rule, when invoked, would cut down the likelihood that an appeal might later be launched on the ground that a weight of

evidence had been ignored in a trial. The TORC rule is valuable because it makes for a better assurance that the respondent is actively taking part in a dialogue. The need for such an assurance especially important when an argument has the form of one of the presumptive argumentation schemes. For apart from the TORC rule, it is difficult to understand why the argument is rationally binding on the respondent.

There are some further questions about the TORC rule. One problem is where to draw the line between critical questions and counter-arguments. Consider appeal to expert opinion as an example. The consistency critical question matching the scheme, as indicated above, where *A* is the statement asserted by the expert, poses the following query. Is *A* consistent with what other experts assert? Of course, this is just a question, but in some cases asking it may be based on evidence that some other expert has disagreed with the one cited. Thus there will always be a practical question of judging whether something is merely a critical question as opposed to a counter-argument. In principle, however, it is both possible and useful to make a distinction between merely raising doubts about an argument and putting forward a counter-argument meant to rebut or refute the original argument. Pollock's distinction between arguments that defeat another argument, as opposed to arguments that merely undercut it, can be cited here as relevant, even though undercutters, in his sense are more than critical questions.<sup>26</sup> Another problem is whether other questions should be allowed under the TORC rule, as well as the critical questions matching the argumentation scheme. For example, questions asking for clarification of a term used in the argument would seem to be appropriate.

These problems suggest that what might be useful is some further consideration of the purpose of the TORC rule, and how it achieves this purpose. Its purpose is to be sure the respondent has paid some attention to an argument that was put forward, and has considered it. It does this by making the respondent reply by indicating he has made a critical examination of the argument just put forward, before the dialogue moves on to consider other argument or issues. The rule is meant to insure that the argument has had some impact in the dialogue. The way it does this is to get some sense of the respondent's reaction, by getting some assurance that he has not just ignored it or thoughtlessly dismissed it. Thus the question is raised: what is a critical examination of an argument? Some of the problems about what sorts of replies ought to be included by the TORC rule turn on issues relating to this question. For example, a question asking for clarification of a term used in an argument should surely count as coming within a critical examination of that argument. A counter-argument would not, if it is a new argument that is quite different from the argument it counters. However it would, if it is part of the critical examination of the original argument. The suggestion is that the way to move towards a better TORC rule is to reach agreement on what a critical examination of an argument should consist in. However, this topic is a serious problem in its own right (Walton 2002, 174–180) and there is not enough space to seriously discuss it here. A hypothesis is that critical examination can be defined as a type of dialogue in relation to the kinds of speech acts that fall under the TORC rule. These include

speech acts like asking critical questions matching an argument, posing questions that seek clarification of terms used in an argument, and posing relevant counter-arguments that probe into weak points in an argument or indicate it is wrong in some way.

It is very important to think about these kind of problems, because presumptive argumentation schemes need to be seen as rational arguments of a different sort from the traditional models of deductive and inductive rational argument. To say such an argument is a rational argument means that when brought forward by a proponent, it is binding on the respondent. This means that it somehow affects the commitments of the respondent by altering or restricting them in some predictable way. A commitment rule needs to be formulated that specifies precisely how such a commitment alteration should take place. The TORC rule is just such a rule. It is a significant problem to try to formulate some rule of this kind, and to see how it works in a QPD type of dialogue.

Addressing these problems is necessary in order work towards a general method for the analysis and evaluation of defeasible arguments, an important goal for both legal argumentation and AI. A defeasible argument is open-ended in the sense that it is based on a rule (inference warrant) that is subject to default in the future as new information comes in. But whether it will default in a given case cannot be known in advance. For an arguer does not know in advance whether an exception to the rule will arise in a given case. Thus the dialogue model of argumentation fits defeasible arguments very well, because any argument in a dialogue can be evaluated in relation to a future sequence of dialogue moves and counter-moves that has not occurred yet. The dialogue model fits argumentation in cases of lack of knowledge and uncertainty very well. And of course, one type of uncertainty is brought in by the use of defeasible arguments, like those represented by presumptive argumentation schemes. Such schemes are based on generalizations that are subject to exceptions that have not arisen yet, but may arise in the future. Whether the argument defaults or not depends on the evidence that will come in as the dialogue proceeds. To represent rational argumentation in such a setting, the respondent who replies to the argument must have the freedom to criticize such an argument or argue against it. And yet it must have some effect on his commitments so that it is rationally binding on him. The proponent must be able to use it, at the end of dialogue, if not before, to build up the evidence she can use to realize her goal.

## Notes

<sup>1</sup> I would like to thank the Social Sciences and Humanities Research Council of Canada for a Research Grant that supported this work, and the two anonymous referees who helped to improve it.

<sup>2</sup> The cases I have chosen are from Anglo-American law. I haven't tried to investigate how the problem they illustrate arises (or fails to arise) in other systems of law.

<sup>3</sup> Alexy (1989, pp. 138–154) outlined these historical developments.

<sup>4</sup> Of course, the trial is much more complex than the simple model of the critical discussion. The trial is more like a play with a large cast of characters. There are the two central parties, their advocates, the judge or other triers, and so forth. The claim is only that the critical discussion models the central normative structure of the argumentation within a broader institutional setting that also has to be taken into account.

<sup>5</sup> Prakken (2002, p. 7) calls locution rules speech act rules, and he calls structural rules move admissibility rules.

<sup>6</sup> This distinction between the two basic types of persuasion dialogue is a familiar one in the literature, although the terminology varies. For example, van Eemeren and Grootendorst (1984, p. 80) distinguish between simple and complex disputes. A simple dispute is one where the respondent only expresses doubt about the proponent's thesis, while a complex dispute is one where the respondent's is the opposite thesis. For a more complete analysis, see Walton and Krabbe (1995, pp. 68–70).

<sup>7</sup> As shown below, deductive validity can be one important standard of structural correctness of an argument, but other standards can be considered as well. These other standards are weaker, because they represent forms of argument that are not conclusive.

<sup>8</sup> This problem arose from discussions at a workshop 'Computational Models of Natural Argument' at the ECAI Conference in Lyon, France, on July 22, 2002. For discussions that helped articulate some concerns I would like to thank Subrata Das, Fiorella de Rosis, Floriana Grasso, Antonis Kakas, David Moore, Pavlos Moraitis, Henry Prakken, Chris Reed, Francisca Snoek Henkemans, and Tangming Yuan. I would especially like to thank Henry Prakken for making numerous critical comments in November of 2002 on an earlier draft of the paper. The current version took the form of a dialogue in which I tried to answer Henry's critical questions by making a series of revisions to my earlier arguments.

<sup>9</sup> A comparable problem of argumentation was recognized by DeMorgan (1926, pp. 296–297) as a "common occurrence" related to the fallacy of begging the question: "it is the habit of many to treat an advanced proposition as a begging of the question the moment they see that, if established, it would establish the question".

<sup>10</sup> Rule 11.1 says that for each elementary argument of the listener, if the premises and the argument link from the premises to the conclusion are concessions of the speaker, the conclusion is also a concession of the speaker.

<sup>11</sup> There are some technical issues about negation and types of opposition that there is no space to adequately discuss here. Notice that the respondent's concession that not tipping is bad practice does not necessarily imply that tipping is good practice. We simply assume that the two propositions 'Tipping is a good practice' and 'Tipping is a bad practice' are opposites (negations) of each other. But whether this is technically correct as an assumption depends on how 'good' and 'bad' are defined.

<sup>12</sup> The fallacy could possibly be diagnosed as one of amphiboly, based on a syntactical ambiguity.

<sup>13</sup> This problem was pointed out by Henry Prakken, in some comments he made on this paper.

<sup>14</sup> Prakken (2001, p. 191) takes defeasibility as the same property as nonmonotonicity, when applied to arguments. A monotonic argument is one that stays correct, to the same standard, no matter how many new premises are added. For example deductive arguments are monotonic. They stay valid if new premises are added. A defeasible argument, in contrast, can default if a new premise is added.

<sup>15</sup> The TOR rule was first proposed (although not by that name) by the author in a talk, 'Argumentation, Dialogue Types, Shifts and Embeddings', at the Conference on Argumentation in Dialogic Interaction, Lugano, Switzerland, July 3, 2002.

<sup>16</sup> A way of expanding the TOR rule would be to allow for certain other kinds of questions as well. For example, questions that ask for clarification of terms used in the argument could be allowed. The rationale is to restrict questioning to the critical examination of the argument, to make sure the weak points in the argument have been examined before turning to a consideration of other arguments.



<sup>17</sup> PPD, or permissive persuasion dialogue, is contrasted with RPD, or rigorous persuasion dialogue. In the latter moves are tightly constrained by strict rules. In the former, there is more freedom on what kinds of moves can be made, and on what kinds of replies to a move are allowed.

<sup>18</sup> The distinction between strong and weak refutation is useful here. According to Woods, Irvine and Walton (2000, p. 56), a distinction between the two types of refutation in a dialogue can be drawn as follows. To say that a proposition is refuted in the strong sense means that the respondent has shown it to be false. To say it is refuted in the weak sense means that the respondent has shown that the proponent has insufficient grounds for holding it. The issue can perhaps also be posed using the distinction between two kinds of argument defeaters called undercutters and rebutters by Pollock (1995, p. 40). An undercutter is an argument that raises doubts about the acceptability of a previous argument. A rebutter is an argument that proves or asserts that the conclusion of the previous argument is false. The issue can be posed in Pollock's terms in the following question. Should the respondent be restricted to replies that undercut the previous argument by raising doubts about its acceptability, or should he be allowed to put forward a counter-argument that rebuts the previous argument? Henry Prakken has raised some doubts about the equivalence of these two distinctions. On his interpretation of Pollock's definition, an undercutter is not just a question. It is an argument of which the conclusion says that another argument is unacceptable. Since an undercutter is an argument, on this interpretation, it also has premises. So an undercutter can be attacked in the same way as other arguments. Regarding an undercutter as just a critical question would leave no room for this kind of response to it.

<sup>19</sup> These questions of how loose or tight a dialogue should be are related to the problem of whether one can ever pin an arguer down to a formal fallacy (Krabbe 1996).

<sup>20</sup> Another approach is that of Prakken and Sartor (1997). They modeled legal arguments about the strength of other arguments by giving the judge the power to decide conflicts between arguments of the adversaries.

<sup>21</sup> Quoted from comments on an earlier draft of this paper made by Henry Prakken in November, 2002.

<sup>22</sup> Actually even this formulation is too strict. When a proponent uses a defeasible argument, like one that is an instance of the appeal to expert opinion, for example, premises do not give a conclusive reason for accepting the conclusion. If the respondent is committed to the premises, and the argument meets the structural requirements of the scheme, it does not follow that the respondent has to become committed to the conclusion. All it means is that if the respondent is committed to the premises, then he should become committed to the conclusion as a plausible statement. The strength of this commitment should be determined by the strength of his commitment to the premises and by the strength (plausibility) of the argument link between the premises and the conclusion. This subtlety will be discussed and taken into account in section five below.

<sup>23</sup> Indeed, as Henry Prakken pointed out, it would not be possible for the respondent to make a counter-argument to a previous argument unless backtracking were to be allowed.

<sup>24</sup> Calderon, 745 NYS 2d at 612.

<sup>25</sup> This account is a paraphrase of the court's words, quoted by Hoening from Calderon, 745 NYS 2d at 612.

<sup>26</sup> It appears that Pollock intends undercutting arguments to be defeating counter-arguments in a way that makes them stronger than critical questions.

## References

- Barth, Else M. and Krabbe, Erik C. W. (1982). *From Axiom to Dialogue: A Philosophical Study of Logics and Argumentation*. Walter de Gruyter: Berlin.
- Bench-Capon, T. (1997). *Argument in Artificial Intelligence and Law*. *Artificial Intelligence and Law* 5: 249–261.

- DeMorgan, A. (1926). *Formal Logic*. The Open Court Company: London. Reprint of the original Taylor and Walton edition of 1847.
- Dube, F. (2002). Judge Criticizes 'Hired Gun' Experts. *National Post (Canada)*, November 18, 2002, A1 and A5.
- Fox, J. and Das, S. (2000). *Safe and Sound: Artificial Intelligence in Hazardous Applications*. MIT Press: Menlo Park, CA.
- Feteris, E. (1999). *Fundamentals of Legal Argumentation*. Foris: Dordrecht.
- Frank, J. (1963). *Courts on Trial*. Atheneum: New York.
- Gordon, Thomas F. (1995). *The Pleadings Game: An Artificial Intelligence Model of Procedural Justice*. Kluwer Academic Publishers: Dordrecht.
- Hage, J. (2000). Dialectical Models in Artificial Intelligence and Law. *Artificial Intelligence and Law* 8: 137–172.
- Hage, Jaap C., Leenes, Ronald and Lodder, Arno R. (1994). Hard Cases: A Procedural Approach. *Artificial Intelligence and Law* 2: 113–167.
- Hamblin, Charles L. (1970). *Fallacies*. Methuen: London.
- Hamblin, Charles L. (1971). Mathematical Models of Dialogue. *Theoria* 37: 130–155.
- Hastings, Arthur C. (1963). *A Reformulation of the Modes of Reasoning in Argumentation*. Ph.D. diss., Evanston, IL
- Hoening, M. (2002). Products Liability: Jury Rejection of Uncontradicted Expert Testimony. *New York Law Journal* 228: 3–6.
- Kienpointner, M. (1992). *Alltagslogik: Struktur und Funktion von Argumentationsmustern*. Fromman-Holzboog: Stuttgart.
- Krabbe, Erik C. W. (1996). Can We Ever Pin One Down to a Formal Fallacy? In Johan van Benthem, Frans H. van Eemeren and Frank Veltman (eds.) *Logic and Argumentation*, 129–141. North-Holland: Amsterdam.
- Krabbe, Erik C. W. (2001). The Problem of Retraction in Critical Discussion. *Synthese* 127: 141–159.
- Lodder, Arno R. (1999). *Dialaw: On Legal Justification and Dialogical Models of Argumentation*. Kluwer Academic Publishers: Dordrecht.
- Loui, Ronald P. (1998). Process and Policy: Resource-Bounded Nondemonstrative Reasoning. *Computational Intelligence* 14: 1–38.
- Mackenzie, J. (1981). The Dialectics of Logic. *Logique et Analyse* 94: 159–177.
- Mackenzie, J. (1990). Four Dialogue Systems. *Studia Logica* 49: 567–583.
- Park, Roger C., Leonard, David P., and Goldberg, Steven H. (1998). *Evidence Law*. West Group: St. Paul, MI.
- Perelman, C. and Olbrechts-Tyteca, L. (1971). *The New Rhetoric: A Treatise on Argumentation*. In J. Wilkinson and P. Weaver (trans.), 2nd edn, University of Notre Dame Press, Notre Dame, 1971 (First published, as *La Nouvelle Rhetorique*, in 1958).
- Pollock, John L. (1995). *Cognitive Carpentry*. The MIT Press: Cambridge, MA.
- Prakken, H. (1997). *Logical Tools for Modelling Legal Argument*. Kluwer Academic Publishers: Dordrecht.
- Prakken, H. (2001). Relating Protocols for Dynamic Dispute with Logics for Defeasible Argumentation. *Synthese* 127: 187–219.
- Prakken, H. (2002). *Models of Dispute Resolution: A Formal Framework and an Application*. preprint at [www.cs.uu.nl/staff/henry.html](http://www.cs.uu.nl/staff/henry.html), 1–69.
- Prakken, H. and Sartor, G. (1997). Argument-based Extended Logic Programming with Defeasible Priorities. *Journal of Applied Non-classical Logics* 7: 25–75.
- Reed, C. and Walton, D. (2001). Applications of Argumentation Schemes. In *Proceedings of the OSSA Meeting*.
- Reed, C. and Walton, D. (2002). Diagramming, Argumentation Schemes and Critical Questions. In *Proceedings of the ISSA Conference*.

- Safer, Jay G. (2002). Evolving Standards on Expert Witnesses. *New York Law Journal* 228: s4–s12.
- Twining, W. (1985). *Theories of Evidence: Bentham and Wigmore*. Weidenfeld and Nicolson: London.
- van Eemeren, Frans H. and Grootendorst, R. (1987). Fallacies in Pragma-Dialectical Perspective. *Argumentation* 1: 283–301.
- van Eemeren, Frans H. and Grootendorst, R. (1992). *Argumentation, Communication and Fallacies*. Erlbaum: Hillsdale, NJ.
- Verheij, B. (1996). *Rules, Reasons, Arguments: Formal Studies of Argumentation and Defeat*. Doctoral diss., University of Maastricht.
- Walton, Douglas N. (1984). *Logical Dialogue-Games and Fallacies*. University Press of America: Lanham, MD.
- Walton, Douglas N. (1995). *A Pragmatic Theory of Fallacy*. University of Alabama Press: Tuscaloosa.
- Walton, D. (1996). *Argumentation Schemes for Presumptive Reasoning*. Erlbaum: Mahwah, NJ.
- Walton, D. (1998). *The New Dialectic: Conversational Contexts of Argument*. University of Toronto Press: Toronto.
- Walton, D. (2002). *Legal Argumentation and Evidence*. The Pennsylvania State University Press, University Park.
- Walton, Douglas N. and Krabbe, Erik C. W. (1995). *Commitment in Dialogue: Basic Concepts of Interpersonal Reasoning*. State University of New York Press: Albany.
- Wigmore, John H. (1931). *The Principles of Judicial Proof*. 2nd edn, Little, Brown and Company: Boston.
- Woods, J., Irvine, A., and Walton, D. (2000). *Argument: Critical Thinking, Logic and the Fallacies*. Prentice Hall: Toronto.

