

## METADIALOGUES FOR RESOLVING BURDEN OF PROOF DISPUTES<sup>1</sup>

The study of dialogues, or conversational frameworks of argument use, has been an important part of argumentation for some time. Erik Krabbe made a noteworthy contribution to the field, in collaboration with the present author, in our book on commitment in dialogue (Walton and Krabbe, 1995). His pioneering paper on metalogues (dialogues about dialogues) has opened up an important new avenue of research in the field, largely unexplored. His paper was so innovative in exploring this new subject that his modest conclusion was that it was too early for conclusions (Krabbe, 2003, p. 89). Even so, by posing a number of problems along with tentative solutions his paper was a very important advance in the field. Hamblin (1970) was the first to suggest the usefulness of metalogues in the study of fallacies. He proposed (1970, pp. 283-284) that disputes that can arise about allegations that the fallacy of equivocation has been committed could be resolved by redirecting the dispute to a procedural level. This procedural level would correspond to what Krabbe calls a metadiologue (Krabbe, 2003). Other writers on argumentation (Mackenzie, 1979, 1981; Finocchiaro, 1980, 2005; van Eemeren and Grootendorst, 1992), as noted by Krabbe (2003, pp. 86-87) have tacitly recognized the need to move to multi-level dialogue framework, but none provided a metadiologue system. The study of metalogues is turning out to be very important in argumentation theory and in computer science as well (Wooldridge, McBurney and Parsons, 2005), especially in AI (artificial intelligence), a field of computing that increasingly relies on argumentation tools.

In this paper, it is shown how analyzing disputes about burden of proof is an important research topic for investigation in the field of metadiologue theory. It has recently been shown (Prakken, Reed and Walton, 2005) that legal disputes about burden of proof can be formally modeled by using the device of a formal dialogue protocol for embedding a metadiologue about the issue of burden of proof into an ongoing dialogue about some prior issue. In the present paper, a general solution to the problem of how to analyze burden of proof is yielded by building on this framework, using three key examples to show how disputes about burden of proof can arise. The three examples are presented as classic cases of burden of proof disputes, and it is shown how some current tools from argumentation theory and artificial intelligence based on metalogues can be applied to the problems they pose. The solution to the problem of burden of proof is shown to be based on the finding that the global burden of proof is set at the confrontation stage of a dialogue, but that there have to be mechanisms for resolving disputes about burden of proof at all four stages. Most importantly, during the argumentation stage, burden of proof can shift back and forth at each move. One of the most significant problems addressed is the connection between burden of proof and the speech act of making a presumption in a dialogue.

### 1. Three Examples of Burden of Proof Problems

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<sup>1</sup> The author would like to thank the Social Sciences and Humanities Research Council of Canada for a research grant, and both Henry Prakken and Chris Reed for discussions that helped to formulate many of the leading ideas and arguments in this paper in more precise terms.

In this section three examples are presented that could be called classic cases of a problematic shifting of burden of proof from one side of a dialogue to the other. The first one took place in a parliamentary debate. The other two are both legal examples that went to trial, where the issue turned on burden of proof.<sup>2</sup> In the political case, there was no resolution of the issue of which side should have the burden of proof, and the argument about the original issue of the debate simply carried on. In both the legal cases, the court made a ruling on the issue of which side had the burden of proof. All three cases are instructive, but in different ways. Each brings out different aspects of how problems about burden of proof arise, and how they are resolved (or not) in different contexts of argument use.

The first example is part of a debate from the Canadian House of Commons that took place on September 30, 1985, described in (Walton, 1996, pp. 118-120). The debate arose from concerns that an embargo on the export of Canadian uranium for non-peaceful purposes was not being respected. It had recently been reported in the media that Canadian uranium was being used in American nuclear weapons. The question directed to the government representative was: “Can the minister give us the reasons why he is absolutely certain that depleted uranium is not being used for peaceful purposes?” The government representative responded as follows: “I have informed myself on the principle of fungibility and other arcane matters that are involved in this question. I have learned that there is, in the treaty, a requirement for administrative arrangements to be put into place that deal with the residue as well as with the original uranium. I have learned that those administrative arrangements are in fact in place. I am satisfied, on the basis of the information I know I have available, that the treaty is being respected.” An opposition member then asked the question: “What is your proof?” The government representative replied: “I am asked for proof. The proof is that I have looked for any weaknesses in the treaty and I have found none. If honorable members have any information that the treaty is not being respected, I ask them for the fourth time not to be so secretive. Come forward with your allegations so that we can find out whether they are true or false.” At that point, another opposition member said, “Do a proper investigation”.

The sequence of argumentation in this case was classified in (Walton, 1996, p. 119) as fitting the argumentation scheme for the argument from ignorance, or *argumentum ad ignorantiam*, as it is traditionally called in logic (Krabbe, 1992). It was also commented (p.120) that the problem is one of burden of proof. The manual of rules for Canadian parliamentary debate (*Hansard*) does not define burden of proof. Procedural disputes, like those about burden of proof, are presumed to be resolved by the Speaker of the House. In this case, the government representative began by replying that he investigated the matter, and was satisfied, based on his investigation, that the treaty was being respected. However the opposition questioner, not satisfied with this standard of proof,

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<sup>2</sup> Anglo-American law recognizes two different kinds of burden of proof, one called burden of persuasion and the other called burden of production (or burden of producing evidence). According to *McCormick on Evidence* (Strong, 1992, p. 425), the term ‘burden of proof’ is ambiguous in law, covering both these two different notions. The burden of persuasion, allocated at the point in a trial where the judge instructs the trier (herself or the jury) on what needs to be proved for the issue to be decided, is described (Strong, 1992, p. 425) as “the burden of persuading the trier of fact that the alleged fact is true”. Unlike the burden of persuasion, the burden of producing evidence can shift back and forth from one party to another during the sequence of argumentation in a proceeding (Strong, 1992, p. 425).

asked him to give reasons why he is “absolutely certain” that the uranium is not being used for military purposes. This is an extremely high standard, one which the government representative would be in no position to satisfy. The best the government representative could be expected to do would be to monitor violations, and be able to cite any that had been drawn to his attention, given the investigative resources at his disposal. At this point, the dialogue degenerates into an attempt by both sides to shift the burden of proof to the other side in a quarrelsome manner. Another opposition critic even says, “Do a proper investigation”. The problem is one of which side should have the burden of proof.

Moving on to the second and third examples, we will start with the easier case and then move to the harder one. The second case, ruled on by the U.S. Supreme Court in October, 2005, began with a suit in a lower court (*Weast v. Schaffer*, 41 IDEL 176, 4<sup>th</sup> Cir. 2004). The parents of a disabled child, Brian Weast, sought reimbursement for private school tuition on the grounds that that the program provided by their school district was inappropriate for his needs. Their argument was based on the Individuals with Disabilities Education Act, which requires school districts to create individual education programs for each disabled child. However, the act made no statement about the allocation of the burden of proof. The parents claimed that the district had the burden of proving that their program was appropriate, while the district held that the parents had the burden of proving that the district’s program was inappropriate. When the case went to the Supreme Court, the starting point was the ordinary default rule that the plaintiff bears the burden of proof for the claim made. It was, however, acknowledged that school districts have a natural advantage in information and expertise, and that this imbalance might justify treating this case as an exception to the normal default rule. But it was argued that this exception did not apply in this case, because Congress had already obliged schools to safeguard the procedural rights of parents and share information with them. Parents have the right to review all records on their child possessed by the school, and the right to an independent educational evaluation of their child by an expert. The Supreme Court concluded that the burden of proof was properly placed on the parents.

This case was an easy one, because the parents’ main argument was that putting the burden of proof on school districts will help to ensure that children receive a free special education for each disabled child. The Supreme Court concluded that this argument did not provide sufficient grounds for departing from the default rule on burden of proof. The Supreme Court also concluded that the exception on grounds of imbalance of expertise did not apply to this case. Therefore, the normal default rule automatically applied, and the conclusion drawn by the Supreme Court was that, in accord with this rule, the burden of proof is on the side of the parents. The third example is a harder case.

Prakken, Reed and Walton (2005) presented a hard case of a Dutch Supreme Court trial about the labor dispute in September, 1980 in which a shift in the burden of proof in the case become the subject of a secondary dispute that threatened to deadlock the case. In this case, the band *Los Gatos* was hired to work for a cruise ship of the Holland America line. While the ship was waiting for repairs in harbor without passengers, the manager told the band to perform for the crew. The band refused, and the manager fired them. In Dutch law, this kind of dismissal is valid only if there was a pressing ground for it, for example if the employee persistently refuses to obey reasonable orders. *Los Gatos* sued the Holland America line arguing that this pressing ground did not apply in their case because the Holland America managers had not wanted to listen to the reason why

they refused to play. Neither party contended this assertion. Instead, the subject of the dispute was how much had to be proven by Los Gatos to adequately support their claim that their refusal to play was not a pressing ground for the firing. The issue was whether Los Gatos had to prove that they had a good reason to refuse to play, or whether Holland America had to prove that they did not have a good reason to refuse to play. In other words, it was a classic case of a dispute about burden of proof. The decision of the Dutch Supreme Court was that Holland America had the burden of proof. The reason given was that the Holland America managers had made it impossible for Los Gatos to explain their reasons for not wanting to play.

## 2. Meta-arguments and Metadialogues in Logic and AI

A dialogue is a framework of argumentation use in which participants in some definable type of conversation tacitly or explicitly make agreements about the rules of conduct they will observe. For example participants might agree to take part in a critical discussion, in which the goal is that of resolving the conflict of opinions by rational argumentation. If this type of dialogue can be called a ground level dialogue (Krabbe, 2003, p. 83) a metadialogue can be called a dialogue about the dialogue, or about some dialogues. For example there might be disagreement about the correctness of some moves in a dialogue. Participants may then move to a meta-dialogue in order to have a secondary dialogue on whether the move in the first dialogue can be judged to be correct or not by some criteria (Hamblin, 1970; Krabbe 2003).

One subject that has been very little studied in formal dialogue theory is the dialectical shift, or change from one type of dialogue to another during a sequence of argumentation. Dialectical shifts were studied in (Walton and Krabbe, 1995), but very little systematic formal work seems to have been done on them since that time. Shifts are very important for formal dialogue theory as a tool for analyzing argumentation, because they are very common in argumentation, because they are often associated with fallacies (Walton and Krabbe, 1995; van Laar, 2003), and because we can scarcely understand many argumentation phenomena without realizing that a shift underlies the argument. Some shifts are so common, and effect such a natural and smooth transition between two types of dialogue that we need little in the way of technical tools to understand and manage the shift. Others are highly problematic, and some very special mechanism needs to be inserted between the two dialogues so that the shift can be procedurally managed in a proper and coherent manner that can be fair to the participants, and that can help us to analyze the argument that took place in an equitable and logically justifiable manner. One type of shift that can sometimes be highly problematic in this way is the burden of proof shift. As shown by the examples above, some such shifts are easy cases that can be managed without undue effort by simple rules that can be more or less automatically applied to the case. Others are hard cases that require systematic intervention, and cannot be fairly adjudicated without the intervention of a third party at a metadialogue level.

Wooldridge, McBurney and Parsons (2005), noting the steadily increasing attention to argumentation and informal logic given by the multi-agent systems community over the past decade, argue that the formalization of such argument systems is a necessary step for their successful deployment. On their view, argumentation in dialogue is inherently meta-logical, meaning that it does not just involve the asserting of statements about some

domain of discourse, and putting forward arguments based on these statements, but also the making of arguments about these arguments at a higher level. To help assist the formal development of this notion, they define three tiers of a hierarchical argument system. The first level corresponds to statements about a domain. The second level defines the notion of an argument and captures notions like attack and defeat of an argument. The third level encompasses the process of reasoning about the arguments that were used at the second level. Wooldridge, McBurney and Parsons (2005, p. 7), note that meta-logical systems have been widely studied in the past four decades in artificial intelligence and logic, little research has addressed the issue of meta-argument, an exception being (Brewka, 2001). One of their main aims is to put this idea of meta-argument on the map of argumentation research.

The object level does not contain arguments at all. It consists only of statements about a particular domain of discourse, and defines relations on the entities in this domain. In a legal setting, the object level could be thought of as what are called the facts of a case, meaning the evidence that is ruled as admissible in a trial. The ground level, on their analysis, consists of a set of arguments. At the argument level, statements can be made about object level statements. On their view, an argument consists of a conclusion and some supporting statements, called premises, linked to that conclusion by some notion of logical consequence. At this level, there is a mechanism for modeling the notion of one argument attacking another one, defined using Bench-Capon's system of value-based argumentation (Bench-Capon, 2003). When this model is applied, an argument attack based on values that the audience holds can be evaluated as weaker or stronger, partly based on these values. At the meta-argument level, an argument analyst can refer to the process by which an argument is established, and discuss and evaluate other properties of it as an argument. As an example they consider an argument that takes place between advocates in a trial. At the meta-argument level, arguments can be made by the judge about these arguments that took place at the argument level.

Prakken (2001) constructed a formal system to show how shifts in a burden of proof work in legal reasoning of the most common sort. He argued that such questions cannot be answered purely within nonmonotonic logics (Prakken, 2001, p. 253). He classified such problems as "irreducibly procedural" (p. 253) aspects of defeasible reasoning that can only be modeled by turning to meta-argument level considerations. He illustrated this thesis with the following common type of example (p. 259). Suppose that plaintiff supports his claim that a contract exists by arguing that there was an offer and acceptance by the defendant. She supports this claim by bringing forward two witnesses who testify to her offer and defendant's acceptance. The burden is now on the defendant to question or refute this evidence. Defendant attacks her argument by presenting evidence that the witnesses are unreliable. The burden now shifts to his side, and he risks refutation of the argument based on witness testimony. How should the issue of which side bears the burden of proof be decided? Should defendant have to prove his claim that the witnesses are unreliable? Or should plaintiff have to prove the opposite proposition that the witnesses are reliable. Or to make the case even more problematic, suppose defendant, instead of claiming that the witnesses are unreliable, claims that there is an exception because she was insane at the alleged time of contract acceptance. On which side should the burden to prove or refute this claim lie?



This type of common example of legal reasoning shows how a burden of proof can shift back and forth in a trial. It shows why ruling on which side should have the burden of proof in cases of such shifts may even require a decision by a judge. The problem posed is to provide a formal framework for allocating burden of proof to a meta-argument level. As shown above, this is a problem for artificial intelligence, for law, and for applying methods of argumentation and AI to understanding the logical basis of how legal reasoning works. It is also surely a central problem for argumentation theory as a whole, one best approached through the study of metadialogues.

### 3. Theoretical Problems of Metadialogues

The formalism of Wooldridge, McBurney and Parsons (2005) is a meta-logic, that is, a first-order logic whose domain includes sentences of an object language. Such languages can be self-referential, that is, they can refer to themselves. However, this property is barred, because of the problems and paradoxes it can introduce. Instead, Wooldridge, McBurney and Parsons (2005) construct a first-order hierarchical meta-language, such that no sentences from a higher level can be contained in the domain of a lower level. One of the problems with applying such a formal logical structure to any realistic cases of argumentation concerns the interface between levels when there may be a shift to a higher level, and then back to a lower level. It is just this kind of shift that typically occurs in cases of disputes about burden of proof. As the argumentation at one level founders because it has become deadlocked by a dispute about which side should have the burden of proof, there is a need to shift to a higher level in order to rule on this issue by examining the arguments that produced the deadlock in light of standards and rules concerning burden of proof that may have been established at some prior stage of the dialogue. When is such a shift appropriate, and how should the issue be resolved at the higher level? These are the questions posed if burden of proof is to be studied by applying a meta-logic approach. But there are other questions as well. Once the shift has taken place, and some argumentation at the second level has come to some resolution of the issue that blocked progress at the first level, how should the transition back to the lower level take place? And how should any ruling that might have been made at the second level be applied to the argumentation that took place at the first level? Clearly rules are needed to govern such shifts back and forth between higher and lower levels, if the shift to the higher level is to be considered reasonable by both parties, and if solution that has been worked out at the higher level is to be accepted by both of them and fitted back into the lower level so that the argumentation at that level can move forward.

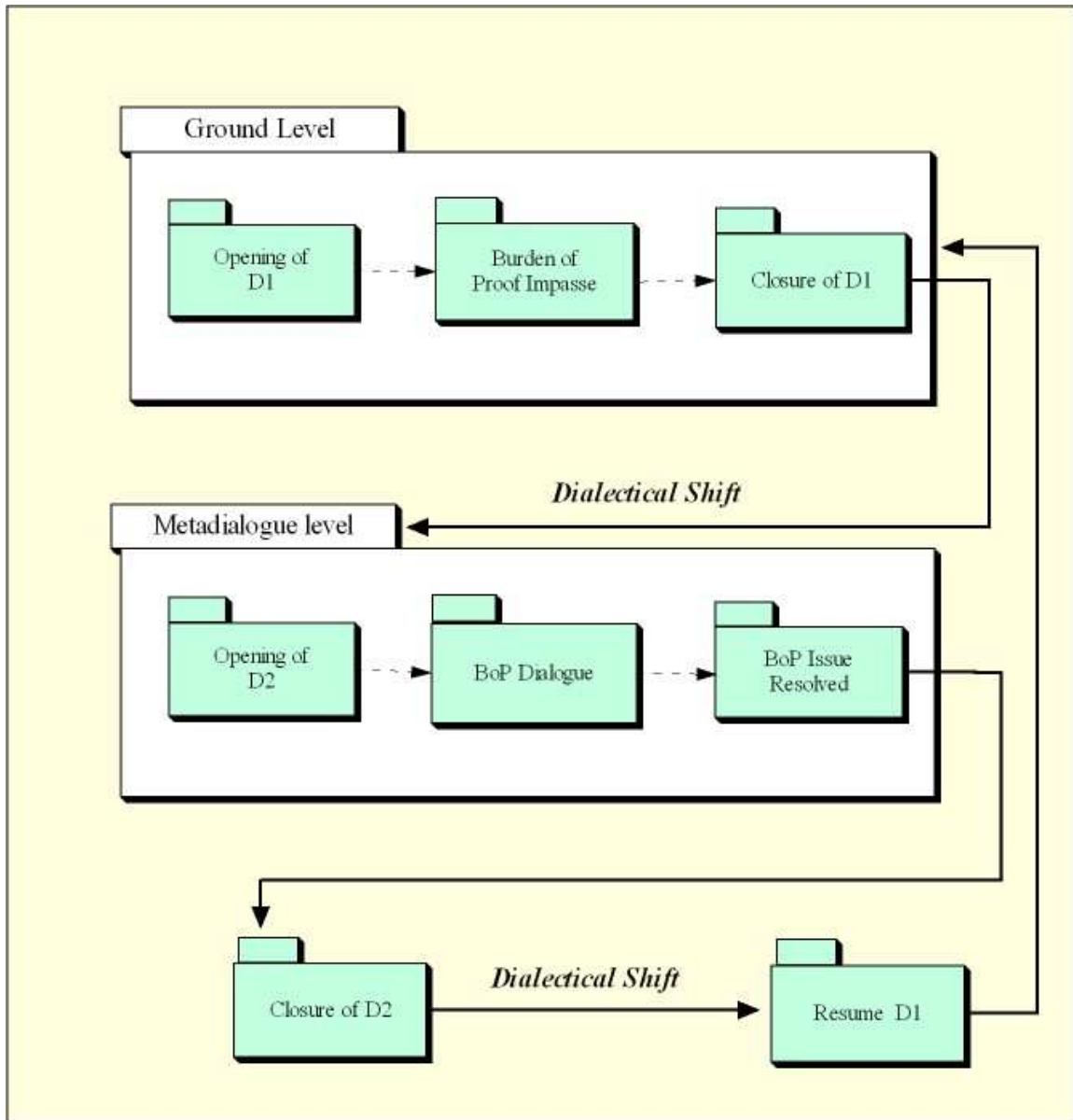
Krabbe (2003, p. 83) formulated the central problems that arise in connection with metadialogues. One is the demarcation problem of deciding which critical moves belong to the ground level and which ones belong to the metadialogue level. Many moves at the ground level may ask for conversational repairs of some sort, but for that reason alone may not need to be classified at the metalevel. However, some serious problems can occur at ground level that might actually block the dialogue from achieving any further progress at that level. A burden of proof impasse is such an example. Suppose one side says “You prove it!” and the other side replies “You disprove it”.<sup>3</sup> Trying to resolve such

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<sup>3</sup> Many examples of this sort can be found in studies of the *argumentum ad ignorantiam* fallacy (Hamblin, 1970; Krabbe, 1992; Walton, 1996).

a dispute within a dialogue, like a persuasion dialogue for example, might prove futile. Help is needed, possibly in the form of intervention by a third party, or by some rule or mechanism that is not part of the persuasion dialogue itself, but is needed to resolve the burden of proof dispute. The diagram in figure 1 shows how the need for such an intervention involves a shift from the original dialogue D1 at a ground level to a metadialogue that needs to take place at a different level D2.

Figure 1: Shift from a Ground Level Dialogue to a Metadialogue



The demarcation problem in such a case of a shift to a metadialogue involves examining the textual details of a given case of argumentation, and applying dialogue identifiers to determine the two types of dialogue involved, their stages, and judge where each of the

points in figure 1 can be found in the text of the case. But other normative problems also arise. How could we judge whether the shift was an embedding, that is, whether D2 is embedded in D1 so that D2 is really a help in contributing to the fulfillment of the goal D1 by moving D1 forward in a positive way? Generally, the problem is one of formulating the mechanisms and rules that license such an embedding.

Krabbe (2003, p. 83) also stated two other central problems. The problem of infinite regress is that a discussion about ground level rules may open up a discussion about rules governing the ground level rules, which might lead to a discussion about the application of the second level rules. The problem is how to block such a regress. The conversation could cycle endlessly back and forth between D1 and D2, and also involve discussions about normative issues of whether the shift is legitimate or improper. The equity problem is that of resolving a metadialogue dispute while blocking unwarranted charges or procedural quarreling.

#### 4. A Typical Case of Burden of Proof at Different Levels

Before trying to discuss the subject of burden of proof at an abstract level and applying an analysis to our three examples where burden of proof is a serious bone of contention, it is useful to look at a fairly typical kind of case in general outline. In this kind of case, we can see that burden of proof plays an important role at different levels as the argumentation in the case proceeds. Untangling how these levels are related to each other, and tying the argumentation in the whole case together, has provided a formidable problem to investigating how burden of proof works in real examples, and what its function is. Here a legal type of example is helpful. In ordinary conversational arguments, there may be no initial agreement on what the burden of proof for either party should be. Conversational postulates may be loosely implied, but not stated or specifically agreed to by either party (Grice, 1975). However in legal cases, for example in a trial, rules of evidence require clear agreement on matters of burden of proof at the outset. Starting with such a case helps to define the problem.

The following case is hypothetical<sup>4</sup>, and only a few details are given, but even so, it is instructive. Let's say that Alice signed an agreement to deliver a package to Bob on a certain date, but then failed to do so. Bob sued her for breach of contract, showing a written contract describing the terms of agreement to deliver the package. It contained Alice's signature, showing that she had agreed to deliver the package by the date indicated. Alice argued that the contract was not valid, because she was forced to sign it, bringing forward a witness to testify that Dragut, a known gangster, had threatened to burn down her shop if she did not sign Bob's contract. An analysis of the argumentation in the breach of contract case is presented in the argument diagram in figure 2. Bob's ultimate *probandum* in the case contains two components. One is that a contract existed between him and Alice. The other is that Alice failed to live up to her side of it. In order

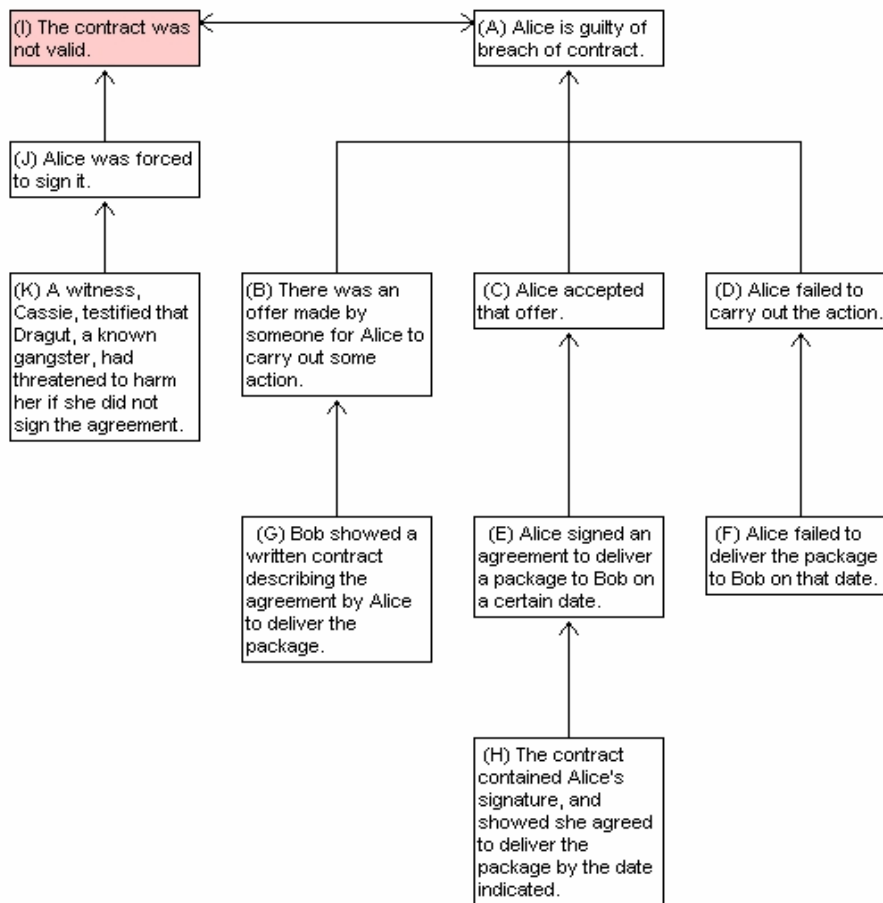
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<sup>4</sup> A real case of a common sort would be one in which the defense raises a plea of insanity in a murder trial. In such a case, the prosecution initially has the burden of proof to prove the charge of murder, but when the insanity defense is brought forward, the burden of proof shifts to the other side. Or at least so the situation can roughly be described. As Burkhard Schafer has shown, however (by e-mail correspondence to Henry Prakken, Chris Reed and the author), this shift can work in a different way in Scots Law than in German law. How such a shift works in a real legal case is beyond the scope of this paper.



to prove that there was a contract in law, you have to prove that there was an offer and an acceptance (and possibly some other propositions). In this case, Bob has to prove that he made an offer to pay something for Alice to deliver the package by the specified date, and that she agreed to deliver the package by that date. To prove breach of contract, he has to prove that she failed to deliver the package by that date. That's Bob's side of the case. Alice does not dispute that there was such a contract. She argues that it is not a valid contract, because she was forced to agree to it. To support this claim, she brings forward the testimony of a witness who told of a threat.

Figure 2: *Araucaria* Diagram for the Breach of Contract Case



This typical case illustrates the general point that once a well-defined claim is made, like breach of contract, this term is defined in a standard way so that the elements needed to prove it are specified. The general rule, often called the default rule, is that the burden of producing evidence falls upon the party who made the claim. Since Bob made the claim that Alice committed breach of contract, he must prove it, in order to win the verdict. Once he offers evidence to this effect, the burden shifts to the other side to respond to his argument, or otherwise Bob wins by default. In law, it is said that a burden of production is put on the opposing party to bring forward opposing evidence against the initial claim.

Thus this case illustrates how a shift in the burden of proof can move back and forth, as the argumentation in the case plays out.

It also illustrates another important property of burden of proof. In Bob's general initial claim there are three elements that need to be proved. First, there had to be a contract, which means there has to be an offer, and second there has to be an acceptance of the offer. Third, there had to be to be some breach of the contract by the opposing party. The plaintiff has to prove all three of the elements or subsidiary propositions. Thus in drawing an *Araucaria* diagram to represent the argumentation in any legal case of this sort, there will always be one proposition at the top, the ultimate conclusion that there has been breach of contract (ultimate *probandum*). Then there will be the component propositions forming a linked argument just beneath this top node. Then under each of these three nodes will be subarguments, for example in this case, an argument from witness testimony, and conclusions making up the mass of additional evidence in the case.

Here we have a typical case where burden of proof traces downward from the ultimate *probandum* though the component elements to other propositions connected to it by the chain of argumentation in the case. Thus we see that burden of proof is vitally important in such a case, both in seeing how the component arguments work in the case a whole, and in understanding how the case is won or lost. It seems that the burden of proof is set at the beginning, depending on the type of case, and on the claim made. Once set, it pullulates though the whole sequence of argument that unfolds in the case on both sides. The local burden of proof shifts back and forth, as individual arguments and counter-arguments are put forward by each of the two sides. Having set out this typical case, we now attempt to describe its main features at a level of abstraction and theoretical clarity appropriate for studying burden of proof as a central concept of argumentation theory.

## 5. Local and Global Burden of Proof

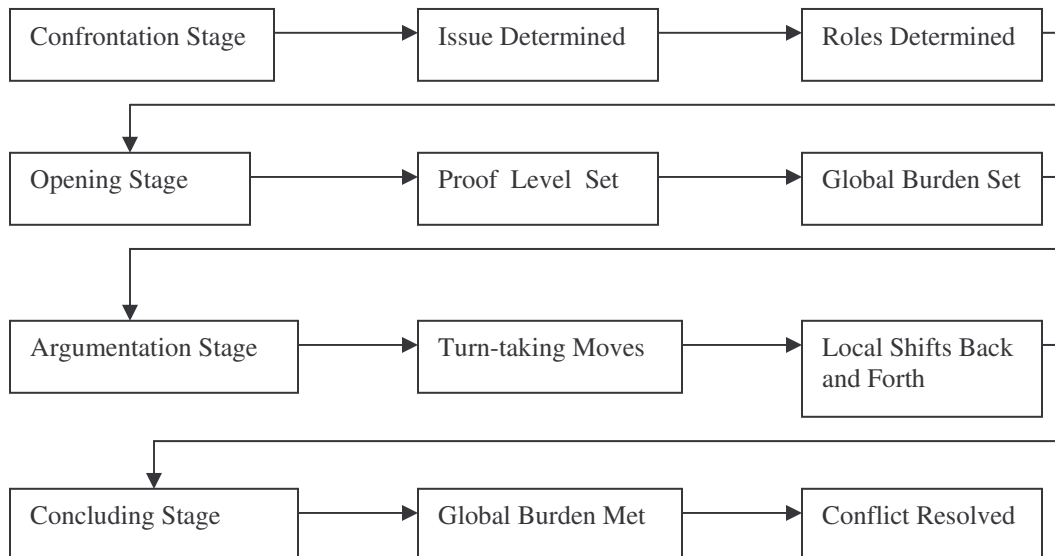
As the breach of contract case above showed, in a legal dispute like one in a trial there is an ultimate *probandum*, or ultimate proposition to be proved or disproved. Global burden of proof refers to what has to be proved to remove the doubt that originated a dialogue, thus winning the dialogue. According to van Eemeren and Houlousser (2002) a critical discussion aimed at resolving a conflict of opinions can only be successful if the burden of proof is made clear at the outset, and if all parties to the dialogue comply with the requirements set by it (p. 17). Thus the burden of proof needs to be set at the outset. As the breach of contract case showed, however, its effects are made manifest through the whole sequence of moves made at each local level by both parties in the dialogue. The local burden of proof defines what requirements have to be fulfilled for a speech act, or move like making a claim, to be successful.<sup>5</sup> If one party has the burden of proof at the global level while the other does not, that will influence what happens with issues of burden of proof that arise at the local level. Discussions of levels of dialogue need to begin, however, by examining the different stages any dialogue goes through.

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<sup>5</sup> There is no space in this paper to investigate the interesting but controversial hypothesis that global burden of proof corresponds to what is called the burden of persuasion in law, while local burden of proof corresponds to what is called the burden of production in law.

Van Eemeren and Houtlosser define the burden of proof for a standpoint as the obligation to defend a standpoint when challenged to do so: “Unless it is explicitly agreed otherwise, the burden of proof is on the side of those whose standpoints are challenged by the other party” (p. 18). This commitment is set because the proponent of an argument is advocating a standpoint. Van Eemeren and Houtlosser (2002, pp. 22-25) segment a critical discussion into four stages. At the confrontation stage, the two parties achieve clarity in stating the specific issue to be resolved by the discussion. The goal of the critical discussion is to resolve this conflict of opinions by having one party show that the doubt of the other party concerning the first party’s viewpoint can be removed by rational argumentation. Thus it is very important that the issue be stated in order for conditions for success of the dialogue to be formulated. Strategic maneuvering with regard to the burden of proof can occur at the confrontation stage. The second stage is the opening stage, in which both parties accept procedural and material starting points. The third stage is the argumentation stage, in which the standpoints of both parties are tested by the arguments put forward by the other side. The fourth stage is the concluding stage that decides to what extent the burden of proof has been met. The side that has failed to meet its burden of proof must concede to the winning party. Figure 3 illustrates how burden of proof is set, and how it affects the outcome of a critical discussion.

Figure 3: Burden of Proof at Four Stages of a Critical Discussion



As figure 3 shows, two things are set at the confrontation stage. The role of the proponent is to prove a designated proposition, and the role of the respondent is to doubt it, or prove the opposite proposition. The issue is the pair of propositions, or the one and the doubt of it. The level of proof is the strength of the argument needed to prove the designated proposition (standard of proof). For example, some standards are “beyond a reasonable doubt” or “by an argument more plausible than the opposed one”. The global burden of proof is composed of these two factors. Once it is set, the back and forth shifting of local

burden proof that takes place at the argumentation stage is affected by the earlier requirements set on burden of proof. Finally, at the concluding stage (also sometimes called the closing stage) the final outcome of the dialogue is determined by what happened at the three prior stages. Basically, this evaluation is achieved by scanning over the whole network of argumentation on both sides that took place at the argumentation stage, and making a judgment about which side fulfilled its burden proof set at the confrontation and opening stages. If one side has successfully met its burden, it has proved what it was supposed to prove, and has achieved success in the dialogue. In such a case, the conflict has been resolved by rational argumentation.

To analyze the structure of the argumentation in cases where there is a problem of burden of proof, Prakken, Reed and Walton (2005) formalized a protocol for the embedding of burden of proof dialogues into conventional persuasion dialogues. The protocol uses a formal dialectical framework that regulates how the intervening burden of proof dialogue should be embedded into the prior dialogues. To ensure an orderly transition, each move in a dialogue is assigned a level, and there are rules that determine how a given dialogue can move to a higher level in which a burden of proof discussion can take place, and can then move back to the lower level once this metadialogue sequence is terminated. Notice that such a move to a higher level can involve a shift from one type of dialogue to a different type. For example, the initial dialogue might be a persuasion dialogue, but then during the burden of proof interval it may shift to a negotiation dialogue. Once the issue of which side should have the burden proof has been resolved, the argumentation would then shift back to the original persuasion dialogue, and continue where it left off.

## 6. Presumption and Burden of Proof

Presumption is a notion that is closely connected to burden of proof, and the two terms are sometimes even used interchangeably. For example, the burden of proof on the prosecution to prove that the defendant committed the crime alleged is often called the presumption of innocence. However, such a burden of proof is not really a presumption, properly speaking. So what, then, is the difference between the two notions? To approach this question, it is best to begin with some typical examples of presumptions. One common example is presumption of death in law. In order to expedite wills and estates, a court may rule that a person is presumed to be dead if there has been no evidence that he is alive for a fixed number of years. It may be that we can't prove that the person is dead – for example, by finding a body. But we can presume that he is dead, after the prescribed period, and then act on that presumption in order to divide up his estate among the heirs. Another common example is the letter example (Park, Leonard and Goldberg, 1998, p. 103). A legal rule states that a letter properly addressed, stamped, and deposited in an appropriate receptacle will be presumed to have been received in the ordinary course of the mail. Unless the presumption created by this rule is rebutted, the properly addressed, stamped, and deposited letter will be deemed to have been received in what is considered to be the ordinary amount of time needed in that delivery area.

Using these two examples, it can be shown how the two concepts of burden of proof and presumption can precisely be distinguished. Burden of proof is a global factor that pertains to a whole dialogue, and can affect all four stages. Presumption is a speech act

that fits in between assertion and assumption, and other speech acts that are used by both parties to a dialogue at the argumentation stage. It is vitally important to draw a three-way distinction among three of these speech acts, those of assertion, assumption and presumption, and contrast them with the speech act of putting forward an argument. When you make an assertion, you are obliged to offer justification for it, or retract it. You are free to make an assumption at any time, even if it can't be proved, or even if you and others know it is false. When you make a presumption, you are not obliged to offer a justification for it, but you are obliged to give it up if the other party can disprove it. Those familiar with fallacies will immediately see the connection with the *argumentum ad ignorantiam*. You presume that something is true without having to prove that it true, but you do have to retract it if the other party can prove it is false. Table 1 summarizes the key properties of these speech acts. As opposed to a positive burden to show a proposition is true there is a negative burden of showing the proposition is not false.

Table 1: Properties of Speech Acts Relating to Presumption

Speech Act	Goal	Precondition	Definition	Burden	Effect
Assertion	To put forward a claimed proposition for assent	Can be made at any appropriate point	Commits speaker to holding the proposition as true	Must justify (give an argument in support) or retract	Proposition added to speaker's commitment set
Assumption	To see where it leads by a chain of argumentation	Can be made at any appropriate point	No need for commitment to truth or even plausibility	No burden of proof	Respondent must accept it if it is relevant
Presumption	To secure tentative assent	Practical need to move forward in absence of proof	Commits speaker to holding a proposition as not false	Negative burden of showing the proposition is not false	Respondent must accept for now unless he can show falsity
Argument	To gain commitment by offering reason to accept	Doubt by the other party that can be addressed by offering reasons	Offering premises in support of the truth of the conclusion	Must defend the argument if attacked, or retract it	Helps move speaker's side forward to meeting burden

In the presumption of death example, the court cannot prove that the missing person is dead, but has some negative evidence to support that proposition, and has no positive evidence that proves it is false. If that proposition were to be asserted, or to be argued for in an attempt to prove it, either of these speech acts could easily fail if challenged. However, the proposition can be presumed as a tentative basis for action, until such time as new evidence comes in showing that it is false. In the letter example, the sender may not be able to prove that the addressee received it, but unless he can prove that he did not receive it, she can put forward a presumption that he did, as part of her argument in the case, and the court will tentatively accept it.

We can see in such cases how presumption is so closely connected to burden of proof. The presumption shifts a burden to the other side to disprove it, or the proposition



becomes lodged into place as a commitment of both sides. This shifting takes place at a local level, and it can be reversed at a later point in the argumentation stage. But it puts in place a mechanism for tentative acceptance of the proposition to help the dialogue move ahead towards its goal. This property is typical of presumptions. We use them to help a dialogue move ahead towards resolving a conflict of opinions on a burden of proof basis, even though we lack knowledge of a kind that would provide us with certainty, or with enough evidence to resolve the issue by proving one side's claim true or the other's false.

According to the theory of the speech act of presumption in (Walton, 1992, pp. 278-282), there are four conditions governing this speech act in a dialogue. *A* is the proposition that is contained in the presumption. The preparatory condition states that a proponent and a respondent are engaged in a dialogue in which *A* is a relevant assumption. The placement condition states that *A* is brought forward for acceptance by the proponent who made the presumption, that the respondent has an opportunity to reject *A*, and that until he rejects it, *A* becomes a commitment of both parties. The retraction condition permits the respondent to retract commitment to *A* at any point in the following dialogue, provided that he can give evidence to support such a rejection. The burden condition states that at any given point in the dialogue, the proponent has the burden of showing that assuming *A* has some practical value in moving the discussion forward, and that the respondent must let the presumption stay in place as long as it is useful.

This dialectical theory is only one type of analysis of the concept of presumption. The notion is controversial and slippery, both in law and everyday argumentation. Here we have just presented enough about the concept of presumption to enable us to draw some rough and preliminary but useful distinction between it and the concept of burden of proof. The reader is free to choose another analysis of either concept, but needs to be aware of the potential for confusion that can be caused by failing to clarify them.

## 7. Analyzing the Three Examples

We now turn to a discussion of the problem cases that were presented in section 1. The first example was the debate from the Canadian House of Commons in which the questioner requested that the government minister prove that depleted uranium is not being used for other than peaceful purposes. The minister replied that he was satisfied, on the basis of the available information, that the treaty is being respected. This reply is essentially an argument from ignorance. The minister replied that he had looked for any weaknesses in the treaty and found none. From this premise he drew the conclusion that there are none, and inferred that the treaty is being respected. He even tried to use more aggressive burden shifting strategic maneuvering by asking the questioner to come forward with allegations of a more specific kind. However, at that point in the dialogue, another opposition member shouted that he should do a proper investigation, thereby attempting to shift the burden of proof back to the government representative to collect more evidence. Thus here we have a classic case of a dispute about burden of proof.

The problem in this case is that the rules for Canadian parliamentary debate do not define burden of proof precisely, and it is left up to the Speaker of the House to rule on such a dispute. What tends to happen in such a case is that the argument passes on to some different issue, and the Speaker does not intervene on the burden of proof dispute one way or the other. The problem is left up to the public, who are presumably watching

the debate, to determine which side has the better argument, by judging on which side the burden of proof lies. In analyzing and evaluating such a case, however, the normative framework of burden of proof set out in this paper above can be applied, showing how the burden of proof shifts back and forth during these strategic maneuvers. Still, the problem is that since specific burden of proof requirements were not made at the confrontation and opening stages, precise determinations about the burden of proof at the argumentation and closing stages cannot be made. If they had been made, however, they could be used, by also using a metadialogue if necessary, to solve the impasse. Here we have a problem about burden of proof, because the dispute cannot be resolved, and is simply left hanging. It is up to the audience to decide which side won the exchange.

The second case is an easier one in which a clear decision was arrived at by the Supreme Court. It was pointed out by the Supreme Court that the disabilities education act made no statement about the allocation of the burden of proof, and therefore that the normal default rule applied. This means that the ruling automatically followed from the opening and confrontation stage that the parents had the burden of proof. The parents failed to use the potentially strong argument that the school districts have a natural advantage and expertise. But even so, the Supreme Court argued that this exception did not apply in this case because Congress had already obliged schools to share information with parents. The parents put forward the argument that putting the burden of proof on school districts will help to ensure that children receive a free special education for each disabled child. However the Supreme Court, on examining the evidence from the argumentation stage, including the previous trials where this issue had been disputed, concluded that the argument did not provide sufficient grounds for departing from the normal default rule on burden of proof. On our theory, the Supreme Court was looking over all the argumentation that was offered by both sides in the previous trials and using that evidence to arrive at a conclusion about burden of proof, based on the requirements of burden of proof set at the opening and confrontation stages. Unlike the case of a political debate, in a trial at law there are rules that set specific burdens of proof for each type of case that can be used to bring the argument to the closing stage with a definitive ruling on which party met its burden of proof. It is in fact a central feature of our system of law that it allows the trial to function as a device for resolving conflicts of opinions without the possibility of a stalemate arising.

The hardest case is the third one of the Dutch Supreme Court trial concerning the Los Gatos band. The analysis of this case requires the embedding of a metadialogue into the argumentation in the original ground-level argument. The decision of the Dutch Supreme Court was that Holland America had the burden of proof, since they had made it impossible for Los Gatos to explain their reasons for not wanting to play. Prakken, Reed and Walton (2005) have reconstructed the burden of proof debate from this case using a formalized protocol for burden of proof dialogues. The protocol is formulated as a formal dialogue game with commitment rules that define the preconditions and post conditions of the speech acts used by both parties in the dialogue. The type of dialogue is that of a persuasion dialogue, and hence a basic persuasion protocol is used in which the burden of proof is hard-wired into the system. Relevance is defined in terms of the dialectical status of a move, which is in turn recursively defined by the nature of the replies to the move. A move is said to be *in* if it is surrendered or if all of its attacking replies are *out*, meaning that a move without replies is *in*. A move is *out* if it has an attacking reply that is *in*.

Finally, a move is *definitely in* or *definitely out* if it is in or out and its status cannot change anymore. Another requirement is that a move is *surrendered* if it is an argument move and it has a reply saying that the argument is conceded or if it has any surrendering reply. These rules enable us as critics to determine by looking at the argumentation stage in any given case how a move is in or out, and how each subsequent move becomes in or out based on the rules and on the previous moves. Using this formal dialogue protocol Prakken, Reed and Walton (2005) presented the following reconstruction of the burden of proof debate from the Los Gatos case. *P* is the proponent in the dialogue (Los Gatos) and *O* is the opponent (Holland America). The moves are numbered, and the speech acts at each move are labeled in a way that indicates what type of move is made. The target of a move, the move to which it was addressed, is shown in the second column. The metadialogue of the Los Gatos case is from (Prakken, Reed and Walton, p. 122) presented in table 2 as a profile of dialogue (Krabbe, 1999).

Table 2: Embedded Metadialogue in the Los Gatos Case

Move	Target	Speech Act and Content	Effect
P1	nothing	<i>claim</i> dismissal-void	P1 is in
O2	P1	<i>why</i> dismissal-void?	P1 is out, O2 is in
P3	O2	dismissal-void <i>since</i> no pressing-ground	O2 is out, P1 is in
O4	P3	<i>why</i> no pressing-ground?	P3 and P1 are out
P5	O4	no pressing-ground since not-heard	O4 is out, P1 is in
O6	P5	<i>why</i> good-reason-for-refusal?	P5 and P1 are out
P7	O6	<i>why</i> not-good-reason-for-refusal?	P1 is in, O6 is out
O8	P7	<i>BoP</i> (good-reason-for refusal, P), <i>since</i> plaintiff must prove his main claim	P7 and P1 are out, O6 is in
P9	O8	<i>BoP</i> (not-good-reason-for refusal, O) <i>since</i> employer made expressing reasons for refusal impossible	O8 is out, P1 is in
O10	P9	<i>concede</i> <i>BoP</i> (not-good-reason-for refusal, O)	P9 is definitely in, O8 is definitely out, P1 is in

At move O10 the burden of proof dialogue is terminated, so that the transition back to the original persuasion dialogue can be made. The burden of proof dispute having been resolved in this interval, the argumentation in the original case can be carried on. The burden of proof dispute arises when the opponent asks at O6 why there is a good reason for refusal, and the respondent replies at O7 by asking why there is not a good reason for refusal. But then at O8, the opponent invokes the notion of burden of proof, using the normal default rule to argue that the plaintiff must offer a reason to prove his main claim. This means that O6 is now in, and that a good reason for refusal must be provided. The proponent fulfills this *BoP* request by providing such a reason. He argues that the employer made expressing reasons for refusal impossible.

This case shows how a burden of proof metadialogue can be embedded into an original persuasion dialogue, and used to solve a hard problem about burden of proof so

that the original dialogue can continue in a constructive manner towards its goal. In this case, the main issue in the trial was that of burden of proof, and hence the metadialogue reconstructed above is the tool that shows how the dispute in the trial as a whole should be resolved. This case is an especially interesting one, because it shows not only how a dispute about burden of proof can be the main issue in a trial, but also how the best framework for resolving the issue is the embedding of a metadialogue.

## 8. A Solution to the Problem of Burden of Proof

In this section it is shown how the techniques and concepts studied in the previous sections can be put together into a general method for resolving conflicts about burden of proof. It has been shown that there are three kinds of cases. In the first type of case, the dispute can't be resolved by the method (other than hypothetically), because not enough data is given about the argumentation and the context of dialogue in the case. In the second type of case, the dispute can be resolved using the general criteria for setting burden of proof that apply to the case, but without having to use the device of an embedded BoP metadialogue. In the third type of case, the dispute can only be resolved by using a BoP metadialogue. In addition to providing a tool that can be applied to cases, it is shown in this section how the components of the previous sections fit together, providing a general theory of BoP shifts that is a solution to the problem of burden of proof in argumentation of any sort. It is argued, in other words, that the solution applies to all argumentation in which allocation of burden of proof plays a role.

The solution to the problem of burden of proof begins with the recognition that disputes about burden of proof can occur at any one of all the four stages of a dialogue, as shown in figure 3. Most importantly, the global burden of proof is set at the confrontation stage. At this stage, the participants have to decide what type of dialogue they are supposedly engaging in. For example, it might be a persuasion dialogue, a deliberation dialogue or a negotiation dialogue. Let's say it's a persuasion dialogue. At the confrontation stage, it needs to be decided which party has the burden of proving or doubting which proposition. For example, in a persuasion dialogue there can be two types of conflicts of opinions. In the dispute, one party has a designated proposition to prove, while the other party has the burden of proving the opposite proposition. In the type of dialogue called the dissent, one party has the burden of proving a designated proposition, while in order to be successful in the dialogue, all the other party has to do is to cast doubt on the first party's attempts to prove this proposition. At the opening stage, both parties accept procedural and material starting points. For example, supposing it is a legal dispute, one which needs to be resolved by a procedure like a criminal trial. At this stage, each of the parties needs to fulfill its burden of proof by putting forth arguments and other speech acts. In the case of a criminal trial, for example, that standard is one of proving something beyond a reasonable doubt.

At the argumentation stage the local burden of proof can shift back and forth. What is important for regulating burden of proof, and resolving disputes about burden of proof at this stage, is determined by the dialogue rules for different types of speech acts. Centrally important here are the properties of the speech acts relating to presumption, classified in table 1. There is not enough space here for discussing the relationship between burden of proof and presumption in detail, but it needs to be seen that the speech act of

presumption, as well as the related speech acts of assertion, assumption and argument, are the central ones to be considered in many of the most common kinds of cases of disputes about burden of proof. The normal default rule<sup>6</sup> works at this local level, just as it does at the global level, for certain speech acts. For example, if I make a claim, I immediately incur a burden of proof to provide some justification for the proposition asserted by the claim, or I must retract that proposition. However, as indicated in table 1, the requirements for the speech acts of presumption and assumption are different. The problem in evaluating any given case is to determine the type of dialogue, and then examine the local argumentation to determine the requirements for each move in the dialogue, where each move fits a type of speech act.

Problems with burden of proof are also very common at the closing stage of the dialogue. At this stage the problem that commonly occurs in connection with an argument from ignorance is called the closed world assumption in artificial intelligence. This assumption poses the question of when a dialogue can be closed off on the grounds that the search made for information or knowledge during the argumentation stage of the dialogue has been complete enough to prove what is required to be proved. Making such a decision requires not only having set an initial burden of proof at the confrontation and opening stages, but also scanning through the argumentation stage to see if the argument put forward by the one side or the other is strong enough to meet its requirements. It is this question that determines whether closure of the dialogue is appropriate or not. This too is a common issue about burden of proof that can be disputed.

Now if we look at the breach of contract case, we can see how the setting of burden of proof applies to all four levels, and how the burden of proof plays an important role at all four. As well, this case illustrates very clearly how the distinction between local and global burden of proof, and the relationship between the two, is fundamentally important to understanding how burden of proof works in any given case. As noted in section 4, rules of evidence in a trial require clear agreement on matters of burden of proof at the outset. For example, if the case is a civil trial, the standard of proof is one of preponderance of the evidence, meaning that the burden is fulfilled by the party who has the stronger argument, on balance. In order to win the verdict, Bob has to prove that Alice is guilty of breach of contract. The elements of his argument are shown on the right of the *Araucaria* diagram for the breach of contract case underneath the proposition that Alice is guilty of breach of contract. Alice has to show that the contract was not valid. This proposition is displayed in the diagram as the one in the darkened box on the left. Once it has been agreed at the opening and confrontation stages that the global burden of proof has been set up in this manner, the dialogue can then proceed to the argumentation stage, where both parties present their arguments. Both sides have to prove the elements (components) of their claims as shown in the diagram. Since Bob made the claim that Alice committed breach of contract, the default rule means that he must prove that claim in order to win the verdict. But at the local level, during the argumentation stage the burden will shift to Alice's side to respond to Bob's argument, once it is given, or otherwise Bob wins by default. Such a legal case of argumentation in a trial illustrates very well how the burden of proof can shift back and forth during the argumentation stage, depending on the prior moves made by each party. Thus this case, brief as it is,

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<sup>6</sup> The normal default rule is that the the pleader who brought forward the claim generally has the burden of proving it. In terms of table 1, this rule could be classified as a default rule for assertions.



illustrates very well how burden of proof works at all four stages of a critical discussion type of dialogue, as shown generally in figure 3.

In this paper, a general framework for analyzing burden proof as a fundamental concept of argumentation theory has been built out of the components presented in the body of the paper. It is also shown that central problems on how to resolve burden of proof issues can be solved in this framework. These are significant positive results, given the current lack of precise theoretical knowledge about burden of proof. By linking burden of proof to metadialogues, both subjects of research have been moved forward. Krabbe's demarcation problem of deciding which moves belong to the ground level and which to the metalevel have been solved, at least as far as burden of proof is concerned. The problem of when it is appropriate to shift back and forth between a ground level and a metalevel have been solved, by using the device of the four stages of a dialogue, and the other tools presented. Even more significantly, the serious problem of the blockage of a dialogue at ground level posed by endless back and forth arguments from ignorance has been solved. Not all burden of proof impasses can be solved, as shown by the political debate example, but the legal examples show that if requirements for burden of proof are properly set at the confrontation stage, and other procedural requirements are set at the opening stage, such an impasse can be broken through by moving to a burden of proof metadialogue.

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#### Abstract

In this paper, a solution to the problem of analyzing burden of proof in argumentation is developed by building on the pioneering work of Erik C. W. Krabbe on metadialogues.

Three classic cases of burden of proof disputes are analyzed, showing how metadialogue theory can solve the problems they pose. The solution is based on five dialectical requirements: (1) global burden of proof needs to be set at the confrontation stage of a dialogue, (2) there need to be special mechanisms for resolving disputes about burden of proof at all four stages of the dialogue, (3) they are especially significant during the argumentation stage, where burden of proof often shifts back and forth at each move, (4) such local shifts need to be partly regulated by the global burden of proof already set, and (5) the connection between burden of proof and the speech act of making a presumption in a dialogue needs to be clarified.

Key Words: hierarchical metalanguages; dialectical shifts; legal argumentation; presumption; speech acts; burden of persuasion; evidence and proof; deadlocked dispute; metalogic of arguments.