

# The relation of argument to inference <sup>1</sup>

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## Abstract

This paper attempts to clarify the relationships that hold between 1) arguments and inferences, 2) the normative study of arguments and the normative study of inference, 3) logic as the normative study of inference and the study of argumentation. It aims to provide an alternative to (a) standard formal logic textbook accounts of reasoning or inference, (b) the pragma-dialectical theories of van Eemeren and Grootendorst and (c) the views presented by Doug Walton in his paper “What is logic? What is reasoning?”. More particularly, it argues that there is a normative study of inference that does not coincide either with formal logic or with the study of argumentation, but which must be presupposed by the study of argumentation.

I’m going to use the word *inference* for the mental act or event in which a person draws a conclusion from premisses, or arrives at a conclusion on the basis of the consideration of a body of evidence. I’m going to use the word *argument* for a set of statements or propositions that one person offers to another in the attempt to induce that other person to accept some conclusion. And I’m going to use the word *argumentation* for an interactive social process involving two or more people, in which the principal goal is to induce belief or agreement through the presentation of arguments.<sup>2</sup>

My concern in this paper is to clarify the relationships that hold between

- 1) arguments and inferences
- 2) the normative study of arguments and the normative study of inference
- 3) logic as the normative study of inference and the study of argumentation.

My aim is to develop an account of these matters that will provide an alternative to (a) standard formal logic textbook accounts of reasoning or inference, (b) the pragma-dialectical theories of van Eemeren and Grootendorst and (c) the views presented by Doug Walton in his paper “What is logic? What is reasoning?” (Walton 1990). More

<sup>1</sup> This paper has benefited from trenchant criticisms made by John Woods of an earlier version.

<sup>2</sup> My use of the word ‘argumentation’ differs from that of van Eemeren and Grootendorst, who use it as the name of an illocutionary act complex in which propositions are asserted in order to convince someone to adopt a given standpoint toward an expressed opinion. See van Eemeren and Grootendorst 1984: 39-45. I am using argumentation to refer to what van Eemeren and Grootendorst call argumentative discussions.

particularly, my thesis is that there is a normative study of inference that does not coincide either with formal logic or with the study of argumentation, but which must be presupposed by the study of argumentation.

## 1. Arguments and inferences

Books on logic--both formal and informal logic--typically claim to deal with *thinking* or *reasoning*. Yet even the most cursory examination reveals that they talk mostly about what they call *arguments*. There is a more or less standard rationale for this practice. Reasoning is identified or equated with *inference* (with basing a conclusion on premisses) and it is claimed that “[c]orresponding to every possible inference is an *argument*, and it is with arguments that logic is chiefly concerned.”<sup>3</sup> The identification and, what is more important, the appraisal of reasoning then becomes a matter of formulating and appraising the arguments that correspond to inferences.

### *Reasoning and inference*

One ground for dissenting from this picture is to object to the identification of reasoning with inference. Ralph Johnson, for example, has balked at that identification:

If reasoning is anything at all, it would seem to be the seeking, the having and the giving of reasons. (Johnson 1991: 4)

In line with this idea, Johnson classifies explaining, predicting, asserting, arguing, defining, and clarifying--and not just inferring--as instances or species of reasoning. Though I sympathise with Johnson's reservations on this point,<sup>4</sup> I am not going to follow up on them here. There is a long tradition, going back at least to the middle ages, in which words that could be translated into English as 'reasoning' are used to mean the act of drawing a conclusion. In classical phases of that tradition, reasoning was one of three "operations" of the intellect (Aquinas<sup>5</sup>) or four "actions of thinking"

<sup>3</sup> The words are from Copi and Cohen 1990: 6.

<sup>4</sup> I don't quite share Johnson's view of the relation of inference to reasoning. Johnson thinks of inference as one of many *species* of reasoning. I find it more perspicuous to see reasoning as a process in the course of which a variety of different sorts of acts or events occur--posing questions, propounding hypotheses, analysing concepts and meanings, etc. Inference is one of the kinds of act or event that occur in the course of the process of reasoning, but not the only one. On my view, the relation of inference to reasoning is a relation of part to whole, not a relation of species to genus.

<sup>5</sup> See Aquinas, *Summa Theologica*, I, 85,5, for example. Aquinas uses the word *ratiocinare*.

(Arnauld and Nicole in the *Port-Royal Logic*<sup>6</sup>). The three operations Aquinas recognised were:

1. Simple apprehension (or conceiving of the essence of something),
2. Judging (affirming or denying one thing of another)
3. Reasoning (drawing a conclusion syllogistically).

To these Arnauld and Nicole added a fourth: ordering (*ordonner*), by which they meant arranging the ideas, judgements and reasonings one has about a certain subject in “the manner most proper for making that subject known” (Arnauld and Nicole 1965: 38). Something like Aquinas’ theory survives even in recent lexicography: recent editions of the Merriam-Webster collegiate dictionary still explain the shared meaning element of ‘think,’ ‘cogitate,’ ‘reflect,’ ‘reason,’ ‘speculate,’ ‘deliberate’ in the following way: “to use one’s powers of conception, judgement or inference” (*Webster’s Ninth New Collegiate Dictionary* 1991: 1226).

### *Inference and argument*

Since Frege’s attack on what he called “psychologism,” it has become standard to distinguish clearly between the psychological study of thought processes and the logical study of reasoning, and to portray the subject matter of logic as something other than mental events and processes. In its historical context, Frege’s attack on psychologism was a response to late 19th century neo-Kantian attempts to reduce logic to empirical psychology, attempts that were seen as threatening to deprive logic of its status as a *normative* theory of reasoning.<sup>7</sup> A crucial element in Frege’s strategy was to insist that the subject matter of logic is not acts of thinking, ideas, or anything subjective.<sup>8</sup> Logic is to be a “science of truth” (Frege 1977: 1-2), the “thoughts” (*Gedanken*) it deals with are things “for which the question of truth can arise” and are “senses of sentences” (p. 4). They are “neither things in the external world nor ideas,” but belong to a “third realm,” are independent of what anyone thinks and, if true, are timelessly true (p. 17). When a thinker grasps a thought, it does not belong to the contents of the thinker’s consciousness, but there must be something in consciousness that “aims at” the thought (p.25-26). In retrospect, it makes sense to construe Fregean “thoughts” as *propositions*, where propositions are expressed by declarative sentences and constitute the *content*

<sup>6</sup> See Arnauld and Nicole 1965: 37-38. Arnauld and Nicole use the word *raisonner*: “On appelle *raisonner* l’action de notre esprit, par laquelle il forme un jugement de plusieurs autres; comme lorsqu’ayant jugé que la véritable vertu doit être rapportée à Dieu, & que la vertu des payens ne lui étoit pas rapportée, il en conclut que la vertu des payens n’étoit pas une véritable vertu.”

<sup>7</sup> In the context, at least, of the assumption that empirical sciences can discover only what is, and not what ought to be.

<sup>8</sup> Though it is not *about* mental acts, it has a bearing on them: “From the laws of truth there follow prescriptions about asserting, thinking, judging, inferring” (p. 1).

of both assertion and belief.<sup>9</sup> Logic then becomes the study of certain relations that hold between propositional contents, and in particular, the relations that justify moving from one propositional content to another.

A variant on the Fregean approach is found in Copi and Cohen. Early in their exposition of what logic is they introduce the notion of inference:

*Inference* is a process by which one proposition is arrived at and affirmed on the basis of one or more other propositions accepted as the starting points of the process. (Copi and Cohen 1990: 5)

But, as we saw above, they are quick to point out that to every inference there corresponds an argument. And they tell us,

An argument, in the logician's sense, is any group of propositions of which one is claimed to follow from the others, which are regarded as providing support or grounds for the truth of that one. (Copi and Cohen 1990: 6)<sup>10</sup>

Again, logic becomes the study of the relations that hold among the *propositions* (designated as premisses and conclusion) that make up arguments.

When Doug Walton develops his conception of reasoning, a conception which has its roots in the tradition described in the preceding section, he also focuses our attention not on psychological processes, but on the relations among abstract propositional entities. His "first pass" at a definition of reasoning sounds like Copi and Cohen's account of inference:

*Reasoning* is the making or granting of assumptions called *premisses* (starting points) and the process of moving towards conclusions (end points) from these assumptions by means of warrants. (Walton 1990: 403)

But Walton is quick to make it clear that he doesn't want to identify reasoning with the *psychological* process or act of drawing an inference. He says rather that he defines reasoning "as a kind of abstract structure" (Walton 1990: 401). Pointing out that reasoning can be studied from a psychological or a logical point of view, Walton offers the following definition, which seems to be the one he takes most seriously:

<sup>9</sup> This departs slightly from Frege's usage, in that he was anxious to deny that *Gedanken* comprised the content of any consciousness--in his view that threatened to render them objectionably subjective. Nevertheless, even for Frege, *Gedanken* were *what* is asserted and assented to. And in current philosophical parlance, it has become standard to call *what is asserted* or believed the content (or propositional content) of the belief or assertion.

<sup>10</sup> As a matter of fact, Copi and Cohen are quite clear on the point that an argument in their sense is not simply a set (or "mere collection") of propositions; it has a "structure" by virtue of which one of the members is a *conclusion*, and other are *premisses*. In this respect it very much resembles what Walton will define as "reasoning from the logical point of view."

From the logical, as opposed to the psychological point of view, *reasoning* can be defined generally as a sequence of steps from some points (premisses) to other points (conclusions). (Walton 1990: 404.)

Walton wants the word ‘reasoning’ to stand for an abstract structure of propositions (a sequence in the mathematical sense of an ordered n-tuple), a structure that can be used or instantiated in various contexts. As we shall see, Walton’s conception of logic is broader than the standard post-Fregean conception, since he wants to include the *pragmatics* of reasoning as a part of logic. For him the pragmatics of reasoning is the study of the use of abstract propositional structures in contexts of discourse, and most especially in contexts of persuasion and of dialogue.

Walton, in a deliberate departure from Copi, defines argument as follows:

*Argument* is a social and verbal means of trying to resolve, or at least to contend with, a conflict or difference that has arisen or exists between two or more parties.... (Walton 1990: 411)

Walton treats *argument* as a “framework of use” in which reasoning can occur (Walton 1990: 411).<sup>11</sup> The important point here is that for Walton, in contradistinction to Copi and Cohen, the consideration of *argument* belongs to the *pragmatics* of reasoning.

Walton’s conception of argument overlaps with the pragma-dialectical account (PDA) offered by van Eemeren and Grootendorst. At the heart of PDA is an analysis of the presentation of arguments in terms of speech act theory. Presenting an argument is an illocutionary act complex in which propositions are asserted in order to convince someone to adopt a given standpoint toward an expressed opinion. Van Eemeren and Grootendorst say, for example,

The essential condition for the illocutionary act complex argumentation is different for pro-argumentation and contra-argumentation [i.e. presenting an argument for the adoption of an opinion and presenting an argument for the rejection of an opinion]. For pro-argumentation it may be formulated thus:

*Advancing the constellation of statements  $S_1, S_2$  (..... $S_n$ ) counts as an attempt by  $S$  to justify  $O$  to  $L$ ’s satisfaction, i.e., to convince  $L$  of the acceptability of  $O$ .* (van Eemeren and Grootendorst 1984: 43)

There is an echo here of Copi-type arguments and Walton-type reasonings, in that the propositional contents of the statements advanced and of the opinion argued for correspond to the elements of the abstract structures Copi and Walton speak of. But

<sup>11</sup> And the framework of argument may or may not occur in broader framework of dialogue.

van Eemeren and Grootendorst make clear, and rightly so I believe, that *advancing* statements for the purpose of *convincing or persuading* is what makes for argument.

What is it to convince or persuade?

What we understand by *convince* is: to use pro-argumentation to induce a listener to accept an expressed opinion, or to use contra-argumentation to induce a listener to reject an expressed opinion. (van Eemeren and Grootendorst 1984: 48)

Even van Eemeren and Grootendorst, in their own way, want to avoid falling into the pit of the psychological. The acceptance or rejection of an expressed opinion at which argumentation aims is not intended to be a psychological phenomenon:

It [acceptance] amounts to no more nor less than *agreeing* to the point of view defended in the argumentation. Thus our term *accept* has a lesser extension than the expression “be convinced” may have in colloquial idiom, and it is free of any psychological (and philosophical) connotations.” (van Eemeren and Grootendorst 1984: 69)

#### *Arguments as invitations to inference*

I want to side with Walton and with van Eemeren and Grootendorst on the question of whether arguments ought to be conceived simply as abstract structures of propositions or whether the use of certain linguistic materials in contexts of persuasion ought to be considered a necessary condition of the existence or occurrence of an argument. The word “argument,” I want to hold, is appropriately applied to sequences of propositions only when they serve as instruments of persuasion.

But I want to differ with Walton and van Eemeren and Grootendorst, in a slight but I think significant way, on the question of what it is that arguments, as instruments of persuasion, aim at. I want to say that the typical goal of an argument is to effect an *inference* in the person to whom it’s addressed (and not simply to effect acceptance of its conclusion). Notice that both arguments and inferences have premisses and have conclusions. That is surely not coincidence. This commonality becomes intelligible if we view the premisses that are put forward by the arguer as intended to elicit assent to the argument’s conclusion by forming the basis of an inference drawn by the person to whom the argument is addressed. Indeed, imagine a situation in which the presentation of an argument *caused* assent to its conclusion but in which the addressee did not make an inference from the argument’s premisses to its conclusion. For example, the argument is actually too complicated for the addressee to follow, but worn down by its length and caught up by the arguer’s charm, the addressee’s resistance to the conclusion disappears. Would we count this as a case in which the addressee was *persuaded by the argument* to accept its conclusion? Caused, yes. But not, I maintain, persuaded.

If I am right, then, arguments are invitations to inference.<sup>12</sup> Arguments succeed when the persons to whom they are addressed accept their conclusions *on the basis of* their premisses. Arguments fail when the addressee either refuses to accept their premisses, or accepting their premisses does not draw the intended conclusion from those premisses.

*Logic, formal logic and argumentation theory*

When we appraise arguments, we can do so from several points of view. If I am right that arguments are invitations to inference, an important evaluative question will always be: *ought the addressee to make the inference* which the argument invites? And that will be quite a different question from: *ought the arguer to have offered this particular argument* to this particular audience. Moreover, this latter question can be considered from variety of different points of view. Was the argument likely to be effective? Was it morally right to offer such an argument? Was it in the arguer's interest to offer that argument at that time? Was it a good argument to offer from the point of view of advancing the goals of negotiation, or of critical dialogue, or of pedagogical dialogue? And so on.

*Logical appraisal* of an argument deals, I would suggest, with the issues raised by the question of whether the *inference* invited by an argument is an inference that ought to be made--and, more particularly, ought to be made by the person to who it is addressed.<sup>13</sup> If logic be the study which elaborates the concepts, categories, and principles requisite for the appraisal of inference, then the theory of argumentation will be different from logic and will in some sense presuppose it.

At the same time that logic--as the elaboration of the concepts, categories, and principles requisite for the appraisal of inference--is distinguishable from argumentation theory, logic does not coincide with formal logic either. By formal logic I mean both (a) classical modern logic (as instanced in the propositional calculus and quantification theory) and (b) alternate logics (e.g., nonmonotonic logics) which pattern themselves on classical modern logic.

<sup>12</sup> Scriven (1976: 55-56) reviews the "relationship between argument and inference." He says, "The *function* of the argument is to persuade you that since the premise is true, you must also accept the conclusion. The persuasion will be powerful if it is clear that the inference from the premise to the conclusion is sound, that the premiss does in fact imply the conclusion. (Other ways to put this are to say that you can legitimately infer the conclusion from the premise, or that the conclusion is in fact a consequence of the premise.)" Scriven's point isn't exactly the same as mine. But it's close.

<sup>13</sup> For purposes of this paper, I leave open the question of whether the *logical* appraisal of arguments ought to concern itself with the acceptability of premisses, as well as with the question of whether the premisses provide a suitable basis for drawing the conclusion that the argument invites. Those who take classical formal logic as a paradigm for logical appraisal typically view the evaluation of premisses as lying outside the scope of logic (see, for example, Copi and Cohen 1990: 53.) Informal logicians, on the other hand, frequently view the determination of the acceptability of premisses as an important part of the logical appraisal of arguments (see for example Johnson 1987). Though I happen to share the latter view, it is not essential to any of the points I try to make in this paper.



Classical modern logic investigates sets and sequences of propositions and, for an important subclass of propositions, has developed powerful techniques for ascertaining the presence of consistency, equivalence, entailment, etc.<sup>14</sup> The pertinent claim it can make about the relation of a set of premisses to a conclusion is that it entails the conclusion. But entailment is neither a necessary nor a sufficient condition for the premisses and conclusion of an argument or inference being suitably linked. Not sufficient, because an argument of the form “P, therefore P” meets the criterion of entailment but is hopeless as an argument.<sup>15</sup> Not necessary, because there are innumerable inductively strong arguments in which premisses do not entail conclusions. The abstract structures that classical logic studies just don’t coincide with the factors that make *arguments* logically good.

I want to suggest, moreover, that what prevents classical logic from being a general theory of inference or reasoning may not lie simply in the fact that the only premiss-conclusion link that it considers is entailment. Basic to the classical conception is the assumption that the suitability of the relationship between premisses and conclusion can be appraised simply by examining the propositional content of the premisses and of the conclusion (and, in most versions of the classical conception, examining only the “logical form” of that propositional content). On such an assumption, consideration of relations that obtain between propositions *in abstraction from their occurrence in actual thinking or contexts of discourse* can yield insight into whether premisses and conclusion are suitably related. This approach to appraising the relationship between premisses and conclusion has, on the whole, worked splendidly for appraising mathematical and/or “deductive” inferences. But attempts to construct similar logics for other kinds of inference--inductive inference, conductive inference (see Wellman 1971), abduction or inference to the best explanation, as well as large stretches of what AI calls practical or everyday reasoning<sup>16</sup>--have yet to bear anything near final fruit. We do not know how successful we will be in developing models of such reasoning that resemble to a greater or lesser degree the structures developed by classical formal logic. But consider the possibility that in these types of reasoning *the content of the premisses is not by itself sufficient to warrant acceptance of the conclusion.*

<sup>14</sup> This logic succeeds only for a subclass of propositions because it lacks the resources to deal with semantic entailments.

<sup>15</sup> It can also happen that the premisses of an argument entail its conclusion, though no one is in a position to know this. E.g., if Golbach’s conjecture is indeed derivable from the axioms of arithmetic, then those axioms entail Golbach’s conjecture. But even if that is true, in the present state of mathematical knowledge an argument which consisted only of the axioms of arithmetic as premisses and Golbach’s conjecture as conclusion would not be a good argument. And the problem with it would lie in the nature of the link between premisses and conclusion. See Pinto 1994, where these points are developed at greater length.

<sup>16</sup> And which is being explored in some of the newly developed nonmonotonic logics--especially default logics.



Writing about analogical reasoning, Evelyn Barker has said

Like inductive reasoning generally, an inductive analogy is not based merely on its stated premisses but on all our knowledge about the world. (Barker 1989: 187).

Suppose that something like this is true--that background information which motivates the move from premisses (or data) to conclusion, and which is essential to its warrant, cannot be rendered explicit because of its complexity and/or its character. Then it is hard to see how evaluative strategies patterned on classical modern logic could provide a pattern or paradigm on which to model the understanding of reasoning generally--since those strategies locate the justification of a conclusion precisely in the propositional content of its premisses and the rules of inference which license the move from one propositional content to another.

## 2. Inference

If arguments are invitations to inference, what then is inference? And if an important dimension of the appraisal of arguments is appraisal of the inference that argument invites, on what is such appraisal to be based, if not on formal logic?

*What is inference? A first try*

In an inference, one belief or set of beliefs (called the premiss or premisses) "leads to" another belief (called the conclusion), which in some way or other is "based on" the premiss. What can we make of this? A tempting answer is that inference occurs when one belief *causes* another--that when I infer  $q$  from  $p$ , I believe  $q$  *because* I believe  $p$ . D. M. Armstrong, for example, has attempted to elaborate a causal theory of inference (Armstrong 1968: 194-200.), and so in a way did C. S. Peirce before him.

But the mere fact that one of your beliefs causes or leads to some other belief does not mean that the second belief is inferred from or grounded in the first. One way of seeing this is to recall a puzzle from G. E. Moore (which Armstrong cites in developing his point). I want to go out, and my belief that it's raining causes me to search for my umbrella, as a result of which I find my umbrella in the hall closet and come to believe it's there. My belief that it's raining is one of the causes of my belief that the umbrella is in the closet. Yet we certainly wouldn't want to say that the first belief provides a premiss from which the second is inferred. Hence not every belief acquisition that's the result of a belief already held is an inference. How then to pick out the inferences from this broader group of belief acquisitions?

We might try to say that a person  $S$  infers  $q$  from  $p$  just in case  $S$  comes to believe  $q$  because  $S$  believes that  $p$  and also believes that the truth of  $p$  justifies the belief that  $q$ . Such an answer would require us to unpack the requisite sense of justification, and

might well turn out to be circular--if we could not explain what justification is except by reference to what correct or proper inference is.

Another, potentially more promising, way of explaining why Moore's example isn't a case of inference is to appeal to something like Peirce's notion of a "habit of mind" that leads us to "draw one inference rather than another."<sup>17</sup> In "The Fixation of Belief" Peirce writes:

That which determines us, from given premises, to draw one inference rather than another is some habit of mind, whether it is constitutional or acquired.... The particular habit of mind which governs this or that inference may be formulated in a proposition whose truth depends on the validity of the inferences which the habit determines; and such a formula is called a *guiding principle* of inference. Suppose, for example, that we observe that a rotating disk of copper quickly comes to rest when placed between the poles of a magnet, and we infer that this will happen with every disk of copper. The guiding principle is that what is true of one piece of copper is true of another. Such a guiding principle with respect to copper would be much safer than with regard to many other substances--brass, for example. (Peirce 1960: 5.227-228.)

Notice a couple of things about what Peirce says in this passage.

- 1) Peirce is (consciously and deliberately, I think) refusing to take "What is true of one piece of copper is true of all" as an additional *premiss* in this inference. Rather, the guiding principle "formulates" the habit--lets us see *why* the conclusion is connected to the premiss.
- 2) The guiding principle in this example is not a "law of logic." Qua "inference rule" it doesn't depend on the "logical form" of the propositions involved. It is what some authors call a "material inference rule"--an inference rule that is subject-matter dependent. As Peirce himself notes (Peirce 1960: 5.228), "almost any fact may serve as a guiding principle."
- 3) Insofar as they are principles of inference that are subject-matter dependent, Peirce's "guiding principles" resemble the elements of arguments called *warrants* in Toulmin's theory of argument (see Toulmin 1958 and Toulmin et al. 1979).

<sup>17</sup> Armstrong appeals to something resembling Peircean habits in Armstrong 1968: 198, but without mention of Peirce. See also Armstrong 1973.

One can see, I think, how the notion of a guiding principle or a habit of mind helps with Moore's puzzle. And one can also see how such an account of inference could provide a framework for the appraisal of inferences. Thus in "The Fixation of Belief" Peirce wrote:

The object of reasoning is to find out, from the consideration of what we already know, something else which we do not know. Consequently, reasoning is good if it be such as to give a true conclusion from true premisses (Peirce 1960: 5.226).

And a few paragraphs after having introduced the notion of habits of mind and guiding principles, he says:

The habit is good or otherwise, according as it produces true conclusions from true premisses or not; and an inference is regarded as valid or not, without reference to the truth or falsity of its conclusion specially, but according as the habit which determines it is such as to produce true conclusions in general or not. (Peirce 1960: 5.227-228)

#### *Criticisms of the causal theory of inference*

Now I think that there is something importantly right-headed in this theory of inference, but I don't think it will do in anything like the form in which it has been presented here.

First, four objections that I'll treat as relatively minor for purposes of this paper. (1) The upshot of inference can be, not the acquisition of new belief, but the anchoring of pre-existing belief (as when I find additional evidence or additional reasons for what I already believe). (2) On the causal account, the upshot of inference or reasoning is always *belief*. This is too narrow: reasoning or inference can lead, not to a firm belief that something is so, but to the suspicion that it is so, or to the retraction of the belief that it is so. Moreover, the upshot of inference can be, not the modification of a doxastic attitude toward a proposition, but a decision about what to do or the acquisition of a resolve to act in a certain way.<sup>18</sup> (3) A related but slightly different point: it seems natural and correct to speak of drawing inferences in the course of suppositional reasoning, but in such cases neither premisses nor conclusion are believed by the one who makes the inference or draws the suppositional conclusion. (4) Peirce says that the habit "determines us, from given premisses, to draw one inference rather than another." This can't be right as it stands. The explanation of why I draw the conclusion I do will surely have to include more than the fact that I believe the premisses together with the fact that I have such a "habit of mind." Many things which I currently believe *could* lead me to various conclusions in accord with my current

<sup>18</sup> See Pinto 1991 for analogous points concerning arguments.

habits of mind, but don't do so. Which conclusions I actually draw depends not only on the "guiding principles" that govern my thought, but also on my current interests, concerns, etc. The full story of the generation of belief by inference will have to be considerably more complex than the story that Peirce (or for that matter, Armstrong) has told so far.

These first four objections point out several respects in which the initial causal story is incomplete. The next two objections, I believe, pose even more serious problems for the initial story.

(5) Many of the most important inferences we make do not exhibit readily discernible conformity to the requisite patterns, rules or generalisations. The best work in the philosophy of science leaves little doubt that what are called simplicity and considerations of overall explanatory coherence play a crucial role in the inferences we make from a given body of actual or putative evidence. But no one has succeeded in reducing these factors to articulable pattern or to rule. At the point in our cognitive lives at which inference becomes most interesting and most fateful, doxastic transitions don't lend themselves to being understood along the lines set out in the initial causal story.

(6) All but one of the preceding objections try to show that the initial causal story does not capture a necessary condition of inference. One can also question whether that story captures anything like a sufficient condition of inference. Imagine that whenever Smith comes to believe another person to be Irish he will believe that person to be dull-witted, and that many of Smith's beliefs can be explained by reference to this tendency of his (e.g., his belief that O'Brien is dull-witted). But suppose that (a) when we ask Smith *why* he thinks O'Brien is dull-witted, he can't tell us and (b) getting Smith to acknowledge large numbers outstanding Irish literary figures, scientists, etc., has no effect at all on his tendency to assume, of individuals he knows to be Irish, that they are dull. Are we prepared to count these products of Smith's doxastic tendencies instances of inference? Are they instances of *reasoning*? Peirce himself has pointed out in other places that for inference (or reasoning) in the full sense to occur, it is *not* sufficient that the premisses cause the conclusion to be believed in accordance with some rule or principle. He insists that it is also required that the person making the inference *know* or *see* (or at least think) that an appropriate connection holds between premisses and conclusion. Thus Peirce (1960: 5.295) writes

For this theory [pragmaticism] 'requires' that in reasoning we should be conscious, not only of the conclusion, and of our deliberate approval of it, but also of its being the result of the premiss from which it does result, and furthermore that the inference is one of a possible class of inferences which conform to one guiding principle.

Perhaps we should go a step further, and require that if a doxastic transition is to count as inference (or a part of reasoning), it must occur in the context of a cognitive economy that meets certain minimum standards of self-consciousness and of rationality.

*What is inference? A second try*

Let us use the phrase *proto-inference* to refer to the phenomena described by our first causal theory of inference. And let's suppose the first four objections can be met by an account of the causes of belief and of other mental states that is considerably richer than the one initially envisaged. I want to suggest that we could meet the potentially weightier objections--(5) and (6)--if we develop and enhance the account of proto-inference in certain definite and intelligible ways. The result would be to make *liability to criticism* an essential component of the very concept of inference. Imagine then a development that proceeded through the following six steps.

- 1) We start out with the concept of proto-inference--a postulated, ill-understood causal transition from belief in premisses to belief in a conclusion, dependent "somehow" on the presence of a recognised pattern that embraces the premisses and the conclusion.
- 2) Then we introduce the idea that such inferences are good or bad depending on whether the patterns are truth-preserving; or even better (and taking our cue from Peirce), that they are strong or weak to the extent that the patterns are truth-preserving. By patterns here we mean both logical form and material principles of inference that could function as Peircean guiding principles, Toulmin warrants, etc.
- 3) Next we teach those who make proto-inferences to identify (actual or potential) proto-inferences as good or bad by reference to such patterns, and to resist the proto-inferences that are bad. As a consequence of doing this, we have introduced a practice of criticism.
- 4) We then re-conceive inference as something which is, as such, subject to the critical practice introduced in step 3. This reconceptualisation involves more than the bare notion that inferences can be graded as good or bad (strong or weak). It involves, in addition, the idea that belief transitions not open to the influence of critical reflection are not inferences in the full sense of the word.<sup>19</sup>
- 5) Critical practice, as introduced in step 3, was a matter of discerning the pattern which the inference exemplifies and judging the extent to which that pattern is truth preserving. But 20th century epistemology--and in particular, 20th century philosophy of science--has made us aware that the goodness of many

<sup>19</sup> This idea may already present in Peirce's idea, noted above, that for reasoning proper to occur, the one who draws a conclusion must be aware of the guiding principle in terms of which he draws it. It is certainly present in Toulmin's idea that warrants require backing.

of our most fateful and highly prized inferences do not yield to any simple analysis in terms of pattern or guiding principle. And yet the value of those inferences is not something that is just arbitrarily accepted; rather it is something open to discussion and rational evaluation. We move, therefore, to a broadened conception of criticism, one not tied quite so closely to logical rules or material principles of inference, but modelled in part on the discussions of the probative value of evidence that occur in contexts where articulable rules are not available.

- 6) Finally, we reconceptualise inference again as belief transition open to the influence of critical reflection in this broadened sense.

The upshot would be a conception of inference not subject to Moore's puzzle and not vulnerable to objections (5) and (6) in the preceding section. Moreover, this conception of inference already contains the idea of a critical evaluation of belief-transition that, I maintain, does not coincide with formal logic.

### **3. Logical pragmatics, argumentation theory, and the evaluation of inference**

The study of argumentation that has developed over the last 15 years has made a major contribution to resuscitating and refurbishing aspects of the study of inference and argument that had either been forgotten or fallen into questionable repute. There can be no question but that the elaboration of empirical and normative models of critical dialogue by the pragma-dialectical school, and the reconsideration of the informal fallacies in the context of dialectic and argumentative dialogue by Walton, Woods, Krabbe and others, have deepened our understanding of argument and argumentation and have often resulted in analyses of the fallacies that are more rigorous and more subtle than anything we've seen before.

Despite my respect and indeed my enthusiasm for these developments, some of their proponents seem to me to divide things up in a way that threatens to lose sight of an essential ingredient of the phenomena they want to deal with. That ingredient is precisely the critical evaluation of inference that I alluded to in the preceding section.

The achievement of the pragma-dialectical school is the elaboration of a normative model of argumentative discourse, whose main components are an account of the phases of such discourse, of the speech acts that are appropriate to each of the phases, and most importantly a set of rules--essentially procedural--designed to maximise the possibility that such discourse achieves its goals. But the procedural rules which comprise the model presuppose and make explicit reference to *logical rules* that are presumed to be already at hand. Van Eemeren and Grootendorst state that the parties to the discourse "must have logical rules which they can apply in order to evaluate the validity of the protagonist's argument" (1984: 169). The 1984 presentation is of a decidedly deductivist cast. The presentation in van Eemeren and Grootendorst 1992 is more supple and not so unremittingly deductivist. Nevertheless, even there the sup-

position seems to be that a set of straightforward procedures for determining validity are already available and can be presupposed by the procedural rules which comprise the model.

My countersuggestion is that there needs to be a critical practice and a set of techniques for evaluating the inferences that don't fall under any articulable inference rule, and that this practice and these techniques cannot be defined or captured by any set of procedural rules either. For example, where simplicity emerges as a salient criterion of theory choice, one can rationally consider (monolectically as well as dialectically) which of two theories is simpler, but no rule or algorithmic procedure will settle the question.

Analogously to van Eemeren and Grootendorst, Doug Walton has written:

Formal logic has to do with forms of argument (syntax) and truth values (semantics). At any rate, that is the traditional conception. Informal logic (or more broadly, argumentation, as a field) has to do with the uses of argumentation schemes in a context of dialogue, an essentially pragmatic undertaking. (Walton 1990: 417-418)

It is not as clear in Walton's case that he views all pragmatic considerations as essentially procedural in nature. However, to illustrate what he says in the paragraph just quoted, Walton writes:

Only recently has it become more apparent that a pragmatic approach is absolutely necessary in order to make sense of informal fallacies. What are fallacies? They are violations of the rules of reasonable dialogue. But over and above this, they are also deceptive tactics used unfairly in argument to defeat an adversary in dialogue. If the study of fallacies is to be part of logic, clearly logic can make no headway in working toward its primary goal unless the pragmatic study of the uses of reasoning in argument (informal logic) is included as a legitimate part of the subject. (Walton 1990: 419.)

In this passage there is no suggestion that the *probative* force of the reasoning which occurs in argument is to be assessed by informal logic. It is easy to leave with the impression that for Walton, as for van Eemeren and Grootendorst, the strength with which premisses support a conclusion is to be judged by formal logic.<sup>20</sup>

If my characterisation of these authors' positions is correct, they are suggesting that to understand and appraise arguments and argumentation we need only (a) formal logic and (b) procedural rules for the use of arguments in the context of dialogue and/or

<sup>20</sup> In much of his most recent writing, Walton allies himself even more closely with the pragma-dialectical approach to argument. See for example Walton 1992.



critical discussion. My countersuggestion is that, in light of the considerations adduced earlier, there is need for a logical study of the principles of inference that does not coincide with formal logic. Since there does not today exist a formal logic capable of functioning as a normative theory of inference in general, I believe that the burden of proof is on these authors to show that my countersuggestion is false.

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