

BURDEN OF PROOF IN DELIBERATION DIALOGS

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Abstract

The literature in argumentation and artificial intelligence has distinguished five types of burden of proof in persuasion dialogs, but there appears to have been no serious investigation so far on how burdens of proof should be modeled in deliberation dialogs. The work in this paper is directed toward filling that gap by extending existing formal models of deliberation dialog to analyze four examples of deliberation dialog where burden of proof is at issue or poses an interesting problem. The examples are used to show (1) that the eight stages in the formal model of Hitchcock, McBurney and Parsons (2007) need to be divided into three more general stages, an opening stage, an argumentation stage and a closing stage, (2) that deliberation dialog shifts to persuasion dialog during the argumentation stage, and (3) that burden of proof is only operative during the argumentation stage. What is shown in general is that deliberation is, in the typical type of case, a mixed dialog in which there is a shift to persuasion dialog in the middle.

Both in argumentation studies as an interdisciplinary domain and in artificial intelligence, the type of dialog that has been most intensively studied so far is that of persuasion dialog. In this type of dialog, there is some claim at issue, and the object of the dialog is to prove or disprove that claim. Deliberation has a different kind of goal. It is to solve a problem about what course of action to take. The problem statement is not a proposition, but a question, called a governing question by McBurney, Hitchcock and Parsons (2007). Examples of these are: 'Where should we go to dinner?' and 'How can we provide all Americans with health care insurance?'. The goal of a deliberation is to find a solution to a common problem. Unlike persuasion dialog, there are no winners and losers. Everyone wins if the dialog is successful. Does burden of proof have a place in this type of dialog? It seems so, because arguments go back and forth in a deliberation dialog, and once an argument is brought forward, like 'Ricardo's is the best place to go for dinner, because their food is organic', it requires evidence to back it up if it is challenged. It appears then that understanding how burden of proof works in it is an important step in the study of deliberation dialog as a form of group decision-making.

There is a growing literature on burden of proof in argumentation (Kauffeld, 2003) and in work on formal dialog models in artificial intelligence (Prakken, Reed and Walton, 2005; Prakken and Sartor, 2006, 2007, 2009; Gordon, Prakken and Walton, 2007). Importantly, this work has distinguished several types of burdens in persuasion dialog, as opposed to the widely accepted traditional assumption that there is a single concept of burden of proof. There is also a recent literature on formal models of deliberation dialog (Tang and Parsons, 2006; McBurney, Hitchcock and Parsons, 2007). However,

there appears to be no serious investigation so far on the special problem of how burden of proof should be modeled in deliberation dialog.

The work in this paper is directed toward filling that gap by extending existing formal models of deliberation dialog to analyze four examples of deliberation dialog where burden of proof poses a problem. Based on analysis of the argumentation in these examples, a working hypothesis is put forward. It is that burden of proof only becomes relevant when deliberation dialog shifts, at the beginning of the argumentation stage, to a persuasion dialog. The hypothesis is that the shift can be classified as an embedding of one type of dialog into another, meaning that the goal of the first type of dialog continues to be supported once the transition to the second type of dialog has been made (Walton and Krabbe, 1995, p. 102). In other instances, it is well known that a shift can be illicit, where the advent of the second dialog interferes with the fulfillment of the goal of the first one. It has also been shown that such shifts can be associated with fallacies, as well as other logical and communicative problems (Walton, 2007, chapter 6).

1. Types of Dialog

A dialog is defined as an ordered 3-tuple $\{O, A, C\}$ where O is the opening stage, A is the argumentation stage, and C is the closing stage (Gordon and Walton, 2009, 5). Dialog rules define what types of moves are allowed (Walton and Krabbe, 1995). At the opening stage, the participants agree to take part in some type of dialog that has a collective goal. Each party has an individual goal and the dialog itself has a collective goal. The initial situation is framed at the opening stage, and the dialog moves through the opening stage toward the closing stage. The type of dialog is determined by its initial situation, the collective goal of the dialog shared by both participants, and each individual participant's goal. The global burden of proof is set at the opening stage, but during the argumentation stage, as particular arguments are put forward and replied to, there is a local burden of proof for each argument that can change. This local burden of proof can shift from one side to the other during the argumentation stage as arguments are put forward and critically questioned. Once the argumentation has reached the closing stage, the outcome is determined by judging whether one side or the other has met its global burden of proof, according the requirements for burden of proof set at the opening stage.

During the argumentation stage of a dialog, two parties (in the simplest case) take turns making moves that take the form of speech acts, like asking a question, making an assertion, or putting forward an argument. Dialog rules define what types of moves are allowed (Walton and Krabbe, 1995). As each party makes a move statements are inserted into or retracted from his/her commitment store. The six basic types of dialog previously recognized in the argumentation literature are persuasion dialog, inquiry, negotiation dialog, information-seeking dialog, deliberation, and eristic dialog. Discovery dialog has been added in new list of the properties of the basic types of dialog in Table 1.

Table 1: Seven Basic Types of Dialog

TYPE OF DIALOG	INITIAL SITUATION	PARTICIPANT'S GOAL	GOAL OF DIALOG
Persuasion	Conflict of Opinions	Persuade Other Party	Resolve or Clarify Issue
Inquiry	Need to Have Proof	Find and Verify Evidence	Prove (Disprove) Hypothesis
Discovery	Need to Find an Explanation of Facts	Find and Defend a Suitable Hypothesis	Choose Best Hypothesis for Testing
Negotiation	Conflict of Interests	Get What You Most Want	Reasonable Settlement 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

On the account given by (McBurney and Parsons, 2001, 4), the properties of discovery dialog and inquiry dialog are different. In inquiry dialog, the proposition that is to be proved true is designated at the opening stage, whereas in discovery dialog the hypotheses to be tested are only formulated during the argumentation stage. A discovery dialog moves through ten stages (McBurney and Parsons, 2001, 5) called open dialog, discuss purpose, share knowledge, discuss mechanisms, infer consequences, discuss criteria, assess consequences, discuss tests, propose conclusions, and close dialog.

Persuasion dialog can be classified as a truth-directed type of dialog, as opposed to deliberation dialog, which is not aimed at finding the truth of the matter being discussed, but at arriving at a decision on what to do, given a need to take action. While persuasion dialog is centrally adversarial, deliberation is a collaborative type of dialog in which parties collectively steer actions towards a common goal by agreeing on a proposal that can solve a problem affecting all of the parties concerned, taking all their interests into account. It may seem initially that we can distinguish between the two types of dialog by saying that deliberation is about actions and persuasion dialog is about the truth and falsity of propositions. However, both deliberation and persuasion dialogs can be about actions, and hence the dividing line between the two types of dialog is not so simple. To determine in a particular case whether an argument in a text of discourse can better be seen as part of a persuasion dialog or a deliberation type of dialog, one has to arrive at a determination of what the goals of the dialog and the goals of the participants are supposed to be. The starting point of a deliberation dialog is a problem to be solved, whereas in a persuasion dialog the starting point is a claim that has to be proved (Walton et al., 2009). The goal of a deliberation dialog is not persuasion. It is to solve the problem posed at the starting point. Deliberation dialog is also different from negotiation dialog, because negotiation deals with competing

interests, and its central role is to resolve a conflict of interests by arriving in a compromise that both parties can live with. In contrast, in a deliberation dialog the participants evaluate proposed courses of action according to standards that may be contrary to their personal interests.

During a sequence of argumentation there can be a dialectical shift from one type of dialog to another (Walton and Krabbe, 1995, 100-116). For example suppose in a debate in a legislative assembly on whether to pass a bill to install a new dam, the participants want to find out things like how the dam needs to be constructed, what its ecological consequences will be, and what it will cost to build it. To answer these questions they might consult experts in engineering and ecology. Here there has been a shift from the original deliberation dialog on whether to build the dam to an information-seeking dialog. In some shifts there is an interruption of the first dialog when the shift occurs, so that the advent of the second dialog is an easily visible break from the line of argumentation in the first dialog. In other cases, the dialog seems to flow smoothly along over the shift so that the second dialog fits nicely into the first. This second type of case, called a dialectical embedding (Walton and Krabbe, 1995, p. 102), is said to occur where there is a productive functional relationship between the two dialogs so that the argumentation in the second dialog enhances the quality of the argumentation in the first. The special concern of this paper is with dialectical embedding of persuasion dialog in deliberation.

Deliberation dialog begins with a problem, and the goal of the dialog is to find a solution to the problem, usually some action to take, typically in a collaborative, not an adversarial context. This process often involves a brainstorming phase in which ideas are put forward that are not yet formulated as proposals that the person who put the idea forward has a commitment to defend. Arguments for and against these ideas can be gathered, with every party providing pro and con arguments for all the alternatives on the table. During this brainstorming phase, parties will put forward con as well as pro arguments for the ideas put forward by other parties. Only later in the deliberation, after the brainstorming phase do parties propose and defend specific solutions. It is during this phase, as we will contend below, that the deliberation dialog shifts to a persuasion dialog.

2. Burdens of Proof in Persuasion Dialog in Law

In law, there is a fundamental distinction between two main types of burden of proof (Prakken and Sartor, 2009). One is the setting of the global burden of proof at the opening stage, called the burden of persuasion. It does not change during the argumentation stage, and is the device used to determine which side has won at the closing stage. The other is the local setting of burden of proof at the argumentation stage, often called the burden of production in law. This burden can shift back and forth as the argumentation proceeds. For example, if one side puts forward a strong argument, the other side must meet the local burden to respond to that argument by criticizing in or presenting a counter-argument, or otherwise the strong argument will hold, helping to fulfill the burden of persuasion of its proponent.

In everyday conversational argumentation, the burden of proof in the case might be more problematic to pin down. In the kinds of examples often used to illustrate arguments and fallacies in critical thinking courses, for example, the given argument may be merely a fragment, and not enough about the context of the discussion may be known in order to determine which side should properly be said to have the burden of proof.

There are also other burdens of proof that can be identified in legal argumentation. Prakken and Sartor (2009, 225) explain the difference between burden of persuasion, burden of production and tactical burden of proof as follows. The burden of persuasion specifies which party has to prove its ultimate statement to be proved to the degree required by its proof standard. The failure to prove the statement results in the loss of the proceeding as a whole for that side. The burden of production specifies which party has to offer evidence to support a claim one has made at some particular point in the proceeding. If the evidence put forward does not meet the proof standard for this burden, “the issue is decided as a matter of law against the burdened party, while otherwise the issue is decided in the final stage by the trier of fact according to the burden of persuasion” (2009, 243). Both the burden of persuasion and burden of production are assigned as a matter of law. The tactical burden of proof is not. It is decided by the party himself, by assessing the risk of losing on that issue if he presents no further evidence. The tactical burden of proof is fulfilled at a given point during the argumentation stage if, when you add up all your arguments at that point, they are sufficient to fulfill your burden of persuasion. In this paper, burden of production and tactical burden of proof are subsumed under the general category of local burden of proof.

In law, in a criminal case, only the prosecution side has the burden of persuasion, and this burden is fixed during the whole trial. In contrast, in a civil case, each side has a burden of persuasion, and each side has to prove its thesis by the standard of the preponderance of evidence. Four standards are formally modeled in the Carneades dialog system (Gordon and Walton, 2009). In Carneades, there are two sides, and there can be pro and contra arguments put forward by each side during the argumentation stage.

- The standard of scintilla of evidence is met if and only if there is one argument supporting the claim.
- The preponderance of the evidence standard is met if and only if the scintilla of evidence standard is met and the weight of evidence for the claim is greater than the weight against it.
- The clear and convincing evidence standard is met if and only if the preponderance of the evidence standard is met and the weight of the pro arguments exceeds that of the con arguments by some specified threshold.
- The beyond reasonable doubt standard is met if and only if the clear and convincing evidence standard is met and the weight of the con arguments is below some specified threshold.

These standards can apply to the burden of persuasion set at the opening stage, or to arguments put forward during the argumentation stage. In either instance, note that the

burden of persuasion is fixed at the opening stage, in contrast to the local burden, which is only operative during the argumentation stage. The local burden requires that when a participant makes an assertion, or makes a claim of any sort, he is required to give sufficient evidence of the right kind to support the claim, to the appropriate standard of proof. If s/he fails to fulfill this requirement, the argument is not strong enough to fulfill its required burden.

3. Three Examples

The first example was a debate in a Rhode Island Assembly on whether or not to bring in no-fault insurance, fully described in Lascher (1999), and cited in more abbreviated form as an example of deliberation dialog in (Walton, 1998, p. 169). One side proposed bringing in a new system of no-fault insurance in Rhode Island, arguing that insurance rates were too high, and that paying the premiums had become burdensome. The goal of both sides was presumably to lower insurance rates if possible. The opposed side argued that the proposed no-fault system would unfairly make good drivers pay for bad drivers, and would fail to lower insurance premiums.

This example initially appears to be one of a deliberation dialog in which two groups engaged in discussion with each other are arguing from what they take to be their common commitments. The point of disagreement is that each side is doubtful that the proposals for action put forward by the other side will fulfill the central goal both agree on. This case looks like deliberation, because there were two sides, for and against, and each used practical reasoning to support its side, often by employing argumentation from consequences. The no-fault side argued, for example, that the change to no-fault insurance would reduce costs of coverage. The opposed side argued, for example, that no-fault unfairly makes good drivers pay for bad drivers. In this case, each side put forward some general or global action that it advocated. The no-fault side advocated changing to a no-fault system. The opposed side argued for retaining the status quo.

The second example is also argumentation based on a practical need to take action, and therefore also appears to be a case of deliberation dialog (Wigmore, 1935, 440). For example, if *A*, as he arrives at his destination and steps out of his car to the crowded sidewalk, sees a purse lying there, picks it up, and looks around to see who may have dropped it, suppose that *M* steps up to him, and claims it as his own. At first *A* is in doubt; hence, inaction as to surrendering it. Then he says to *M*, "Prove your ownership." Suppose that *M* makes a statement that is unconvincing; *A* is still in doubt, hence continued inaction. But suppose that *M* describes exactly the contents of the purse; then conviction comes to *A*, and he hands the purse to *M*.

In this example, *A* does not act on the basis of any legal notion or theory of burden of proof, according to Wigmore's analysis. *A*'s decision is an instinctive one of requiring *M* to remove his doubt before he hands over the purse. As long as *A*'s doubt remains in place, *M* does not get the purse. According to Wigmore (1935, 439), doubt and conviction are the two contrasting states of mind of a person who is confronted with a choice of actions. Doubt leads to inaction, whereas conviction leads to action.

The third example concerns a problem that has recently arisen concerning the importation of active pharmaceutical ingredients from overseas. One example cited

concerned imported heparin¹ that was contaminated and that claimed the lives of patients taking pharmaceuticals in which this drug was an ingredient. An energy and commerce committee asked Congress to grant it powers to order recalls of drug products, to block suspicious imports from gaining access to the U.S., and to require foreign firms to divulge data in inspections. One committee member expressed the problem by saying that according to current practice, the Federal Drug Administration (FDA) must show at the border that imported active pharmaceutical ingredients are unsafe. Instead of the burden being on the FDA to prove that the shipment is unsafe, he suggested, it would be better if the company importing the shipment had the obligation to prove that it is safe.² How could this case be analyzed as an instance of deliberation dialog in which there is argumentation on two sides of an issue and burden of proof is involved? Finally, there is a fourth example that needs to be treated at more length because it is especially controversial and problematic.

4. The Precautionary Principle

The precautionary principle was introduced in Europe in the nineteen seventies to give the environmental risk managers regulatory authority to stop environmental contamination without waiting for conclusive scientific evidence of harm to the environment. It is controversial how the principle should be defined, but a rough definition that provides a beginning point for discussion can be framed as follows: if an action or policy might cause severe or irreversible harm to the public or the environment, in the absence of conclusive scientific evidence that harm would not ensue, the burden of proof falls on the side that advocates taking the action. Note that this definition links the precautionary principle to the notion of burden of proof. It is meant to be applied to the formation of environmental policy in cases like massive deforestation and mitigation of global warming, where the burden of proof is ruled to lie with the advocate.

An early application of the principle was to the prohibition of the purging of ship bilge contents into the oceans (Freestone and Hey, 1996). Because of lack of scientific data on the effects of the purging of bilge contents on the oceans, scientific risk assessment of the practice was not possible. The application of the precautionary principle gave regulatory officials the authority to prohibit the practice without waiting for scientific evidence that it could prove harmful to the environment.

Among criticisms of the precautionary principle is the argument that its application could create an impossible burden of proof for marketing new food products or ingredients (Hathcock, 2000, 225). According to this criticism, excessive precaution can lead to paralysis of action resulting from unjustified fear. Some examples cited are the outbreak of cholera resulting from fear of chlorinated water, and the reluctance to

¹Heparin is a highly sulfated glycosaminoglycan widely used as an anticoagulant.

²This example is a paraphrase of a case described in Joseph Woodcock, "Burden of Proof of Safety Must Fall on Drug Manufacturers", *Validation Times*, May, 2008, 1-7. Found Dec. 22, 2008 at http://findarticles.com/p/mi_hb5677/is_5_10/ai_n29445559

permit food fortification with folic acid to reduce the incidence of birth defects for fear of masking vitamin B12 deficiency (Hathcock, 2000, 255). What is especially interesting is that both defenses and criticisms of the precautionary principle link it closely to the concept of burden of proof.

The precautionary principle was adopted by the U.N. general assembly in 1982, and was implemented in an international treaty by the Montreal Protocol in 1987. According to the Rio Declaration of 1992, “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”. In some countries, like the U.S., the precautionary principle is designated as an approach rather than a principle, meaning that it does not have legal status. In other countries, and in the European Union, it has the legal status of a principle, meaning that it is compulsory for a court to make rulings in cases by applying it (Recuerda, 2008).

Critics have argued that the precautionary principle can be used to stop the use of any new food products, because safety cannot be proved with certainty in any case of a new product (Hathcock, 2000, 258). There is also the problem of judging how serious a harm has to be and how likely it is, before the principle can be applied. The principle was originally meant to give regulatory authority to stop environmental contamination, but once made into law, as Bailey (1999, 3) pointed out, it could conceivably be applied to all kinds of activities. Applying the principle to other areas, for example, inventors would have to prove that their inventions would never do harm before they could be marketed to the public (Bailey, 1999, 4).

One of the problems with implementing the precautionary principle is that there are open questions about the standard of proof that should be applied to the side advocating the action or policy question. It would seem that, since the principle is supposed to be applied under conditions of lack of full scientific certainty, a high standard of certainty, like beyond reasonable doubt, would not be appropriate. On the other hand, there are the questions of how serious and widespread the harm needs to be, and how it can be shown that it is irreversible, before the principle should be applied. There is also the question of how it should be judged how much evidence should be given by the advocate of the action to match the perceived seriousness and likelihood of the harm. The principle needs standards of proof for both sides, but the standards of proof that should be required might be expected to vary from case to case.

5. The Formal Structure of Deliberation Dialog

Deliberation always begins with the formulation of a problem about which action to take in a given set of circumstances. The problem is formulated in a governing question of the kind ‘What should we do now?’ The first stage of the dialog comprises both the formulation of the governing question and the circulation of the information about the given circumstances of the decision to be made among all the members of the group. Knowledge of the circumstances is continually being updated and circulated during a typical deliberation dialog, but the collection of data is typically limited by costs, and in particular by the cost of delaying arriving at a decision on what to do. There is always a

tradeoff between arriving in a timely decision on what to do, and the improvement of the deliberation that would be made by collecting more relevant information about the circumstances. This opening stage comprises the first two stages represented in the formal model of deliberation dialog of McBurney, Hitchcock and Parsons (2007, 100) called *open*, *inform*, *propose*, *consider*, *revise*, *recommend*, *confirm*, and *close*.

Open: A governing question, like “Where shall we go for dinner this evening? ”, expressing a need take action in a given set of circumstances, is raised.

Inform: This stage includes information about facts, goals, values, constraints on possible actions, evaluation criteria for proposals.

Propose: Proposals cite possible action-options relevant to the governing question.

Consider: This stage concerns examining arguments for and against proposals.

Revise: Goals, constraints, perspectives, and action-options can be revised in light of information coming in and arguments for and against proposals.

Recommend: Based on information and arguments, proposals are recommended for acceptance or non-acceptance by each participant.

Confirm: The participants confirm acceptance of the optimal proposal according to some procedure. For example, all participants must do so before the dialog terminates.

Close: Termination of the dialog, once the optimal proposal has been confirmed.

An important property of deliberation dialog (McBurney, Hitchcock and Parsons, 2007, 98) is that a proposal may be optimal for the deliberating group but suboptimal for any individual participant. Another feature is that in a proper deliberation dialog each participant must share his/her individual goals and interests, as well as information about the given circumstances. The goal of deliberation dialog is for the participants to collectively decide on what is the optimal course of action for the group.

It is important to note that the temporal progress of a real deliberation is not the same as the normative model of the argumentation that should ideally take place in it. The bringing in of information is not restricted only to the opening stage in real instances.

Deliberation needs to proceed under conditions of uncertainty and lack of knowledge about a complex situation that is constantly changing. For this reason, information about the changing situation needs to be continually updated. An important skill of deliberation is to adapt an initial plan of action to new information that comes in reporting changes in the existing circumstances. There is typically feedback in which the agents who are involved in the deliberation may see the consequences of the actions they have already carried out, and need to modify their plans and proposals by updating in light of the new information. For this reason, deliberation dialog needs to be seen as having an information-seeking dialog embedded into it. It is constantly shifting from looking at the arguments for and against a proposal and taking into account the new information about the changing factual circumstances of the case being considered. At the opening stage, the *inform* function is employed to collect a database of information concerning the circumstances of the given situation, but later additions and deletions to it need to be made during the argumentation stage.

The opening stage also has a brainstorming phase in which ideas are put forward, but not yet as firm proposals that the participant who voiced the proposal is committed to

defending. Nor is he committed to attacking opposed proposals at this point. At this stage, a participant may bring out weak points in a proposal he has articulated, and find strong points in a proposal someone else has voiced. But then at the *revise* phase, there is a shift. At this point, when a party puts forward a proposal, he is advocating it as the best solution to the problem posed in the opening stage. Thus at this point, we are no longer in the opening stage. We are now in the argumentation stage. The argumentation stage also includes the *recommend* phase, but the last two phases in the McBurney, Hitchcock and Parsons model, the *confirm* and *close* phases, are parts of the closing stage of the deliberation dialog.

Now we have divided the eight phases of the McBurney, Hitchcock and Parsons model into three more general stages, there is a problem that arises. In the middle stage, the argumentation stage, each party defends the proposal he or she has advocated as solving the problem set at the opening stage, and attacks the alternative proposals put forward by other parties. In this stage, has there been a shift to a persuasion dialog, even though later on, at the closing stage, the discussion will shift back to a deliberation dialog? Reconsidering the examples might help to answer this question.

6. Analysis of the No-fault Insurance Example

There are two basic types of persuasion dialog, depending on how the burden of proof is allocated (Walton and Krabbe, 1995). In a dispute (symmetrical persuasion dialog) each side has a thesis to be proved. For example, White (a theist) has to prove that God exists while Black (an atheist) has to prove that God does not exist. In a dissent, one party has a thesis to be proved while the other, in order to win, needs only to cast doubt on the first party's attempts to prove her thesis, so that her burden of proof is not met. For example, White (a theist) has to prove that God exists while Black (an agnostic) needs only to cast doubt on White's attempt to prove her thesis, so that her burden of proof is not met. Thus the following propositions follow.

- In a dispute, both sides have a burden of proof. One side has to prove *A* and the other has to prove not-*A*.
- In a dissent, one side has to prove *A* while the other only needs to cast doubt on the attempts of the first side to prove *A*.
- It follows that the standard of proof needed to win must be set at the opening stage.
- In persuasion dialog, burden of proof must be set at the opening stage.

At first sight, the way the burden of proof needs to be organized in the no-fault insurance example seems comparable to a persuasion dialog.

To see whether it is, let us examine some features of the no-fault insurance example. In this example the burden of proof seems initially to be set in a clear way that is unproblematic. Each side has a proposal. The proposal of the one side is the opposite of that of the other. This suggests a dispute about what action to take. One side proposed bringing in a new system of no-fault insurance, while the opposed side was against the no-fault system. This case shows how serious problems of burden of proof can arise during the argumentation stage. Consider the example dialog in table 2.

Table 2: Argumentation in Dialog Format in the No-fault Insurance Example

	No-fault Side	Opposed Side
1	I propose a no fault-system.	On what grounds?
2	The insurance rates are too high under the existing system.	How can you prove that a no-fault system would lower the rates?
3	How can you prove that a no-fault system would not lower the rates?	It's up to you to prove that a no-fault system would lower the rates.
4	No, it's not.	Yes, it is.
5	You made the claim that a no-fault system would not lower the rates.	No I didn't. Where did I say that?
6	Your argument depends on that claim.	Not really, I just know that the rates are too high under the existing system.
7	Unless you can prove that a no-fault system would not lower the rates, your argument fails.	No, you need to prove that a no-fault system will lower the rates.
8	OK, but my reason is that it would lower the rates.	Well then, prove that this claim is not true.

From such examples, we can see that the speech act of making a proposal is very much like the speech act of putting forward an argument in a persuasion dialog, and involves the same problems arising from disputes about burden of proof. The proposal itself can be seen as a claim put forward, with a local burden of proof comparable to that attached to the speech act of putting forward an argument in a persuasion dialog.

The making of a proposal advocates a proposition for action that needs to be supported, if questioned or attacked, by putting forward other propositions that are offered as reasons in favor of accepting the proposal. On the analysis advocated here, these other propositions are linked to the proposition that is the proposal by practical reasoning, including related schemes like argumentation from consequences. Both sides share the common goal of lowering the insurance rates if possible, but the disagreement is about the best way to carry out the goal. One side has put forward a proposal to bring in a new system of no-fault insurance, while the other side argues against this proposal. We are not told whether the other side has a different proposal of its own to put forward. It may be that they have no new proposal and are simply arguing for sticking with the old system until a better one can be found, or perhaps for modifying the old system in some way.

What can we say about the role of burden of proof in such a case? In the way the cases are described above, it would appear that the side who has proposed bringing in the new system of no-fault insurance would have to make a strong enough case for their proposal to show that it is significantly better than the alternative of sticking with the old system. For example if they put forward a series of arguments showing that the new

proposal was only marginally better than the existing system, that might not be regarded as a sufficient reason for making the change to the new system, or regarding it is worth doing. To convince the audience that the new proposal is the best way to move forward in reducing insurance rates, they would have to provide reasons sufficient to show that the new system has advantages over the old system that are significantly worthwhile enough to warrant the cost of making the change. But this conservatism is just another argument from negative consequences (the negative consequence of added costs).

Does each side have a burden of proof to fulfill, set at the opening stage of the deliberation dialog, or can a side win the dialog merely by proving that its proposal is stronger than all the alternative ones, even if it is only slightly stronger? Some might say that this question depends on how the burden of proof was set at the opening stage of the deliberation dialog. Was the deliberation set up in such a way that only the no-fault side has a positive burden to prove its proposal is acceptable, while the opposed side can be allowed not to prove any proposal that it has advocated?

However, a different answer to the question can be given. The answer is that in a deliberation dialog, proposals are put forward only during the argumentation stage. If this is right, burden of proof is set and is operative only during the argumentation stage. If this is so, the question is raised whether burden of proof only comes into play during the argumentation stage. The next question raised is whether the argumentation stage consists of a persuasion dialog. Only when proposals are put forward, during the argumentation stage, does burden of proof come into play. If this approach is right, it suggests that the deliberation has shifted to a persuasion interval during the argumentation stage. These questions can be investigated by taking a closer look at the argumentation used during the argumentation stage of the no-fault insurance example.

Much of the argumentation in the no-fault insurance example fits the argumentation schemes for practical reasoning and argument from consequences (highly characteristic of deliberation). The argumentation scheme in such a case is that for practical reasoning (Atkinson, Bench-Capon and McBurney, 2006). The simplest form of practical reasoning, called practical inference, is represented by the following scheme (Walton, Reed and Macagno, 2008, 323).

Instrumental Practical Reasoning

MAJOR PREMISE: I (an agent) have a goal G .

MINOR PREMISE: Carrying out this action A is a means to realize G .

CONCLUSION: Therefore, I ought (practically speaking) to carry out this action A .

Below is the set of critical questions matching the scheme for instrumental practical reasoning (Walton, Reed and Macagno, 2008, 323).

CQ₁: What other goals do I have that should be considered that might conflict with G ?

CQ₂: What alternative actions to my bringing about *A* that would also bring about *G* should be considered?

CQ₃: Among bringing about *A* and these alternative actions, which is arguably the most efficient?

CQ₄: What grounds are there for arguing that it is practically possible for me to bring about *A*?

CQ₅: What consequences of my bringing about *A* should also be taken into account?

The last critical question is very often called the side effects question. It concerns potential negative consequences of a proposed course of actions. Just asking about consequences of a course of action being contemplated could be enough to cast an argument based on practical reasoning into doubt.

The basic scheme for practical reasoning is instrumental, but a value-based scheme has been formulated by Atkinson, Bench-Capon and McBurney (2005, pp. 2-3).

Value-based Practical Reasoning

- In the current circumstances *R*
- we should perform action *A*
- to achieve New Circumstances *S*
- which will realize some goal *G*
- which will promote some value *V*.

According to this way of defining the scheme, values are seen as reasons that can support goals. The scheme for value-based practical reasoning can be classified as a composite of instrumental practical reasoning and argument from values.

In the account of schemes given in (Walton, Macagno and Reed, 2008), argument from values is seen as a distinct type of argument in its own right.

Argument from Positive Value

PREMISE 1: Value *V* is *positive* as judged by agent *A* (value judgment).

PREMISE 2: The fact that value *V* is *positive* affects the interpretation and therefore the evaluation of goal *G* of agent *A* (If value *V* is *good*, it supports commitment to goal *G*).

CONCLUSION: *V* is a reason for retaining commitment to goal *G*.

Argument from Negative Value

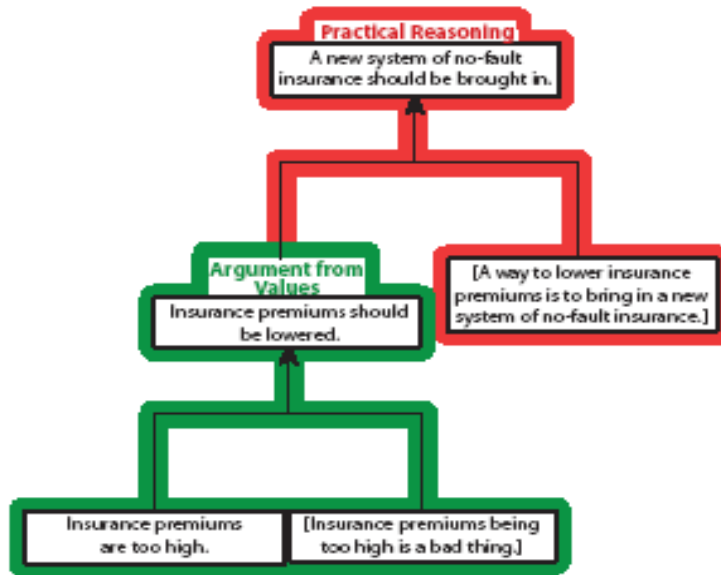
PREMISE 1: Value *V* is *negative* as judged by agent *A* (value judgment).

PREMISE 2: The fact that value *V* is *negative* affects the interpretation and therefore the evaluation of goal *G* of agent *A* (If value *V* is *bad*, it goes against commitment to goal *G*).

CONCLUSION: *V* is a reason for retracting commitment to goal *G*.

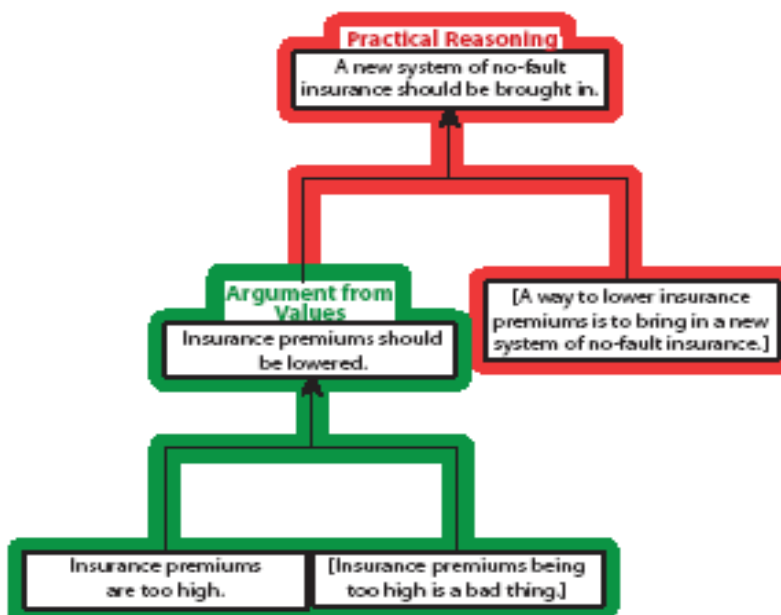
How practical reasoning and argument from values are used by the no-fault side in the no-fault insurance example is shown in the Araucaria diagram in figure 1.

Fig. 1: Practical Reasoning and Argument from Values in the No-fault example.



How practical reasoning and argument from values are used by the opposed side in the no-fault insurance example is shown in the Araucaria diagram in figure 2.

Fig. 2: Practical Reasoning and Argument from Values in the No-fault Example



Finally, we need to see that one other argument is involved in the deliberations in the no-fault insurance example. One side argues that the no-fault system would have bad consequences by making good drivers pay for bad drivers. The opposed side argues that a no-fault system would fail to lower insurance premiums. Both sides agree that lowering insurance premiums is a good thing, and is even the goal both sides are striving for.

To argue that a no-fault system would fail to lower insurance premiums is to argue that such a system would fail to have good consequences. Such an argument is an attack on the practical reasoning of the other side that can be seen as a form of attacking an argument by alleging that it does not have the good consequences it was thought to have. Argument from consequences can take either one of the two following forms.

Argument from Positive Consequences

PREMISE: If A is brought about, good consequences will plausibly occur.

CONCLUSION: Therefore A should be brought about.

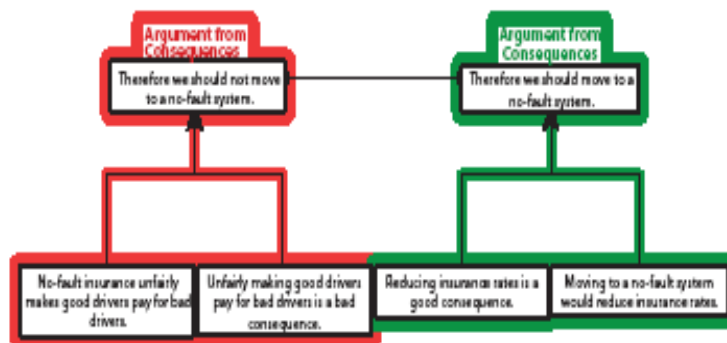
Argument from Negative Consequences

PREMISE: If A is brought about, then bad consequences will occur.

CONCLUSION: Therefore A should not be brought about.

Figure 3 shows how argument from consequences is used by both sides in the no-fault insurance deliberation dialog. The double-headed arrow represents refutation, a relationship in which one claim is used to attack another. The statement in the top box on the right is the proposal of the one side that we should move to a no-fault system. The statement on the same level to the left, shown in the darkened box, is the opposed proposal of the other side, saying that we should not move to a no-fault system.

Figure 3: Argument from Consequences Used by Both Sides in the No-fault Example



Notice that each side uses argument from consequences to support its proposal. On the right side the party proposing that we should move to a no-fault system uses argument from positive consequences, while on the left side the party opposed to moving to a no-fault system uses argument from negative consequences.

How the local burden of proof shifts depends on the arguments that are used to defend the proposals on each side as the argumentation stage unfolds. The argumentation scheme for practical reasoning may be attacked by critical questions that raise doubts, or by counter-arguments. It may also be supported by arguments like argument from values and argument from negative consequences. As the burden of proof dialog above shows, this local burden of proof shifts back and forth during the dialog, depending on the moves and counter-moves made. However, even though the conclusions of the arguments are actions, or at least statements to the effect that certain states of affairs should be brought about or not, it looks like they are arguments that we can analyze and evaluate within the structure of persuasion dialog.

7. Analysis of the Wigmore, FDA and Precautionary Principle Examples

We now turn to the second example, Wigmore's example of the man finding a purse in the street. An explanation of how burden of proof operates in the case can be given by seeing the argumentation as a sequence of dialog. This dialog structure is shown in table 3.

Table 3: Dialog Structure of Deliberation in Wigmore's Purse Example

Round	A	M	A's Commitment
1	A sees purse. What to do?	M claims purse.	Doubt
2	Asks for proof of ownership.	Unconvincing argument.	Doubt
3	A hangs on to purse.	M describes contents [convincing argument].	Conviction [doubt overcome].
4	A hands purse to M.	Dialog concluded.	BoP fulfilled.

As the sequence of dialog represented in table 3 shows, the key factor is how A's commitment to M's argumentation changes during the sequence of moves. When M first claims the purse and A asks for proof of ownership, A is in a state of doubt. Even when an unconvincing argument is presented to him, A remains in a state of doubt. It is only at the third move, when M describes the contents of the purse, that A's doubt is removed. Thus the mechanism whereby the burden of proof is fulfilled, and A is convinced to hand over the purse to M, is the convincing argument presented by M. The reason the burden of proof is fulfilled is because the argument presented by M meets or supersedes the standard of proof required for A to come to accept the proposition that M is the owner of the purse. This sequence can be analyzed as an instance of a persuasion dialog. The proponent claims to own the purse and has the burden of proof.

The person who found the purse is the respondent. They are not deliberating about whether or not to give the proponent the purse, but are taking part in a persuasion dialog about whether or not the proponent owns the purse.

We now turn to the third example. According to one analysis, burden of proof is obviously very important in the right kind of argumentation that should be required to resolve the issue and solve of the problem. According to exponents of this analysis, the example shows that setting the global burden of proof at the opening stage is an important step in solving a problem with deliberation dialog. This decision would imply that there needs to be a classification of different types of deliberations that distinguishes between ordinary deliberations, like those cited in the previous examples, and special deliberations in cases where public policy decisions need to be made about widely important matters like environmental issues where the anticipated outcome may be at a high level in relation to its impact on public safety and where the decision may have potentially irreversible consequences. These could perhaps be classified as public danger cases. The proposal that appears to be put forward by advocates of the precautionary principle is that public danger cases need to be treated as a special species of deliberation dialogs in which the burden of proof is set to an especially high standard of proof right at the outset, i.e. at the opening stage.

According to a second analysis, the deliberation dialog in this case is actually about the issue of setting the burden of proof in a controversial case. On this analysis, the case is an odd one, because the governing question is: on which side should the burden of proof be placed, the FDA or the manufacturers of the pharmaceutical ingredients? Since the dispute itself is about burden of proof, this case does not show that burden of proof in a deliberation type of dialog should be set at the opening stage. It would appear that according to the advocates of the precautionary principle, the burden of proof to be set in cases of environmental deliberation where the anticipated harm may be a high level should be set at the opening stage. According to this analysis, there is no need to create a special class of deliberation dialogs of the public danger type, because if there are serious and widespread consequences that are potentially irreversible, amounting to creating risk of serious public harm, these consequences can be taken into account during the persuasion dialog in argumentation stage. During this stage, argumentation schemes, like practical reasoning and argumentation from negative consequences, will bring out factors of serious and widespread public consequences that are potentially irreversible. Thus, for example, if there is great danger of irreversible harm to the environment from a particular proposal that has been advocated in environmental deliberations, negative argument from consequences can be used to attack this proposal.

This decision about how to deal with the precautionary principle in terms of formal systems of deliberation by dialogical assignments of burden of proof has implications for the criticisms of the principle that it could be applied generally to stop the marketing of any new food products. For those who advocate setting special burdens of proof at the opening stage, the issue becomes one of determining whether a given case, like that of making public decisions on the safety of new food products, can be globally classified as a danger case for not. For those who advocate dealing with the burden of proof locally

at the argumentation stage in all cases, the problem is one of weighing safety against matters of which side has greater access to the evidence, matters of setting reasonable standards of proof for safety under conditions of uncertainty, and balancing these factors against the value of allowing the introduction of new food products that might have valuable public benefits.

8. Conclusions

As suggested by the analyses of the examples above, burden of proof becomes relevant only during the argumentation stage. It is during this stage, when proposals are put forward, and attacked by arguments like argument from negative consequences and argument from negative values, that the need to differentially impose burden of proof becomes operative. For these reasons, it is argued here that no burden of proof should be set at the opening stage of a deliberation dialog. When competing proposals are brought forward during the argumentation stage, the one to be accepted at the closing stage is the one most strongly supported by the evidence brought forward during the argumentation stage. This criterion corresponds to the proof standard called “best choice” by Gordon and Karacapilidis (1997, 15). A choice is said to meet this standard if no other alternative currently has the better arguments. As noted by Atkinson and Bench-Capon (2007, 108), of the five standards of proof set by Gordon and Karacapilidis, the best choice and the “no better alternative” standards apply to deliberation, as contrasted with the other three standards, scintilla of evidence, preponderance of evidence and beyond a reasonable doubt, that apply to persuasion dialog and matters of fact, as opposed to actions. However, it is argued here that the best choice standard of proof is the one a successful proposal needs to meet during the argumentation stage, except at points where a move in the dialog indicates that a different standard is appropriate. This standard is that of the standard of the preponderance of the evidence that is used in persuasion dialog, in that both adopt the standard of a successful proposal (claim) as the one that has more weight supporting it than any other proposal (claim).

In a persuasion dialog, global burden of proof is defined as a set $\{P, T, S\}$ where P is a participant, T is the thesis to be proved by a participant and S is the standard of proof required to make that proof successful at the closing stage. Burden of proof in a deliberation dialog defining the standard of proof required to be met to secure victory for a proposal only comes into play during the argumentation stage of the deliberation, once a shift to persuasion dialog has been made. The standard appropriate for proving it will generally be that of the preponderance of the evidence. To determine whether this standard is met, the argumentation for each of the competing proposals has to be weighed in a comparative manner so that some are judged stronger than others. If there is one that is the strongest, that is the proposal to be accepted, according to the preponderance of the evidence standard set during the argumentation stage.

Support for this approach can be found in a remark of McBurney and Parsons (2001, 420) to the effect that in a deliberation dialog, the course of action adopted by the participants may only emerge during the course of the dialog itself, i.e. during what is

called above in this paper the argumentation stage of the dialog. It is a corollary of this approach that burden of proof in deliberation dialog is operative only at the argumentation stage and works in the same way local burden of proof operates in a persuasion dialog. Once a party has put forward a proposal, he is obliged to defend it, or he can be required to retract it if he is unable to offer a suitable defense.

It is concluded that the burden of proof should not be set more highly against one side than the other in a deliberation dialog, even in the special type of case where serious harm to the public is at stake. The distinction between such a case and the normal case of a deliberation does not need to be drawn at the opening stage, and can be handled perfectly well during the argumentation stage, as shown by the four examples analyzed above. On this model, a deliberation always has the burden of proof set equally during the argumentation stage, so that each side, whatever proposal it puts forward to solve the problem posed by the governing question, has to support its proposal by an argument shown to be stronger than that put forward by the competing side, in order to prove that its proposal is the one that should be accepted. When some evidence of serious irreversible harm to the public is shown to be a possible outcome of a proposal that has been put forward during the argumentation stage, this evidence now becomes a strong argument against the proposal. These factors of serious harm arising as negative consequences of a proposal being considered come out in the argumentation stage, as shown very well in the analyses of the examples presented above using argumentation schemes and other tools widely used in persuasion dialogs.

According to this analysis, in such cases, there is a local burden of proof on both sides during the argumentation stage, but the burdens are distributed unequally. The opponent who alleges that there is serious irreversible harm to the public as a consequence of the proposal put forward by the proponent has to use argument from negative consequences. Because the opponent has put forward this argument, in order to make it plausible, he has to fulfill a local burden of proof to give some evidence to support it. At minimum, his argument has to meet the standard of scintilla of evidence to have any worth in shifting the burden of proof to the proponent's side. Once the burden has shifted, the proponent has to give some evidence of safety to a threshold depending on three factors.

- The first factor is how serious the harm is.
- The second factor is how likely to harm is to occur.
- The third factor is what benefits there may be of the positive action that might be weighed against the alleged harm.

For example, to illustrate the third factor, the proposed action may involve the saving of human lives. This kind of argumentation does involve burden of proof because there is a balance between the two sides. When the opponent puts forward even a small bit of evidence there may be serious irreversible harm to the public as a result of implementing the proponent's proposal, the proponent must respond by meeting higher standard in giving an argument for safety based on the three factors cited above. Such matters of burden of proof come into play only during the argumentation stage, once there has been a shift to persuasion dialog. This kind of argumentation can be

represented adequately by the use of the schemes for practical reasoning, argument from values and argument from consequences, as shown in the example treated above.

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