

Chapter 8

Arguments and Their Sources

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Abstract. As argumentation theory has moved away from classical logic as a standard, sources have played an increasingly important role in the psychology of argumentation. Considering the connections between arguments and their sources is important for both descriptive and normative projects. This chapter draws together different strands of research in the psychology of argumentation and their differing views on source characteristics: namely, procedural rules, pragmatics, argumentation schemes and Bayesian Argumentation. We argue for a reconciliation of these different approaches around a probabilistic notion of relevance.

1. Introduction

To have a theory of argumentation requires us to choose from, or weave together, different senses of the term ‘argument’. An argument can be a reason given in support of an action or idea. Relatedly, an argument can be the combination of the reason and the claim it is taken to support. In other words, an argument, as an inferential argument, will be a set of premises (evidence) and a conclusion (claim) bound together in some way. Lastly, an argument can be a dialogue in context: a dialectical process in which discussants propose and oppose claims. These argumentative dialogues vary in character, including, for instance, both reasonable attempts to resolve or clarify an issue and personal conflicts in which participants verbally hit out at each other (for a typology, see Walton, 2008). Different theories of argumentation have focused on different senses of the word ‘argument’ and, hence, on different aspects of argumentation (on different senses of ‘argument’ see also O’Keefe, 1977, and Hornikx & Hahn, 2012).

Classical logic focuses on the inferential object sense. Thus, arguments are sets of propositions linked through a set of logical rules (see, for instance, Arthur, 2011), and arguments are sound solely in virtue of their structure and the truth of their premises. But since at least Toulmin (1958), argumentation theory has taken a dialectical turn: theories emphasize an argument’s use in context. This dialectical turn brings the different senses of argumentation tightly together. Arguments are reasons for actions or ideas, but they are reasons for *someone*: that is, they are relative to the arguer and audience. And while arguments may have a complex structure, even as inferential objects, they are, on this view properly understood only as part of the wider argumentative process.

In the same way that a dialectical perspective brings together argument and recipient, it also brings into view the argument’s proponent. Historically sources (to wit, proponents of

arguments) have been treated as irrelevant to argument quality. On this view, a source's standing should neither improve nor worsen an argument. Hence, numbering among the traditional fallacies are appeals to a source's expertise (*argumentum ad verecundiam*) or arguments attacking a source (*argumentum ad hominem*) (Hahn, Oaksford, & Harris, 2012). However, while such a view seems natural from a logical perspective, the dialectical turn means that arguments and sources can no longer be treated as wholly separable. Arguments always come from a source, and properties of the source bear on the strength of the argument. For instance, as we will see below, sources seem subject to procedural rules that govern dialogue; if they violate these rules, they risk rendering their contributions inappropriate or unreasonable.

In this chapter we will discuss the multiple, intrinsic connections between arguments and their sources. We will outline the different approaches taken to accounting for the role of sources, and argue for a division of labour between the approaches.

2. Procedural Rules

In argumentation theory, a large and influential body of work situates arguments firmly in the context of discourse. This work focuses on deriving procedural rules for arguments, which is to say principles for how discussants should reasonably behave. Procedural rules bear the imprint both of Toulmin's seminal work on the use of arguments and of natural-language pragmatics.

Pragmatics resists straightforward definitions (Huang, 2007; Levinson, 1983). But popular definitions set pragmatics alongside semantics: both are the study of (or mental faculties for) meaning, distinguishable (crudely) in the following ways. Semantics treats the meanings of words and sentences in abstract. Pragmatics treats the meanings of words and sentences as used by a speaker in a specific context. Hence, we can speak of sentence meaning (semantics) and utterance meaning (pragmatics) (Levinson, 1983). Pragmatics includes a wealth of information that speakers intentionally communicate but leave implicit. Hence, we can also speak of a code and inference model of language: semantics is the code, associating words, concepts and the world; pragmatics is the inference, linking the code to the speaker's intended meaning (Clark, 2013).

One account of procedural rules dominates the literature: namely, pragma-dialectics (see, e.g., van Eemeren & Grootendorst, 1984, 1992, 2004). Pragma-dialectics views argumentation as "verbal moves ideally intended to resolve a difference of opinion" (van Eemeren & Grootendorst, 1995). On this view, argumentation theory becomes a sort of complex pragmatics, the aim of which is to analyze speech acts that are chained together in argument. Pragma-dialectics breaks argumentative discourse down into various stages. During the confrontation stage, discussants encounter a difference of opinion. During the opening stage, they identify themselves and establish their initial standpoints. During the argumentation stage, they begin the discussion proper, outlining their standpoints and defending them against critical questioning. During the conclusion stage, the discussants reach their final standpoints: ideally they reach agreement. Complementing these stages is a set of procedural rules, which draw on Grice's (1975) Cooperative Principle and Maxims of Conversation. The rules derive from the qualitative study of real arguments. Table 1 below lists these rules alongside a competing set.

Standards of Fairness	Pragma-dialectic Rules
I. Faulty Arguments	
(1) Violation of Stringency <i>Arguments presented non-stringently</i>	(1) Freedom Rule <i>Don't prevent advancing standpoints or questioning them</i>
(2) Refusal of Justification <i>No, or insufficient reason, given for assertion</i>	(2) Burden of Proof Rule <i>Must defend standpoint when requested</i>
II. Insincere Contributions	
(3) Pretence of Truth <i>Assertion known to be false, or subjectively true, presented as objectively true</i>	(3) Standpoint Rule <i>Only attack standpoints that have really been introduced</i>
(4) Shifting of Responsibility <i>Unwarranted denial, claim or transfer of responsibility</i>	(4) Relevance Rule <i>Real arguments, relevant to standpoint</i>
(5) Pretence of Consistency <i>Arguments presented that are incongruent with actions/other arguments</i>	(5) Unexpressed Premise Rule <i>Don't falsely attribute implicit premises or deny your own</i>
III. Unjust arguments	
(6) Distortion of Meaning <i>Intentional distortion of any contributions or facts</i>	(6) Starting Point Rule <i>Don't falsely present or deny an accepted starting point</i>
(7) Impossibility of Compliance <i>Don't demand anything of others that you know they won't be able to do.</i>	(7) Validity Rule <i>Supposedly conclusive arguments must be logically valid</i>
(8) Discrediting of Others <i>Intentional or negligent discrediting of other participants</i>	(8) Argument Scheme Rule <i>Non-conclusive arguments must respect argument schemes</i>
IV Unjust interactions	
(9) Expressions of Hostility <i>Don't treat your adversary as your enemy</i>	(9) Concluding Rule <i>Respect inconclusive and conclusive defences in settling argument</i>
(10) Hindrance of Participation <i>Don't impede others' participation</i>	(10) Usage Rule <i>Don't use confusing/ambiguous language; don't intentionally misinterpret opponent's language</i>
(11) Breaking Off <i>Don't break off argumentation without justification.</i>	

Table 1. Fairness Rules versus Pragma-dialectic Procedural Rules; wordings adapted from Schreier et al (1995) and van Eemeren, Garssen and Meuffels (2009)

To illustrate, consider the first two rules:

Rule 1 (Freedom Rule): Discussants may not prevent each other from advancing standpoints or from calling standpoints into question.

Rule 2 (Burden of Proof Rule): Discussants who advance a standpoint may not refuse to defend this standpoint when requested to do so.

(van Eemeren, Garssen, & Meuffels, 2009, pp. 21-22)

These rules have good face validity: we would intuitively consider someone who followed the rules reasonable, and someone who violated them unreasonable. The rules also potentially account for certain fallacies. A discussant, for instance, might violate the Freedom Rule by threats of force (*argumentum ad baculum*) or appeal to compassion (*argumentum ad misericordiam*) or personal attack (*argumentum ad hominem*) (van Eemeren & Grootendorst, 1995). A discussant might violate the Burden of Proof Rule by refusing to justify his/her own standpoint, instead challenging his/her opponent to disprove it (van Eemeren & Grootendorst, 1995).

Pragma-dialectics has accumulated considerable evidence to support its procedural rules. Much of this evidence is naturalistic (e.g. van Eemeren & Houtlosser, 1999), but lately there has been an increasing interest in experimental investigations (van Eemeren, Garssen, & Meuffels, 2012; van Eemeren *et al.*, 2009). These experiments typically present short arguments that respect or violate procedural rules. Participants tend to judge arguments that respect the rules as reasonable and those that violate the rules as unreasonable. Pragma-dialectic rules also fare well with extended arguments: witness van Eemeren and Houtlosser's (1999) detailed discussion of a sophisticated 63-line argument.

These data suggest that insight can be gleaned from generalized rules that treat procedure rather than specific content. But in the rules' procedural nature lies an important limitation, for the rules do not ultimately measure the strength of a specific argument. Imagine, for instance, an argument between two perfectly reasonable discussants, in the sense that they obey all the procedural rules. Procedural rules do not give us a way to decide between these discussants' positions. Who should we take to have provided the stronger argument?

There is also the question of how binding these pragma-dialectic rules are. As we have seen, these rules derive from the study of real arguments, much in the same way that Grice's maxims derived from the study of real language use. But it is not clear how and why pragma-dialectic rules have normative force. It might be desirable to follow the rules: our arguments might be more civilized if we did. It might also be practical to do so: our arguments might be more persuasive if we did. But it is not obviously irrational to disobey the rules, in the way that it is irrational to disobey the rules of logic.

An alternative set of procedural rules comes in the form of fairness rules for argumentation (Christmann, Mischo, & Flender, 2000; Christmann, Mischo, & Groeben, 2000; Mischo, 2003; Schreier, Groeben, & Christmann, 1995). This theory takes as its goal an account, not of reasonableness, but of fairness. That is, the theory is intended as an ethical theory, not an epistemological one (Schreier *et al.*, 1995). According to Christmann, Mischo and Flender (2000), fair argument is governed by rationality and argumentation. There are, on this account, four general aspects to fair argumentation: formal validity (covering, in some unspecified way, abduction, deduction and induction); sincerity or truth; justice; and procedural justice. Arguments are judged unfair if there is rule violation and subjective awareness, that is, if the violator was aware of or intended the violation. Fairness is also subject to contextual factors. The following factors, due to Christmann, Mischo and Groeben (2000), count as mitigating circumstances. (1) Variables in the exchange: the rule

violator may, for example, notice the violation, and make amends for it. (2) Person variables: the rule violator may prove incompetent rather than intentionally unfair. (3) Situation factors: the fairness of moves seems to depend on whether the argument is planned or unplanned, public or private, prepared or unprepared.

This fairness account has been subjected to empirical testing in the following ways. To compile a detailed list of fairness rules, Schreier *et al.* (1995) had participants rate the fairness of 35 commonly discussed rhetorical strategies and classify them into the four general aspects of fair argumentation mentioned above. A cluster analysis then revealed 11 clusters, which are presented in the left-hand side of Table 1 above. Christmann, Mischo and Groeben (2000) then tested these rules by presenting participants with scenarios that varied in their degree of conformity to fairness rules, in their contexts, and in the degree of subjective awareness shown. Participants indicated whether they would personally reproach a transgressor (in Christmann *et al.*'s terms, the 'objective data'), and gave a free response to an open-ended question asking them to indicate which aspects of the scenarios most influenced their decision (in Christmann *et al.*'s terms, the 'subjective data'). The resulting data suggested that participants were sensitive to violations of fairness rules, and that these violations could be mitigated by contextual factors. Rule violations and contextual factors significantly affected fairness judgments for both objective and subjective data. However, subjective awareness (whether a violation was intentional) significantly affected judgments only in the subjective data, thus offering somewhat weaker evidence of its importance.

Fairness rules offer a similar picture of argumentation to procedural rules, as witnessed by the overlap between the sets of rules in Table 1. This similarity raises the question of whether the theories are meaningfully distinct. Nevertheless, that these theories are so similar, and can both call on supporting data, suggests that they are tapping into a real phenomenon. Fairness rules do not, however, add an ultimate measure of argument strength.

Thus far, the source of an argument has been somewhat spectral: procedural rules invoke the arguer, but only in a highly generalized way. Pragma-dialectics makes more concrete reference to discussants as people through the notion of strategic maneuvering. On this view, argumentation has a dual purpose, discursive and rhetorical: that is, argumentation is aimed at resolving a difference but also at doing so in one's own favor (van Eemeren & Houtlosser, 1999). In strategic maneuvering, discussants take advantage of 'topical potential'. Protagonists have available to them, in any given context, a large set of potential topics and argumentative moves, from which they can select the best candidates to achieve their goals. Thus, protagonists can strategize throughout the dialogue. The following points are due to van Eemeren and Houtlosser (1999). At the confrontation stage, a protagonist can choose a standpoint to minimize the 'disagreement space'. To wit, if a protagonist chooses a standpoint fairly close to their antagonist's, there will be less persuading to do. At the opening stage, she can target the most helpful concessions from her antagonist. At the argumentation stage, she can choose the most strategic line of defense. And at the conclusion stage, she can invoke the happy consequences of accepting her standpoint, or the unhappy consequences of not accepting it. All this must be achieved without flouting the antagonist's expectations and preferences. It should be clear that this strategizing places a heavy demand on protagonists. The protagonist, for instance, must formulate general goals and specific strategies to achieve them, and must anticipate and compare the antagonist's responses to a range of hypothetical strategies.

There is a body of evidence to support strategic maneuvering, both within pragma-dialectics and in neighboring social psychology. Strategic maneuvering has been tested in recent experimental work on ad hominem arguments (van Eemeren *et al.*, 2012). An ad hominem argument is an attack against the person, typically occurring in response to another argument. The protagonist of an ad hominem argument does not attack the content

of the original argument but rather its protagonist, dismissing them as a source. Ad hominem arguments are sometimes legitimate, as, for example, when levelled against an argument from expertise, in which the source's expertise is the crucial factor. But ad hominem arguments are very often considered unreasonable or abusive (Walton, 1998).

Van Eemeren *et al.* (2012) presented participants with ad hominem arguments in various forms: as straightforwardly abusive arguments, as disguised abusive arguments, and as legitimate personal attacks. For present purposes, the crucial distinction is between straightforward and disguised abusive arguments. The disguised argument was an abusive ad hominem attack made in the guise of a legitimate personal attack, as in the following item from their materials:

Context: The art museum is renovated and that is the reason why it has been inaccessible to the public for some time. The museum curator discusses this with a journalist.

Curator: I think the museum can be open again for the public. The building is in excellent shape now and it is perfectly safe.

Journalist: As a curator you may know about art but you are not knowledgeable about the safety of the building.

The point, here, is that it is quite reasonable for a curator to know about the health and safety aspects of his building, and to be able to testify about these matters. Hence, the attack is only superficially legitimate. Van Eemeren *et al.* found that participants considered straightforwardly abusive *ad hominem* arguments unreasonable ($M = 2.44$ on a scale from 1-7 where 1 is 'very unreasonable' and 7 is 'very reasonable') and disguised abusive *ad hominem* arguments significantly less so ($M = 4.09$).

Elsewhere, O'Keefe (2009) has linked strategic maneuvering to a large body of research in persuasion theory. He interprets strategic maneuvering somewhat broadly to include various presentational devices, which is to say ways of portraying the same information. Presentational devices do seem to affect persuasion. Arguments are more persuasive when they contain explicit conclusions, identify their sources, are more complete, or use figurative language (O'Keefe, 2009). Arguments are also more persuasive when they are culturally adapted to their audience (O'Keefe, 2009). But all these effects are rather small (effect sizes up to $d=0.28/r=0.14^1$).

3. Pragmatics

Pragmatics has featured so far as the inspiration for procedural rules. As we have seen, pragma-dialectics, for instance, draws on Grice's (e.g. 1975) work to cast argumentation as a complex series of speech acts. However, pragmatics bridges content and source in its own right.

Pragmatic theories generally hold that comprehension is based in large part on making assumptions about the source. Indeed, comprehension is often thought to require recognition of (or at least making assumptions about) speakers' intentions. Take the following stock examples, presented here as in Clark (2013):

¹ Cohen (1988, 1992) makes the following suggestions for interpreting effect size. $d = 0.2$ is small; $d = 0.5$ is medium; $d = 0.8$ is large. $r = 0.1$ is small; $r = 0.3$ is medium; and $r = 0.5$ is large. Note that, unlike d , r is capped at 1, a perfect correlation.

- (1) Those spots mean she's got measles.
- (2) Those three rings on the bell (of the bus) mean that the bus is full.

Sentence (1) is an example of natural meaning: we can infer something from the state of the world (Grice, 1957/1989; Clark, 2013). Sentence (2) is an example of non-natural meaning: the hearers of the bell can infer that the bus is full because that is what the bus driver intended them to infer (Grice, 1957/1989; Clark, 2013). More formally, non-natural meaning is defined as follows:

“U meant something by uttering x” is true iff, for some audience A, U uttered x intending:

- (i) A to produce a particular response r.
 - (ii) A to think (recognize) that U intends (i).
 - (iii) A to fulfil (i) on the basis of his fulfilment of (ii).
- (Grice, 1969/1989, p. 92)

Subsequent work has considered this definition too broad, and added that the speaker's intentions must be part of mutual knowledge – mutual, that is, between the speaker and hearer (e.g. Clark, 1996; Schiffer, 1972; Strawson, 1964; though see Sperber & Wilson, 1995, for further qualifications). It follows from this definition that comprehension requires extensive assumptions about the source of an utterance and, by extension, that comprehension of an argument requires extensive assumptions about the source of utterances chained together in argumentation (Breheny, 2006). Equally, when crafting their utterances, or arguments, sources must make assumptions about how their audience will receive them. This does not, of course, mean that all aspects of comprehension require such assumptions (see the definition of semantics and pragmatics above), but it does mean that full comprehension requires them.

Alongside this definition of meaning we need an account of how people go about making reasonable assumptions about a source's intended meanings. Grice (1975) offered the following account in the form of the Cooperative Principle and complementary Maxims of Conversation:

Cooperative Principle:

“Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged.” (Grice, 1975, p. 45)

Maxims:

Quantity:

1. Make your contribution as informative as required (for the current purposes of the exchange)
2. Do not make your contribution more informative than required.

Quality: Super-maxim, “Try to make your contribution one that is true”

1. Do not say what you believe to be false
2. Do not say that for which you lack adequate evidence

Relation: Be relevant

Manner: Super-maxim, “Be perspicuous”

1. Avoid obscurity of expression
2. Avoid ambiguity
3. Be brief (avoid unnecessary prolixity)

4. Be orderly
(Grice, 1975, pp. 45-46)

For pragmatics to proceed, speakers observe or ostentatiously flout maxims. Hearers then calculate the intended implication (implicature). For example:

Maxim Observed

A: I've just run out of petrol.

B: Oh, there's a garage just around the corner.

Implicature: A may obtain petrol there.

Maxim Flouted

A: Let's get the kids something to eat.

B: Okay, but I veto I-C-E-C-R-E-A-M.

Implicature: B would rather not mention ice cream directly in case the children then demand some.

(Levinson, 1983, pp. 104).

Thus the maxims help to explain intuitions about qualitative linguistic data (for discussion, see, for example, Huang, 2007, and Clark, 2013), and have also proved a springboard for rich explorations of pragmatics. But, as Grice himself seems to have acknowledged, there is both vagueness and redundancy in the account (Clark, 2013). When it comes to discussion of natural conversations, most analyses end up citing the Maxim of Quantity and the Maxim of Relation, and it is difficult to tease the two maxims apart (Clark, 2013). This closeness raises the question of whether the maxims are genuinely distinct. Indeed, leading successors to Grice have re-worked the maxims, preferring a fleshed-out notion of quantity² (e.g. Horn, 1984, 1989, 2004) or of relevance (Sperber & Wilson, 1995). This fleshed-out relevance, embodied in Relevance Theory (Sperber & Wilson, 1995), has achieved greatest popularity.

Relevance Theory takes cognition in general, and communication (pragmatics) in particular, to be geared towards the maximization of relevance. In other words, cognition and communication focus on deriving the greatest, positive cognitive effects (e.g. true conclusions, strengthened or contradicted assumptions) for the least processing effort (Clark, 2013). Speakers produce utterances that are worthwhile for the hearer to process, and as relevant as possible given speakers' abilities and preferences (Clark, 2013; Sperber & Wilson, 1995). With this notion of relevance, the other maxims are arguably superfluous (for a discussion, see Sperber & Wilson, 1995, or Clark, 2013).

There are, of course, alternative theories in both pragmatics (e.g. Levinson, 2000) and formal semantics (e.g. Jaszczolt, 2007; Kempson, Meyer-Viol, & Gabbay, 2000) that all aim at more minimal accounts than the Cooperative Principle and Maxims of Conversation. It suffices, however, to note that, while the theoretical framework of pragmatics has been reduced substantially, the purview of pragmatics has expanded. For Grice, semantics seems to have contributed what is said - roughly, the propositions expressed - and pragmatics what is meant (but not said) (Clark, 2013). On the whole, Grice's successors - and, certainly, relevance theorists - have argued that pragmatics contributes at even lower levels (Clark, 2013). That is, we even need pragmatics to identify the propositions that we would intuit as being literally expressed.

It is easier to appreciate how these aspects of pragmatics bear on argumentation by

² As Clark (2013) argues, Horn's Q and R principles (see references above) can be seen as an expanded version of the Maxim of Quantity: say enough, but not too much.

referring to an example. Take, then, the following toy conversation and suggested pragmatic contributions, which broadly conform to the style of analysis used in Relevance Theory (see, for example, Clark, 2013).

A: John looks grumpy.

B: He hasn't had breakfast, so he is starving.

(3) [John] hasn't had breakfast, so [John] is starving.

(4) [John] hasn't had breakfast [today], so [John] is starving.

(5) [John] hasn't had breakfast [today], so [John] is [very hungry].

(6) [B believes that][John] hasn't had breakfast [today], so [John] is [very hungry].

(7) [B believes that John looks grumpy because (or so B believes)][John] hasn't had breakfast [today], so [John] is [very hungry].

Sentences (3) to (4) are low-level pragmatic intrusion into what is said: reference must be assigned to both instances of the deictic pronoun 'he'; temporal reference must be assigned to the sentence, as "John hasn't had breakfast" presumably does not mean that John hasn't *ever* had breakfast. Sentence (5) is needed to fix the sense of 'starving': the appropriate sense is 'very hungry', not 'in danger of death through malnutrition'. Sentence (6) makes clear that B is expressing his/her belief, a belief that corresponds to reality to a greater or lesser degree. Sentence (7), finally, identifies the real, but implicit, point of the utterance: a possible explanation for John's apparent grumpiness. There are two observations to make, here, about pragmatics and argumentation. Firstly, the pragmatic contributions above resemble an argument; together they seem to constitute a complex inferential object. Secondly, if pragmatic contributions like these are typical of comprehension, then they will also be typical of the comprehension of arguments. In other words, it is pragmatics that offers up the actual content of the argument; it is pragmatics that lets us understand what the argument actually is.

How has pragmatics, in this sense, contributed to the study of argumentation? Certainly, pragmatics has contributed to the study of rationality more generally. Hilton (1995) considered the influence of pragmatics in developmental psychology, judgment and decision-making, and argued that, whenever we assess the rationality of participants' behavior, we must also consider pragmatic cues in tasks. The provision of instructions and materials to participants in psychology experiments is a communicative situation, and participants will naturally draw on natural language pragmatics for their interpretation. Hilton (1995) provides examples of experimental findings on human (ir)rationality, such as the use of base-rate information, the presumed relevance of non-diagnostic information, false-memory effects, and the conjunction fallacy that may require some degree of questioning once the pragmatic context of the experimental situation, as viewed by the participant, is properly taken into account³.

Hilton (1995) used a definition of pragmatics that is rather similar to that presented above, but included it in his broader Attributional Model. In this model, pragmatics has the crucial function of allowing inference to the source's intentions. Crucial, too, is a link to stable attributes of the speaker: for example, to personality traits. Knowing about the speaker's attributes, the hearer might modify their interpretation of the speaker's intentions. To adapt Hilton's (1995) example, imagine an underwhelming reference for a job. How

³ This is not to say that such biases of judgment and decision-making will necessarily disappear when pragmatics is factored in. The conjunction fallacy, for instance, is a robust effect: for discussion, see, for example, Jarvstad and Hahn (2011), and for experiments that control for pragmatic involvement, see Tentori and Crupi (2012). But, as the discussion of framing effects below shows, comprehensive pragmatic accounts are possible, and must be eliminated before judgment and decision biases can be proclaimed.

should we interpret this reference? If we know that the writer is generally generous with praise, producing glowing references, we will likely conclude that the reference is meant as a non-recommendation. By contrast, if we know that the writer is very cautious, or loath to give praise, then we will likely hesitate before concluding that the reference is bad.

The Attributional Model calls for an integration of pragmatic inference with information about specific sources. This integration remains, to the best of our knowledge, underexplored. However, researchers have followed Hilton's lead in assessing the impact of the experimenter's presumed intentions, especially in the psychology of judgment and decision-making. For instance, Sher & McKenzie (2006) explored how participants responded to seemingly equivalent descriptions of cups as half-full or half-empty. Participants inferred from the description 'half-full' that the experimenter intended to refer to a cup that had previously been empty; from the description 'half-empty', to one that had previously been full. More generally, Mandel (2014) has argued that key framing effects – attribute and risky-choice frames – rely on the pragmatics of number terms. For instance, participants famously prefer options that will save 200 out of 600 lives to those that will result in the loss of 400 out of 600 lives, even though these situations are, on some readings, mathematically equivalent (Tversky & Kahneman, 1981). Mandel (2014) has shown that such framing effects depend on participants assuming that the experimenter meant 'at least 200/400 lives', and that when the word 'exactly' is inserted, the framing effect disappears. It may well be that these much-vaunted equivalence framing effects – where the information content is supposedly equivalent but the persuasiveness differs – depend on pragmatic inference (for a discussion of equivalence frames, see the review of Levin, Schneider, & Gaeth, 1998).

Likewise, pragmatics seems to play a role in another key phenomenon, reasoning from conditionals ('if-then' statements). In the famous Wason selection task (van der Henst & Sperber, 2004; for the original exposition of the selection task, see Wason, 1966), participants are tasked with testing a rule of the form 'If P then Q'; the correct responses is checking 'P' and 'not Q'. Consider, for instance, the following set of items, adapted from van der Henst & Sperber (2004) :

Rule: If there is a 6 on one of the card, there is an E on the other.

Card 1: 6 Card 2: 7 Card 3: E Card 4: G

The normative response is supposedly to turn over the cards '6' and 'G' (at least on the rather dubious interpretation of natural language if-then as the material conditional of propositional logic). However, participants tend to turn over the cards '6' and 'E'; only around 10% choose the normative response (van der Henst & Sperber, 2004). These findings can be qualified in two ways. Firstly, more participants show the normative response in a deontic scenario (Griggs & Cox, 1982; van der Henst & Sperber, 2004). For instance, when testing the rule 'If you are drinking beer (P), you must be 18 years old (Q)', participants would turn over cards for 'drinking beer' (P) and '16 years old' (not Q) (van der Henst & Sperber, 2004). Secondly, alternative accounts suggest that testing P and Q may, in fact, be more informative (Oaksford & Chater, 1994). More importantly, for present purposes, is that varying the pragmatics of the materials also varies participants' responses. Giroto *et al.* (2001) manipulated participants' performance on a deontic version of the task. Participants saw the following instructions:

Imagine that you work in a travel agency and that the boss asks you to check that the clients of the agency had obeyed the rule "If a person travels to any East African

country, then that person must be immunized against cholera,” by examining cards representing these clients, their destinations and their immunizations.

Participants then had to choose which of four cards to turn over, representing P (the person travels to an East African country), not P (the person does not travel to an East African country) and Q (the person is immunized against cholera) and not Q (no immunizations done). In this condition, the relevant goal is to prevent people travelling to East Africa unimmunized; the relevant tests are P and not Q. Participants did, indeed, tend to test cards corresponding to P and not Q. In another condition, the same participants read that the boss had been mistaken, and that cholera immunization is no longer required to visit East Africa. As a result, the boss is concerned that she has misinformed clients, causing them to follow an obsolete rule. In this condition, the relevant goal is to test whether people have been immunized unnecessarily; the relevant tests are P and Q. Participants did, indeed, tend to test cards corresponding to P and Q. Thus, Girotto *et al.* (2001) found evidence that pragmatics does indeed affect people’s reasoning.

The preceding examples of the role of pragmatics in assessing experimentally human rationality, finally, are themselves simply expressions of a more fundamental pragmatic connection between content and source. As described above, pragmatics involves inferences about speaker intentions in the service of interpreting utterances. In the context of those inferences, hearers make a default assumption not only that communicated information should be relevant to them, but that it is so because speakers possess some (degree of) rationality. Among possible interpretations we choose (in the first instance) those that allow the speaker to be perceived as ‘making sense’ (on the so-called ‘principle of charity’ or ‘rational accommodation’ see e.g., Davidson, 1973; Quine, 1960, p. 59).

In summary, utterance comprehension intrinsically connects content and source at a basic level. It is by making assumptions about an argument’s source that we understand the form and purpose of an argument. As we have seen, pragmatics has changed markedly since Grice, with a popular movement towards more streamlined theory but with wider scope. This raises the question of whether the streamlining of pragmatic theory can beget the streamlining of argumentation theory. We will return to this question below. Important though pragmatics may be in interpreting arguments, its role in evaluating the strength of arguments is less clear. The discussion in the following section moves towards a deeper, probabilistic notion of argument strength, but one that nevertheless reflects the importance of pragmatics through its link to more stable source characteristics such as source reliability (for extended discussion of this link, see McCready, 2014).

4. Source Reliability

As arguments occur in natural language, they are inherently subject to natural-language pragmatics. Pragmaticists after Grice have argued that pragmatics contributes even to the recovery of the literal proposition: that is, to understand what an argument even is, we need to use pragmatics. It follows from this account that, when they hear arguments, audiences must make considerable assumptions about a source. This account contrasts strongly with the dominant view on arguments and their sources in social psychology. In social psychology, fundamental aspects of communication are relegated to heuristic processes that can be turned on and off.

Social psychology treats arguments in the context of persuasion. In other words, social psychology is primarily interested not in when arguments are ‘good’ but when they ‘work’. Though source characteristics feature heavily in the persuasion process, they have been

given a decidedly ‘second class’ role in argument evaluation, at least by the dominant models. In particular, the Elaboration Likelihood Model (ELM) separates persuasion into two different routes: the central and peripheral routes (e.g. Petty & Cacioppo, 1984; Petty & Cacioppo, 1986). In the central route, people engage in sustained and critical processing of an argument’s content. In the peripheral route, people evaluate an argument briefly or heuristically using source information or presentational features. Which route obtains is a function of the audience’s motivation and ability to analyze the issue at hand, with central processing being engaged only under conditions of high personal involvement.

All of this sounds both surprising and problematic in light of the points raised in the preceding sections. In fact, it seems questionable whether it is even possible to understand, let alone be persuaded by, natural language arguments without at least some consideration of the source from which the argument or persuasive message is coming.

This is not to doubt that social psychology has obtained findings that seem roughly compatible with source processing assigned to a lesser, ‘peripheral’ route which is used only on occasion, as contrasted with an analytic route focused on content. However, in light of the implausibility (and impossibility) of strict separation between content and source, these data would seem in need of re-interpretation and process accounts of persuasion which need to be revised in light of more careful consideration of what, if anything, about sources can and cannot be ignored.

Not only does it seem difficult to ignore source considerations when evaluating arguments, it also seems normatively undesirable. Intuitively the reliability, veracity and competence of a reporting source seem informationally relevant (see also Schum, 1972). In keeping with this, sources feature more prominently in research into argumentation schemes (e.g. Walton, Reed, & Macagno, 2008) and Bayesian Argumentation (see, e.g., papers in Zenker, 2012) – both of which have overtly normative concerns.

When is information about sources relevant? There may be cases when the audience knows enough about a subject to evaluate an argument fully and ignore source information (Hahn *et al.*, 2012). Perhaps, for example, when audiences encounter a deductive argument, they need not refer to source information as long as they accept the truth of the premises. Likewise, perhaps when audiences encounter an inductive argument, they need not refer to source information as long as they can independently corroborate the facts presented. One can, nevertheless, imagine many cases when source information will be relevant. Even in deductive arguments, we may need assurances about the truth of the premises before granting that the argument is sound. It remains possible that the degree of source involvement does and should differ across types of inference. When source information does contribute, however, to ignore it is to risk forming inaccurate beliefs.

One way to capture sources is to treat source-related content through argumentation schemes – an approach that has been popular also in the context of ‘critical thinking’ (e.g. Inch & Warnick, 2009). Argumentation schemes represent patterns of inference in common types of argument as a way to get a handle on argument strength. Argumentation schemes have yielded considerable insight into common arguments. Many sets of schemes are available (e.g., Garssen, 1997; Hastings, 1962; Kienpointner, 1992; Perelman & Olbrechts-Tyteca, 1969; Schellens, 1985), but probably the most extensive is Walton *et al.* (2008). According to Walton *et al.* (2008), schemes model arguments with defeasible reasoning: conclusions are held to be true or false but provisionally so; conclusions should be revised in light of new evidence. Defeasible reasoning contrasts with deductive reasoning, in which new information should not change a valid argument. Source content – indeed, argument content more generally – is represented in two ways. Firstly, content appears in the schemes themselves; secondly, it is probed in a corresponding set of critical questions. On this approach, hearers should judge an argument’s strength by identifying the relevant argumentation scheme, and trying to find acceptable answers to the critical questions.

Walton *et al.* (2008) provide a set of a source arguments and attendant source fallacies (e.g. *argumentum ad hominem, ad populum, ad verecundiam*).

We can best assess the strengths and weaknesses of argumentation schemes by considering some examples. We will consider the argument from expertise (*argumentum ad verecundiam*) and the argument from popular opinion (*argumentum ad populum*), our analysis following that of Hahn and Hornikx (2015). Walton *et al.* (2008) provide the following scheme and set of critical questions:

Source E is an expert in subject domain S containing proposition A
 E asserts that proposition A (in domain S) is true (false)
 A may plausibly be taken to be true (false).
 (Walton *et al.*, 2008, p. 14)

How credible is E as an expert source?
 Is E an expert in the field that A is in?
 What did E assert that implies A?
 Is E personally reliable as a source?
 Is A consistent with what other experts assert?
 Is E's assertion based on evidence?
 (Walton *et al.*, 2008)

On further consideration, though, the list of critical questions balloons: Walton *et al.* (2008, pp. 92-93) distinguish some 21 questions that might be relevant in different contexts. While this list demonstrates the depth of the analysis, it also demonstrates what Walton *et al.* (2008) call the completeness problem. Simply put, we can always think of new critical questions to ask. The completeness problem argues for a way to integrate source information with broader argument content in a way that allows for uncertainty and for appropriately hedged degrees of belief. The argument from popular opinion demonstrates a further limitation to argumentation schemes. The scheme for this argument is as follows:

S1: Everybody (in a particular reference group) accepts that A.
 Therefore, A is true (or you should accept A).
 S2: Everybody (in a particular reference group) rejects A.
 Therefore, A is false (or you should reject A).

CQ1: Does a large majority of the cited reference group accept A as true?
 CQ2: Is there other relevant evidence available that would support the assumption that A is not true?
 CQ3: What reason is there for thinking that the view of this large majority is likely to be right?
 (Walton *et al.*, 2008, p. 123)

Here there also seems to be some degree of question begging: CQ3 asks the same question that critical questions are supposed to address (Hahn & Hornikx, 2015). This problem of circularity indicates the need for supporting accounts of when such evidence can be diagnostic, can truly support a conclusion (for a discussion of Condorcet's Jury theorem in this context, see Hahn & Hornikx, 2015). In other words, it is not clear when and why argumentation schemes are normatively binding. That is, while the schemes focus the attention on crucial aspects of common arguments, they do not necessarily compel an audience to accept the argument. Although this point is compounded by the completeness

problem, it would hold, nonetheless, even if we had a definitive set of critical questions for each scheme. We would also need a definitive set of standards for judging whether we have satisfactorily answered each question. Argumentation schemes do not offer such a set and, indeed, currently do not offer much insight into what satisfactory answers would look like.

Such a normative basis might, however, be provided through the use of probability theory to capture uncertainty, degrees of belief, and varying diagnosticity of evidence in order to provide an explicit treatment of argument strength. Such an approach has come to be known as Bayesian Argumentation (see, for example, Hahn, Harris, & Oaksford, 2012; Hahn & Oaksford, 2006, 2007, 2012; Zenker, 2012). Through the application of Bayesian probability theory, Bayesian Argumentation also provides strong links to social epistemology, in which there are rich seams of work on sources and testimony that draw on the Bayesian framework to explicate intuitions on these topics within epistemology and philosophy of science (e.g. Bovens & Hartmann, 2002; Olsson, 2011; Olsson & Vallinder, 2013; Zenker, 2012). Bayesian Argumentation extends the use of Bayesian probability theory from its now familiar use in the psychology of reasoning (Oaksford & Chater, 2007).

Bayesian Argumentation allows degrees of belief, which are modelled as subjective probabilities, and Bayes' rule allows calculation of the probability of a hypothesis or claim given the evidence (argument) for that claim. Bayesian Argumentation has much of the appeal of formal logic (in providing a well-founded mathematical formalism) while also handling the kinds of uncertain arguments that we typically encounter. It also provides a natural account of argument strength⁴ and of how we should adjust our beliefs in the light of new evidence (for specific examples see e.g., Hahn & Oaksford, 2007). What is more, Bayesian inference can be justified more broadly as a normative system. For instance, Bayesian inference has been shown to be an optimal form of inference⁵ (Leitgeb & Pettigrew, 2010a, 2010b; Rosenkrantz, 1992) and an effective strategy to avoid Dutch Book Arguments (for discussion, see Corner & Hahn, 2012; Hahn, 2014).

One project, here, then, is to recast argumentation schemes – such as the *argumentum ad hominem*, the appeal to expert opinion or the appeal to popular opinion – within the Bayesian framework and thus provide a normative basis for those schemes (see, e.g., Hahn *et al.*, 2012; Oaksford & Hahn, 2012; Hahn & Hornikx, 2015, for Bayesian treatments of these schemes).

Consideration of the effects of variation in the strength of argument and content and variation in the reliability of a reporting source within a Bayesian framework (see e.g., Hahn *et al.*, 2009) leads to a very different perspective than that adopted by dual-route models of persuasion within the social psychology literature. Specifically, the multiplicative nature of Bayes' rule implies statistical interactions between source reliability and evidence, not just additive effects. Hahn, Harris, and Corner (2009) found evidence of just such an interaction. They used experiments to explore evidence strength and source reliability, and found that when source reliability is high and evidence strong, there is an extra boost to argument strength.

⁴ The likelihood ratio (or its logarithm) is a traditional and influential Bayesian measure of the evidential support of given data for a hypothesis of interest (Brössel, 2013, offers a recent survey). Also, there is experimental evidence that this measure captures people's judgments quite well at least in certain settings (see Tentori, Crupi, Bonini, & Osherson, 2007). From an argumentation perspective, however, it will not typically matter whether the likelihood ratio or other, alternative probabilistic measures of confirmation are chosen. What matters is that they afford quantitative measures of argument strength.

⁵ Leitgeb & Pettigrew showed (see also D'Agostino & Sinigaglia, 2010, and Predd, Seiringer, Lieb, Osherson, Poor, & Kulkarni, 2009; Joyce, 1998) that, unless an agent A complies with a probabilistic representation of uncertain judgment and inference, there will always be an alternative (probabilistic) belief state which dominates A's in epistemic accuracy.

Closer consideration of how to model source reliability within the Bayesian framework has also drawn attention to other aspects of the relationship between arguments and their sources. In particular, sources are not only informative of argument content, but content may shape our views of the source. In particular, it seems intuitive that we may, in everyday life, use the content of what people say not just to revise our beliefs on the topic in question, but also to revise our beliefs about their reliability. Philosophers have, in recent years, been exploring the epistemological implications of using content to revise beliefs about source (see e.g., Bovens & Hartmann, 2003; Olsson, 2013; Schubert & Olsson, 2012). These results shed light not only on fundamental philosophical questions, but also on practical problems such as argument within the climate debate (Hahn, Harris & Corner, 2015) and suggest rich avenues for psychological research.

For example, Collins, Hahn, von Gerber & Olsson (2015) recently examined how argument content is used to draw inferences about reliability. A set of experiments manipulated source reliability and evidence strength, the latter being operationalized as a simple distinction between expected and unexpected information (i.e. high/low prior probability). Consider, for example, the following set of items. In the task on argument convincingness, participants first provided a rating of the initial claim, then of the claim repeated with source information:

Initial Claim: One of the best remedies against a severe cough is lots to drink, hot or cold.

Repeated Claim: Now imagine that Michael, who is a clinical nurse specialist, told you the following: “One of the best remedies against a severe cough is valium.”

And, in the source-reliability task, a separate group of participants first provided a rating of the source, then of the source after reading their claim:

Initial source information: Michael is a drug addict.

Claim: Now imagine that Michael told you the following. “One of the best remedies against a severe cough is valium.”

Reliable sources significantly increased the perceived convincingness of an argument; unreliable sources decreased it. Expected information significantly increased the perceived reliability of a source; unexpected information significantly decreased it. These data also provide evidence for source anti-reliability: highly unreliable sources can cause people to revise their beliefs in the opposite direction of what the source is claiming. In short, these data provide evidence for an intimate relationship between arguments (claims) and their sources. Not only does source information affect perceived argument strength; argument (claim) strength also affects perceived source reliability.

As we have seen, Bayesian models offer a subtle account of source reliability, and source reliability is a (relatively) stable attribute of discussants in argumentation. But source reliability is just one such attribute; there are doubtless many others. This raises the question of whether all such attributes can be handled in the same way. Recall the example of the reference for a job application, and generous versus the cautious referee. Both referees seem reliable as sources as long as we know of their attributes; nevertheless, we would interpret the evidence they offer in rather different ways. One of the strengths of the Bayesian framework is that all probabilistically relevant aspects can be handled in essentially the same way and thus inferentially integrated in probabilistic models.

This is illustrated with a final example from the recent empirical literature. Harris, Corner, and Hahn (2013) explored how pragmatic inferences can be cashed out in terms of

Bayesian inference. Specifically, they considered the example of an underwhelming reference for a maths course. If, other things being equal, one received a reference stating only that “James is polite and punctual”, one would seem to be entitled to infer that the reference is unfavorable. The implication is a lack of recommendation. Formally, this is a type of argument from ignorance: the inference about James’ math skills follows from what is *not* being said, not from the fact that punctuality is negatively correlated with mathematical ability (see Harris *et al.*, 2013 for details). This was borne out in an experimental condition that probed the effects of being told that James was punctual and polite in addition to being informed of his mathematical ability in the context of a fictional university application. Where no further evidence about James is provided by the referee (other than that he is punctual and polite), that is, no evidence of his mathematical ability is given, the impact of that failure should nevertheless be moderated by beliefs about the specific characteristics of the source. Whereas one would expect information on his mathematical ability from an ‘expert’ source (James’ maths teacher) the lack of such evidence from an inexpert source (James’ personal tutor, a history teacher) is less surprising. In keeping with this, Harris *et al.* (2013) found that the weak reference led to decreases in the belief that James should be admitted to a university mathematics course only when it came from the maths teacher.

5. Integrating the Accounts

We have discussed, so far, rather different accounts of argumentation and the considerable evidence that they can call on. These accounts differ considerably in their approach. Procedural rules focus on arguments as a dialectical process. Argumentation schemes focus on content, treating arguments as inferential objects. Bayesian Argumentation focuses on arguments both as claims and as inferential objects, factoring in assumptions about sources. Whereas procedural rules and argumentation schemes are largely qualitative accounts, the Bayesian framework is inherently quantitative, even though it may be used to draw purely qualitative evaluations. And whereas procedural rules are well-suited to extended arguments, argumentation schemes and Bayesian Argumentation tend to focus on smaller fragments (though see Kadane & Schum, 1996, for a Bayesian analysis of all the evidence in the Sacco and Vanzetti trial). Since argumentation is a complex business, it is hardly surprising that there should be different accounts focusing on different aspects. It would be desirable both to integrate these accounts, and to simplify the theoretical frameworks involved. We have already given some indication of ways in which this might be achieved, but further considerations on this issue for future research seem an apt way to conclude.

We have suggested, above, that pragmatics could contribute more to argumentation theory when the developments since Grice are included. One way to simplify argumentation theory is to reduce the amount of things it has to explain. Perhaps some of the burden can be shifted to pragmatics, at least where we are concerned with mistaken reasoning rather than deliberate deception. Take, for example, the pragma-dialectic procedural rules. The rules draw on Gricean Maxims of Conversation: the Relevance Rule corresponds to the Maxim of Relation; the Usage Rule corresponds to the Maxim of Manner; and various rules (e.g. the Standpoint and Unexpressed Premise Rules) seem to echo the Maxim of Quality. Why not allow pragmatic principles to bear the load? We have also seen that pragmatics after Grice has tended to invoke fewer principles: most dramatically, Relevance Theory replaces Grice’s maxims with an expanded notion of relevance, which is supposed to apply to pragmatics and to cognition more generally

(Sperber & Wilson, 1995). It is a tempting prospect that a more minimal set of pragmatic principles could account for good and mistaken reasoning.

It is also possible to reconcile pragmatic and Bayesian inference. Indeed, there is an emerging field of probabilistic semantics and pragmatics (for an introduction, see Goodman & Lassiter, in press) and the Harris *et al.* (2013) example of James and his mathematical ability provides a simple example.

In all of this, the notion of relevance is key. Relevance is a further point of contact between pragmatics and probabilistic reasoning. In Relevance Theory, relevance is still qualitatively defined: relevance arises out of a trade-off between positive cognitive effects and processing effort. But within probabilistic theories of reasoning there have long been suggestions that probability provides a natural vehicle for relevance, specifically in the form of the axioms of conditional independence (Hahn & Hornikx, 2015; Korb & Nicholson, 2011; Pearl, 1988). To clarify, Korb and Nicholson (2011) give the example of a simple causal model in which A causes B, which in turn causes C (i.e. $A \rightarrow B \rightarrow C$). Let us follow them in assuming that A is smoking, B is cancer, and C is dyspnea (shortness of breath). To quote,

If we don't know whether [a] woman has cancer, but we do find out she is a smoker, that would increase our belief both that she has cancer and that she suffers from shortness of breath. However, if we already knew she had cancer, then her smoking wouldn't make any difference to the probability of dyspnea. That is, dyspnea is conditionally independent of being a smoker given the patient has cancer. (Korb & Nicholson, 2011, p. 39)

The notion of conditional independence thus captures dynamic aspects of relevance: how (probabilistic) relevance changes as a result of what one come to know. Certainly, much remains to be done in testing how well probabilistic relevance captures the relevance of Relevance Theory and argumentation. In other words, does probabilistic relevance map onto the kinds of inference that are, or should be, made in argumentation? But a probabilistic notion of relevance has the potential to tie together research in Bayesian inference, pragmatics and argumentation theory.

This is not to say that pragmatics and probabilistic reasoning can, together, say everything we might want to say about argumentation. Even if relevance proves useful in explaining, more minimally, various aspects of argumentation, it seems unlikely that it will account for the following points. Firstly, in pragmatics it can be relatively unimportant whether what is said is strictly true; hence in Relevance Theory, for instance, the Maxim of Quality is considered largely redundant (Clark, 2013). For instance, we do not expect utterances such as (8) and (9) to be strictly true:

- (8) A hundred people showed up to my party.
 - (9) Aberdeen is five hundred miles from London.
- (Clark, 2013, p. 70)

What is important is not the truth of such apparent claims but what the speaker meant (implicated) by them. In argumentation, truth seems to matter rather more. Indeed, argumentation theory has been partly motivated by the desire to avoid such counter-intuitive inferences as the paradoxes of material implication: for instance, from 'If P then Q' and 'Not P', in propositional logic we can infer 'Therefore Q' (Arthur, 2011). Secondly, relevance does not capture what we might call the ethical aspects of argumentation. However well relevance treats accidentally bad reasoning, it will not extend to deliberate

bad, deceptive reasoning. There may be nothing inherently wrong, from the perspective of relevance, with committing an abusive *ad hominem* argument or threatening force (*argumentum ad baculum*) or deliberately misconstruing the opponent's standpoints or implicit premises (straw man fallacy). If we want to rule out such arguments, we will have to have recourse to procedural rules of some kind. To explain why such arguments might be effective, however, we can invoke relevance and Bayesian inference.

6. Conclusion

We tentatively suggest the following division of labour for a unified approach to argumentation. It seems plausible that a unified framework will have a common core of relevance, and probabilistic reasoning may help tie together relevance in communication and argumentation. Bayesian inference provides a natural vehicle for assessing the normative strength of arguments, and for prescribing appropriate belief revision. Bayesian inference can also be used to formalize insights from other fields, for instance, from argumentation schemes (for discussion, see Hahn & Hornikx, 2015). Pragmatics provides a natural vehicle for studying how people (mis-)understand arguments. Insights from pragmatics have already seeped into argumentation theory through procedural rules, but a fuller pragmatic treatment might reduce the burden on argumentation theory, and allow a shorter list of procedural rules. Procedural rules, in turn, provide a natural vehicle for explaining what we have called the ethical aspects of argumentation: why arguments can seem fair or unfair. Together these approaches can offer a rich account of argumentation.

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