

## ARGUMENTATION IN THE FRAMEWORK OF DELIBERATION DIALOGUE

Douglas Walton, Katie Atkinson, Trevor Bench-Capon, Adam Wyner and Dan Cartwright

According to argumentation theory, reasoning takes place in different types of dialogue: persuasion dialogue, negotiation, deliberation, information-seeking dialogue, inquiry, and eristic dialogue. These different dialogue types may be nested within one another. Current research in artificial intelligence is building formal models corresponding to each of these types of dialogue and showing how they can be implemented in, for example, multi-agent communications systems. In this paper, we (1) clarify the distinction between deliberation dialogue and persuasion dialogue, (2) survey some recent research in artificial intelligence studying formal properties of deliberation dialogue, (3) present a model of argumentation in deliberation dialogue that has proved to be useful in electronic democracy, and (4) argue that this model provides an attractive alternative to the dominant cost-benefit model of rational argumentation traditionally accepted in economics and other fields as the basis for evaluating argumentation of the kind used in policy decision making.

One of the most important lessons of argumentation theory has been that arguments need to be analyzed and evaluated not only by identifying the logical form of an argument in abstraction from its context of use, but also by paying attention to the purpose for which an argument was supposedly used in a conversational setting. In particular, as we will show in this paper, it is vitally important to distinguish between two different types of conversational frameworks called *persuasion dialogue* and *deliberation dialogue*. As we will show, logical fallacies can easily be committed in the most common kinds of everyday reasoning by failing to take this distinction into account. However, in the artificial intelligence literature, of these two dialogue types persuasion has received far more attention than deliberation (Prakken, 2006), and it is only recently there have been attempts to study the formal structure of deliberation dialogue computationally. Our goal is to move this research forward by presenting a model of deliberation dialogue built on this work, but that also extends it.

Persuasion dialogue is essentially adversarial. The different sides start from different positions and the goal is to win out over the other side by finding stronger arguments that defeat its contention or cast that contention into doubt. Deliberation, in contrast, is a collaborative type of dialogue in which parties collectively steer actions towards a *collective* goal by agreeing on a proposal that can solve a problem affecting all of the parties concerned, taking all their interests into account. As we will show, although persuasion dialogue and deliberation dialogue share many common kinds of arguments, there are certain special species of argumentation that are highly characteristic of deliberation dialogue. These include practical reasoning, often called teleological or goal-directed reasoning, and argument from positive and negative consequences based on values.

Both persuasion and deliberation are centrally important for understanding the argumentation processes at work in global governance. Steering agents towards collective goals without using legal sanctions and the kinds of force that can be employed by nation states obviously requires persuasion. However, we hope to show

that deliberation is equally important. Deliberation can be a solitary process, but on the model presented in this paper, even when it is solitary, it consists of critically examining the pros and cons of a proposed course of action. On this model, therefore, even when deliberation is solitary, when one person tries to deliberate by himself, he is in effect engaging in an internal dialogue by considering and weighing the arguments on both sides of a case to be decided. In the key example we give of deliberation in a town hall meeting, the deliberation explicitly involves a group of agents trying to decide what to do in a situation that requires some sort of collective action. To cover both kinds of cases, we propose a normative model of deliberation that is supposed to represent rational argumentation of a certain sort.

The research reported in our chapter contributes to broadening the conceptualization of argumentation. While we focus on some matters, others are set aside. For example, other chapters in this volume address how ideas are created and diffused through global institutions or how agents use argumentation to shape the interests, interactions, or intentions of other agents in order to promote collective action. We discuss tools which could be used to support these activities; the approach we take is compatible with research in multi-agent systems or social simulation. Similarly, other papers consider a range of social, political, or psychological factors of argumentation, while our work focuses more specifically on the role of values in human reasoning. From our point of view, an understanding of how persuasive, deliberative, or practical reasoning operates in particular contributes to applying it generally.

In terms of the parameters *empirical v. normative* and *ontologically universalist v. ontologically contextualist* which appear in the introduction to this volume, our approach is dynamic and adaptive. While we propose normative argument schemes or dialogical protocols, these can be amended given empirical support; similarly, the schemes and protocols may be universal to argumentation, but these can be contextualized as well. In these matters, theories of argumentation are themselves the subjects of defeasible reasoning and argumentation; this implies that differences from given norms indicate alternative norms or variation within a norm rather than violation. Indeed, by arguing about argumentation, we can more clearly reveal individual and collective agency, background knowledge and presuppositions, and the aspects of argumentation which are shared or not among a group of agents.

Finally, the argumentation support tools which are discussed in the chapter are intended to foster deliberative democracy whereby individuals contribute their opinions on matters of public policy using argumentation schemes, thereby giving a highly articulated view of public justifications for policy decisions. These sorts of consultations are intended to improve argumentation over public policy and to give the public a greater role in collective decision-making.

The chapter is structured as follows. In Section 1 we provide a discussion of the differences between persuasion and deliberation dialogues that highlights the characteristics of each. In Section 2 we introduce the notion of an argumentation scheme and give examples of schemes that can be used within deliberative reasoning. In Section 3 we provide a worked example showing how one of the schemes introduced in Section 2 can be used to capture and model the deliberative reasoning in the example.

In Section 4 we discuss a characterization of deliberation dialogues in accordance with a structured model that makes clear the different stages within such dialogues. In Section 5 we describe how the model of deliberative argumentation put forward can lay claim to being an alternative to the traditional cost-benefit model that was the dominant model of rational decision-making in fields like economics in the past. In Section 6 we turn to look at a more practical application. Here we describe how argumentation schemes have been used in an implemented system for deliberative democracy which is intended to support the gathering and analysis of information in online debates about political issues. We conclude the paper with some final remarks in Section 7.

## 1. Persuasion Dialogue and Deliberation Dialogue

The conversational settings that we consider in this paper apply to both human, as well as agent communication. Models of agent communication have made use of dialogical aspects of discourse theory and informal logic in an attempt to characterize and capture the pragmatic elements of communication. Within such dialogues arguments can play a variety of roles, and these roles determine who needs to accept them. For example, arguments can *justify*, in which case it is enough that the agent making the argument accepts them. Or they can *convince*, when the agent to which the argument is directed must accept them. Or they can be used as part of a problem solving process, in which case all parties involved need to find them acceptable. That arguments can play such different roles in different dialogue types, has implications for what counts as a successful argument in the various contexts. In this section we discuss a particular dialogue typology which characterizes six primary types of dialogue in terms of the initial starting point, the aims of the dialogue, and the goals of the participants. The typology that we discuss has received considerable attention from the agent communication community, see e.g. (Huget, 2003), whereby numerous different dialogue protocols have been developed to characterize the different models of interaction that can take place between agents. Our focus in this paper will be on two specific types of dialogue: persuasion and deliberation, and in particular, their use within computational theories and tools.

In the dialogue typology of Walton and Krabbe (1995), there are six primary types of dialogue: information-seeking dialogue, inquiry dialogue, persuasion dialogue, negotiation dialogue, deliberation dialogue and eristic dialogue. These dialogues are technical artifacts called normative models, meaning that they do not necessarily correspond exactly to real instances of persuasion or negotiation, etc. that may occur in a real conversational exchange. Each model of dialogue is defined by its initial situation, the participants' individual goals, and the aim of the dialogue as a whole. The initial situation of deliberation is the need to choose between two or more different courses of action that are possible in a given situation, and, unlike a persuasion dialogue, the participants should not be committed to any of these courses of action at the outset. The ultimate goal of the dialogue is for the participants to collectively decide on what is the best available course of action for them to take. Both persuasion and negotiation dialogue can also be about action, and therefore we have to distinguish more carefully

among these three types of dialogue. The deliberation dialogue is not centrally an attempt by one participant to persuade another to become committed to a particular proposal, although it is quite common for there to be a shift to persuasion dialogue as reasons for or against a proposed action are supported and criticized. Deliberation dialogue is also different from negotiation dialogue, which deals with competing interests, because in deliberation the participants evaluate proposed courses of action according to standards that may be contrary to their personal interests. An important property of deliberation dialogue is that an action-option that is optimal for the group, *considered as a whole*, may not be optimal from the perspective of any individual participant (McBurney, Hitchcock and Parsons, 2007, 98). In a deliberation dialogue, a participant must be willing to share both his/her preferences and also information with the other participants.

In this paper we focus on the final two dialogue types, deliberation and persuasion since both are centrally important for understanding the argumentation processes at work in issues of global governance. At any level of governance arguments presented to intended audiences must be well justified and hence persuasive. Since decision-making forms such a fundamental part of governance activities, deliberation plays a central role that consists of critically examining the pros and cons of a proposed course of action. The initial situation of deliberation is the need to choose between two or more different courses of action that are possible in a given situation, and, unlike a persuasion dialogue, the participants should not be committed to any of these courses of action at the outset. The ultimate goal of the dialogue is for the participants to collectively decide on what is the best available course of action for them to take. Both persuasion and negotiation dialogue can also be about action, and therefore we have to distinguish more carefully among these three types of dialogue. The deliberation dialogue is not centrally an attempt by one participant to persuade another to become committed to a particular proposal, although it is quite common for there to be a shift to persuasion dialogue as reasons for or against a proposed action are supported and criticized. Deliberation dialogue is also different from negotiation dialogue, which deals with competing interests, because in deliberation the participants evaluate proposed courses of action according to standards that may be contrary to their personal interests. An important property of deliberation dialogue is that an action option that is optimal for the group, *considered as a whole*, may not be optimal from the perspective of any individual participant (McBurney *et al.* 2007: 98). In a deliberation dialogue, a participant must be willing to share both his/her preferences and also information with the other participants.

In a persuasion dialogue, one participant puts forward a thesis to be proved, and the other puts forward an opposed thesis, or else expresses doubt about the first party's thesis. As in all types of argumentation dialogue, there are three main stages, the opening stage, the argumentation stage and closing stage. Persuasion dialogue always arises from a conflict of opinions and the goal is to resolve the conflict of the opening stage by putting forward arguments on both sides at the argumentation stage (Walton and Krabbe, 1995, 79). During the argumentation stage, each party puts forward arguments meant to prove his own designated thesis or to attack the thesis of the other

party. This thesis is set during the opening stage, when the conflict of opinions for the dialogue is identified. In order to prove his or her thesis, the party must only use arguments that have premises that are commitments of the other party. The act of persuasion is defined by this use of argumentation. To persuade the other party of a conclusion, you must use premises that she already accepts, or can be gotten to accept through further argumentation. To accomplish this feat, you must find a persuasive argument that is strong enough to meet the burden of proof set at the opening stage.

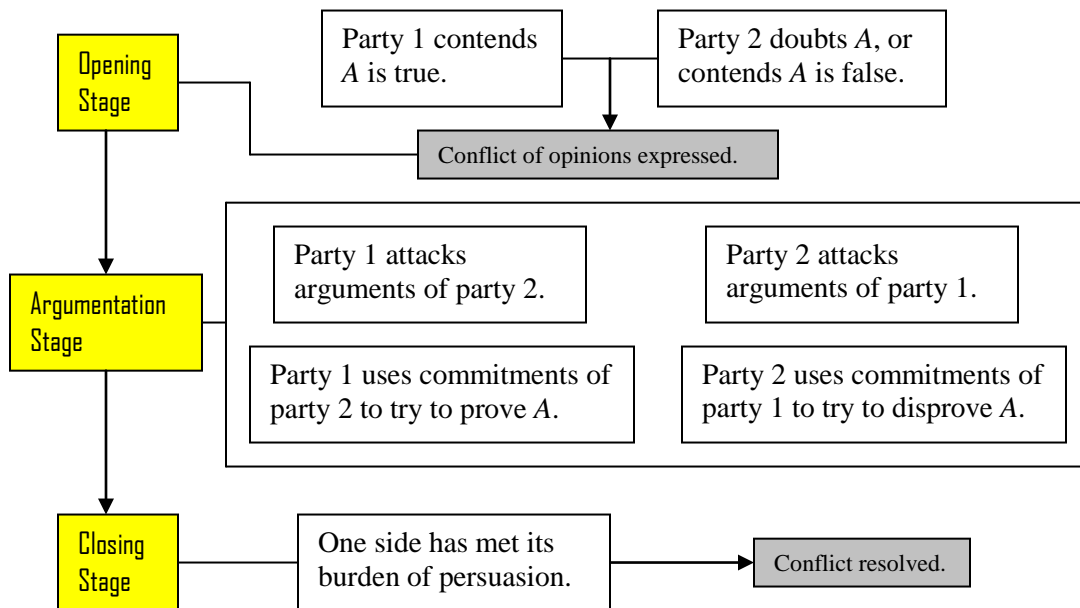


Figure 1: The Three Stages of Persuasion Dialogue

The overarching principle of burden of proof, called the burden of persuasion, the requirement that he who asserts must prove, is set at the opening stage, as shown in figure 1. Meeting the burden of persuasion is determined by three factors: (1) what strength of argument is needed to win the dialogue for a participant at the closing stage (standard of proof), (2) which side bears the so-called burden for producing such an argument, and (3) what kind of argument is required for this purpose. 'Winning' means producing an argument that is stronger enough than the opponent's argument to lift the burden of persuasion set at the opening stage. In contrast to the burden of persuasion that applies over the whole dialogue from opening to closing, there is also the evidential burden (called the burden of production in law) that applies during the argumentation stage when a particular claim is made or a particular argument is put forward. Both burden of persuasion and evidential burden are burdens of proof.

Both deliberation and persuasion dialogues can be about actions, and therefore we have to try to draw a bright line between these two types of dialogue. In deliberation, unlike persuasion, there is no commitment by the participants to a particular proposal, and hence no sense in which they attempt to champion a particular course of action.

There appears to be no burden of proof in a deliberation dialogue, comparable to the central notion of burden of proof in persuasion dialogue, but this matter has so far not been studied. Argumentation in deliberation is primarily a matter of identifying proposals and arguments supporting them and finding critiques of other proposals. Also, a proposal may need to be abandoned if the reasons given against it are strong enough to show that the opposed proposal is better to solve the problem posed at the opening stage, but abandoning a proposal is not losing the dialogue, but progress towards resolution. Deliberation dialogue is different from negotiation dialogue, which deals with competing interests, because the participants evaluate proposed courses of action according to standards that may be contrary to their personal interests, and typically negotiation involves proposal trade-offs and compromises.

When confronting an argument used in a text of discourse, a rational critic needs to decide whether it belongs to one type of dialogue or another, using the evidence from the text as the basis for the decision. Figure 2 (Walton and Krabbe, 1995, 81) offers a key for arriving at this sort of decision.

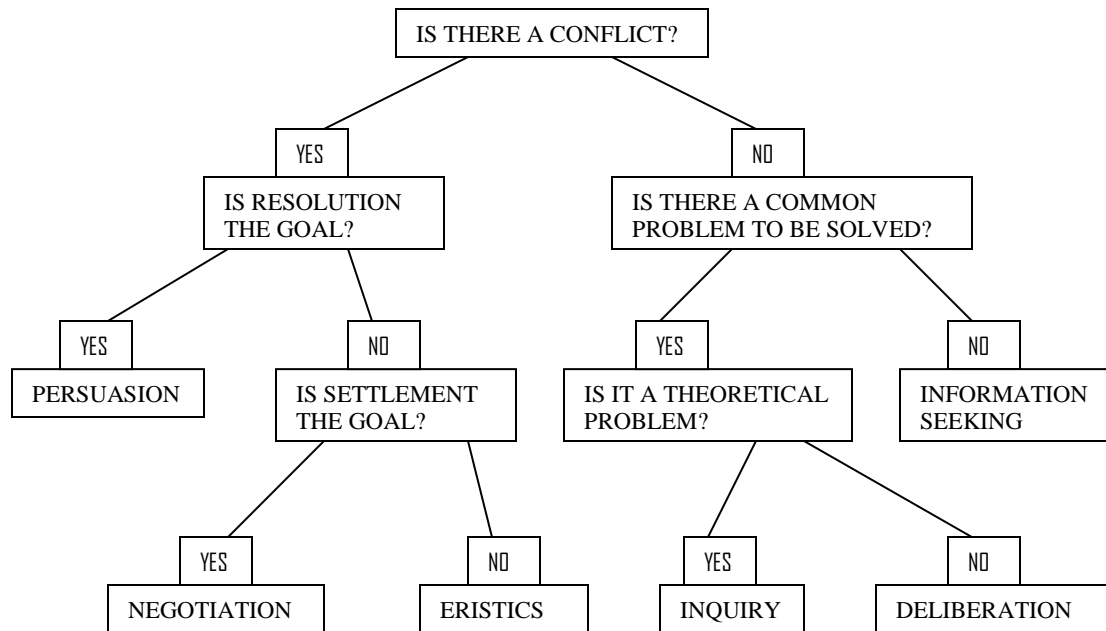


Figure 2: Key for Determining Type of Dialogue in a Case

In some instances it may be difficult to identify the type of dialogue. In everyday conversational argumentation, participants may be unclear, when putting an argument or criticizing it, what type of conversation they are supposed to be engaging in. That is not an insuperable problem however, as the rational critic may make a conditional decision on how to treat the case. The analysis of the argument can be conditional on this assumption. In some special cases however, as shown in section 3, making this decision can be tricky.

What defines a persuasion dialogue is the burden of persuasion set at the opening stage. In a dispute, each side has a proposition to be proved, called its ultimate

*probandum*, and the ultimate *probandum* of the one side is the opposite (negation) of the ultimate *probandum* of the other side. In a dissent, only one side has a proposition to be proved, and the role of the other side is merely to cast doubt on the attempts of the first side to prove its ultimate *probandum*. The difference between the two types of persuasion dialogue can be summarized as follows. In a dispute, both sides have a burden of persuasion, whereas in a dissent, only the one side has a burden of persuasion. In order to fulfill its burden of persuasion, a side has to produce an argument that meets two criteria. It has to be strong enough to meet a standard of proof set at the opening stage of the dialogue, and it has to be based exclusively on premises that are commitments of the other side. Once these goals and requirements are set at the opening stage, the argumentation proceeds through the argumentation stage, where each side puts forward arguments to support its own thesis, and attacks or critically questions the arguments put forward by the other side. The central goal of each side is for each to meet its burden of persuasion, and the dialogue reaches the closing stage when either the one side or the other has done this, or where it is clear that there is no point in continuing the argumentation.

What defines the opening stage of a deliberation dialogue is a situation where a single agent or a group of agents has to make a decision about which course of action to choose in particular circumstances or a choice has to be made. The nature of the problem that defines the opening stage of the deliberation dialogue is that the agent is forced to make a rational choice, because even doing nothing will have significant consequences, and therefore can rightly be seen to constitute a course of action. The subtle point made here is that, in such a case, an omission to act can also count as a species of action. In contrast to persuasion dialogue, in a deliberation dialogue, the origin of the dialogue is not a conflict of opinions about whether some particular proposition is true or not, or whether a particular course of action is desirable or not. It is a problem posed by the need to make a choice between two (or more) different courses of action. Something needs to be done, and the problem is which choice of action is the better, or more prudent, in the given circumstances, taking account of the interests and aspirations of the whole group.

In a persuasion dialogue, the argumentation stage is fairly simple, because basically each side puts forward arguments and critically questions the arguments put forward by the other side. The argumentation stage of deliberation dialogue is more complex (Tang and Parsons, 2006). First, there is an information segment where facts about the particular circumstances are introduced. Second, although the parties to the deliberation need to share goals in order to make it successful, they will also have differing goals. And some of the discourse involves the clarification of goals in relation to the specific circumstances confronted by the parties<sup>1</sup>. Around these intervals, the

---

<sup>1</sup> “Goal” is used here to mean several things: the state of affairs to be brought about, the desirable features of the state of affairs, or the reason why they are desirable. For deliberation there must be agreement on at least one of these, but there may be differences in the others. We may agree that it is desirable to go to Paris, although I want to go for the art and you for the food; we may agree that it is desirable to go somewhere with good vegetarian food, although I do so for dietary and you for ethical reasons. The

argumentation stage is dominated by the putting forward of proposals that, it is argued, will solve the problem set at the opening stage. The speech act of making a proposal is somewhat similar to the speech act of putting forward an argument, but is in certain ways also different from it (Walton, 2006).

Once all the interested parties have made their proposals, the deliberation dialogue takes a form somewhat similar to that often seen in the persuasion type of dialogue, where the parties put forward criticisms and attacks<sup>2</sup>. During this segment, there is quite often a shift to persuasion dialogue, as the reasons for and against a proposal are critically examined in light of the circumstances of the case and the goals of the parties who are involved, and indeed parties may decide that they prefer a proposal and so commit themselves to its acceptance. During this segment, proposals are modified in light of these criticisms. As each proposal is refined in light of criticisms, and strengthened or weakened in relation to taking goals and circumstances into account, it may become evident to the group that one proposal is stronger than the other, or that some proposals are unacceptable to one or more members of the group.

The argumentation reaches the closing stage when there has been acceptance by the group of one proposal has being stronger than its alternatives. There can be different kinds of methods for determining acceptance. For example, the participants in the deliberation may have a vote, and a majority vote will then close the dialogue.

Typically, deliberation dialogues relate to a choice of actions rather than the truth of some proposition. The co-operative determination of the truth of a proposition is more the concern of inquiry dialogues (Black and Hunter, 2007). The concern with action does not serve to distinguish them from persuasion dialogues however, which may relate either to persuading someone to do something or to believe something. The concern with action does, however, mean that deliberation dialogues are dominated by argumentation schemes relating to practical reasoning, whereas these schemes form only a part of persuasion dialogues. In the next section, we will introduce several schemes designed to support practical reasoning and which are therefore important for deliberation.

## 2. Argumentation Schemes

Argument from consequences, as illustrated above, is a form of reasoning that cites the consequences of a proposed course of action as a reason for or against taking that course of action. The two basic argumentation schemes for arguments from consequences can be found in (Walton, 1996, p. 75). A represents a state brought about by an agent.

---

problem that we are trying to solve may be in terms of states of affairs, goals or values, depending on where our basis of agreement and cooperation lies.

<sup>2</sup> The relation to persuasion is clearest when one of the parties plays “devil’s advocate”, or champions a proposal. Here a commitment is pretended for the sake of the discussion.



*Argumentation Scheme for Argument from Positive Consequences*

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

CONCLUSION: A should be brought about.

*Argumentation Scheme for Argument from Negative Consequences*

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

CONCLUSION: A should not be brought about.

According to (Walton, 1996, pp. 76-77), three critical questions match each scheme.

CQ1. How strong is the probability or plausibility that these cited consequences will (may, might, must) occur?

CQ2. What evidence, if any, supported the claim that these consequences will (may, might, must) occur if A is brought about?

CQ3. Are there negative (respectively, positive) consequences that ought to be taken into account?

Argumentation from consequences, in its most common form, is inherently defeasible. Such an argument, once put forward in a deliberation dialogue, gives a reason to accept the conclusion tentatively, subject to exceptions or counter-arguments that may be advanced by the other side as new circumstances become known. The conclusion has a presumptive status, once positive or negative consequences are cited as reasons to support the proposed action. However, such an argument is cast into doubt if any one of the critical questions above is asked. The presumptive status of the original argument is only restored if an appropriate answer to the critical question is given. Also, a given argument from consequences can be stronger or weaker, given the further argument used to support it, or the opposing arguments or critical questions used to attack it.

As shown by the no-fault insurance example, argument from consequences is closely related to the argumentation scheme called practical reasoning.

*Simplest Scheme for Instrumental Practical Reasoning*

MAJOR PREMISE: I 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.

*Critical Questions*

CQ<sub>1</sub>: What other goals do I have that should be considered that might conflict with G?

CQ<sub>2</sub>: What alternative actions to my bringing about A that would also bring about G should be considered?

- CQ<sub>3</sub>: Among bringing about A and these alternative actions, which is arguably the most efficient?
- CQ<sub>4</sub>: What grounds are there for arguing that it is practically possible for me to bring about A?
- CQ<sub>5</sub>: What consequences of my bringing about A should also be taken into account?

It can be seen from CQ<sub>5</sub> that argumentation from consequences is closely related to the scheme for practical reasoning.

It has often been disputed in philosophy whether practical reasoning is purely instrumental or whether it needs to be based on values. Value-based practical reasoning is well explained by (Bench-Capon, 2003) and (Atkinson, Bench-Capon and McBurney, 2006). Argument from values is combined with practical reasoning in the type of argumentation called value-based practical reasoning (Bench-Capon, 2003; Atkinson, Bench-Capon and McBurney, 2006). The following argumentation scheme for value-based practical reasoning is the one given in (Atkinson, Bench-Capon and McBurney, 2005, pp. 2-3).

#### *Scheme for 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. As clearly shown in the no-fault insurance example, arguments from positive and negative consequences are also based on values. Classifying consequences as good or bad, positive or negative, depends on some prior assignment of values. Like the other argumentation schemes, this scheme is associated with a number of critical questions. The complete list of sixteen is given in (Atkinson *et al.*, 2006). We will use three in an example in a later section. These are:

- Will the action achieve the new circumstances?
- Will the action demote some other value?
- Is there another action which will promote the value?

Having now identified argument from consequences and its variants as reasonable forms of argumentation commonly used in deliberation, we must now turn to an important subtlety. Argument from consequences (*argumentum ad consequentiam*) has also been cited as a logical fallacy in logic textbooks. Rescher (1964, p. 82) cited the following classic example.

#### The Mexican War Example

The United States had justice on its side in waging the Mexican war of 1848. To question this is unpatriotic, and would give comfort to our enemies by promoting the cause of defeatism.

In this instance, argument from consequences is classified as a fallacy on the ground that it is not relevant to the conflict of opinions in a persuasion dialogue on the issue of which side was in the right in the Mexican war of 1848. Rescher (1969, 82) classified the argumentation this example as a fallacy of relevance. It may indeed have been true that saying the United States had justice on its side in waging the Mexican war of 1848 would give comfort to our enemies by promoting the cause of defeatism would have bad consequences for the national interest. Or this point could be granted in the context of the example. But is such a claim relevant to the issue of which side was in the right? The answer we propose here that it is not, because there has been an illicit shift from the original persuasion dialogue, relating to the justice or otherwise of the war, to a deliberation dialogue concerning whether it is prudent to question the justice of the war in a situation where giving comfort to our enemies by promoting the cause of defeatism would be a negative consequence that should be avoided if possible.

### 3. The No-fault Insurance Example

The first account of all the structural characteristics of deliberation as a type of dialogue contrasted with persuasion dialogue was presented in (Walton, 1998, chapter 6). The simplest and most useful type of example for study cited is that of the town hall meeting. The example given (Walton, 1998, 169-171) is that of a meeting assembled to make a decision on whether or not to bring in no-fault insurance in a state.<sup>3</sup> The problem to be addressed was the perception that insurance rates were so high that they had become burdensome for the average citizen in this state. The general perception was that this problem needed to be solved by changing to a no-fault system of auto insurance. In this case, the choice to be made was clear at the opening stage of the deliberations. It was basically a choice between staying with the existing system or moving to a no-fault system. Basically, the argument of those supporting the move to a no-fault system was that it would solve the problem by reducing insurance rates. The advocates of staying with the existing system put forward opposing arguments. We now consider this example in terms of the value-based argumentation scheme and its critical questions. To begin, the proponent of the argument for the introduction of the no-fault system can instantiate the scheme as follows, giving rise to Arg0:

---

<sup>3</sup> This example is based on the much longer case study of a real town hall meeting in (Lascher, 1999).

Arg0: Currently<sup>4</sup>, we should introduce no-fault insurance to reduce premiums. This will achieve the goal of premiums not being burdensome<sup>5</sup>, promoting the value of affordability.

Opponents of no-fault insurance can pose several critical questions against this argument. For example, they may deny that the action will have the intended consequences:

Arg1: Currently, introducing no-fault insurance would not reduce premiums since the ability to sue for pain and suffering will be left intact.

A second critical question that can be posed is that the action should not be performed since it would demote some other, presumably more important, value:

Arg2<sup>6</sup>: Currently, we should not introduce no-fault insurance since good drivers will pay for bad drivers. This would bring about cross-subsidization, demoting the value of fairness.

A third critical question might propose a different way of achieving the value of affordability:

Arg3<sup>7</sup>: Currently, we should encourage competition to reduce premiums. This will achieve the goal of premiums not being burdensome, promoting the value of affordability.

We must now consider the status of all the arguments put forward in this debate. For Arg0 to be acceptable, Arg1 must be defeated since it claims that the desired consequences of Arg0 will not follow. To rebut such an argument, we might point to cases in which the introduction of no-fault insurance had led to lower premiums. For example:

Arg4: When no-fault insurance was introduced in Location L premiums fell by 10%.

The relationship between the arguments can be show diagrammatically, as in Figure 3, where arguments are represented as nodes, and attacks between them as arrows.

---

<sup>4</sup> Since the circumstances are not in dispute and are the same for all instantiations of the argumentation scheme we will simply write 'currently' for this premise.

<sup>5</sup> This illustrates the importance of distinguishing the situation realized from goals. The cost could be made less burdensome (the goal realized) in several ways other than reducing premiums: for example by granting tax relief on premiums. We do not present arguments to this effect, as we assume that such fiscal measures are *ultra vires* for our deliberating body.

<sup>6</sup> This has strong resemblance to the *argument from negative consequences*, but additionally indicates why the consequences are negative by pointing to the value demoted.

<sup>7</sup> This has strong resemblance to the *argument from positive consequences*, but additionally indicates why the consequences are positive by pointing to the value promoted.

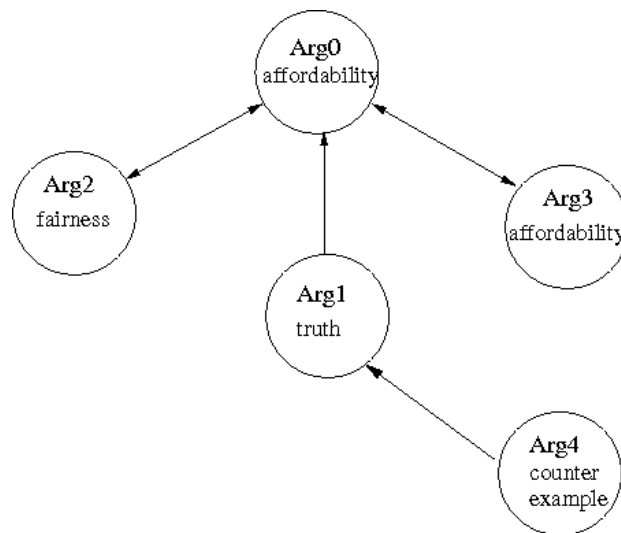


Figure 3: Graphical Representation of Arguments and Attacks in the Example.

The conflict between Arg0 and Arg2 needs to be resolved<sup>8</sup> differently from the one between Arg0 and Arg1; it will depend on the subjective preferences of the parties concerned, which are shown on the nodes in the graph in Figure 3. If the value fairness is preferred to the value affordability, Arg2 will cause Arg0 to be rejected. Given the opposite preference, Arg0 can be accepted with the reduction of fairness seen as unfortunate but inevitable. Bringing Arg3 into consideration however, offers a way in which affordability can be promoted without compromising fairness, since it is not attacked by Arg2. Of course, further arguments against Arg3 might be produced so that the value preference would again become crucial. On the basis of the arguments we have presented however, the rational conclusion would be to reject no-fault insurance and rely on competition to reduce premiums.

#### 4. The Structure of Deliberation Dialogue

In the formal model of deliberation dialogue presented by McBurney, Hitchcock and Parsons (2007, 100), a deliberation dialogue consists of eight stages.

**Open:** In this stage a governing question is raised about what is to be done. A governing question, like ‘Where shall we go for dinner this evening?’, is a question that expresses a need for action in a given set of circumstances.

**Inform:** This stage includes discussion of desirable goals, values, constraints on possible actions, evaluation criteria for proposals, and determination of relevant facts. Staying with the example of where to go for dinner, an example goal would be that the

<sup>8</sup> Frameworks for representing and resolving conflicts between arguments based on value have been formally described and investigated since their introduction in (Bench-Capon, 2003). We omit the formal details here.

restaurant is near a station, and an example value would be that the restaurant is inexpensive.

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

**Consider:** this stage concerns commenting on the proposals from various perspectives.

**Revise:** goals, constraints, perspectives, and action-options can be revised in light of comments presented and information gathering as well as fact-checking.

**Recommend:** an option for action can be recommended for acceptance or non-acceptance by each participant.

**Confirm:** The participants can confirm acceptance of the recommended option according to some agreed procedure. For example, all participants must do so before the dialogue terminates.

**Close:** The termination of the dialogue.

An important property of deliberation dialogue is that an action-option that is optimal for the group considered as a whole may not be optimal from the perspective of an individual participant (McBurney, Hitchcock and Parsons, 2007, 98). In a deliberation dialogue, a participant must be willing to share both his/her preferences and also information with the other participants. The initial situation of deliberation is the need for action arising out of a choice between two or more competing courses of action that are possible in a given situation. The ultimate goal of deliberation dialogue is for the participants to collectively decide on what is the best available course of action for them, considered as a group, to take.

Our model will follow the general outline of the eight-stage model of McBurney, Hitchcock and Parsons in general outline, but we will distinguish three main stages. On our model, there is an opening stage, a closing stage, and the six other sub-stages in between, in the model of McBurney, Hitchcock and Parsons, are seen as making up the argumentation stage.

Deliberation builds on information that is constantly changing. Indeed, a deliberation dialogue can be seen as having an information-seeking dialogue embedded into it in a certain characteristic way described below. A part of the function of the opening stage (**open** and **inform**) is to collect a database of information concerning the circumstances of the given situation, including a collection of the desirable goals, values and constraints on actions. This database is set at the opening stage, but later additions and deletions to it are made during the argumentation stage.

The main part of the argumentation stage (**propose**, **consider**, **revise** and **recommend**) concerns proposals that are brought forward by the participants and the commenting on these proposals by all the participants. At the same time, interwoven with a discussion of proposals is the continuation of the information function that was begun in the opening stage. As the circumstances change, the factual information is revised. The continuing process of information gathering requires that action options need to be revised in light of new facts and comments presented by the participants. A third stream of the argumentation stage is the recommending of the proposals put forward, or objections made to them, by each participant. The opening and argumentation stages are displayed in figure 4.

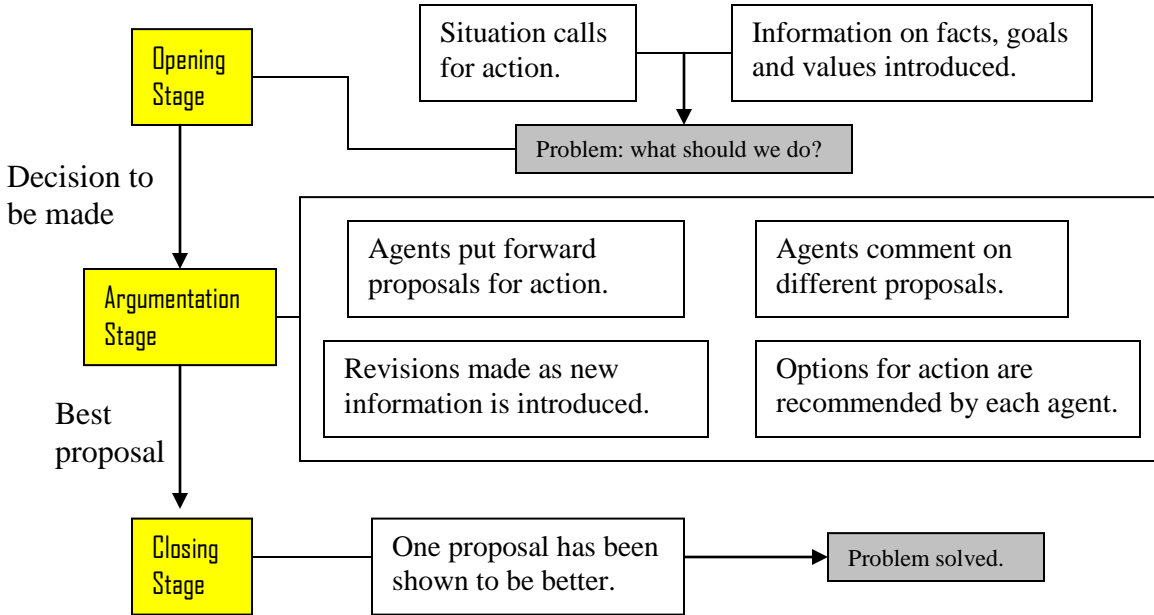


Figure 4: The Three Stages of Deliberation Dialogue

There are two parts to the closing stage of a deliberation dialogue. The first part (**confirm**) is that the participants confirm acceptance of one particular option that has been recommended, according to some agreed-upon procedure. The second part (**close**) is the termination of the dialogue once the decision has been arrived at that one particular proposal is the recommended option because it has been shown to be the best of all the proposals that have been put forward.

#### 5. Contrast with Decision Making Based on Expected Utility

In the traditional model of decision-making alternatives are stated and the expected costs and expected benefits of each alternative are compared, and the alternative with the greatest expected utility is selected. Some doubt has been cast on this model of decision making by experimental economics, e.g. (Forsythe *et al.*, 1994) and (Bardsley, 2007). One of these experiments, the so-called 'Dictator Game'<sup>9</sup> has been re-cast using arguments based on the value-based practical reasoning scheme in (Atkinson and Bench-Capon, 2008). In these experiments agents appear not to choose states maximizing their utility and indeed the state chosen often depends on how the experiment is stated, even where this does not change the expected utility of states. (Atkinson and Bench-Capon, 2008) shows how choosing an action on the basis of

<sup>9</sup> In the Dictator Game one player is given a sum of money and can choose to give some or all of it to the other player where the game ends. While traditional rational choice suggests that players would keep all the money, in practice the great majority give away a non-zero sum.

justifications in terms of arguments and a preference ranking on personal values can account for the behaviors of subjects in such experiments.

It could, however, be said that an argumentation-based approach is unnecessary and the behavior could equally be accounted for in terms of subjects maximizing their expected utilities, provided a wide interpretation is taken of what gives the state utility. While this may be possible, the following points should be noted. First, the utility function cannot be only applied to states, as it is in classical decision theory in which expected utility is calculated on the basis of the likelihood of reaching various states. If it were applied only to states, in the Dictator Game, for example, the same state would be chosen regardless of how the problem was framed. Thus the utility function would need to be applied to the transitions between states, recognizing that actions can have intrinsic utility. Second, any such function would need to be complicated to distinguish between the different ways in which various factors contribute to utility, whereas argumentation can handle this distinction rather elegantly by using different critical questions and so identifying different attacking arguments. Third, argumentation provides an explanatory account of the reasoning process of the participants in terms of arguments, which we regard as more instructive than reference to a formula and expected utility calculations. Fourth, in extreme situations we cannot trade-off one benefit for another; some risks are simply too great to run for a small benefit, however unlikely they may be. The value-based account naturally represents this absence of trade-off. Fifth, to be usefully deployed, we need a way of identifying the utility function in advance: this is psychologically implausible. In many situations we are really rather bad at attaching numerical weights to our various interests and aspirations, making a qualitative account more plausible. Finally, another feature of practical reasoning, identified in (Searle 2001), is that our preferences are typically determined as a product of practical reasoning rather than given as an input to it. On our account this process is seen when a choice between actions needs to be made on the basis of preferences over the values promoted by the actions: we believe that considering the issue that “if you prefer fairness to affordability then do A with these consequences but if you prefer affordability do B with these other consequences” gives a more plausible basis for arriving at these preferences than being asked to assign relative weights to fairness and affordability at the outset.

For all these reasons, we believe that the approach described here provides a viable alternative to decision making based on utility theory.

## 6. The Parmenides System

We now turn to discussing a particular system that makes use of the argumentation scheme for practical reasoning with values discussed in the previous section and is intended as online discussion forum concerning political issues. The system is named Parmenides. The development of this system was driven by the desire to exploit technological developments and bring democratic processes into the online world.



Furthermore, internet-based tools to encourage public participation in debates concerning policy issues are seen as desirable, in a bid to mobilize the electorate in engagement with political issues. Such systems for 'e-participation' are used to exploit new technologies to support the provision, gathering and analysis of the public's contributions to political debate. Numerous systems have appeared in recent years with the aim of meeting these objectives. We discuss and contrast a few examples, before describing the Parmenides system in detail.

A prominent example of such online democratic support systems are the several e-consultation systems described in (Macintosh et al, 2003). Their systems have been developed to support and encourage young people in Scotland to participate in democratic decision making and the systems have been trialed in the Scottish Parliament.

The British government has also recently introduced a mechanism to allow the public to create, sign and deliver online petitions to the Prime Minister. These e-petitions<sup>10</sup> are intended to facilitate signature collection and make it easier for the government to respond to individuals by email in order to answer to the concerns raised in the petitions. However, the *quality* of engagement provided by the e-petitions is questionable since these electronic versions suffer from the same problems as their paper counterparts: mainly, that a number of issues are conflated within one stock statement and the stock responses generated might not appropriately address each signatory's individual concerns on the issue. It therefore becomes important to recognize that individuals have different reasons for taking a stance on a particular issue, and that this will affect the relevance and subsequent persuasive force of the arguments that can be used to counter objections made on an issue. Furthermore, if online tools are used to support such debates, then they too must provide structure to enhance the quality of engagement, whilst remaining easy to use.

There are numerous e-democracy tools available that impose more structure on the information provided and gathered than do the e-petitions. One such example is the Zeno argumentation framework (Karacapilidis and Gordon, 1997) which is described by its authors as a framework "designed to be used in mediation systems, an advanced kind of electronic discussion forum with special support for argumentation, negotiation and other structured forms of group decision making". The framework is based upon a formal model of argumentation structures that provides structure to the issues and their relative merit within a debate. However, by introducing such structure, this makes the system more difficult to understand and use for laypersons, which is a general problem that can be encountered with any such interactive systems that attempt to decompose and classify arguments. Furthermore, there are also tools for argument mapping that attempt to show relations between arguments and their contributions within a debate. One such example of an argument mapping tool is Argunet<sup>11</sup>. Argument mapping tools are useful for the purposes of debate visualization, but they do not always provide inference and evaluation mechanisms.

---

<sup>10</sup> <http://petitions.pm.gov.uk/>

<sup>11</sup> <http://www.argunet.org>

The issues highlighted in relation to the above tools have been taken into account in the development of the Parmenides system, of which we will now provide an overview.

As described in (Cartwright and Atkinson, 2008), Parmenides is intended as a system for deliberative democracy whereby the government is able to present policy proposals to the public so that users can submit their opinions on the justification presented for the particular policy under scrutiny. The system makes use both of argumentation schemes, to structure the information supplied by and submitted to the system, and argumentation frameworks (Dung, 1995), which are mechanisms used in the computational modeling of arguments, to evaluate the arguments of concern to a debate.

A particular policy proposal is presented to users through a webpage interface. The proposal sets out a justification upholding a particular action for the topic under discussion, with the justification being structured in the form the value-based argument scheme. Users are then led in a structured fashion through a series of web pages that pose the appropriate critical questions to determine which parts of the justification the users agree or disagree with. Users are not aware (and have no need to be aware) of the underlying structure for argument representation but it is, nevertheless, imposed on the information they submit. This enables the collection of information which is structured in a clear and unambiguous fashion from a system that does not require users to gain specialist knowledge before being able to use it. All opinions submitted to Parmenides are written to a back-end database, allowing the arguments to be analyzed to evaluate which elements of the justification have the most persuasive force. An analysis tool takes the individual critiques of the policy justification that the users have submitted and it computes a set of statistics that reflect the analysis. This allows the administrator of the system to easily see which particular element of the policy justification users agree or disagree with most. For example, the analysis will reveal whether the most contentious part of the justification concerned the description of the facts of the situation, or the effects of the action proposed, or whether it does in fact promote the social values stated. Such a fine-grained analysis of the arguments provides the proponent of the policy with more meaningful information that highlights which elements of the justification need to be presented more persuasively or better justified, and which elements could be emphasized to increase the acceptability of the argument.

The Parmenides system has the capacity to be used for debates on an international, national or local level. By way of an example, consider a local debate based around a proposal to build a supermarket in a particular town named Smalltown. The proposed action is to build a supermarket. The Initial Position of the debate, instantiated using the Value-based Argument Scheme for Practical Reasoning on which Parmenides is based, could be as follows:

In the current circumstances Smalltown does not have adequate shopping facilities; Smalltown has high unemployment; Smalltown has wasteland suitable for building. Therefore we should build a supermarket. This will result in increased shopping facilities, job opportunities, regeneration of wasteland. Increased shopping facilities

promotes convenience, job opportunities promotes prosperity, regeneration of wasteland promotes aesthetics.

As one can imagine, there are many possible reasons for disagreeing with the proposed action of building a new supermarket. For example, one person (Mr A) may be a wildlife enthusiast who disagrees with the proposal to build a supermarket because the building work will destroy the habitat of animals. Another person (Mr B) may be a local corner-shop owner, who disagrees with the new supermarket because it is likely to result in reduced profits for his business. In a normal petition, these people are not given the opportunity to be selective about aspects of agreement and disagreement within petitions presented to them. Some people may be discouraged from signing the petition because they disagree with a small part of it. In the case of the example presented here, respondents to a petition could state their disagreement with the building of a supermarket, but the petition may not unambiguously pinpoint the exact reasons as to why they disagree with this proposed action. Consequently, the results of the petition are not particularly useful.

However, the Parmenides system would allow respondents to agree or disagree with each part of the justification presented. With regards to the situation described above, Mr A would probably disagree with the circumstance “Smalltown has wasteland suitable for building.” Conversely, Mr. B would probably express no disagreement with this statement, instead disagreeing with the statement “Smalltown does not have adequate shopping facilities.” As more people participate in the debate and express agreement and disagreement with the various parts of the justification, analysis of the resulting data allows us to construct a clear picture of which part of the debate the majority of respondents agree and disagree with. It also helps to distinguish disagreements based on factual matters (e.g. the unemployment rate) from disagreements based on subjective values (e.g. whether wildlife preservation is important). Additionally, the dynamic nature of web-based submissions means that the debate can be modified as it progresses. Parmenides allows users to suggest elements of the initial position that they feel are missing, and these suggestions can be considered by the debate administrator and added to the debate if they feel that this is appropriate, thus allowing future participants to view and critique the updated argument.

As briefly discussed earlier in this section, the analysis tools in the Parmenides system make use of Argumentation Frameworks (AFs) (as used in the insurance example in Section 3). With these frameworks we can represent the various elements of the initial position of the argument, along with the respondents who agree and disagree with the respective elements. The notion of attack and defeat in AFs allows us to determine which lines of reasoning within the initial position are accepted by the majority and which are not. The results of such an analysis could be used by the debate administrators to change or target their campaign. For example, in the Smalltown supermarket example, analysis may show that the majority of respondents disagree with the circumstance statement “Smalltown has wasteland suitable for building.” In this case, the administrators could respond, for example, by providing a list of the waste plots deemed to be suitable for building on.

The Smalltown supermarket debate presented above is an example of a debate constructed on a local scale, intended only for a relatively small and targeted audience. Now, we consider a debate on an international level. The Iraq War debate, constructed in 2003 to reflect the debate concerning the invasion of Iraq, has been implemented in the Parmenides system. The initial position is instantiated as follows:

In the current circumstances Saddam Hussein has WMD, and Saddam is running an oppressive regime. Therefore we should invade Iraq. This will result in removal of the WMD, and restoration of democracy to Iraq. Removal of the WMD promotes world security; restoring democracy to Iraq promotes human rights.

The Iraq War debate differs from the Smalltown supermarket example in terms of the target audience; the former is intended for a large international audience whereas the latter is intended for a selective, local audience. It also differs in its purpose; the former is more likely to be used to gather public opinion, whereas the latter may actually influence a decision. Despite these differences, both can easily be represented and analyzed within the Parmenides system. There are few restrictions on the type of debate that can be represented in the system. However, the context-dependent nature of such debates is captured through the underlying structure of the argument scheme and the associated critical questions used.

To date, the Parmenides system has been tested with a number of political debates including, the justification for the 2003 war in Iraq, the UK debate over the legality of fox hunting<sup>12</sup>, and a debate concerning the use of speed cameras on UK roads.

Parmenides is intended as a forum to facilitate high quality debate between the public and the government, in a setting where the power of persuasive argument can be explored and exploited. As detailed in (Cartwright and Atkinson, 2008), investigations into conducting field trials of the system are currently underway and it is hoped that such trials will provide insight into the effectiveness of the system in addressing issues of e-democracy.

## 7. Concluding Remarks

In this chapter we have discussed the distinction between persuasion and deliberation dialogues in terms of the initial situation, goals of the participants and aims of the dialogue. Focusing on deliberation we have presented several argumentation schemes used in that type of dialogue and illustrated them with an example. The application of our model of deliberation and our use of argumentation schemes in e-governance has been illustrated with a description of an implemented tool, Parmenides, which allows for the presentation of arguments and critiques of proposals of action.

The chapter has also shown that even simple arguments and dialogues have complex internal structure. By looking at this internal structure, we highlighted background knowledge and presuppositions and shared aspects of argumentation. Though the

---

<sup>12</sup> This particular debate can be seen at: <http://cgi.csc.liv.ac.uk/~parmenides/foxhunting/>

paper makes specific proposals, they are subject to revision, addition, or deletion. As argumentation makes use of defeasibility, so too does argumentation about argumentation. The tools we have discussed support collective argumentation and thereby global governance.

## References

Katie Atkinson, Trevor J. M. Bench-Capon and Peter McBurney, 'A Dialogue Game Protocol for Multi-Agent Argument over Proposals for Action', *Autonomous Agents and Multi-Agent Systems*, 11(2), 2005, 153-171.

Katie Atkinson, Trevor J. M. Bench-Capon and Peter McBurney, 'Computational Representation of Practical Argument', *Synthese*, 152, 2006, 157-206.

Katie Atkinson and Trevor J. M. Bench-Capon, 'Value-Based Arguments in the Dictator Game'. In: *Proceedings of the Fourth Multidisciplinary Workshop on Advances in Preference Handling*, 2008. Accepted for publication, to appear in July 2008.

Nick Bardsley, 'Dictator Game Giving: Altruism or Artefact.' *Experimental Economics*. In press, available through Online First.

Trevor J. M. Bench-Capon, 'Persuasion in Practical Argument Using Value-based Argumentation Frameworks', *Journal of Logic and Computation*, 13, 2003, 429-448.

Elizabeth Black and Anthony Hunter, 'A Generative Inquiry Dialogue System.' In: *Proceedings of the Sixth International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS'07)*, ACM Press, 2007, 1010-1017.

Michael E. Bratman, David J. Israel and Martha E. Pollack, 'Plans and Resource-bounded Practical Reasoning', *Computational Intelligence*, 4, 1988, 349-355.

Dan Cartwright and Katie Atkinson, 'Political Engagement through Tools for Argumentation'. In P. Besnard, S. Doutre and A. Hunter (editors): *Computational Models of Argument, Proceedings of COMMA-2008*. Frontiers in Artificial Intelligence and Applications, Vol. 172. IOS Press, Amsterdam.

Phan Minh Dung. On the acceptability of arguments and its fundamental role in nonmonotonic reasoning and logic programming. In *Proceedings of the Thirteenth International Joint Conference on Artificial Intelligence (IJCAI 1993)*, pages 852–859, 1993.

Robert Forsythe, Joel L. Horowitz, N. E. Savin and Martin Sefton. 'Fairness in simple bargaining experiments.' *Game and Economic Behavior* 6(3), 1994, 347–369.

Thomas F. Gordon and Nikos I. Karacapilidis. 'The Zeno Argumentation Framework.' In *Proceedings of 6th International Conference on AI and Law (ICAIL-1997)*, ACM Press, New York, 1997, 10–18.

Marc-Philippe Huget (editor), *Communication in Multiagent Systems: background, current trends and future*, Lecture Notes in Artificial Intelligence 2650, Springer, 2003.

Edward L. Lascher, *The Politics of Automobile Insurance Reform: Ideas, Institutions, and Public Policy in North America*, Washington, Georgetown University Press, 1999.

Ann Macintosh, Edmund Robson, Ella Smith and Angus Whyte. 'Electronic Democracy and Young People'. *Social Science Computer Review*. 21(1):43-54, 2003.

Peter McBurney, David Hitchcock and Simon Parsons, 'The Eightfold Way of Deliberation Dialogue', *International Journal of Intelligent Systems*, 22, 2007, 95-132.

Chris Reed and Glen Rowe. 'Araucaria: Software for argument analysis, diagramming and representation', *International Journal on Artificial Intelligence Tools*, 14(3–4): 961–980, 2004.

John R. Searle, *Rationality in Action*, MIT Press, Cambridge, MA, USA, 2001.

Yuqing Tang and Simon Parsons, 'Argumentation-Based Multi-agent Dialogues for Deliberation', *Proceedings of ArgMAS 2005*, Lecture Notes in Artificial Intelligence 4049, Berlin, Springer, 2006, 229-244.

Douglas Walton, *The New Dialectic*, Toronto, University of Toronto Press, 1998.

Douglas Walton, 'How to Make and Defend a Proposal in Deliberation Dialogue', *Artificial Intelligence and Law*, 14, 2006, 177-239.