Justification of Argumentation Schemes

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Abstract: Argumentation schemes are forms of argument that capture stereotypical patterns of human reasoning, especially defeasible ones like argument from expert opinion, that have proved troublesome to view deductively or inductively. Much practical work has already been done on argumentation schemes, proving their worth in AI [19], but more precise investigations are needed to formalize their structures. The problem posed in this paper is what form justification of a given scheme, as having a certain precise structure of inference, should take. It is argued that defeasible argumentation schemes require both a systematic and a pragmatic justification, of a kind that can only be provided by the case study method of collecting key examples of arguments of the types traditionally classified as fallacies, and subjecting them to comparative examination and analysis. By this method, postulated structures for schemes can be formulated as hypotheses to solve three kinds of problems: (1) how to classify such arguments into different types, (2) how to identify their premises and conclusions, and (3) how to formulate the critical questions used to evaluate each type of argument.

1 INTRODUCTION

On September 19, 2004, I gave a lecture on informal logic and argumentation to the graduate students of the Institute of Logic and Cognition at Sun Yat-sen University in Guangzhou, China.[1] The subject of the lecture included an account of argumentation schemes representing common forms of argument that are neither deductive nor inductive. During the question period, Wen Xue-Feng, a PhD student, asked an interesting question: how were the argumentation schemes constructed? I took this question to ask not just about where the schemes come from, but also about their justification. I replied

[1]I would like to thank Professor Liang Qing-yin for making this visit possible, and to thank Xiong Minghui, Zhang Nanning, Tang Ling-yun and David Godden for discussions.

that the schemes came from studying many examples of arguments, especially ones associated with informal fallacies, and from finding patterns and structure common to these arguments.[2] That answer seems to me basically right, but on reflection it seemed to me that it is incomplete, and that considerable elaboration is required to explain the point of it. The purpose of this paper is to provide that elaboration.

Classical deductive logic has been proved to be consistent and complete. Although the argument structure common to argumentation schemes has been formalized [10], the completeness problem for them has not yet been solved. Hence, as will be shown here, although it is not possible yet to offer a complete systematic justification of them, they can be given a pragmatic justification.

2 WHAT ARE SCHEMES?

Schemes have a long history. Aristotle's listings of common forms of argumentation called topics (places) in *Topics, On Sophistical Refutations* [1,3] and *Rhetoric* [2] represent the first systematic attempt to give an account of schemes. After Aristotle, the topics evolved into various forms, but there seemed to be little agreement on what they were, or what they should be used for. Often they were seen as devices for argument invention, perhaps useful mainly in rhetoric. It wasn't until the twentieth century that Perelman and Olbrechts-Tyteca employed argumentation schemes, in *The New Rhetoric* [7], as tools for analyzing and evaluating arguments used in everyday and legal discourse. Schemes now had a new role.[3] Schemes have now proved to be a central tool in argumentation theory (informal logic) used to analyze informal fallacies.

Arthur Hastings, in his PhD thesis [5] at Northwestern University, provided the first systematic analysis of common argumentation schemes. He presented a format representing the premises and conclusion of each scheme with a set of critical questions matching the scheme. He presented one premise of each presumptive scheme as a defeasible conditional in the form of a Toulmin [14] warrant. Many of these Hastings-style argumentation schemes were used in the analysis of argumentative discourse in van Eemeren and Grootendorst [15, 16]. Recent classifications of argumentation schemes includes the extensive account of Kienpointner [6], who included deductive and inductive schemes, and the analysis of many of the twenty-six common presumptive schemes was given by Walton [21]. Current research aims to construct a systematic methodology for classifying schemes and for analyzing the formal structure of each scheme in a precise system. To amplify these points, it is helpful to look at one particular argumentation scheme as an example.

[2] I would like to thank the Social Sciences and Humanities Research Council of Canada for a research grant, 'Argumentation Schemes in Natural and Artificial Communication', that supported this work.

[3] Warnick [26] has provided a systematic list comparing Aristotle's topics with the argumentation schemes identified by Perelman and Olbrechts-Tyteca in *The New Rhetoric* [7].

A leading example of a presumptive argumentation scheme is the one representing argument from expert opinion [22]. This form of argument was traditionally classified as a fallacy, but recent developments have borne out the thesis that it is often a reasonable form of argument, even though it is fallible, and sometimes notoriously subject to misuse as a deceptive argumentation tactic. Argument from expert opinion can be a reasonable argument if it meets the conditions displayed in the following argument form, where A is a proposition, E is an expert, and D is a domain of knowledge.

SCHEME FOR ARGUMENT FROM EXPERT OPINION

E is an expert in domain D.
E asserts that A is known to be true.
A is within D.
Therefore, A may plausibly be taken to be true.

The three premises in this scheme represent assumptions that, if justified as acceptable in a given case, warrant the drawing of a defeasible inference warranting provisional acceptance of the conclusion. However, if someone who is skeptical about the inference asks any one of the following six critical questions [22], the argument from expert opinion defaults until the question has been answered.

SIX QUESTIONS FOR AN ARGUMENT FROM EXPERT OPINION

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

Acceptance or rejection of the argument from expert opinion thus rests on a balance of considerations in a case. If a respondent asks any one of the six appropriate critical questions, a burden of proof is shifted back onto the proponent of the argument to provide a satisfactory answer to the question. If she fails to give such an answer, the appeal to expert opinion loses its previous weight of support. Only if the question has been answered does the appeal to expert opinion have a restored weight of presumption in its favor. Thus the evaluation of any given argument from expert opinion involves not just the semantic form of the argument, but also contextual factors such as how the argument is placed in an ongoing dialogue where questions are asked and answered.

3 SYSTEMATIC JUSTIFICATION

When one asks the question of how a scheme can be justified, one is usually thinking of a defeasible scheme, like argument from expert opinion. Such a scheme, as has been shown [25], cannot be well analyzed as being a deductive or inductive form of argument. But the same kind of questions can be asked, and have been asked, about deductive and inductive forms of argument. The question, 'How can inductive reasoning be justified?' has been a frequently discussed topic in philosophy, and there have even been parallel discussions on how or whether deductive reasoning can be justified. These questions have turned out to be harder to answer that one might initially think.

We can sharpen such questions by putting them in a more specific format. For example, we can ask how a particular form of argument, like *modus ponens*, can be justified. Presumably, pursuing any serious attempt to answer this question takes us to general considerations about deductive propositional logic as a whole system. First, we have to define validity for this class of arguments, and then we have to show how the material conditional (the hook of classical propositional logic) is defined in terms of truth values of propositions. Once all this has been done, it is then fairly easy to prove that *modus ponens* is a valid form of inference, and is therefore justified. What is shown, to put it briefly, is that deductively valid forms of inference are truth preserving, meaning that if the premises are true, the conclusion also necessarily has to be true. Then given the truth-functional definition of the hook, it can easily be shown that all inferences having the form *modus ponens* are truth preserving. Similar kinds of systematic justification can be carried out in cases of inductive inference. First, some general theory is offered of how inductive inferences can be evaluated as strong or weak in terms of probability values. Second, conditional probability, and other inferential forms like conjunctive and disjunctive probability, are defined, for example, by Bayesian axioms. Then a particular form of inductive argument can be justified, or not, based on this system.

How can such a systematic program of justification be applied, in a comparable way, to argumentation schemes like argument from expert opinion that are neither deductively valid nor inductively strong? The answer is that there is no widely accepted and established system yet in place for evaluating such argumentation schemes, because the problem of building a system for analysis and evaluation of such forms of argument has not yet been solved. The problem of building a system to analyze the structure of defeasible arguments like 'Birds fly; Tweety is bird; therefore Tweety flies' remains unsolved, even though there have been many theories put forward in computing [8]. Some parts of the solution to the problem have been provided by recent developments in argumentation theory, however.

4 STRICT AND DEFEASIBLE MODUS PONENS

The next point to be made is that argument from expert opinion, like any presumptive scheme, can be formulated in a *modus ponens* format in which the warrant supporting the inference as a generalization can be expressed in the form of a conditional. In such an alternate version [25], an implicit conditional premise that links the explicit premises stated in the scheme above has been added.

ARGUMENT FROM EXPERT OPINION (*modus ponens version*)
E is an expert in subject domain S containing proposition A.
E asserts that proposition A, in domain S, is true.
A is within D.
If E is an expert in a subject domain S containing proposition A, and E asserts that proposition A is true, then A may plausibly be taken to be true.
Therefore, A may plausibly be taken to be true.

The *modus ponens* version is not a deductively valid argument. To see this we can follow the analysis of Verheij [18] who drew a proof-theoretic distinction between two rule-based forms of inference, presented below:

STRICT MODUS PONENS (SMP)
As a universal rule not subject to exceptions, if A then B.
A is true.
Conclusion: B is true.

DEFEASIBLE MODUS PONENS (DMP)
As a rule subject to exceptions, if A then B
A holds as true.
It is not the case so far that there is a known exception to the rule that if A then B.
Conclusion: B holds tentatively, but subject to withdrawal should an exception arise.

Strict *modus ponens* is a deductively valid form of argument of the kind widely known and accepted as valid in logic. What is less widely accepted is that *modus ponens* can also have a non-strict, or defeasible, form that can be reasonable in some cases even though it is not deductively valid when applied in these cases. These two schemes need to be applied differently in different kinds of cases. Verheij [18], recommended the following policy for applying them. In a case where both strict rules and rules not admitting of exceptions might possibly

come into play, defeasible *modus ponens* must always be used. In a case in which only universal rules that are not subject to exceptions are involved, strict *modus ponens* suffices as the appropriate rule of inference. Although the conclusion is really the same in both forms of argument, the qualifier 'tentatively, but subject to withdrawal should an exception arise' is stated in the conclusion part of DMP, indicating that the inferential relation between the premises and the conclusion is different in this kind of *modus ponens* argument. The reason for this feature has to do with recognizing each type of argument as distinct from the other based on "indicator words" [13]. This problem, often called "translation" in formal logic, is discussed below.

The acknowledgment of DMP as being a species of *modus ponens* inference is heretical in logic, as it implies that there can be *modus ponens* arguments that are not deductively valid. The general policy of the currently prevailing logic textbooks is to only consider *modus ponens* inferences that are deductively valid and to classify many of the arguments fitting the DMP scheme above under the SMP form. For example, Copi and Cohen, in their leading textbook [4, p. 363] instruct their students that the statement, 'If he has a good lawyer then he will be acquitted' should be symbolized using the hook (the symbol for the material conditional) as the connective. Using this symbolization, the following argument they offer as an example is said to have the SMP form.

THE LAWYER ARGUMENT

If he has a good lawyer then he will be acquitted.
He has a good lawyer.
Therefore he will be acquitted.

The conditional expressed in the first premise, however, is better seen as based on a defeasible rule rather than a strict one. It doesn't mean that if he has a good lawyer, it must follow in all instances that he will be acquitted, no matter how the trial goes. It surely means, on the best interpretation, that if he has a good lawyer then, on a balance of considerations, all else being equal in the case, he will be acquitted. For any such rule is subject to exceptions. You could have a good lawyer, but all the evidence supports the other side, and the judge sees that. Or you could have a good lawyer, but the other side could have an even better one.

The problem is that we are so accustomed to seeing *modus ponens* as a form of argument that is deductively valid that the recognition of DMP as a legitimate form of argument will be conceded only very reluctantly by those committed to formal logic as the tool of choice for the evaluation of arguments. The committed formal logician will argue that the consequent of a true conditional can never be false when the antecedent is true. So, in all cases where the antecedent condition (asserted in the first premise) and the consequent condition asserted as the conclusion turn out to be false, the conditional itself must also have been false. Suppose that in the case of the lawyer argument, the other

side has a better lawyer who, as things turn out, wins the case. That outcome would defeat the DMP argument above. But according to the viewpoint of the committed formal logician, the conditional premise, as things turned out, was not really true. Therefore, according to this viewpoint, it was not "true" in the strict sense. On this viewpoint, the conditional can only be (strictly speaking) true if it is true in all circumstances, and otherwise it is false. However, using the lawyer argument and many similar cases as examples, the advocate of DMP will argue that the conditional does not need to be treated exclusively in this strict way in all cases.

Once we recognize two types of conditionals, another problem is how to distinguish between them. For example, is the conditional represented by the sentence 'If Bill comes to the party tonight, he'll come before 8:00 pm' of the kind that supports an SMP or DMP argument? Here, as with any case of interpreting an argument in a natural language text of discourse, we have to look at the evidence in that text. For example, suppose part of the evidence is that the speaker backed up her argument by claiming that Bill told me that if he's coming he'll be there before 8pm. Should this conditional be taken as a universal assertion meant to hold without exceptions, or one that is subject to exceptions? Since it is based only on what Bill said, it could fail. Bill could be mistaken, or he could have lied, for example. Thus it makes more sense, in this instance, to treat the conditional as a defeasible one. However, each case is different, and the problem is one of interpreting a natural language text of discourse. In formal logic, such problems are treated under the heading of "translation" of a natural language into a formal language.

The same kind of problem arises in formal logic in judging, in a given case, whether a conditional that should be taken as a material conditional or as a strict conditional of the kind represented in modal logic by a necessity operator governing a statement containing a material conditional. It should be stated as well that the problem of differentiating between different kinds of arguments having structures comparable to *modus ponens* affects generalizations and quantifiers as well. Some generalizations are strict (meaning not subject to exceptions) and are well represented by the universal quantifer of classical logic. Many generalizations (to offer a generalization) are defeasible, because they are meant to be subject to exceptions of a kind that cannot always be identified in advance.

The remaining problem is that DMP cannot be analyzed by means of a context-free truth table in the way that SMP has been in deductive logic. DMP could hold at one point in an ongoing collection of data in an investigation. But then later, as new evidence comes in, it might default. Thus DMP needs to be analyzed and evaluated not only in light of its logical form, but also in light of a context of investigation in which a conclusion can be accepted at one point, but then rejected at a later point. There are some resources in argumentation theory that can be used to model this notion of an argument used in a context. In particular, the notion of argumentation as a sequence of moves made by two

participants in a goal-directed dialogue is central. In a nutshell, DMP needs a pragmatic structure for argument evaluation.

5 PRAGMATIC JUSTIFICATION

Argumentation schemes of the defeasible type that are the central focus of justification attempts here require a pragmatic justification because they represent arguments used for some purpose in a given conversational context. This pragmatic dimension requires that such arguments need to be examined within the context of an ongoing investigation in dialogue in which questions are being asked and answered. Because context is important in a given case, the collection and analysis of case studies is more significant than it is in context-free deductive and inductive logics. The premises and conclusion are the core of an argument to be evaluated, but how this central argument is being used to convince an opponent, or to prove the conclusion by collecting evidence, are also important. For this reason, an argumentation scheme needs to have a pragmatic justification as well as a systematic one. This means that the collection and analysis of examples of the use of a particular type of argument in varying contexts is a required part of the analysis and justification of any scheme being studied. We can no longer take for granted that schemes like argument from expert opinion can routinely be classified as fallacies. We now need to address the hard task of considering each individual case on its merits, and build criteria that will aid in judging whether the given case is reasonable or fallacious.

All of the research on fallacies conducted over the past thirty years has been based on the same methodology [20]. It begins with the collection of data in the form of selection of examples of arguments of the type being studied. These are real examples of arguments taken from newspaper editorials, television news reports, and so forth. Each example is recorded as an exact quotation so that what you have is a text of discourse in natural language with its source carefully documented. Taking each individual case as unique, a preliminary attempt is made to do three things to identify the argument in the case, to analyze it, and to evaluate it as strong, weak or fallacious. Such a preliminary attempt can be seen as a rough hypothesis, not yet guided by any precise theory. However, as noted above, a dialectical theory of argumentation has arisen out of these practical efforts to analyze individual fallacies.

Using the dialectical approach, each individual case of an argument needs to be analyzed and evaluated not just as a semantic form, but as an argument used for some purpose in a conversational setting. The conversational setting is represented by a formal dialogue structure in which a proponent and a respondent take turns making moves. The proponent puts forward an argument designed to incur the commitment of the respondent to the conclusion. But the argument can be, and often is defeasible, meaning that the respondent can make objections to it and ask critical questions [12]. The argument and its

reply need to evaluated as a pair of moves, on a balance of considerations in a dialogue setting that allows new evidence to come in at a later point. This means that pragmatic factors, like burden of proof, can play a role in the evaluation of the argument as strong, weak or fallacious.

It should also be mentioned however that in addition to case study analysis and formal dialectical systems, there is another form of justification for schemes that bridges the pragmatic and the systematic. New technology in distributed computing has been built on argumentation schemes, especially in multi-agent computing, where rational software agents need to engage in interactive communication, including the speech acts of putting forward an argument and questioning it [27]. One development worth mentioning is a formal and implemented model of argumentation schemes in agent communication [10]. In this work, a method of formalizing schemes is put forward that is implementable in computing but is also close to the richness of natural language argumentation. The formalization is based on the implementation of an Argument Markup Language (AML) originally developed as part of the Araucaria software tool for argument diagramming [9].[4]

The method represents a formalization of schemes that includes both familiar deductive schemes like *modus ponens* and defeasible schemes like argument from expert opinion. This formal tool is being combined with the case study technique of analyzing arguments from natural language discourse. Araucaria now has a database that can be used to access existing examples, along with analyses of them provided by other users, and to enter new examples and analyses of them. This current research in computing is formal, but at the same time practical, because it is used for practical purposes in computing, and because it requires an approximation to natural language argumentation. It combines systematic and pragmatic justification of argumentation schemes.

6 CONCLUSION

The first conclusion that needs to be stated is negative and cautionary. What needs to be stated is that there is a completeness problem for defeasible argumentation schemes that has not yet been solved. So far, the study of schemes like argument from expert opinion makes the account of the scheme open to the possibility that the process of critical questioning could go on and on without any clearly defined stopping point. Thus the issue needs to be raised whether the argument from expert opinion can be established in any given case as an argument in which the premises offer solid evidence supporting the conclusion. It is often possible to ask subquestions of the basic critical questions. But if a scheme cannot generally be closed off to further critical questioning (because of defeasibility), how can schemes be justified as representing forms

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

of rational argument in which the premises provide evidence for accepting the conclusion?

Suppose that a proponent has put forward an argument from expert opinion for example. The way towards a solution needs to be based on the dialectical premise that the appeal to expert opinion should never be regarded as complete and closed to further questioning, until the dialogue itself has reached the closing stage. This proposed solution implies that asking of critical questions in a given case depends on the type of dialogue in the case, the stage the dialogue is in, and the conditions governing closure of the dialogue. What makes defeasible arguments different from deductive ones, as noted above, is their lack of completeness as used in many cases, meaning that the dialogue on the argument offered earlier in a case may need to re-opened if new evidence comes into the case. For example, critical questioning of an argument from expert opinion needs in many common cases to be seen as open-ended. Case studies of this kind of argument have shown that the fallacy of *ad verecundiam* typically consists in the closing off of the respondent's critical questioning too hastily by the proponent.

This proposal for solving the completeness problem needs to be developed at two levels. At one level, basic critical questions can be asked. At another level, critical subquestions that bring out more specific aspects of the basic critical questions can be asked. Thus according to this proposal, the solution to the completeness problem will come from the dialectical analysis of argumentation schemes. Each scheme needs to be evaluated on a case-by-case basis in the context of dialogue appropriate for how the argument was used in that case. The analyst needs to examine the text of discourse in the given case to determine how far along the process of critical questioning has proceeded. This data is to be used in determining whether closure of the dialogue can be assumed or not, and what stage the dialogue is in. The structure for systematic justification is not yet fully established, because the completeness problem has not yet fully been solved. More generally, the problem of evaluating defeasible argumentation has not yet been fully solved, even though there are many theories of it in computing, where it is a central problem for AI. However, it was argued above that the best approach to solving these two closely related problems is the theory of formal dialogue systems offered by argumentation theory.

As argued above, defeasible argumentation schemes like argument from expert opinion require both a systematic and a pragmatic justification. It was argued that pragmatic justification is provided by the case study method of collecting key examples of arguments of the kinds traditionally classified as fallacies and subjecting them to comparative examination and analysis. Through the study of many such examples, general principles can be formulated as hypotheses to solve the problems of how to classify such arguments into different types, how to identify their premises and conclusions, and how to specify the critical questions that need to be asked in relation to each type.

These hypotheses represent the current state of the art, the tools needed to analyze and evaluate individual cases of the use of these argument types. As more and more cases are collected and analyzed, these analytical tools are sharpened and the principles they represent are refined.

It should be observed that neither type of justification is yet complete, as the study of fallacies and argumentation schemes is still underway, and is a growing, but still relatively newly cultivated field. Nonetheless, each form of justification, systematic and pragmatic, has resources that have been built up. Many of the most important fallacies, like argument from expert opinion, have now been studied in some depth. The many examples of this type of argument that have now been collected and analyzed form a body of case studies. Lessons have emerged from them, increasing our knowledge of how these arguments work, and what factors are important in evaluating them. Thus resources are in place that can support pragmatic justification of many of the schemes that have now been identified and studied. As for systematic justification, although the problem of defeasibility cannot realistically be thought of as having been entirely solved, the dialectical structures provided by formal models of dialogue systems offer a framework that seems to be the best route to a solution.

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