Argumentation Schemes in Dialogue

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ABSTRACT

This paper uses the language of formal dialectics to explore how argumentation schemes and their critical questions can be characterized as an extension to traditional dialectical systems. The aim is to construct a dialectical system in which (i) the set of locutions is extended to include scheme-based moves (ii) the set of structural rules describes the roles that critical questioning can play; and (iii) the set of commitment rules distinguishes between exceptions and assumptions.

KEYWORDS

Argumentation Schemes, Critical Questions, Dialogue.

Introduction

Argumentation schemes have been proving to be a powerful tool in understanding the structure of arguments as well as playing a key role in the pedagogy of critical thinking. One of the key features of schemes is the set of critical questions. Walton and others have started to explicate how these critical questions seem to be of two types: assumptions and exceptions. The way in which these two function in argumentative discourse is now just starting to be better understood, and a link with burden of proof is being established, particularly in the context of legal argumentation. The inherently dialogical nature of critical questions has to date, however, been rather down-played. This paper uses the language of formal dialectics to explore how argumentation schemes and their critical questions can be characterized as an extension to traditional dialectical systems. The aim is to construct a dialectical system in which (i) the set of locutions is extended to include supporting claims with arguments constructed from schemes, and responding to challenges by countering with such arguments; (ii) the set of structural rules describes the roles that critical questioning can play; and (iii) the set of commitment rules distinguishes between exceptions and assumptions. In this way the formal dialectic specification itself captures the way in which the different schemes license both proponent and opponent to use particular moves, and the different critical questions oblige and permit particular dialogical actions.

Argumentation Schemes

Argumentation schemes are forms of inference from premises to a conclusion of the kind used in

arguments used in everyday conversational exchanges in which one party is trying to get another to come to accept a conclusion that is at issue. They represent patterns of deductive and inductive reasoning in some instances, but typically they represent defeasible inferences of a kind that are useful heuristics for moving to a plausible hypothesis under conditions of uncertainty and lack of knowledge. Many of them are similar to the so-called topics of Aristotle, and, in the same way as topics were long taken to be, can be useful for inventing arguments as well as for evaluating them. In modern times, many of the most common and important schemes have been identified and analyzed by Hastings (1963), Perelman and Olbrechts-Tyteca (1969), Kienpointner (1992), Walton (1996), and Grennan (1997). Recently there has been considerable interest in schemes in computer science, notably in artificial intelligence, where they are increasingly being recognized in fields like multi-agent systems as useful for making refining the reasoning capabilities of artificial agents (Reed and Norman, 2003; Verheij, 2003). For special use in artificial intelligence systems Pollock's OSCAR (1995) identified some ten schemes.

Schemes are necessary for identifying arguments, finding missing premises, analyzing arguments, and finally for evaluating them. The tool used for evaluation is the set of appropriate critical questions matching each scheme (Hastings, 1964). The questions criticisms that, if not answered adequately, make the argument fitting the scheme fial to hold. The scheme most commonly used to illustrate how schemes work is the one for argument from expert opinion, as formulated in (Walton, 1997, p. 210), here with some minor notational changes[1]. *E* is an autonomous agent of a kind that can possess knowledge in some field or domain expertise, represented by the variable *F*. Such a domain of knowledge is assumed to contain a set of propositions (statements).

Scheme for Argument from Expert Opinion

Major Premise: Source *E* is an expert in field *F* containing proposition *A*.

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

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

Any argument fitting the scheme for argument from expert opinion is supposed to be evaluated in a dialogue framework in which another party (usually called the respondent) can ask critical questions. The standard six basic critical questions matching the appeal to expert opinion (Walton, 1997, p. 223) are these.

1. *Expertise Question*: How credible is *E* as an expert source?
2. *Field Question*: Is *E* an expert in the field *F* 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?

If the respondent asks one of the six critical questions a burden of proof shifts back to the proponent's side to respond appropriately. Asking any one of the six questions defeats the argument temporarily

[1] An earlier version used the variable *D* to represent the domain of knowledge.

until it has been answered.

The method of evaluating an argument like one from expert opinion is dialectical. It is carried out by an assessment of such a shifting of burden of proof as a dialogue proceeds in a given case (Walton, 1997). When the respondent poses any one of the six critical questions, the proponent has the burden of responding at the next move. The problem of evaluating the argument this reduces to the problem of tracking such a dialogue and deciding who has lost or won, given the moves they made, in the order they made them. However, there are difference between the critical questions on how strongly or weakly they produce such a shift.

Critical Questions in Carneades

Carneades approaches the problem of determining how the burden of proof should be distributed by dividing premises of a scheme into three types, ordinary premises, assumptions and exceptions (Gordon, Prakken and Walton, 2007). Evidence for ordinary premises and assumptions must be produced by the proponent of the argument with these premises, whereas evidence for exceptions must be produced by the respondent. The critical questions matching the scheme are represented in Carneades as assumptions and exceptions. The premises and conclusion of the scheme for argument from expert opinion are classified in the Carneades model as follows.

Ordinary Premise: E is an expert in the subject domain S containing the proposition A.
Ordinary Premise: E asserts A.
Assumption: E is a credible expert.
Exception: E is not reliable.
Exception: A is not consistent with the testimony of other experts.
Assumption: A is based on evidence.
Conclusion: A.

The distinction between assumptions and exceptions in Carneades tells us which answer to a critical question can be assumed, if the critical question has not been asked yet. Whether an assumption or exception is appropriate depends on the burden of proof in a dialogue. If the respondent who poses the question should have the burden of proof, the critical question should be classified as an exception. If the proponent should have the burden of proof, the critical question should be classified as an assumption.

The Game ASD

Our aim is to define an Argumentation Scheme Dialogue, or ASD. We take as our starting point Walton's (1984) game, CB. As a subset of Mackenzie's (1979) DC game and Hamblin's (1970) H, it is both familiar and simple. CB has just four locutions, five commitment rules and three further dialogue rules, and with such a small set, allows us to explore what is unique to dialogue with schemes. (We hope in future to apply scheme-based extensions to much richer accounts of argumentative dialogue such as PPD (Walton and Krabbe, 1995)). We do not here want to defend CB as a model of (even idealised) dialogue – but rather use it as a tool to explore how a dialogue game can be extended to encompass argumentation schemes.

Walton's CB is as defined as follows (Walton, 1984, pp133-135):

Location Rules

i. Statements: Statement letters, S, T, U, ..., are permissible locutions, and truth-functional compounds of statement-letters.
ii. Withdrawals: 'No commitment S' is the locution or withdrawal (retraction) of a statement.
iii. Questions: The question 'S?' asks 'Is it the case that S is true?'
iv. Challenges: The challenge 'Why S?' requests some statement that can serve as a basis in (a possibly defeasible) proof for S.

Commitment Rules

i. After a player makes a statement, S, it is included in his commitment-store.
ii. After the withdrawal of S, the statement S is deleted from the speaker's commitment store.
iii. 'Why S?' places S in the hearer's commitment-store unless it is already there or unless the hearer immediately retracts his commitment to S.
iv. Every statement that is shown by the speaker to be an immediate consequence of statements that are commitments of the hearer then becomes a commitment of the hearer's and is included in his commitment store.
v. No commitment may be withdrawn by the hearer that is shown by the speaker to be an immediate consequence of statements that are previous commitments of the hearer.

Dialogue Rules

R1. Each speaker takes his turn to move by advancing once locution at each turn. A no-commitment locution, however, may accompany a why-locution as one turn.
R2. A question 'S?' must be followed by (i) a statement 'S', (ii) a statement 'Not-S', or (iii) 'No commitment S').
R3. 'Why S?' must be followed by (i) 'No commitment S' or (ii) some statement 'T', where S is a consequence of T.

Walton goes on to describe further Strategic Rules that are not of interest here and are invariant to the extensions for argumentation schemes.

Like Mackenzie, Walton requires his dialogue game to have available to it a set of rules of inference. In (Walton, 1984), the assumption is that these are selected from the rules of inference of propositional logic, but here we relax that assumption and instead expand the set of rules to include argumentation schemes. Walton's (1984) definitions of immediate consequence and consequence hold for schemes just as they do for deductive rules of inference:

> **immediate consequence**. A statement T is an immediate consequence of a set of statements S0, S1, ... Sn if and only if 'S0, S1, ..., Sn therefore T' is a substitution-instance of some rule of the game.
>
> **consequence**. A statement T is a consequence of a set of statements S0, S1, ... Sn if and only if T is derived by a finite number of immediate consequence steps from immediate consequences of S0, S1, ... Sn.

(Walton, 1984, pp132-3)

The analogy between deductive and inductive reasoning is strong here: where deductively if we know A and A ⊃ B, then B is an immediate consequence (assuming Modus Ponens is amongst the rules of inference we accept); where inductively if we know E is an expert (in the domain of X) and E asserts X, then X is an immediate consequence (assuming Argument from Expert Opinion is amongst the rules of inference we accept).

CB supports what we might call 'reasoning elicitation' (i.e. the support of a conclusion by a premise) along a single specific path: one player states S, the other player challenges, Why S?, and the original player can respond with T, of which S is a consequence. It is this reasoning elicitation step that is the focus of the extension of CB to form ASD.

We introduce a new dialogue rule that is applicable after the S - Why S? - T pattern:

(R4) After a statement T has been offered in response to a challenge locution, Why S?, then if (S, T) is a substitution instance A of some argumentation scheme of the game, the locution pose(C) is a legal move, where C is a critical question of scheme A appropriately instantiated.

There are several things to note about rule R4. Firstly, CB does not deal explicitly with enthymemes. It is not particularly instructive to extend it to do so, but it is important to note that argumentation schemes have an arbitrary number of premises, and only some of these premises might be introduced explicitly in a dialogue. So (S, T) in rule R4 may be a *partial* substitution instance. We may, for example, say:

My doctor has said I need to eat less salt, so I probably should try and cut down.

This is an enthymeme in which the doctor's expertise in dietary matters is left implicit – we have one of the premises of the scheme, plus its conclusion:

(Minor premise)	My doctor has said I should eat less salt
(Major premise)	*My doctor is an expert on my diet*
(Conclusion)	I should eat less salt

The instantiation (My doctor has said I should eat less salt, I should eat less salt) thus counts as a partial substitution instance of the general form of the scheme, (E says A, E is an Expert, A), and would license a pose(C) moves under rule R4.

The rule R4 introduces a new locution move, pose(C), which can be added as a fifth in the list of CB's locutions:

(v) Critical Attacks: the attack 'Pose C' poses the critical question C associated with an argumentation scheme.

Though there is a single locution type, it has two distinct effects on the dialogue depending on whether

the critical question being posed is an exception or a assumption. Broadly, we want to capture the intuition that assumptions are required for an argument to go through, that they function much like missing or implied premises, and that questioning them requires the proponent of the argument to justify. Exceptions, in contrast, are potential attacks in which the barrier is set higher: an interlocutor must not just ask the question but must provide some evidence for the potential counter. This distinction is discussed with legal examples in (Prakken et al., 2005) and with computational ramifications in (Gordon and Walton, 2006). We assume that the different types of critical questions are explicitly marked - both (Gordon and Walton, 2006) and (Rahwan et al., 2007) suggest that this is a reasonable expectation in computational practice as well as in theory. We can then formulate a new dialogue rule to handle the Pose move:

(R5) After a 'Pose C' move, then either
- (a) if C is an assumption of its argumentation scheme, the move is followed by
  - (i) a statement 'C'
  - (ii) a statement 'not-C'
  - (iii) 'No commitment C'
- (b) if C is an exception to its argumentation scheme,
  - (i) a statement 'C'
  - (ii) a statement 'not-C'
  - (iii) 'No commitment C'
  - (iv) 'Why not-C?'

Part (a) of rule R5 is of course a rehearsal of the rule for the question move: questioning an assumption is analogous (as Gordon and Walton (2006) and Verheij (2005) have discussed) to questioning an implicit premise (in these earlier versions of the theory, what are now called assumptions were referred to as *presumptions*). Part (b) extends the permitted responses to include a reciprocal challenge move, requiring the other party to justify their critical questioning.

So for example, an assumption of the expert opinion scheme is that E is indeed an expert in the right field (an assumption associated with the second critical question of that scheme). If this is questioned, the speaker must state that it is the case, or that it is not, or withdraw commitment to it. Similarly the fourth critical question of the expert opinion scheme allows a critic to probe the expert's reliability. The question that can be posed is 'Is the expert reliable?', to which the proponent can respond with not only statement or withdrawal moves but also a challenge, 'Why is the expert not reliable?'

But what happens if critical questions are not posed? Clearly, with respect to exceptions, there is nothing to do: only if an interlocutor takes exception is there any work to be done – exceptions function as potential “growth points” of an argument, but the opportunity for growth lapses if not taken up. But for assumptions, it seems natural to account for the assuming some how. This is an ideal candidate for the notion of *mere concession* introduced in Walton and Krabbe's (1995) PPD. Mere concessions provide a way of accounting for propositions that are agreed to (typically by a hearer) but in a weaker way than commitments. Specifically, commitments are usually required to be defended on demand, whilst mere concessions are not. Unfortunately, CB does not have such a subcategory of commitment – so instead we sketch how bare commitment to assumptions can be introduced.

(iv) Every statement that is shown by the speaker to be an immediate consequence of statements that are commitments of the hearer via some rule of inference or argumentation scheme A, then becomes a commitment of the hearer's, along with all the assumptions of A.

This encompasses the previous version of this commitment rule because the definition encompasses rules of inference such as Modus Ponens which have no assumptions, as well as argumentation schemes which may have critical questions, some of which will be marked as assumptions.

The new Pose move also introduces commitment directly but it does so in exactly the same way as the challenge move, so can be accommodated by a change to CB's third commitment rule:

(iii) Both 'Why S?' and 'Pose S' place S in the hearer's commitment store unless it is already there or unless the hearer immediately retracts his commitment to S.

In combination, these changes to the rules of commitment and the rules of dialogue ensure that inference over argumentation schemes can contribute to a dialogue in just the same way as inference over deductive rules, and furthermore that the burden of proof is distributed appropriately across the different critical questions: the proponent takes the burden of proof for assumptions, the questioner for exceptions.

To summarise, our new dialectical game, ASD, is as follows:

Location Rules

i. Statements: Statement letters, S, T, U, ..., are permissible locutions, and truth-functional compounds of statement-letters.
ii. Withdrawals: 'No commitment S' is the locution or withdrawal (retraction) of a statement.
iii. Questions: The question 'S?' asks 'Is it the case that S is true?'
iv. Challenges: The challenge 'Why S?' requests some statement that can serve as a basis in (a possibly defeasible) proof for S.
v. Critical Attacks: the attack 'Pose C' poses the critical question C associated with an argumentation scheme.

Commitment Rules

i. After a player makes a statement, S, it is included in his commitment-store.
ii. After the withdrawal of S, the statement S is deleted from the speaker's commitment store.
iii. 'Why S?' places S in the hearer's commitment-store unless it is already there or unless the hearer immediately retracts his commitment to S.
iv. Every statement that is shown by the speaker to be an immediate consequence of statements that are commitments of the hearer via some rule of inference or argumentation scheme A, then becomes a commitment of the hearer's and is included in his commitment store along with all the assumptions of A.
v. No commitment may be withdrawn by the hearer that is shown by the speaker to be an immediate consequence of statements that are previous commitments of the hearer.

Dialogue Rules

R1. Each speaker takes his turn to move by advancing once locution at each turn. A no-commitment locution, however, may accompany a why-locution as one turn.
R2. A question 'S?' must be followed by (i) a statement 'S', (ii) a statement 'Not-S', or (iii) 'No commitment S').
R3. 'Why S?' must be followed by (i) 'No commitment S' or (ii) some statement 'T', where S is a consequence of T.
R4. After a statement T has been offered in response to a challenge locution, Why S?, then if (S, T) is a substitution instance A of some argumentation scheme of the game, the locution pose(C) is a legal move, where C is a critical question of scheme A appropriately instantiated.
R5. After a 'Pose C' move, then either
    (a) if C is a assumption of its argumentation scheme, the move is followed by
        (i) a statement 'C'
        (ii) a statement 'not-C'
        (iii) 'No commitment C'
    (b) if C is an exception to its argumentation scheme,
        (i) a statement 'C'
        (ii) a statement 'not-C'
        (iii) 'No commitment C'
        (iv) 'Why not-C?'

Worked Example

As an example, let us take the following dialogue fragment between Bob and Wilma. Wilma isn't sure about Bob's assertion that the conference programme is perfect, and tries to convince Bob that it has a mistake in it.

(L1) Bob: OSSA's great: all the experts go. And they're brilliant at doing the programme – they never make a mistake.
(L2) Wilma: Hmm. Look at the programme: either Alf is staying home, or they've made a mistake on this one.
(L3) Bob: Yes, I suppose so.
(L4) Wilma:Well do you remember that "expert" piece that Alf wrote in *South Western Ontario Philosophy Monthly* that said that most Canadian philosophers go to OSSA?
(L5) Bob:Yes, I remember.
(L6) Wilma:Well Alf should know, so we can take it that most Canadian philosopher's do indeed go.
(L7) Bob: Yes, but he'd have a biased opinion.
(L8) Wilma: Why do you think he's biased?
(L9) Bob: Er, not sure – OK so what if he wasn't biased? So what?
(L10) Wilma: Well if we know that Canadian philosophers are going, then, given that Alf is a Canadian philosopher, he'll certainly be going.
(L11) Bob: No, not necessarily – he only said *most* philosophers.
(L12) Wilma: Well, you must agree that if all experts are going (as you said) and Alf is an expert (as you agreed), then Alf must be going any way.
(L13) Bob: Yes, I suppose so.

We can reconstruct the dialogue propositionally, tracking the changes to the commitment stores thus:

Locution	***Speaker***	***Content***	***B's Commitments***	***W's Commitments***
L1	B	a, b	a, b	
L2	W	c ∨ not-a ?		
L3	B	c ∨ not-a	c ∨ not-a	
L4	W	e ?		
L5	B	e	e	
L6	W	d *by AS1 that has e as premise, and f as an assumption and g as potential exception*	d, f	d, f
L7	B	Pose(g)		
L8	W	Why not-g		
L9	B	g	g	
L10	W	e ⊃ not-c?		
L11	B	No commitment e ⊃ not-c		
L12	W	(f ∧ b) ⊃ not-c ?		
L13	B	(f ∧ b) ⊃ not-c	(f ∧ b) ⊃ not-c not-a	

Key List
a: They never make a mistake doing the programme at OSSA.
b: All the experts go to OSSA.
c: Alf is staying home
d: Most Canadian philosophers go to OSSA
e: Alf said most Canadian philosophers go to OSSA
f: Alf is an expert
g:Alf is unbiased

At L13, Wilma wins – one can see how this is so with the following proof through Bob's commitments to Wilma's thesis T_W that not-a (we assume that all the rules of propositional logic are available to this dialogue; they are indicated in the proof by 'PL'):

(1) (f ∧ b) ⊃ not-c (Established at L13)
(2) b (Established at L1)
(3) f (Established at L6)
(4) f ∧ b (2, 3, PL)
(5) not-c (1, 4, PL)
(6) c ∨ not-a (Established at L3)
(7) not-a (5, 6, PL) ■

The trick to Wilma's success is in using the assumption implicit in the argumentation scheme at L6 to formulate the final implication at L12, having failed with the implicative gambit (or "corner" in the language of (Walton, 1984)) of L10. In more detail, the game starts with Bob offering his position which commits him to two propositions (and, indeed, several others omitted here for clarity). In order to try and have Bob retract his commitment to *a* (that they never make a mistake in the conference programme), Wilma adopts a strategy based on disjunctive syllogism, pointing out that (in the face of some evidence), either Alf isn't going *(c*), or else a mistake has been made (*not-a*). At L3 Bob accepts the disjunction, so Wilma proceeds to disprove the first disjunct. She starts by introducing the claim that Alf wrote an article saying that most Canadian philosophers attend OSSA (*e*). At L5, Bob agrees to this claim. At L6 Wilma uses an argumentation scheme (we assume it is rather like the Scheme from Expert Opinion presented in the first section) based on the premise *e*, and with the conclusion *d*, that most Canadian philosophers do indeed attend OSSA. The use of this scheme involves an assumption – that Alf is an expert (*f*), which gets tacitly added as another commitment under commitment rule (iv). The scheme also has a potential exception – that the expert may be biased – here referred to as *g*. (Note that the scheme carries a number of other assumptions and exceptions omitted from this analysis for clarity). Bob decides to pose the critical question associated with this exception – not because he has any particular reason to doubt the honesty of the expert, but rather, as a strategic ploy, in an attempt to shift the burden of proof to Wilma (Prakken *et al*., 2005). Unfortunately for Bob, at L8, Wilma rejects the ploy by demanding justification for the critical question, as she is permitted to do with critical questions associated with exceptions, under locution rule (R5b). With no further evidence, Bob is compelled to concede that his question has no further justification, so agrees that the exception does not hold (*g*). At L10, Wilma attempts to win her "corner" - the premise that will guarantee success, namely the conditional that if most Canadian philosophers are going, then Alf is going. Bob rejects this conditional though. So at L12, Wilma adopts a different strategy, this time using the implicit assumption from the argumentation scheme used earlier at L6. She again aims for agreement on a conditional, this time that if Alf is an expert, and all experts are attending OSSA, then Alf is attending OSSA. This time, Bob agrees, so Wilma wins her corner – she has one of the disjuncts in her disjunctive syllogism shown to be false, so the other – her ultimate thesis – must be true.

Conclusions

This paper has aimed to sketch how traditional dialogue games can be extended to take account of the dialectical nature of argumentation schemes. Most work on argumentation schemes to date, both within argumentation theory, and also in artificial intelligence where such schemes have found a very warm reception, has focused on the representational and inferential aspects. Yet schemes clearly have an inherently dialectical nature, with critical questions forming a crucial component. By showing how schemes can fit in to simple, well-established dialogue games, it becomes possible, first, to develop more sophisticated games that exploit what argumentation schemes can do with an eye to implementation in artificial intelligence, and second, to explore theoretically the links between argumentation schemes and fallacies, for which dialogue games were largely invented.

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