of argument diagramming, and though the square of opposition is mentioned, it is barely explicated. Fallacies are covered, but quickly, and not as a central tool for critical reasoning.

These comments should not be taken as indicating shortcomings. Rather, the text is not intended for courses which now use texts such as Johnson and Blair (*Logical Self-Defense*), Govier (*A Practical Study of Argument*), or Groarke and Tindale (*Good Reasoning Matters*). The material on which they rely, and there are a great number of references, demonstrate that the fields are different. I would have preferred if more of the work done in Argumentation Theory had been included, but perhaps limitations had to be set. In any case, as a secondary or ancillary text, *Cooperative Argumentation* would serve as an interesting and nicely thought out resource for a course in critical reasoning.

Reference

Gilbert, Michael A. 1995. "Arguments and Arguers". *Teaching Philosophy.* 18: 2: 125-138.

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Once upon a time there was a philosopher with a bag of beans. The philosopher was Charles Sanders Peirce, and he used the beans to cultivate a seminal distinction between three types of reasoning: deduction, induction, and abduction. The story goes as follows. Suppose we know as a fact that all the beans in a bag are white and that a handful of beans have been taken from such bag: then we can safely infer that all these beans are white—and we do so by *deduction*. Now imagine instead we have seen a number of beans being drawn from the bag, and all of them were white: even if we are not sure that every bean in that bag is white, we can reasonably infer such general rule from the statistical correlation we observed, reasoning by *induction*. Finally, let us say that again we know that all the beans in the bag are white, and then we notice a handful of white beans on a table nearby: under these circumstances, it seems reasonable to presume that those beans were drawn from that particular bag—and this is *abduction*.

More than a century later, the notion of abduction is still controversial in philosophy, linguistics, law, psychology, and computer science. Walton's *Abductive Reasoning* is one of the most recent attempts to struggle with this fascinating problem, and one of the most remarkable in its interdisciplinary breadth and scholarly erudition. Walton conceives abduction as *inference to the best explanation*, and in this book he endeavours to provide a detailed account of what exactly is meant by 'best explanation'. His main contribution is to outline a *dialogical model of explanation*, and apply it to the analysis of abductive reasoning. This also reveals the connections between abduction and argumentation, since Walton's model of

explanation is a direct extension of his dialogical account of argument structures. Moreover, his theoretical analysis is constantly informed by and tested against several applicable domains, such as scientific discovery, historical research, legal reasoning, medical diagnosis, and Artificial Intelligence. As a result, Walton's book provides a stimulating, updated, and comprehensive survey of this interdisciplinary field of research, with impressive mastery of the huge bibliography on abductive reasoning.

As for the specific contents of the book, chapter 1 introduces the basic notion of abduction and its alleged differences from both deduction and induction, with precise discussion of the existing literature. The problem of defining the *form* of abductive inference is outlined: is abduction to be modelled as the fallacy of affirming the consequent (since A implies B and B is the case, then A), or is it to be seen as inference to the best explanation, where a set of data D is observed and there is a hypothesis H that would explain D better than any other available alternatives, so that it is presumable that H is true? Walton frames this discussion using notions and examples taken from epistemology, argumentation theories, philosophy of science, legal reasoning, and artificial intelligence.

Chapter 2 delineates Walton's dialogue model of explanation. This section is truly pivotal: Walton aims to analyze abduction as inference to the best explanation, so he needs to define precisely (i) what is an explanation, and (ii) what makes an explanation more or less successful. The basic rationale of his account is to see *explanation as a dialogue* between two agents, in which "one agent is presumed by the other to understand something, and the other agent asks a question meant to enable him to understand it as well. An explanation is successful if it communicates understanding of a sort needed to enable the questioner to make sense of the thing questioned" (p. 51). Walton's account relies on a chain of embedded concepts: a definition of understanding is needed to characterize explanation, which in turn serves to analyze abduction as inference to the best explanation. Walton draws inspiration from several different domains, such as models of explanation in Artificial Intelligence (pp. 52-60), the debate on mind-reading capabilities in humans (pp. 60-66), and pragma-dialectical taxonomies of different speech acts and conversational contexts (pp. 66-78). Thus he is able to put forward his own model of what constitutes an explanation, by setting the conditions (dialogical, epistemological, and pragmatic) that characterize it as a special kind of speech act (pp. 78-82).

Chapter 3 assesses the import of Walton's dialogue model of explanation for the debate on the *nature of rationality*, with special reference to the recent surge of interest for argumentation theories in artificial intelligence (computational dialectics). Most noticeably, Walton provides a clear distinction between the *function of argument* (to remove doubts on unsettled issues) and the *function of explanation* (to provide understanding of known facts), and a thorough discussion of *inference-chaining in reasoning*, both forward (e.g., in assessing a legal case) and backward (e.g., in scientific inquiry). As for the nature of rational thought, Walton concludes that, notwithstanding shortcomings of both deductive and inductive models of reason, we should not give up the notion of rationality, but rather devise new models for it, by first recognizing that a large part of human reasoning is abductive.

One of these new models is presented in chapter 4: *defeasible modus ponens* (DMP). Walton observes that several argumentation schemes (i) have a *modus ponens* (MP) structure, albeit (ii) they are defeasible, i.e., their conclusion may have

to be retracted once more information is acquired. Hence he argues that deductive validity is not a property of MP in itself, but rather of the kind of conditional that is invoked by the MP structure. A material conditional will transfer truth to the consequent whenever the antecedent is true, but other kinds of conditional may pass on different and less demanding properties: e.g., a probabilistic conditional will make the conclusion only probable, and an abductive conditional will make it merely plausible. Then we can have rational argumentation schemes that are instances of DMP, and, as such, have the formal structure of MP but remain open to retraction in the future.

Chapter 5 applies Walton's model to *causal explanation*, trying to offer some insights on the excruciating problem of causation. The basic thesis is that causal reasoning should be usually seen as a type of abduction, leading backward from given data to an explanatory hypothesis, instead of defining it in terms of necessary and sufficient conditions. As usual, Walton discusses these topics with frequent and precise references to works in philosophy of science, logic, argumentation theories, law, medicine, semiotics, and computer science.

Chapter 6 explores the dialogical nature of abductive reasoning, and it tries to make full use of the dialogue model outlined in chapter 2. The core of Walton's approach to abduction is to be found here: *two complementary argumentation schemes for abduction* are presented (pp. 217-218), their *critical questions* are listed (pp. 223-227), and the *dialogical structure of abduction* is further detailed (pp. 239-242). Walton maintains that abduction can be formally represented in two different ways, by using two closely related argumentation schemes: a *backward abductive scheme*, and a *forward abductive scheme*. Roughly speaking, the first goes from a set of facts to their best *explanation*, i.e. the account that makes most sense out of them, given background knowledge and conversational context. The second scheme, instead, goes from the same facts to the *conclusion* they support most, via the most plausible argumentation chain that takes those facts as premises for such conclusion. Both these inference schemes are defeasible, and they can always be translated into each other. In fact, Walton sees them as different ways to represent the same abductive mechanism, which are helpful to capture different *uses* of it, depending on the goal of the dialogue. When we are looking for an explanation of some undisputed fact (e.g., in scientific inquiry), the backward abductive scheme fits more naturally the pattern of our reasoning; but while we are trying to make the case for a disputed claim on which we do not have conclusive evidence (e.g., in a legal trial), the forward abductive scheme is more perspicuous.

In chapter 7, Walton highlights open problems of abduction that may benefit from his dialectical theory. He especially focuses on open issues in philosophy of science (pp. 253-268), emphasizing the importance of abduction at the discovery stage, generating and selecting tentative hypotheses that appear more promising for future inquiry and testing. Walton also summarizes the twofold connection between abduction and argumentation (pp. 243-252): on the one hand, abduction itself is conveniently represented by specific argument schemes; on the other hand, several presumptive schemes seem to be intrinsically abductive (e.g., argument from appearance, from sign, from effect to cause, from correlation to cause), but others resist this analysis to some extent (e.g., argument from expert opinion, from ignorance), so that we should not consider presumptive and abductive reasoning as synonymous. Finally, Walton speculates on the import of his dialectical query-

driven model of abduction for applications in artificial intelligence, especially question-answering technologies and critiquing systems (pp. 269-272).

On the whole, Walton's analysis of abductive reasoning is both detailed and self-contained, with clear explanations of all key concepts and several examples. This makes the text fully accessible to non-experienced readers, while people already well-acquainted with Walton's approach may find it convenient to skip those parts which borrow more heavily from his previous works (1996; 1998). Not surprisingly, Walton's far-reaching interdisciplinary approach also has its drawbacks, alongside its virtues. Sometimes, his perspective on abduction is so generously broad and all-encompassing that a few loose ends are left to dangle behind, and some minor points appear either vague (e.g., characterization of reasoning on pp. 102-104), slightly superficial (e.g., discussion of mind-reading and theory of mind on pp. 60-66), or simply repetitive (e.g., readers will lose count of how many times it is said that abductive reasoning is defeasible, nonmonotonic, and presumptive). But these minor shortcomings are indeed to be expected, whenever an author attempts such a far-sighted synthesis.

More relevant is the fact that there are some (critical) questions that are raised, rather than solved, by Walton's approach to abduction. This is not necessarily a drawback, and it even helps in making the book so thought-provoking and enticing, but still it is worth considering. To my mind, the most important issues that Walton still fails to settle are the following:

1. If abduction is to be taken as inference to the best explanation, then what is an explanation, and what is it that makes it 'best'?

2. What is the real import of a dialogue model of abduction?

It is almost tautological to say that defining explanation is crucial for a theory of abduction as inference to the best explanation. Walton conceives explanation as a dialogue in which some *understanding* is transferred from one party to the other. Hence the corner-stone of abduction is the notion of understanding. In trying to define it, Walton borrows from the long debate on *mind-reading*, i.e., the ability of interpreting, predicting and influencing the behaviour of other agents by using insight on their inner mental states. Walton suggests that understanding the actions of another agent requires what he calls "simulative practical reasoning" (p. 65): the capacity of (i) recognizing as familiar the predicament in which we observe the other agent, and hence (ii) drawing the relevant conclusion on what the other is trying to do. He stresses that both mental simulation and practical reasoning are necessary to achieve this kind of understanding, and he labels this account as "the dual hypothesis regarding explanation" (p. 65).

This hypothesis is reasonable in its own right, but still does not provide any definition of what understanding is—it only suggests what cognitive skills we need to grasp it. Namely, we need to be able to put ourselves in the shoes of someone else, and then derive the practical consequences of that particular situation, so that we can understand it. But what does it mean to 'understand it' in the first place? What is this understanding that should be transferred in an explanation dialogue? In Walton's words, "how can understanding increase or decrease in virtue of an explanation?" (p. 65).

The answer to these crucial questions is, with respect to the general sophistication of Walton's analysis, rather vague and disappointing. He suggests

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linking understanding to *clarification* of the issue under debate, depending on the conversational context in which an explanation is offered. So we are told that "an explanation has a clarifying function in dialogues of various sorts, [and] how this function works depends on the kind of conversation the two parties are supposedly engaged in, [since also] how clarity is defined depends on the nature of conversation" (p. 65). By way of example, Walton provides the following: "A scientific explanation in physics may be quite clear to a group of physicists at a conference but terribly obscure if offered to a group of people who have never studied physics. On the other hand, an explanation of some arcane phenomenon in physics presented to readers of a popular magazine may be quite clear and helpful to these readers, yet a group of physicists might find it vague and metaphorical and not very enlightening or satisfactory at all as an explanation" (pp. 65-66).

Now, most researchers in argumentation theory and informal logic (including myself) are familiar and sympathetic with the idea of linking some properties of arguments to their conversational context, and clarity may well be one such context-dependent feature. But here the problem is that we still *miss* a definition (even a contextual one) of what clarity is—yet we need it, if we are to define understanding in terms of clarity, explanation in terms of understanding, and abduction in terms of inference to the best explanation, as Walton suggests.

This is where the real trouble lies, in my view: since a clear definition of clarity (no pun intended) is not to be found in Walton's essay, his whole remarkable chain of reasoning ultimately relies on an undefined quantity.[1] This does not make his arguments on abduction less fascinating, but it exposes them to the danger of future collapse, in case clarity should turn out to be either indefinable, or incompatible with Walton's conversational intuitions. Indeed, Walton himself seems aware of this shortcoming, when he writes: "The problem is that the notion of understanding, like the notion of commitment, is so fundamental to everyday human reasoning that, paradoxically, it almost seems hard for us to understand it. The paradox is posed by the bothersome question, 'How can we understand understanding?'" (p. 78). In what follows, Walton suggests that we should rely, to solve the quandary, on a normative model of the dialogical structure in which understanding takes place: "Just as we can come to understand commitment as a normative notion through setting up systems of formal dialogue with rules and clearly defined moves, so we can come to understand understanding as a normative notion that is based on clearly defined standards of rationality by using the same kinds of dialogue structures" (p. 78). Unfortunately, the dialogical framework proposed in chapter 6 does not shed any light on the exact nature of understanding, but rather makes use of this same notion to define the normative boundaries of dialogue (cf. the common understanding condition on p. 240). Therefore, while the pragmatic direction suggested by Walton seems promising, it still has to be refined and clarified, before a systematic evaluation of its merits and limits can be pronounced.

The alleged need for broader dialogical approaches to understand abduction is another leitmotiv in Walton's work, and one of his most inspiring suggestions— but how inspiring is it, exactly? My answer would be that we need a dialogical perspective to *evaluate* abductive arguments, i.e. to check whether they are adequate to the context in which they are used, given some normative understanding of such context. However, sometimes Walton champions more radical ideas: "What is really needed to grasp *the logical form of abduction* as a process of reasoning is to go

beyond seeing it as a single inference, called abductive inference, with characteristic premises and conclusion. What is needed is even to go beyond seeing abduction as a chaining of reasoning with several inferences connected in a sequence. One need is to grasp the ultimate aim of such a sequence by seeing the reasoning as used within a larger framework" (p. 179, my emphasis). Here Walton seems partially carried away by his own enthusiasm, since the pragmatic context in which abduction occurs is certainly crucial to assess its validity, as Walton illustrates, but it has nothing to do with 'the logical form of abduction'—that is, with the formal definition of what constitutes abduction in the first place (in Walton's view, the twin argument schemes on pp. 217-218). To grasp such slippery definition, we have no choice but to struggle with the 'atomic' cases of abduction in single inferential steps, to see what is it that differentiates presumed instances of abduction from cases of deduction and induction—following in Peirce's footsteps, we have to get back to beans. But this is precisely what Walton suggests we need to go beyond: as a result, his dialogue model turns out to be necessary (and perhaps sufficient, once better specified) to *evaluate* abduction, but it is neither necessary nor sufficient to *define* abduction.

This is not to say that Walton does not commit to any definition of abduction: of course he does, and repeatedly, when he characterizes abduction as inference to the best explanation. Since this definition includes an evaluative element, 'best', we may be tempted to conclude that, indeed, defining abduction implies evaluating its merits—so that Walton would be ultimately right in his urge to consider pragmatic factors "to grasp the logical form of abduction". On second thought, it is not so: in abduction, an explanation is considered best because it fits most adequately the facts known at the moment, and there is nothing intrinsically dialogical in this, unless we want to regard the assessment of competing hypotheses as a kind of dialogue. The fact that what is considered the best explanation may change over time, once new information are gathered and critical questions addressed, is certainly inspiring for evaluating real-life cases of abductive reasoning, but it has no bearing on how we define abduction *per se*. In other words, the definition of abduction as inference to the best explanation remains totally independent from the dialogue model that we may (beneficially) use to assess its progress in the context of a prolonged inquiry.

Consider again Peirce's beans: when we conclude by abduction that the handful of white beans on the table were taken from the all-white bag, is this inference cogent? Clearly it is not deductively valid, but cogency in everyday reasoning is rarely a matter of deductive validity. So the answer is—it depends. According to Walton, it depends whether or not this argument can 'answer' all the critical 'questions' associated with abductive inference (see pp. 222-228). I put 'answer' and 'questions' in quotes because such questions are really asked and answered only when the argument itself becomes matter of debate, to clarify whether the licensed inference can be accepted, and to what extent. Otherwise, those 'questions' are more perspicuously represented as *conditions* that must hold, if the argument is to be judged as (more or less) valid. Thus the questioning-answering session described by Walton is either (i) a consequence of the fact that a given argument comes to be debated in its own right, or (ii) a slightly metaphorical way of naming validity conditions of an argument scheme. If (i) is the case, Walton's claim that we need a dialogical model of abduction becomes trivial, because what it really says is

that we need to account for dialogical features to understand abduction in the context of a dialogue. If (ii) is the case, the claim is unwarranted, because as soon as we see critical questions as validity conditions, the need to conceive abduction as inherently dialogical evaporates: we do not ask questions; we check conditions, so that our evaluation is certainly critical, defeasible, and subject to change over time, but not necessarily dialogical in any self-evident sense.

All this said, these open problems do not hinder the value of Walton's momentous speculation on abduction, but rather set the framework for future studies in the same general direction. This openness to future developments, together with comprehensive coverage of previous works on the topic, is what makes this book so fascinating and helpful for any scholar interested in the study of abduction. In the words of Walton himself: "Although some light has been thrown ... on the question of whether there is a third category of logical reasoning other than deductive and inductive, some key questions have merely been posed with more urgency. In particular, basic questions about abductive reasoning remain unanswered. But some problems have at least been posed that suggest directions to carry the inquiry further" (p. 105). Indeed, it would be impossible to deny that Walton's book has shown several promising directions of research for a theory of abduction. Now, following his example, the inquiry *is* to be carried further.

Notes

[1] In his review of this same book, David Hitchcock suggests a different understanding of Walton's understanding: "According to Walton, explanation is the transmission of understanding: an explanation communicates information that enables its recipient to infer the thing explained. Thus Walton implicitly equates understanding something with being able to infer it from information at one's disposal" (2005: 1). If Hitchcock is right in his reconstruction of Walton's thesis, then my accusation of vagueness is mistaken—but in that case, Hitchcock's own criticisms have to be answered, since "ability to infer the occurrence of a phenomenon is neither necessary nor sufficient for understanding it; for example, one can understand why an atom of a radioactive isotope decays without being able to infer it from the data, and one can infer from hearing thunder that lightning just struck without understanding why the lightning struck" (2005:2). In contrast, if Hitchcock's reconstruction misinterprets Walton's views, my challenge of vagueness still remains to be addressed.

References

Hitchcock, D. (2005). "Review of Douglas N. Walton's Abductive reasoning". Manuscript, http://www.humanities.mcmaster.ca/~hitchckd/abductive.pdf (consulted on 30 September 2005).

Walton, D. N. (1996). *Argumentation schemes for presumptive reasoning*. Mahwah: LEA.

Walton, D. N. (1998). *The new dialectic: Conversational contexts of argument*. Toronto: University of Toronto Press.

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