

IDENTIFYING AND ANALYZING ARGUMENTS IN A TEXT

In this paper, a survey of the main tools of critical analysis of argumentative texts of discourse is presented. The three main tools discussed in the survey are: (1) argument diagramming, including automated systems for argument visualization, (2) argumentation schemes and (3) dialogue typologies. The focus of the discussion is on defeasible argumentation schemes rather than on deductive or inductive forms of argument. The main objective is to present an outline of a methodology for the task of analyzing argumentation in a given text of discourse from a critical point of view. Typical of the task of argument analysis is activity of the kind that takes place in a critical thinking course where the instructor and the students analyze an argument taken from a text of discourse in everyday conversational argumentation, for example an argument found in a newspaper article or some similar media source.

These tools are then applied to the perennial problem of enthymemes, arguments with an unstated premise, or unstated set of premises, or an unstated conclusion. The problem is to find some technology for filling in the missing parts, or at least for assisting a human user with this task. This problem is a hard one, and remains unsolved so far, but here, very briefly, a direction for research is indicated. Finally, some remarks are made about how situating a given argument in a conversational context should be seen as part of carrying out the task of analyzing the argument.

1. Defining 'Argument' as a Type of Speech Act

The term 'argument' is often used in loose way in conversational practice, a practice that also often finds its way into logic textbooks, such that no clear distinction is drawn between it and what is called 'reasoning'. In (Walton 1990, p. 411) a distinction was drawn between reasoning and argument, based on the assumption that reasoning does not always, or exclusively, occur in arguments. For example, a player can reason in game of chess, where the reasoning need not necessarily be in an argument. On this way of viewing the matter, reasoning can be used in speech acts other than that of putting forward and argument, as in the speech act of offering an explanation of something. Another distinction (p. 411) is that reasoning can be aimless, whereas argument is essentially goal-directed. Putting forward an argument should be defined as a type of speech act in a dialogue in which two parties participate. In an argument there is always a claim made by the part called the proponent, and this claim is to be identified with the statement that is designated as the conclusion of the argument. It is typically marked by the textual indicator word 'therefore', or some comparable word. An argument is a set of statements, as we are so often told, and the remaining statements are premises, meant to support the conclusion, or give reasons for the respondent to come to accept it. The purpose of putting forward the argument is to get the respondent to come to accept it, for the primary characteristic of an argument is that the respondent doubts the claim made by the proponent. In some, but not all instances, the respondent even presents an opposing claim. What distinguishes an argument from an explanation is that in an argument, the conclusion is subject to doubt, and the purpose of the argument is to remove that doubt. In an explanation, in contrast, the thing to be explained, called the *explanandum*, is accepted by both parties as factual, as an event that really happened, or as some statement

that really is true. The purpose is not to remove the respondent's doubt, but to help him come to understand the event or statement in question.

Thus the speech act of putting forward an argument is different from the speech act of asking a question. The aim of asking a question can also be to remove the speaker's doubt, but the structure of how this aim is implemented is different than in the case of an argument meant to remove doubt. In putting forward an argument, the speaker is trying to get the hearer to accept something he didn't accept before, by presenting reasons why he should accept it now.¹ The ultimate aim is to remove the hearer's doubt and settle the unsettled issue in the larger dialogue that speaker and hearer are taking part in. In asking a question, the speaker is not generally trying to do anything so positive, although some questions function very much like arguments, viz. loaded questions and the like. The extreme case is a rhetorical question, which has the surface structure of a question, but from a speech act point of view has a function of making a statement or of putting forward an argument. Other borderline cases include indirect speech acts, like 'Can you pass the salt?', that are superficially questions but typically function as a request.

2. Asking Questions

Argumentation as a field should not be just about arguments. It should include not only explanations and some other important kinds of speech and acts. It should also include a study of the asking of questions. Argumentation, of the kind that is important to use critical argumentation to assess, is not just made up of propositions and inferences. It is also made up of questions. Questions are used to respond to arguments that are put forward, called critical questions. And it is the connected sequence of questions and answers that make up the dialogues that are the contexts in which arguments are used. Questions often seem innocent and harmless enough, you might think, from a viewpoint of critical thinking. After all, questions don't make assertions, in the way statements are typically used to do, and questions don't have premises and conclusions, the way arguments do. Perhaps for these reasons, the systematic study of questions has not been taken seriously enough, as a branch of logic or critical argumentation. But this branch of critical argumentation is especially important in public deliberations of the kind vital to a democracy. For as Best (2001) pointed out, intelligent planning in a democracy needs to be based on social data collected by statistical methods based on polls. The polls are based on questions. But by manipulating these questions, the media, politicians and social activists can push and massage statistics and even create social problems artificially.

The structure and wording of questions can have highly significant effects in statistical polls and surveys, and on the inferences drawn from them. The outcomes of statistical polls are heavily influenced by significant "response effects" stemming from the positive or negative connotations a word has to the respondents, or from how the term is defined for statistical purposes. For example, in making a statistical survey on poverty or unemployment, the outcome can be that a statistical finding is moved upwards or downwards, depending on how 'poverty' or 'unemployed person' are defined. Just as statements and terms can be loaded to one side of an argument, producing a biased argument, questions can also be loaded in much the same way. A loaded question may

¹ The exception is the case of putting a hypothetical argument to explore something rather than advocating it (or advocating it very strongly).

not make an explicit assertion, but it does have a bias or spin on it that can suggest a proposition indirectly, by implicature and innuendo. Questions, in many cases, are not as innocent or harmless as they might seem. In fact, asking the right questions, and responding to them the right way, can be enormously influential in steering a dialogue in a direction that may go towards (or away from) the goal the dialogue is supposed to fulfill. For all these reasons, learning skills of questioning and answering is one of the most important aspects of critical argumentation. The skills that need to be taught include the following: learning how to detect hidden and tricky implications of questions, learning how to respond in a rational and constructive way to such questions, learning to recognize different kinds of questions, and learning how to answer them, when not to answer them, and how to reply when an answer is not appropriate.

3. Explanations

One of the most common kinds of explanations found in everyday conversational discourse is the type meant to answer a question about how something works. For example, suppose Bob does not understand how to copy a document on both sides using the office photocopy machine, and he asks Arlene to explain how to do it. Neither are experts, but she has used it many times before, and he assumes she knows how it works. The aim is not to produce a scientific explanation of the process of photocopying. What Bob needs is to understand the sequence of actions he needs to perform in order to get the machine to do this type of job. He asks her, "How do you make it copy on both sides of the page when the originals are one-sided?" Arlene's explanation tells Bob the sequence of actions he needs to perform in order to get that job done. This how-to-do-it type of explanation runs through a sequence of actions that needs to be performed in order to achieve an outcome.

The features of an explanation generally are that it occurs in a dialogue in which one party understands how something works while the other party (the questioner) lacks such understanding. When the explainer offers an explanation, the questioner may simply accept it, or he may ask further questions about the explanation. The questioner can express his specific gaps of understanding, and the explainer can tailor her efforts to addressing the aspects the questioner fails to understand. Such an explanation requires that some understanding of the thing to be explained is already shared by the questioner and the explainer. But there is also a gap. To be successful, the explainer's explanation must remove the questioner's expressed lack of understanding.

Speech Act Conditions for Explanation (Walton, 2004, p. 83-84).

Dialogue Conditions

Dialogue Precondition: the speaker and the hearer are engaged in some type of dialogue that has collaborative rules and some collective goal.

Question Condition: The hearer asks a question of a specific form, like a why-question or a how-question, containing a key presumption.

Presumption Condition: The presumption in the question can be expressed in the form of a proposition (statement) that is assumed to be true by both parties. The presumption is a common starting point, or a

previous commitment of both parties. It is a “given”, or data that is not in question, as far as the dialogue between the two parties is concerned.

Understanding Conditions

Speaker’s Understanding Condition: the speaker has some kind of special knowledge, understanding or information about the presumption that the hearer lacks.

Hearer’s Understanding Condition: the hearer lacks this special knowledge, understanding or information.

Empathy Condition: the speaker understands how the hearer understands the presumption, premises and inferences, understands how the hearer expects things to normally go, and what can be taken for granted in these respects, according to the understanding of the hearer.

Language Clarity Condition: in special cases, the speaker may be an expert in a domain of knowledge or skill in which the hearer is not an expert, and must therefore use language only of a kind that the hearer can be expected to be familiar with and can understand.

Success Conditions

Inference Condition: the speaker is supposed to supply an inference, or chain of inferences (reasoning), in which the ultimate conclusion is the key presumption.

Premise Understanding Condition: the hearer is supposed to understand all the premises in the chain of reasoning used according to the inference condition.

Inference Understanding Condition: the hearer is supposed to understand each inference in the chain of reasoning.

Transfer Condition: by using the inference or chain of reasoning, the speaker is supposed to transfer understanding to the hearer so that the hearer now understands what he previously failed to understand (as indicated by his question).

Understanding is a hard concept to define, because the circular question, ‘How can we understand understanding?’ is posed. Rather than confronting the question directly, it is better to ask how gaps in understanding can be filled, based on common knowledge and lack of knowledge. Research in AI and cognitive science tells us that agents can communicate and understand the actions of other agents because they share “common knowledge” of the way things work in everyday life. Such common knowledge can vary, and gaps that one person has may be need to be filled in by knowledge that another has. For example, Arlene can have some grasp of what Bob may be expected to know about the photocopier machine, and also what he may be expected not to know about it. As Schank (1986, p. 6) put it, understanding is a “spectrum” admitting of gaps and gradations. One agent’s finding the explanation offered by another useful is possible because both share routines of acting and thinking in stereotypical situations both are already familiar with (Schank and Abelson, 1977). They both know about these things to some extent, but one may also learn that she knows some things that the other does not. Transfer of understanding is filling such gaps. Arlene can transfer understanding of special features of a situation or problem that she possesses but Bob lacks, as shown by his question. She can answer his question successfully by transferring such understanding to Bob. Thus we can approach the defining of ‘understanding’ by the negative route, if

we define it as the filling of a gap in knowledge by one party, provoked by the question of the other party in a dialogue who shows evidence of such a gap.

4. Defeasible and Plausible Reasoning

A defeasible argument is one in which the conclusion holds only tentatively, subject to defeat as new information comes in, and is added to the premises. The classic case is the Tweety example.

Birds fly.

Tweety is a bird.

Therefore Tweety flies.

The first premise in this argument is a kind of generalization, but not an absolutely universal one that is meant to apply to all birds, without exception. It could be expressed as saying ‘Generally (but subject to exceptions) birds fly’, a kind of generalization that leaves room for exceptional cases of birds that do not fly, like penguins or ostriches. In the absence of evidence that the case of Tweety is an exception, the argument above supports the conclusion and the statement that Tweety flies is taken to hold. But it holds only tentatively, and is subject to defeat by new circumstances. For example, Tweety could be a type of bird that flied, like a canary, but he may have an injured wing. There are many theories of defeasible reasoning in artificial intelligence, so far, no one theory has been definitively or widely accepted.

One of the unsolved problems is to precisely define the different ways an argument can be defeated. It is a commonplace in critical thinking that there are two ways of attacking an argument. One way is to refute it by presenting the counterargument that is stronger than the original argument. The other way is to ask critical questions that suspend the argument, undercutting its support for its conclusion, but without defeating it in the stronger sense of the term. Pollock (1995) drew an influential distinction between two kinds of argument defeat he called rebutting defeaters (defeaters simpliciter) and undercutting defeaters (undercutters). A rebutting defeater gives a reason for denying a claim (Pollock, 1995, 40), while an undercutting defeater attacks the inference from the reason to the claim rather than attacking the claim directly (p. 41).

Citing Pollock’s leading example of an undercutter (1995, p. 41) is the best way to show what he had in mind.

For instance, suppose x looks red to me, but I know that x is illuminated by red lights and red lights can make objects look red when they are not. Knowing this defeats the prima facie reason, but it is not a reason for thinking that x is *not* red. After all, red objects look red in red light too. This is an *undercutting defeater* (Pollock’s italics in both instances).

There are various ways to analyze Pollock’s example, but one is to see it as based on a generalization that is an implicit premise: when an object appears to be red, then (normally, but subject to exceptions) it is red. The generalization, along with the observed fact that the object appears red, acts as a premise that leads by inference to the conclusion

that the object is red. The undercutter can be seen as an opposed inference based on a second generalization: when an object is illuminated by a red light this can make it look red even though it is not. This new evidence leads to the undercutting of the support for the previous conclusion that this object is red if there is any evidence that the object is, or even may be illuminated by a red light. On Pollock's account (p. 41), this defeater is an undercutting defeater but not a rebutting defeater because the object may still be red, for all we know, despite the counter-argument above. The new data undercuts the original argument by removing the support of the inferential link between the premises and the conclusion. Despite Pollock's clear example, the whole area of defining precisely how arguments are attacked and defeated by opposed arguments remains problematic.

Another kind of reasoning that is being studied as important for critical argumentation is called plausible reasoning (Rescher, 1976). Plausible reasoning can be illustrated by a famous and ancient example described by both Plato and Aristotle.² There was a trial concerning a case of assault of one man by another. The one was visibly bigger and stronger than the other. The accused, appealing to the jury, asked them whether it appeared plausible to them that he, the visibly smaller and weaker man, assaulted the visibly bigger and stronger man. The jury found this hypothesis implausible. Why? One answer is that the jury would be aware of the likely outcome of such an attack, and they would be aware that the smaller man would also be aware of it. Thus they could conclude that the hypothesis that the smaller man attacked the bigger one (subject to further circumstances that might apply) implausible. By itself, this kind of evidence is weak, but case of assault with no witnesses could hang on a balance of evidence, if it is just one man's word against the other's. Even some inconclusive plausible reasoning on the one side or the other could swing the decision in the trial to the one side or the other.

According to Rescher (1976), plausible reasoning is different from probable reasoning of the kind modeled by the probability calculus. On that model, the probability value of a statement not-*A* is calculated at one minus the probability value of *A*. However in the bigger and smaller man example, this axiom does not apply. It could be the case both that the claim of the weaker man claim of the stronger is plausible, and that of the stronger man is also plausible, relative to the body of evidence supporting it. In a case at trial, there can be plausible arguments on both sides. For example, the stronger man argued: why would he attack this visibly smaller and weaker man, when he knew that would make it look very bad for him in court?³ This case presents a conflict of opinions of the kind loved by the Sophists, with plausible arguments for both sides.

Now we come to a big question. It appears that we need a third type of argument, in addition to the deductive and inductive types of argument already studied in logic. But what should we call it? Should this third type of argument be called defeasible argument, plausible argument, abductive argument, presumptive argument, or something else? Or should this third class be seen as a composite of these categories? The forms of argument now commonly called argumentation schemes, described in (Hastings, 1962; Perelman and Olbrechts-Tyteca, 1969; Kienpointner, 1992; Walton, 1996), generally fit into this third category. Most of them, as they are instantiated most commonly in everyday argumentation, represent defeasible kinds of arguments that don't easily fit into the

² Plato tells us that the two sophists, Corax and Tisias (middle of the fifth century BC) were the originators of this example, but Aristotle (*Rhetoric* 1402a17 - 1402a28) attributed it to Corax.

³ Here is a good example of a rhetorical question used as an argument.

standard forms of deductive or inductive forms of argument. They are better cast as plausible arguments that give defeasible grounds for tentatively accepting a conclusion as plausible, assuming the premises are plausible.

5. Argumentation Schemes

Argumentation schemes most commonly represent defeasible but plausible forms of argument that fit stereotypical types of argument used in everyday conversational argumentation as well as special contexts of use, like law and science. Among the schemes listed in (Walton, 1996) are: argument from expert opinion (also called appeal to expert opinion), argument from verbal classification, argument from sign, argument from example, argument from commitment, argument from position to know, argument from popular opinion, argument from lack of knowledge, appeal to pity, fear appeal argument, argument from threat, practical reasoning (or argument from goal to action), argument from cause to effect, argument from waste (or sunk costs), argument from consequences, argument from analogy, argument from precedent, personal attack (*ad hominem*) argument, argument from gradualism, and the slippery slope argument. Other schemes that have been studied include argument from witness testimony (also called appeal to witness testimony), argument from temporal persistence and argument from appearance (Pollock, 1995; Bex, Prakken, Reed and Walton, 2003). Now a total of more than sixty such schemes are presented in a compendium of schemes in a forthcoming book, *Argumentation Schemes*, along with a classification system for these schemes.

Schemes have proved to be practically useful for teaching students of critical thinking how to recognize, analyze and evaluate common forms of argument used in everyday conversational argumentation (Walton, 2006). Each scheme is seen as having a matching set of critical questions. The method of evaluation is for the critic to identify the type of argument in a given text of discourse matching one of the schemes, and then posing a question from the set of critical questions matching the scheme. This method helps a critic confronted with an argument to find weak points on which the argument can be questioned. Three of the most prominent schemes are now presented.

The scheme most often used to illustrate schemes is the one for argument from expert opinion. The version below is from (Walton, 2006, p. 87).

Argumentation Scheme for Argument from Expert Opinion

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

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

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

Argument from expert opinion is in typical cases a plausible but defeasible form of argument. It is not generally a good idea to take the word of an expert as infallible, or to defer to an expert without questioning what she says, and the tendency to do so in many cases may at least partly explain why argument from expert opinion can be fallacious. As a practical matter, you can do much better if you are prepared to critically question the

advice given by an expert. Thus it is vital to see appeal to expert opinion as defeasible, as open to critical questioning.

Here are the six standard critical questions matching the appeal to expert opinion.⁴

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

One can critically question an appeal to expert opinion by raising doubts about any of the premises. The first question concerns the depth of knowledge the expert supposedly has. Is the expert a master or only a beginner, even though he or she is qualified? The second question probes into the exact wording of what the expert said (whether quoted or paraphrased). The third question raises the issue of whether the expert may be an authority in one field, while the statement she makes lies in another field. The fourth question raises doubts whether the expert is personally reliable as a source, for example, if she is biased, or has something to gain by making the statement.

One very common form of argumentation is goal-directed practical reasoning, often called means-end reasoning.

Instrumental Scheme for Practical Reasoning (Walton, 2006, p. 301)

I have a goal *G*.

Bringing about *A* is necessary (or sufficient) for me to bring about *G*.

Therefore, I should (practically ought to) bring about *A*.

This form of argument should generally be regarded as defeasible, and it can be undercut or defeated by asking any one of a set of standardized critical questions.

A variant of the basic instrumental scheme is the following value-based scheme for practical reasoning (Atkinson, Bench-Capon and McBurney, 2006).

Scheme for Value-based Practical Reasoning

I have a goal *G*.

G is supported by my set of values, *V*.

Bringing about *A* is necessary (or sufficient) for me to bring about *G*.

Therefore, I should (practically ought to) bring about *A*.

⁴ Walton (2006, p. 88).

Values may be the background in cases of practical reasoning, and may not need to be taken into account. In such cases, the instrumental scheme can be applied. In other cases, values may be crucial factors that need to be taken into account. In these cases, the scheme for value-based practical reasoning needs to be applied.

Abductive arguments are now often identified with inferences to the best explanation, and both categories (or one, if they are the same), are closely related to plausible inferences. An abductive inference begins with a collection of data, or given facts of a case. The several explanations of the given facts are considered. The explanation that best fits the facts is selected out as the conclusion to adopt. According to Josephson and Josephson (1994, p. 14), an abductive inference has the following form.

D is a collection of data.

H explains *D*.

No other hypothesis can explain *D* as well as *H* does.

Therefore *H* is probably true.

According to the analysis of Josephson and Josephson (p. 14), the evaluation of an abductive inference should be judged in relation to the following critical questions.

How decisively does *H* surpasses the alternatives?

How good is *H* by itself as an explanation, independently of the alternatives?

How much confidence there is that all plausible explanations have been considered?

How good are the original data?

How can the cost of being wrong be weighed against the benefit of being right?

How strong is the need is to come to a conclusion at all, as opposed to collecting more information?

A common example of abductive reasoning is the kind of argumentation called argument from sign. Suppose I see what appear to be bear tracks on the trail in Banff. I infer that a bear was present on the trail earlier. There could be other explanations, but in the absence of evidence to the contrary, the bear hypothesis might be the best explanation. Some argumentation schemes can be analyzed as abductive, but others do not appear to fit the abductive format without a lot of stretching.

6. Argument Diagramming and Schemes

The technique of argument diagramming is a basic method of informal logic. An argument diagram is made up of two basic components (Freeman, 1991): (1) a set of nodes (points) representing the propositions that are the premises and conclusion in the argument being diagrammed, and (2) a set of arrows joining the points. Each arrow represents an inference. In automated argument diagramming systems, the node is a text box in which the sentence representing the proposition appears. Thus such diagrams are often called box and arrow diagrams. A sequence of points (boxes) connected by arrows

represents a chain of argumentation. In an argument diagram representing a mass of evidence in a legal case, there is always a final conclusion or ultimate *probandum* representing the claim that is to be proved or to have doubt cast on it. This final conclusion is supported by means of a chain of argumentation that usually has an earlier conclusion as one of its premises, or even a string of them.

A set of premises can go together to support a conclusion in two ways that need to be distinguished. In a linked argument, each premise is dependent on the other(s) to support the conclusion (Freeman, 1991). In a linked argument, if one premise is deleted, the other offers much less evidential support for the conclusion than the two do together. The other way has a structure called a convergent argument. In a convergent argument, each premise provides independent evidential support for the conclusion. Even if one premise is deleted, the other still offers the same evidential support for the conclusion it did before. Some diagramming systems, like *Araucaria*, require the linked-convergent distinction to be drawn, while others, like *Rationale*, do not.

Araucaria is an automated system of argument diagramming that can be used to teach critical thinking skills in courses on informal logic (Rowe, Macagno, Reed and Walton, 2006). It is available as freeware on the Internet.⁵ The user inserts the text of discourse containing an argument as a text file into *Araucaria*, and he/she can then use the software to draw in lines representing each of the inferences from the premises to the conclusions in the argumentation. *Araucaria* is very helpful in representing the structure of the argumentation in a visual way that displays its premises, conclusions, missing assumptions and the argumentation schemes on which the reasoning in the given case is based. There are other systems of argument diagramming now becoming widely used in many areas of application, especially in law.

Verheij's system ArguMed enables defeasible arguments to be represented in argument diagrams. A defeater (rebuttal) of an argument is represented as another argument where the conclusion is the opposite (negation) of the original argument. As an example of an undercutter, Verheij (2003, p. 14) used the example of the critical question, 'Did expert *E* not make a mistake?' replied to an argument based on the scheme for argument from expert opinion. This method enables critical questions to be represented as undercutters on an argument diagram. This structure of this undercutter is visualized in ArguMed by the argument diagram in figure 1.

⁵ The *Araucaria* software can be downloaded at no cost from the following location on the internet: www.computing.dundee.ac.uk/staff/creed/araucaria.

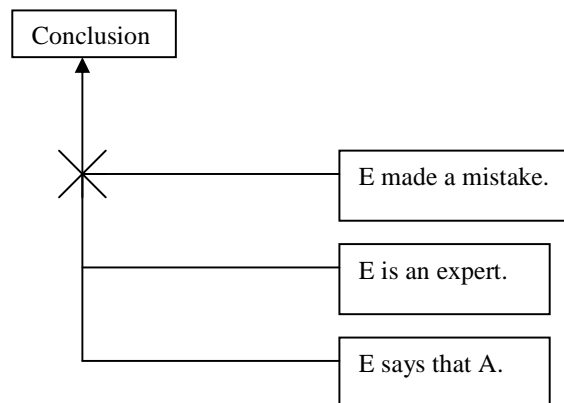


Figure 1: Argument from Expert Opinion in ArguMed Undercut by an Exception

The argument with only the premises in the two bottom boxes would support the conclusion provided the premises are acceptable, based on the defeasible argumentation scheme for argument from expert opinion. But when the new premise in the top box is added, the original argument is undercut, and support for the conclusion is withdrawn.

Araucaria represents argument from expert opinion as a linked argument, and has a tool that can be used to display the scheme on the diagram. This is shown in figure 2.

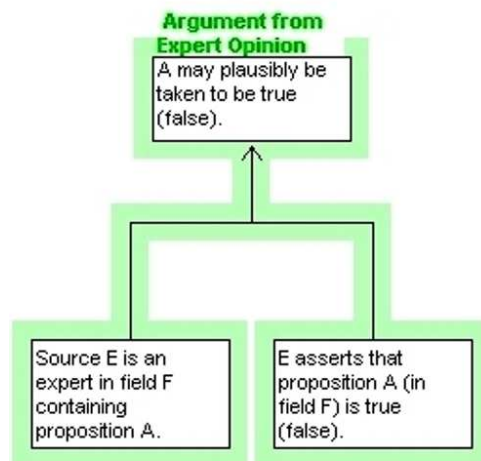


Figure 2: *Araucaria* Diagram for Argument from Expert Opinion

The premises in the two bottom boxes are shown as linked. The critical questions matching the scheme are not explicitly shown on the argument diagram, but can be found in the menus for each of the schemes. Also, they can be shown as additional implicit premises of the argumentation scheme. In figure 3, the expertise critical question is represented as an implicit premise.

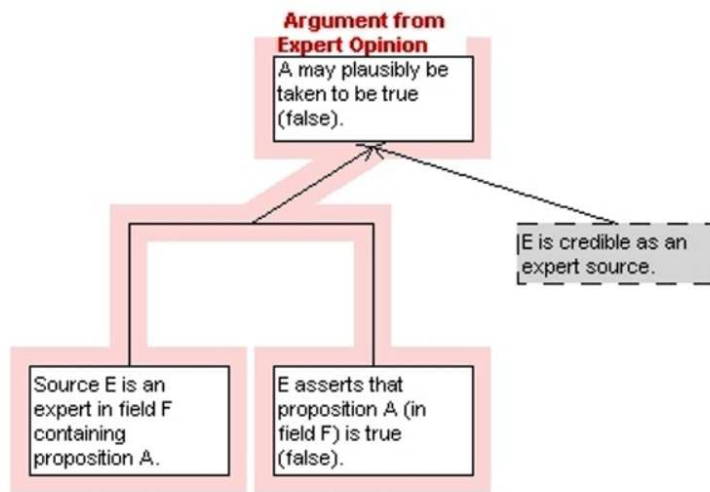


Figure 3: *Araucaria* Diagram for Argument from Expert Opinion with Implicit Premise

It needs to be noted, however, that even though critical questions can be modeled as additional implicit premises on either of these systems of argument diagramming, there remains a general problem of distinguishing between critical questions that are merely undercutters as opposed to those that should be seen as defeaters. The problem is to distinguish how the asking of critical questions shifts the burden of proof from one side to the other in argumentation. There is currently much research on this problem in artificial intelligence studies.

The Carneades system (Walton and Gordon, 2005) deals with the problem posed by classifying premises in argumentation schemes as ordinary premises, assumptions or exceptions. Ordinary premises are assumed to be acceptable, and must be justifiable to make an argument acceptable. Assumptions are assumed to be acceptable unless called into question. Exceptions are premises that are not assumed to be acceptable, but are taken for granted for the sake of argument unless they are challenged. Ordinary premises are premises that are already present as stated premises in a scheme, and so critical questions questioning them can be seen as redundant. Assumptions are premises that are assumed to be true, while exceptions are premises that assumed to be false, even though they may later be shown to be true.

An argument is defined in Carneades as a triple, made up of a statement designated as the conclusion, a direction, *pro* or *con*, and a set of premises (statements). Arguments in the Carneades system can be visualized using as argument diagrams in a way compatible with conventions of the semantic web. A Carneades argument diagram visualizes an argument as a directed graph in which the nodes can either represent statements or arguments, and the arrows joining the nodes represent inferences from a set of premises to a conclusion, or from an argument to a conclusion. An argument is identified by recognizing its scheme, and its direction, *pro* or *con*. Carneades has a dialectical framework – local arguments are judged accepted acceptable or not in relation to a global issue being discussed. An issue functions as a record for keeping track of the arguments

pro and *con* each position as the argument progresses through the sequence of speech acts in the dialogue (Gordon and Walton, 2006). A statement can be accepted, rejected or at issue. Whether a premise holds in any given argument depends on its dialectical status as well as the type of premise it is classified as.

7. Enthymemes

The problem of how to analyze enthymemes is a fundamental and much studied problem of critical argumentation. There has been an enormous literature on the topic, as the reader can see by clicking on the *Scholar* icon in Google and inserting the term ‘enthymeme’ in the search box. Despite this literature, spanning several fields, including logic and rhetoric, very little appears to be known about precise criteria that can be used to fill in missing assumptions in enthymemes. If we just want to fill in missing premises or conclusions needed to make an argument valid (needed assumptions), the job is much easier than if we want to fill in missing assumptions that actually represent what the arguer meant to say (used assumptions).⁶ The latter are often based on presumptions about expert knowledge, common knowledge, and other bases for the enthymeme.

Govier (1992, p. 120) classified a premise in an argument as expressing *common knowledge* if states something known by virtually everyone, even though the matter is dependent on audience, context, time and place. She cited examples like, ‘Human beings have hearts’ and ‘Many millions of civilians have been killed in twentieth-century wars’ (p. 120). On the analysis of Freeman (1995, p. 269) a proposition is a matter of common knowledge means that many, most or all people accept it, adding the qualification, “popularity is never sufficient to warrant acceptance”. Common knowledge has been widely studied in artificial intelligence (Schank and Abelson, 1977). For example, the open mind common sense system (OMCS)⁷ includes statements like ‘People generally sleep at night’ and ‘People pay taxi drivers to drive them places’ under the category of common knowledge (Singh, Lin, Mueller, Lim, Perkins and Zhu, 2002, p. 3). These statements are defeasible generalizations that, like the common knowledge generalization ‘Birds fly’, can be defeated in special situations that are not known in advance.

(Walton, 2001) showed how enthymemes are often based on implicit premises that can be classified as falling under the heading of common knowledge. This paper did not develop a general solution to the problem of enthymemes, but did analyze several examples of them found in ordinary conversational argumentation, showing that implicit premises based on common knowledge are commonly found in argumentation. (Walton and Reed, 2005) showed how argumentation schemes, representing forms of commonly used defeasible types of arguments, can be applied to an argument found in a text of discourse, and used to reveal implicit premises needed to make the argument fit the requirements of the scheme. (Walton and Macagno, 2006) surveyed research on common knowledge in artificial intelligence, combined that with an account of how law deals with

⁶ Ennis (1982, pp. 63-66) drew an important distinction between needed and used assumptions. A needed assumption in an argument is a missing propositions such that (1) the argument is not structurally correct as it stands, but (2) when the propositions in question are inserted, the argument becomes structurally correct (for example, deductively valid). A used assumption in an argument is an unstated proposition that is meant to be part of the argument by the speaker (and is likely to be so taken by the hearer or audience).

⁷ <http://commonsense.media.mit.edu/cgi-bin/search.cgi>

evidence based on common knowledge, and showed how these resources help to provide a fuller understanding of how the notion of common knowledge works in argumentation. The two examples below illustrate how these two bases of the enthymeme - common knowledge and an arguer's commitments – are used in analyzing arguments. They also show how argumentation schemes can be used to fill in the needed assumptions.

The first example is an argument found in a web site called Animal Freedom.

Animals in captivity are freer than in nature because there are no natural predators to kill them.

The conclusion is the statement that animals in captivity are freer than in nature. The explicit premise is the statement that there are no natural predators to kill animals that are in captivity. One missing premise is the statement that there are natural predators to kill animals that are in nature. Another missing premise can be expressed as a conditional: if animals are in a place where there are no natural predators to kill them, they are freer than if they are in a place where there are natural predators to kill them. This second implicit premise can also be classified as a generalization.

The basis of the first implicit premise is common knowledge. The second implicit premise is not, however, an item of common knowledge. It is a controversial claim that would presumably be objectionable to those supporting the cause of animal freedom. It seems to be based on a definition of 'freedom' different the conventional one, a use of the word that is put forward to support the viewpoint of the opposed side. At any rate, we would not want to classify it under the heading of common knowledge. We could classify it as based on the arguer's commitment on the one side, but not the other.

The animal freedom example is diagrammed in *Araucaria* in figure 4. CK stands for classification of an implicit premise under the heading of common knowledge, and COM stands for classification of an implicit premise under the heading representing the arguer's commitment reflecting her special view but not that of common knowledge.

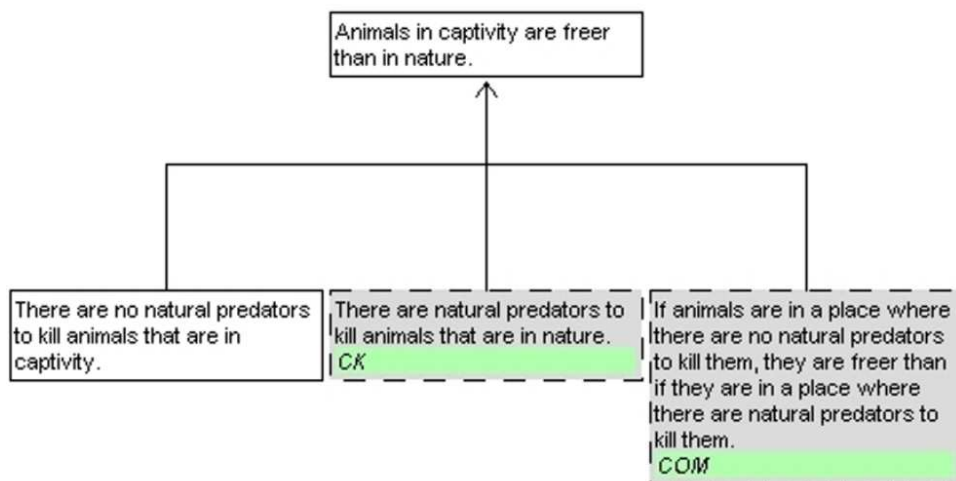


Figure 4: Implicit Premises in the Animal Freedom Example

This first example shows how enthymemes can be based on common knowledge and arguer's commitment.

The second example shows how argumentation schemes are involved. It is taken from commercial ad on TV (quoted insofar as the wording can be recalled, which may not be exact).

Harry has an itchy scalp. He needs Scalpicin.

The conclusion is the proposition that Harry needs Scalpicin. The explicit premise is the proposition that Harry has an itchy scalp. There may be many ways of analyzing this argument, but according to the one presented below, it has the following four propositions as implicit premises.

Harry needs something that would make his scalp no longer itchy.

Scalpicin would make his scalp no longer itchy

An itchy scalp is a bad condition or problem (negative value).

A bad condition is something that should be removed if possible.

An analysis that shows how these four implicit premises fit into an argument supporting the conclusion is displayed in figure 5.

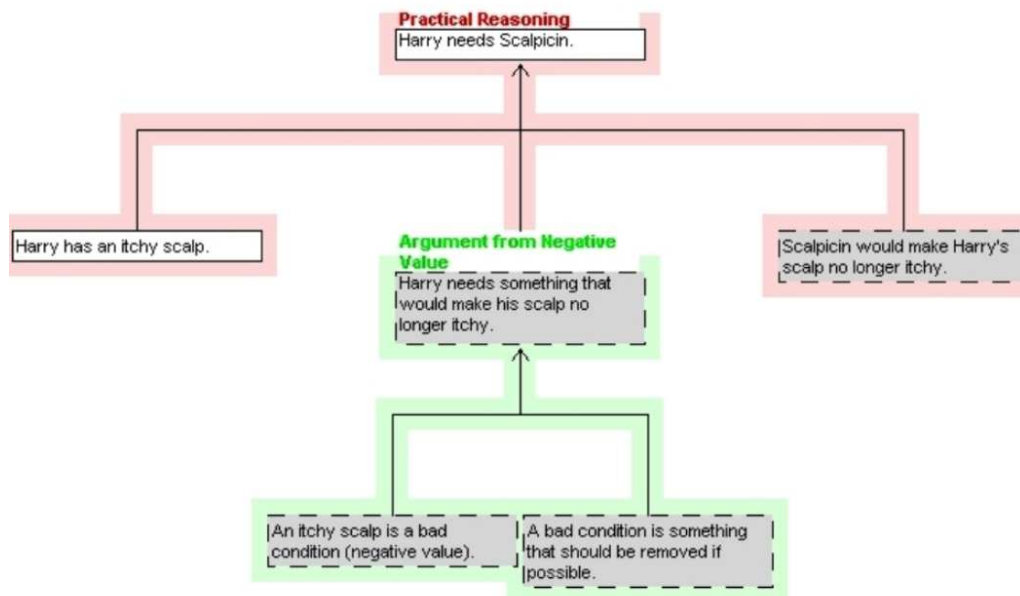


Figure 5: *Araucaria* Diagram of the Scalpicin Example

The two argumentation schemes are displayed in figure 5. At the top, instrumental practical reasoning is applied to the explicit premise, along with two implicit premises, as shown. The premise 'Harry needs something that would make his scalp no longer itchy' is taken to represent a goal. Under the text box for that proposition, a scheme called argument form negative value is applied to the two remaining implicit premises shown at

the bottom of the diagram. On this analysis, value based practical reasoning is shown to combine instrumental practical reasoning with another scheme called argument from values.

8. Types of Dialogue and Dialectical Shifts

It is often thought that interpreting a natural language text of discourse is subjective, and that therefore there is no objective evidence that could be used to prove or disprove a particular interpretation as rationally justified or not. This common skepticism may be based on the recognition that interpreting a speech act is contextual. Determining what an argument is, or should be taken to be, depends not only on what was explicitly said, but on the purpose of saying it within a conventional conversational setting. There are different kinds of conversational settings, or types of dialogue, and each has distinctive structures, goals and rules. Knowledge of the conversational setting in which an argument was used in helps a critic to determine what the argument is, what its non-explicit parts should be taken to be, whether it is relevant to the issue of the dialogue, and what standard of proof is appropriate for judging the success of the argument.

The new dialectic recognizes six basic types of dialogue that represent different kinds of goal-directed conversations in which argumentation is used: persuasion dialogue, the inquiry, negotiation dialogue, information-seeking dialogue, deliberation, and eristic dialogue. The properties of these six types of dialogue are summarized in table 1.

TYPE OF DIALOGUE	INITIAL SITUATION	PARTICIPANT'S GOAL	GOAL OF DIALOGUE
Persuasion	Conflict of Opinions	Persuade Other Party	Resolve or Clarify Issue
Inquiry	Need to Have Proof	Find and Verify Evidence	Prove (Disprove) Hypothesis
Negotiation	Conflict of Interests	Get What You Most Want	Reasonable Settlement 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

Table 1: Six Basic Types of Dialogue

When analyzing and evaluating an argument, each type of dialogue is used as a normative model that provides standards for determining whether a given argument was used correctly or not in a given case. The text of discourse in the given case provides the evidence to critically examine whether and how the given argument can be taken to be a contribution to that type of dialogue.

In persuasion dialogue, the proponent has a particular thesis to be proved, while the respondent has the role of casting doubt on that thesis. One special type of persuasion dialogue is called the critical discussion, where the goal is to resolve a conflict of

opinions. In a deliberation dialogue, the goal is for the participants to arrive at a decision on what to do in a given situation. Hitchcock, McBurney and Parsons (2001) have built a formal model of deliberation dialogue in which the issue is expressed in the form of a governing question like, “How should we respond to the prospect of global warming?” The central feature of argumentation in all the types of dialogue is that the one side takes the commitments of the other as premises in arguments. Or in the BDI model, the one side takes the beliefs, desires, and intentions of the other as premises in arguments. This side uses these premises in argumentation that aims towards providing reasons to support its ultimate conclusion, overcoming the doubts of the other side.

A dialectical shift is a sequence of argumentation that starts out as part of one type of dialogue but then, during the sequence, the framework becomes that of another type of dialogue. For example, when riding on our bikes we may be having a persuasion dialogue about whether a house or a condominium is the better residence, but then, coming to a fork in the bicycle path, we shift to a deliberation dialogue on the issue of which way to go. There are several different kinds of dialectical shifts studied in (Walton and Krabbe, 1995, pp. 100-116). One common kind is the shift from deliberation dialogue to negotiation dialogue. Suppose a group of executives are having a discussion in a business meeting in a conference room about whether to launch a new product, but then they start to negotiate on who should take responsibility for marketing the product. To properly analyze and evaluate real cases of argumentation, taking a dialectical shift into account may be necessary. The classic case is the *ad baculum* fallacy, where there can often be a shift from persuasion dialogue to negotiation.

10. Summary: Judging Arguments in a Natural Language Text of Discourse

The general method for judging a given argument critically is to build up and interpretation of the argument, or several competing ones, using the tools sketched out above. The evidence is the text of discourse given. Normally we start with some printed text, like an editorial from a newspaper or magazine, or text of that sort. It is important the text should be printed, so that it is available to all taking part in the analysis of the argument supposedly contained in it. It is also important that the text should be closed off, so that everyone taking part in the exercise can agree on what that text is, and what is not explicitly stated there as well. This actual text provides the data or evidence for the process that will then take place. Often such a text is chosen because it contains, or appears to contain, some interesting argument. However, that is not the exclusive reason. As indicated, for example, an explanation or some speech act other than an argument, may be the target text to which critical argumentation methods are applied.

There are three primary tasks of critical argumentation: identification, analysis and evaluation of arguments found in a natural language text of discourse. The first task of identification is to determine whether the argument thought to be found in the text is really an argument. Explanations often look like arguments, and in some cases it is hard or even impossible to tell whether the speech act in question was really meant to be that of an argument or an explanation. One has to judge by the context, and in particular, the purpose the reasoning is being used for, in the context of dialogue. In an argument the conclusion is at issue, whereas in an explanation, the thing to be explained is taken to be a fact or real event, not an unsettled issue. If one can reasonably assume that the textual

evidence justifies taking the text as an argument, and analyzing it from that viewpoint, the decision can be made to proceed to stage two.

The second stage of identification is the task of determining what the premises and conclusions of the argument are, judging from the textual and contextual evidence given in the case. Typically, in a chain of argumentation, the conclusion of one argument may also function as the premise of the next one. When examining a text of discourse, the conclusion is normally the first part of an argument that needs to be identified. The identification stage involves identifying the type or types of argument involved. For example, it could be an instance of practical reasoning or an argument from expert opinion. The identification stage involves deletion of some of the original text judged to be unimportant for the purpose of critical argumentation. Characteristic of the analysis task is the problem of enthymemes. The analysis task is not independent of the identification task, for as shown above, finding missing premises or conclusions may be assisted by identifying the argumentation scheme.

The third stage of the identification task is to identify what type of argument it is supposed to be. Is it deductive or inductive, or does it fall into the third class of defeasible or plausible arguments? People sometimes argue about this issue in a dispute. For example, one may claim that the other's argument is deductive, while the other party denies this, saying he meant it to be inductive. This kind of dispute needs to be fought out on the basis of the text of discourse and the indicator words and other evidence in it. The dispute does not need to be resolved beyond all doubt, but enough evidence has to be there to reasonably justify for proceeding on a hypothesis about what is a reasonable interpretation to go ahead with. In some cases, considering more than one interpretation may be the most reasonable course to take. It all depends on the textual evidence.

Little has been said about argument evaluation here, because it tends to be the hardest task of the three, and involves a heterogeneous collection of standards and methods. We are all very familiar with deductive and inductive methods, and so what was presented above stressed the latest developments, namely the use of methods for evaluating defeasible arguments. The evaluation stage is one of determining whether the argument is strong or weak, correct or fallacious, by the requirement of the scheme for that type of argument, and by the standard of proof appropriate for that type of dialogue. It is often very helpful to know where the argument came from. Was it from a textbook, a newspaper editorial, a commercial advertisement, or a legal case?

One of the main tools useful at all three stages is the argument diagram identifying whole chains of reasoning from the explicit premises, including the implicit statements added in, to the ultimate conclusion. The next step is to determine the standard of proof appropriate for the type of dialogue the argument is part of. The third step is to take the reconstructed chain of argumentation represented in the diagram, and judge whether it is relevant, meaning whether it is useful as part of the chain of argumentation needed to prove or raise doubt about the ultimate conclusion at issue in the dialogue. Many other tasks can be undertaken, like judging how strong the argument is, by some standard, and whether it meets standards like 'preponderance of evidence' and 'beyond reasonable doubt'. One of these tasks is to look for specific defects or shortcomings that can be identified with fallacies.

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