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AND ARGUMENTATION THEORY

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INFORMAL LOGIC AND ARGUMENTATION THEORY

edited by
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PREFACE: THE VARIETY OF RESEARCH PERSPECTIVES IN THE STUDY OF ARGUMENTATION

For the past four decades the study of argumentation has flourished. Informal logic and argumentation theory have developed into two major – albeit not rigorously demarkable – internationally well–known and strongly institutionalized disciplines. They both consist of a great variety of research ideas, approaches, conceptual frameworks, and methods which allow to inquire into the complicated phenomenon of argumentation. Yet, the argumentative discourse constitutes a key subject of inquiry not only for these two disciplines which *ex definitione* aim at analyzing and evaluating arguments, but also for those branches of scientific research which deal with various forms of **language** and **reasoning**. At least four of them should here be listed:

- **formal logic** – as formal methods are applied in analyzing everyday arguments. The current research directions reveal that "standardized forms of argument that represent common species of arguments encountered in everyday conversational argumentation need to have a precise, partly formal structure" (Walton 2008, p. xiii). Thus, formal-logical approaches to argumentation are necessary for presenting the structure of argumentation, despite of their obvious limitations on grasping *all* features of natural language in which everyday argumentation is usually expressed, and of commonsense reasoning which is performed in any argumentative discourse;
- **semiotics** (understood here as a general theory of language) – as analyses of linguistic utterances or speech acts constitute a basic point of departure for any evaluation of arguments;
- **methodology of science** – as methodological rules of scientific reasoning, questioning and defining are applied in analyzing and evaluating arguments;

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• **informatics** – as software tools are used, among other applications, for: (a) providing computational models for argument diagramming, and (b) identifying formal and informal fallacies in reasoning, what is particularly important for artificial intelligence research (see e.g. Walton 2008, Rahwan and Simari, eds., 2009). One of the reasons for developing intensive research which involve argumentation theory and artificial intelligence is the fact that computation is a major category in understanding reasoning (see e.g. van Benthem 2009, p. vii).[1]

The list of disciplines indicated above shows that there exist many kinds of legitimate tools in the study of argumentation. Moreover, international conferences on argumentation,[2] a great number of articles published in specialized journals (*Informal Logic* and *Argumentation* are especially significant), and activities of many research groups reveal that one of the crucial tendencies in the study of argumentation is to build bridges between distinct research perspectives and traditions.[3] This special issue of *Studies in Logic, Grammar and Rhetoric* is to be a clear exposition of this research tendency. The articles included in this volume support the thesis that various approaches in the study of argumentation, despite of differences in methods of inquiry, try to realize a common research goal: elaborating tools, in particular (1) **language** and (2) **methods**, for analyzing and evaluating common-sense reasoning performed in an argumentative discourse.[4]

Thus, in accordance with this thesis the volume is to complete two tasks:

• to sketch a map of contemporary research directions in the study of argumentation. For this purpose the issue focuses on prominent approaches to argumentation developed in such domains of inquiry as the informal logic movement, the pragma-dialectical theory of argumentation, formal logic, and methodology of science (the latter includes also the logico-methodological tradition of the Lvov-Warsaw School which contri-

[1] This idea is associated with Leibniz's famous call "Calculemus" which was inspiring for the raise and development of informatics and which is today carried on with the help of some tools of informatics (see e.g. the domain "Calculemus" hosted by Witold Marciszewski; http://www.calculemus.org).

[2] The most important conferences are organized or sponsored by the International Society for the Study of Argumentation (ISSA), the Ontario Society for the Study of Argumentation (OSSA), and the Association for Informal Logic and Critical Thinking (AILACT).

[3] See e.g. the *Proceedings of the 6th Conference of the International Society of the Study of Argumentation* (van Eemeren, Blair, Willard & Garssen, eds., 2007, p. XV).

[4] We should note that not only the study of commonsense reasoning, but also the inquiry into the structure and persuasive power of some other crucial cognitive procedures – such as questioning and defining – is significant in informal logic and argumentation theory.

buted to the success of logical studies in Poland; see e.g. Woleński 1989, Coniglione, Poli and Woleński, eds., 1993, Jadacki 2003);

- to introduce those formal logicians and methodologists of science who are not familiar with this field of inquiry to major research problems of informal logic and argumentation theory.[5]

The articles of the volume are organized in five sections. The first section contains papers discussing main theses representative for the two major research traditions. They are presented in the articles written by Ralph H. Johnson and J. Anthony Blair – the co-founders of the informal logic movement, and by Frans H. van Eemeren – the co-founder (with Rob Grootendorst; 1944–2000) of the pragma-dialectical theory of argumentation developed at the University of Amsterdam. These articles give an overview of some distinctive features of informal logic and argumentation theory.

Ralph H. Johnson in his reflections on the Informal Logic Initiative (ILI) explains the circumstances which gave grounds for the raise of the informal logic movement in Canada and in the USA. Informal logic is contrasted with the paradigm of good argumentation based on what Johnson calls *formal deductive logic* (FDL). Some similarities and differences between the tradition of research and teaching informal logic in Canada and in the USA and the Polish tradition of logical culture are briefly taken into account. This subject is also presented in the appendix (included in this article) 'The Logical Culture in Poland' written by Marcin Koszowy.

The problem of what is the scope of applications of informal logic (as compared to applications of formal logic) is further investigated by J. Anthony Blair, who discusses the relationship between informal logic and logic. Three major areas of research (treated here as possible alternatives for formal logic) are distinguished: the theory of informal fallacies; the conception of the *acceptability of premises*, and of *relevance and sufficiency of the premise-conclusion link*; the argument scheme theory. Although informal logic originated with a rejection of the view of formal logic as a discipline which is fully capable of analyzing and evaluating all kinds of everyday arguments

[5] This project is in accord with initiatives aiming at popularization of informal logic and argumentation theory among Polish researchers and at integration of Polish scholars working in these fields. Among such initiatives I should mention the project ArgDiaP (http://argumentacja.pdg.pl/) which aims at organizing a series of conferences devoted to the major problems concerning rational and effective persuasion. Among other recent events there are two conferences: *Argumentacja: racjonalna zmiana przekonań* (*Argumentation: the rational change of beliefs*) organized by the University of Silesia in Katowice (April 1–3, 2009, Ustroń, Poland) and *Rhetoric of criticism in academic discourse. Disputes, polemics, controversies* (April 22–24, 2009, University of Warsaw) organized by the Polish Rhetoric Society.

and commonsense reasoning, applications of argument schemes in computer systems reveal that both disciplines are jointly treated as legitimate research tools in informatics. The difference between informal and formal logic is indicated by presenting a specific subject-matter of informal logic: the class of defeasible arguments (i.e. arguments which are rationally compelling, but not deductively valid and which may be defeated by the implicit knowledge determined by the context in which a given argument is formed).

Both papers sketch the picture of informal logic as an autonomous multi-thematic research discipline, which – in spite of its close relation to formal logic – has an independent research subject (i.e. argumentation and commonsense reasoning in everyday communication), goals and methods. Thus, the question of whether informal logic is in fact logic receives a positive answer which is supported by an overview of current research directions in informal logic.

Frans H. van Eemeren presents the origins and current research directions in the pragma-dialectical theory of argumentation. This theory is to realize jointly two basic goals: the descriptive goal i.e. it is to characterize the use of speech acts in an argumentative discourse, and the normative goal, i.e. it is to give rules for evaluating various kinds of arguments. The author sketches a map of research areas which are crucial for the pragma-dialectical perspective. Among them he lists the conception of argumentation and the study of the fallacies (started with the criticism of the *Standard Treatment of the Fallacies* developed by Charles Leonard Hamblin in his classical monograph *Fallacies*, 1970). Van Eemeren offers a survey of one of the crucial problems known from the very beginnings of logic and rhetoric which may be expressed by the question: how to reconcile the pursuit of success of argumentation aimed at persuasion (which is the distinctive goal of rhetoric) with the maintenance of reasonableness (characteristic for dialectics)? The answer to this question is given within the program of strategic manoeuvring, developed by van Eemeren together with Peter Houtlosser (1956–2008). Within this program, argumentative fallacies are identified as derailments of strategic manoeuvring.

The next section contains articles which explore formal tools in the study of argumentation. Kamila Dębowska, Paweł Łoziński and Chris Reed analyze the relationship between commonsense reasoning performed in everyday argumentation and formal models which represent it. The question of particular importance for the research focusing on applications of formal tools in the study of argumentation is that of how to bridge gaps between various perspectives in the research on argumentation. The authors answer this question by discussing the criteria of analyzing and evaluating

arguments within the major research paradigms, e.g. informal logic and pragma-dialectics. The range of applications of software tools (Araucaria, Arguing Agents Competition, Argument Interchange Format) used either in argument representation or in automated argumentation strategies is discussed.

David Hitchcock elaborates the concept of non-logical consequence which is to capture some basic features of commonsense reasoning. The explication of the concept of *formal consequence* elaborated by Alfred Tarski in his classical paper 'On the Concept of Following Logically' is helpful for making further considerations.

Katarzyna Budzyńska and Magdalena Kacprzak offer a set of formal methods for analyzing and modelling the process of persuasion. The paper constitutes an attempt to give an answer to the question of what scope and limits the applications of formal-logical tools have in analyzing the linguistic utterances designed for an effective persuasion process (convincing the other side).

Dale Jacquette argues for the view called *deductivism* which may be accepted either by formal or by informal logicians. According to the deductivist thesis, "good reasoning in logic is minimally a matter of deductively valid inference". This thesis may be expressed as follows: *formal logic is a reliable tool to detect any rhetorical fallacy.*[6] So, deductivism may be explained as a doctrine claiming that *every* argumentative fallacy may be adequately analyzed by means of formal deductive logic. The consequence of accepting the deductivist thesis is the claim that all fallacies of reasoning, including the so-called *informal* or *rhetorical* fallacies, are deductively invalid inferences. The deductivist thesis is supported by the analysis of fourteen kinds of rhetorical fallacies. The classification of those fallacies is also proposed.

The case study of arguments analysis done by means of formal (cyclic) proofs is developed by Mary Dziśko and Andrew Schumann, the representatives of the Belarussian school of logic. The authors analyze the argumentation which was used to support the decision to exclude Boris Pasternak from the Associaction of the Writers of the USSR. In this argumentation there were no opponents, as each speaker was in fact a proponent of exclusion. The application of cyclic proofs in argument analysis helps to develop graphical tools to present the structure of argumentation.

[6] This re-formulation of the deductivist thesis was made by Witold Marciszewski in his comment on deductivism (see this issue).

The next two articles constitute a section devoted to the role of definitions in argumentation, and, correspondingly, to the role of the *theory of definitions* in the study of argumentation. Robert Kublikowski gives an answer to the question of what role do definitions play within the structure of argumentation. The answer is given by distinguishing three kinds of relations between a definition and the process of argumentation: (a) argumentation *about* definition, (b) argumentation *from* definition and (c) argumentation *by* definition. Whereas Kublikowski's paper sketches a map of main problems concerning argumentation and defining, the article co-authored by Douglas Walton and Fabrizio Macagno is an attempt at elaborating tools to deal with one of the major research problems present either in argumentation theory or in computing, i.e. the problem of how to deal accurately with polysemy and ambiguity of natural language in a discourse. The overall aim of this article is to contribute to building an account of definitions which would allow us to solve this problem. Thus, the pragmatic interpretation of the notion of essential definition is proposed.

The next section is devoted to the model of argumentation developed by Stephen E. Toulmin in his influential book *The Uses of Argument* (1958). Tomasz Zarębski considers the relation between this model and the Toulmin's views on methods of scientific research. It is claimed that Toulmin's model of argument may be helpful in explicating scientific discovery and scientific arguments. Lilian Bermejo-Luque contrasts the deductivist model of *argument goodness* (based on the claim that a 'good' argument is the one which is deductively valid) with Toulmin's views on argumentation. The detailed discussion leads her to formulate a new interpretation of the Toulmin's model of argument.

Applications of argumentation theory in legal and moral argumentation are discussed in two articles constituting the last section of the volume. Eveline T. Feteris and Harm Kloosterhuis explore systematically the relation between argumentation theory and legal theory in order to analyze and evaluate legal arguments adequately. Yadviga Yaskievich undertakes some issues concerning bioethical argumentation. She discusses some legal problems connected with answering key questions in bioethics on the example of the argumentative procedures elaborated by the National Bioethical Committee in the Republic of Belarus.

The volume concludes with Witold Marciszewski's comment on Dale Jacquette's paper 'Deductivism in Formal and Informal Logic' included in this volume. Marciszewski focuses on a particular issue, namely the concept of deductive validity of reasoning. In the comment it is shown how

formal-logical criteria of identifying rhetorical fallacies depend on the accepted conception of deductive validity.

*

* *

The present volume – once its tasks indicated above are taken into account – is the first editorial event of this kind in the Polish logical literature. If these tasks are at least partially achieved, one step towards popularizing informal logic and argumentation theory should be made. For the volume is to show that informal logic should not be contrasted with formal logic, as many representatives of formal logic might think, but that these two branches of research taken together give a comprehensive picture of everyday argumentation. To make this point more explicit: on the one side there is formal logic with its language and methods helpful in exploring the structure of argumentation, and on the other – there are informal logic and argumentation theory which enable researchers to explore crucial features of "real" arguments containing (a) notoriously ambiguous, vague and fuzzy terms (which meaning depends on the context of everyday communication), (b) unexpressed premises, and many other hidden elements. Thus, a comprehensive analysis and evaluation of commonsense reasoning is only possible when those two perspectives are jointly taken into account.

I owe special gratitude to Prof. Ralph H. Johnson for his discussion of many important issues concerning distinctive features of informal logic, in particular its subject, goals and methods. I would also like to thank Prof. Kazimierz Trzęsicki, Prof. Agnieszka Lekka-Kowalik, Prof. Witold Marciszewski, Dr Dariusz Surowik, Dr Robert Kublikowski, Mgr inż. Rafał Lizut, Dr Katarzyna Budzyńska and Dr Magdalena Kacprzak for their suggestions concerning the structure of this issue. Many of their comments were of particular importance in giving the volume its final shape. I am also grateful to my colleagues from the Department of Logic, Informatics and Philosophy of Science of the University of Białystok for fruitful discussions. And especially I would like to thank all the contributors for their enthusiastic participation in this editorial project.

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THE ORIGINS OF INFORMAL LOGIC AND PRAGMA-DIALECTICS

STUDIES IN LOGIC, GRAMMAR AND RHETORIC 16 (29) 2009

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SOME REFLECTIONS ON THE INFORMAL LOGIC INITIATIVE[1]

Abstract: In this paper, I undertake to present clearly just what informal logic ("*logika nieformalna*") is and how it relates to formal logic, and to logic as such. To do that, I start by explaining how the Informal Logic Initiative (ILI) began in North America in the 70s. That will lead to a discussion of what is meant by "informal logic" and how it stands related to cognates such as formal logic, critical thinking, and argumentation. In Section 3, I discuss what I take to be basic theses about argumentation that have emerged from the informal logic perspective. In Section 4, I discuss some achievements of informal logic, and in Section 5, I discuss several interesting recent developments and in Section 6, I discuss the possible future developments. I conclude with some remarks on the importance of the Informal Logic Initiative in Section 7.

Keywords: informal logic, formal logic, logic, argument, argumentation theory, critical thinking, pragmatics, deductivism.

1. Introduction

In this paper, I want to undertake to present clearly just what informal logic ("*logika nieformalna*") is and how it relates to formal logic, and to logic as such. To do that, I start by explaining how the Informal Logic Initiative (ILI) began in North America in the 70s.[2] That will lead to a discussion of what is meant by "informal logic" and how it stands related to

[1] This paper is based, in part, on a presentation to the Humanities Research Group at the University of Windsor in March, 2006. I have also made use of part of my paper "Making Sense of 'Informal Logic'" published in *Informal Logic* in 2006 (26, p. 3), and also my book, *Manifest Rationality* (2000). I am grateful to Marcin Koszowy for discussion of many of the issues and for explaining the Polish context. I am also grateful to Michael Baumtrog (the Bommer) for his help in preparing this paper for submission.

[2] In this paper, I will be discussing developments in North America. From exchanges with Marcin Koszowy, I have learned that the situation as regards the logical culture in Poland is different in certain respects (see Appendix A) from that in North America. Given Poland's illustrious place in the history of logic (Kneale & Kneale, *The Development of Logic* (1962), and McCall, *Polish Logic* (1967)), it is not surprising that informal logic has been somewhat slower to emerge there.

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cognates such as formal logic, critical thinking, and argumentation. Then in Section 3, I discuss what I take to be basic theses about argumentation that have emerged from the informal logic perspective. In Section 4, I discuss some achievements of informal logic, and in Section 5, I discuss several interesting recent developments and in Section 6, I discuss the future. I conclude with some remarks on the importance of the Informal Logic Initiative.

2. Origins of the Informal Logic Initiative

When I was hired in 1966 to help update logic instruction at the University of Windsor (Ontario, Canada), I found students being introduced to what was called symbolic logic (or mathematical logic), which is a species of formal deductive logic (FDL).[3] For the first couple of years that I taught the course, I used Copi's *Symbolic Logic*, a text that traffics in largely artificial arguments, like the following:

> If Argentina joins the alliance then either Brazil or Chile will boycott it. If Brazil boycotts the alliance, then Chile will boycott it also. Therefore if Argentina joins the alliance, then Chile will also.

None (or very few) in the real world argue in this mannerly fashion. So it does not acquaint students with the types of argument they will encounter outside the logic classroom. Its transfer value is marginal. A second limitation of FDL is as a tool for evaluating real arguments. In the Copi approach, students are taught various techniques for determining whether or not an argument is valid. "Valid" here means that the conclusion of the argument follows necessarily from the premises. The classic example of such an argument is "All men are mortal, Socrates is a man; therefore, Socrates is mortal." It turns out that whether an argument is valid is a function of its logical form. In the tradition of FDL, a good argument is a sound argument; and a sound argument is defined as one that has true premises and instantiates a valid logical form. I will shortly argue, that this position makes FDL ill-quipped to handle real arguments.

My experience in teaching that course was that student response to this approach was one of polite toleration, and for some mystification: they found it hard to connect with this approach. They said things like: "How does this

[3] I introduced the abbreviation FDL – formal deductive logic – in my (1987). For a critique of my views, see Woods (2004).

apply to the arguments I have to deal with outside of the logic classroom?" I reported this fact to the Head of the Department, Peter Wilkinson, who said to me: "Then why don't you design a better course?" I resolved to do so. Just about that time, a representative from the McGraw-Hill Book Company put a sample copy of Howard Kahane's text – *Logic and Contemporary Rhetoric* – into my hands. I remember reading the following statement in his Preface:

> Today's students demand a marriage of theory and practice. That is why so many of them judge introductory courses on logic, fallacy, and even rhetoric not relevant to their interests.
>
> In class a few years back, while I was going over the (to me) fascinating intricacies of the predicate logic quantifier rules, a student asked in disgust how anything he'd learned all semester long had any bearing whatever on President Johnson's decision to escalate again in Vietnam. I mumbled something about bad logic on Johnson's part, and then stated that *Introduction to Logic* was not that kind of course. His reply was to ask what courses did take up such matters, and I had to admit that so far as I knew none did.
>
> He wanted what most students today want, a course relevant to everyday reasoning, a course relevant to the arguments they hear and read about race, pollution, poverty, sex, atomic warfare, the population explosion, and all the other problems faced by the human race in the second half of the twentieth century (1971, p. vii).

Kahane's words reflected my own experience, so I decided to develop a new course (which I called "Applied Logic") that would teach students argument analysis using Kahane's text which featured the fallacy approach. In his text, he had attempted to breathe life into that longstanding tradition that goes back to Aristotle which, according to Hamblin (1970) had become (to use his terms) "worn out, threadbare and dogmatic."[4]

I taught the course for the first time in 1970–71, and found that it was well-received by the students. The next year my colleague, J. Anthony Blair, and I each taught sections, and we continued in that way throughout the early 70s, comparing notes on how the course was developing, discussing problems in the teaching, preparing supplementary material, exercises, and tests. We gradually became unhappy with Kahane's text, for two reasons. *First*, it was an American text, and our students were sensitive to this matter. One student said: "Why should we be expected to critique arguments

[4] Hamblin's assessment is not altogether accurate. See my "Hamblin on the Standard Treatment" in (1996).

about Wally Hickel and others? Don't our own Canadian politicians make arguments that could be featured on issues that concern us?" This was at the time when there was growing sensitivity to American influence in Canada.[5] We thought that our students' complaints were legitimate and that there was a genuine need for a "Canadian" text. *Second*, we were not satisfied by what seemed to us Kahane's sometimes loose treatment of some of the fallacies. For example, his description of the begging the question as "failure to support the very question at issue" (1971, p. 44) could equally describe either irrelevant reason or hasty conclusion. We thought the presentation of the fallacies needed to be improved, and we set about doing that by providing conditions for the occurrence of each fallacy. We also stressed the point that when a charge of fallacy is made, it must be supported by an argument. From the beginning, Blair and I insisted that the fallacy approach not be treated like a game of "pin the tail on the donkey" or spot the fallacy.

Blair and I set about the task of developing our own text. We used drafts in our classes, which helped us to discover where there were problems, we then made modifications, and finally submitted a manuscript to McGraw-Hill Ryerson, who, after an initial delay, accepted it for publication. By the time it appeared in 1977, we had become aware of a number of similar texts that were also appearing. Among them were: Stephen Thomas, *Practical Reasoning in Natural Language* (1973); Michael Scriven, *Reasoning* (1976); Ronald Munson, *The Way of Words: An Informal Logic* (1977). It seemed to us that a Geist of some sort was manifesting and decided that to host a conference that would bring together people who had an interest in this newly emerging development. In June 1978, we hosted the First International Symposium on Informal Logic, with papers by Michael Scriven, John Woods, Douglas Walton, and others (see Blair & Johnson 1980). That conference confirmed our belief that we were onto something and that we were not alone; we had allies. The conference also gave birth to the *Informal Logic Newsletter* first published in 1979 which in 1984 became the journal, *Informal Logic*, with the support of the University of Windsor. We continue to co-edit the journal, now sharing editorship with our colleagues, Hans V. Hansen and Christopher Tindale.[6]

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[5] "Living next to you," Trudeau told an American audience in a speech to the National Press Club in 1969, "is like sleeping with an elephant; no matter how friendly and even-tempered is the beast, one is affected by every twitch and grunt."

[6] In 2008, *Informal Logic* became an open access online publication. URL: www.informallogic.ca.

Informal logic and critical thinking. The next important development in our initiative took place in 1981 when we made contact with the critical thinking movement. Michael Scriven had put Blair in touch with Richard Paul who was hosting a conference on critical thinking in May 1981 at Sonoma State University which we both attended. There we found that we had like mind-minded colleagues in universities across North America and in other areas – e.g., in education, in psychology. From then through the mid-90s, the annual Sonoma conference served as a gathering place for the exchange and development of ideas about critical thinking and informal logic at both the theoretical and pedagogical levels. Our second conference on informal logic at the University of Windsor in 1983 gave birth to the Association for Informal Logic and Critical Thinking (AILACT) which continues to this day to promote interest in informal logic by sponsoring yearly conferences and by its recently initiated essay prize competition.

An important question brought about by the alliance between these two initiatives is the conceptual one of the relationship between informal logic and critical thinking. Let me here set forth my view of that relationship. Critical thinking is, in the first instance, a kind of activity, or mental practice, whereas informal logic is a kind of inquiry or theory. Critical thinking thus also designates an educational ideal that emerged with great force in the 80s in North America as part of an ongoing critique of education as regards the thinking skills not being taught (Siegel 1988). The precise definition of "critical thinking" remains a matter of dispute (Johnson 1992, Johnson 2008) but most would agree that in order to think critically, a person must be able to process arguments, because one has to grapple with reasons for and reasons against. That is where the connection to informal logic occurs. But critical thinking requires additional abilities not supplied by informal logic: the ability to obtain and assess information, to clarify meaning. Many believe that in addition to certain skills, critical thinking requires certain dispositions (Ennis 1987) – like the disposition to seek the truth, or being open-minded. Most will also acknowledge that it is not possible to think critically without knowledge and information – and these needs cannot be supplied by logic of any sort. Unfortunately, too many conflate critical thinking with other cognitive goods, like problem solving and decision-making (see Johnson 1992, pp. 42–43). These issues are one dimension of what I have called The Network Problem (Johnson 2000, pp. 21–22). In my judgement, a theory of reasoning is required for their proper settlement (p. 23).

Informal logic and argumentation theory. The next important development in the Informal Logic Initiative occurred 1983 when Blair made

a connection with Frans van Eemeren and Rob Grootendorst, two Dutch linguists who had developed the Pragma-Dialectical approach to argumentation (1984). Through that connection, we learned that the Informal Logic Initiative was part of worldwide network of researchers, all interested in the study of argumentation – what was called argumentation theory. That term has come to denote a multi-disciplinary approach to the study of argumentation. Many have argued that any decent theory of argumentation must take into account logical, rhetorical and dialectical perspectives (Wenzel 1990), with which many agree (but see Blair 2003) and to which one could easily add linguistic, psychological and other perspectives. Thus we came to understand that informal logic is one approach, among many, within the broader inquiry known as argumentation theory.

Why Informal Logic? That's a rough sketch of how our project was launched and how it developed. Now: Why did we call it "informal logic"? As I mentioned above, at the start, that was not how we referred to the work we were engaged in. Throughout the 70s, we referred to our approach to the teaching of logic as "applied logic" (which to many would have meant applied "formal" logic). Two considerations persuaded us that this was not a good choice as a descriptor.

First, what we were teaching students was not how to apply formal logic. We were interested in equipping students to handle the sorts of arguments they would be encountering in their lives as citizens in a democratic society, weighing pros and cons of arguments, strengths and weaknesses, dealing with controversial issues where a conclusive resolution seems unlikely. In our inquiry, we were motivated in the first instance by pedagogical concerns. We became convinced that traditional (formal deductive) logic did not provide a proper account of the goodness of arguments, and that it did not prepare students for assessing and constructing and criticizing the arguments that mattered in their life-world (to borrow a phrase from Habermas). This is no surprise to anyone who knows the history of modern logic which was developed by Frege and brought to a programmatic articulation by Russell and Whitehead in their *Principia Mathematica*, 1910–1913. The purpose of this logic was not to provide a theory of argument but rather to solve pressing problems in the foundations of mathematics in the late 19th century (the so–called paradoxes and antinomies). This logic (heavily symbolic and mathematical) was later "downloaded" into logic textbooks, like Copi's *Symbolic Logic* and *Introduction to Logic*) as a theory of argument – pressed into a service for which it was, to my way of thinking, never intended.

Second, following Kahane, our approach used the so–called "informal fallacies", such as *ad hominem* and hasty conclusion. These mistakes in ar-

gumentation are not the result of using improper logical form but rather stem from some "informal" consideration. The term "informal logic" connected with that aspect of our initiative.

Informal Logic defined. Though we gave various characterizations of informal logic in various papers (1980; 1985), we did not attempt a definition until 1987. In a paper written for the 1988 World Congress of Philosophy (published in *Informal Logic*), Blair and I put forward a definition of informal logic: viz., "a branch of logic whose task is to develop non-formal standards, criteria, procedures for the analysis, interpretation, evaluation, criticism and construction of argumentation in everyday discourse" (Johnson & Blair 1987, p. 147). Since that time we have made one modification; we broaden this now to include the sort of argument that occurs not just in everyday discourse but also disciplined inquiry – what Weinstein calls "stylized arguments *... within the various special disciplines*" (1990, p. 121). Herewith some comments on that definition.

First, it should be noted that the term "informal logic" is a loose descriptor of an inquiry that others have defined or understood in other ways. See Johnson (2007) for a discussion of this point.

Second, the "in" of informal was originally conceived to signal a kind of negation of formal (deductive) logic. At the start of the initiative, there was an underlying dissatisfaction with, if not downright hostility to, formal logic.[7] There were questions about its ability to illuminate natural language arguments, "arguments on the hoof" (as Woods would later refers to them), and many thought that the validity requirement was too stringent. Many took the view that there could be perfectly good arguments that were not valid – inductive arguments, appeals to authority, for example. And many believed that there were pitfalls in argumentation that were not illuminated by traditional approaches to logic, like the *ad hominem* fallacy.

Third, an obvious point is that "informal" must take its meaning by way of contrast to "formal." Yet this point was not made for some time, hence the nature of informal logic remained somewhat opaque, even to those of us involved in it. To clarify it is helpful to have recourse to Barth and Krabbe (1982, p. 14f.) where they distinguish three senses of the term "form."[8]

By "form$_1$," Barth and Krabbe mean the sense of the term that derives from the Platonic idea of form, where form denotes the ultimate metaphy-

[7] The source of dissatisfaction can be traced to Bar Hillel (1969). See Johnson and Blair (1980, p. 27, n. 10). For a spirited roasting of formal logic, see Scriven (1980, pp. 147–48).

[8] The discussion here is based on the discussion in *Manifest Rationality*, pp. 119–120.

sical unit. Barth and Krabbe claim that most traditional logic is formal in this sense. That is, syllogistic logic is a logic of terms where the terms could naturally be understood as place-holders for Platonic (or Aristotelian) forms. In this first sense of "form," almost all logic is informal (not-formal). Certainly neither predicate logic nor propositional logic can be construed as term logics. However, this way of understanding informal logic would be much too broad to be useful.

By "form$_2$," Barth and Krabbe mean the form of sentences and statements as these are seen in modern logic. In this sense, one could say that the syntax of the language to which a statement belongs is very precisely formulated or "formalized;" or that the validity concept is defined in terms of the logical form of the sentences which make up the argument. In this sense of "formal," most modern and contemporary logic is "formal." That is, such logics are formal in the sense that they canonize the notion of logical form, and the notion of validity plays the central role normatively. In this second sense of form, informal logic is not-formal, because it abandons the notion of logical form as the key to understanding structure and likewise abandons validity as constitutive for the purposes of the evaluation of argument(ation). When Govier (1987) discusses informal logic, it is this second sense of "formal" that stands in the background.

By "form$_3$," Barth and Krabbe mean to refer to "procedures which are somehow regulated or regimented, which take place according to some set of rules." Barth and Krabbe say that "we do not defend formality$_3$ of all kinds and under all circumstances." Rather "we defend the thesis that verbal dialectics must have a certain form (i.e., must proceed according to certain rules) in order that one can speak of the discussion as being won or lost" (p. 19). In this third sense of "form," informal logic can itself also be formal. There is nothing in the Informal Logic Initiative that stands opposed to the idea that argumentative discourse should be subject to norms, rules, criteria, standards and/or procedures.[9] What we opposed is that the idea that the criteria for *evaluating all arguments* are to be obtained by reflection on logical form.

Fourth, almost from the beginning, many have expressed dissatisfaction with the name "informal logic," partly, one suspects, because in English the term "informal" has the connotation of looseness. For some, (Hintikka 1989, p. 13) "informal logic" is a "solecism" because logic must be formal (see my 2000, pp. 255–260 for fuller treatment of that point). Walton, for instance, in

[9] Thus, informal logic is inform$_2$al but not inform$_3$al.

the Preface to the 2nd Edition of his *Informal Logic* (2008) wonders whether "semi-formal logic" might not be a better name.[10]

Logic, formal and informal: How, then, does informal logic differ from formal logic? Walton's 1990 article, "What is Reasoning? What is an Argument?" is of interest, both for his conception of informal logic, and for its characterization of the relationship between formal and informal logic. Walton writes:

> Formal logic has to do with the forms of argument (syntax) and truth values (semantics)... Informal logic (or more broadly, argumentation, as a field) has to do with the uses of argumentation in a context of dialogue, an essentially pragmatic undertaking (pp. 418–419).

For Walton, informal logic is "pragmatic," meaning that it is concerned with *the uses* of argument. For Walton this points to the need to situate argument within the context of dialogue, and his later work shows how informal logic can make use of dialogical approaches. The entry on "informal logic" Walton wrote for *The Cambridge Dictionary of Philosophy* says: "Informal logic, also called practical logic, the use of logic to identify, analyze and evaluate arguments as they occur in contexts of discourse in everyday conversations" (Walton 1995, p. 376).

In my (1999), I provided my own account of the relationship between the two logics, premised on drawing a distinction between terms that are often conflated: implication (entailment), inference and argument. If we take "logic" to designate the normative theory of reasoning, then there are as many logics as there are forms of reasoning – viz., epistemic logic, deontic logic, modal logic. Informal logic is logic, because it is focused on one important kind of reasoning–argument–and because it is normative: it seeks to establish the norms for good argument. In my view, informal logic differs from formal logic not only in its *methodology* but also in its *focal point*. That is, the social, communicative practice of argumentation in which arguments occur can and should be distinguished from both deductive implication (and entailment) which is, in my view, the proper focus of formal deductive logic. And it must also be distinguished from the study of inference, which I take to be the subject of inductive logic.[11] Informal logic is concerned with the

[10] I cannot here devote proper attention to the issue of the name of the inquiry. I can only say that I think the choice of a name is important (as opposed to those who say that it does not matter what you call it). In a future paper, I will present my argument for the proposition that the name "Informal Logic" should be retained.

[11] For more on this approach, see (2000), pp. 24–25.

logic of argumentation, with determining the cogency of the support that reasons provide for the conclusions they are supposed to back up. And because arguments in real life are always situated in some context, it is natural to associate informal logic with pragmatics.[12] Thus understood, there is no opposition between formal and informal logic, for they have different subject matters.

Walton takes a similar position. In his discussion of the relationship between formal and informal logic, he writes:

> Hence the strongly opposed current distinction between informal and formal logic is really an illusion, to a great extent. It is better to distinguish between the syntactic/semantic study of reasoning, on the one hand, and the pragmatic study of reasoning in arguments on the other hand. The two studies, if they are to be useful to serve the primary goal of logic, should be regarded as inherently interdependent, and not opposed, as the current conventional wisdom seems to have it (Walton 1990, p. 419).

What Walton means is that, when properly understood, these two logics are not in competition but rather are complementary. (The claim that they are "inherently interdependent" needs elaboration.) To spell out their complementary nature, Walton invoked the traditional distinction between syntax, semantic and pragmatic, assigning to formal logic the syntactical and semantical aspects of the study of argumentation, and to informal logic the pragmatic aspects. Thus it appears that for Walton, informal logic is to be distinguished from formal logic not only by methodology by also by its focal point – argumentation in ordinary and natural contexts – a point with which I agree.

Walton's 1990 article is important because it provides an additional frame through which to view the development of informal logic using the traditional distinction (due to Morris) of semiotics into semantics, syntax, and pragmatics. *Syntax* is taken as the study of language in a formal and structural mode, symbols and their relationship to each other. *Semantics* is taken as the study of language when we seek to provide an interpretation and extra-linguistic meaning for those symbols. *Pragmatics* is taken to be the study of symbols in relationship to the users of those symbols. It is clear that informal logic is more closely related to pragmatics. The tasks

[12] Many who are broadly sympathetic with the Informal Logic Initiative would prefer the term "normative pragmatics" (Goodwin 2001), a term also used by Brandom (1994, pp. 192–93) and by pragma-dialecticians (van Eemeren and Grootendorst (1992, p. 5) For more on this matter, see Blair 2006, pp. 11–13.

of reconstructing an argument, of supplying missing premises, of clarifying meaning – all of these tasks fall within the domain of pragmatics rather than syntax or semantics.

It is clear from the above that informal logic has a different conception of argument from that used in formal logic, which conceives argument as a set of propositions, one of which is supported by the others. In the Informal Logic Initiative, we have been especially interested in teaching students about the use of argument to *persuade rationally*. But there are a great many uses to which argument can be put (see Blair 2004b). In my view, one of the merits of the informal logic approach to argument has been to stimulate inquiry into the very idea of argument (about which much has been written) and to do so from a vantage point that is situated between the highly abstract and de-contextualized approach taken by formal logics, and the more contextualized, nuanced approaches taken by those who are immersed in rhetoric and communication theory.

I now move to a discussion of some central insights about argument developed in the Informal Logic Initiative.

3. Informal Logic as a Theory of Argument

The premise on which the Informal Logic Initiative was developed was that existing logical theory did not provide a satisfactory normative account of the requirements for a good argument. The soundness criterion – valid form plus true premises – is neither necessary nor sufficient. There are good arguments that are not sound arguments, viz., good inductive arguments; and there are sound arguments that are not good arguments: any circular argument with a true premise.[13]

To develop an account of good argument that was not dependent on the notions of logical form (so informal (non-formal) in that sense), validity, and soundness, we worked from the following four formative and, I think, non-controversial insights.

I: Arguments fall into a continuum from strong to weak.

Under the traditional view taken by logicians, arguments are either sound or unsound. Accordingly, appraisal is bipolar: An argument is either

[13] For more on the position discussed here, see Govier (1987), Johnson (2000), Hitchcock (2004).

good or not good. In *Logical Self-Defense*, we took the view that arguments tend to fall along a spectrum: "Rarely is an argument so good that it cannot profit from criticism, and seldom is an argument so bad that it cannot be improved by criticism. Most arguments fall into the middle of the spectrum" (Johnson and Blair 1993, p. 43). We came to understand that arguments have degrees of goodness... that goodness is not an all or nothing affair. While it might be nice to have a knockdown argument, these are few and far between. A "pretty good argument" may be good enough, for the purposes at hand. This fairly obvious truth has important implications for how we go about the whole process of argument evaluation and criticism because it means that adequate norms for argument must allow for this truth.

II: Often there are good arguments on both sides of an issue, and often there are more than two sides to an issue.

Hamblin states: "There are often good arguments for a given conclusion and also good arguments against it" (1970, p. 232). Hamblin's point is evident from the history of thought, most particularly the history of philosophy. There are good arguments for idealism [Plato] and against it [Aristotle]; for phenomenalism [Berkeley, Ayer] and against it [Hume, Wittgenstein]; for skepticism [Descartes, Montaigne] and against it [Moore, Wittgenstein]. Nor is Hamblin alone in making this observation. Henry W. Johnstone Jr. made a similar point with special reference to philosophical argumentation:

> ...Assume that there are valid philosophical arguments, understanding "valid" in any way you choose. Suppose a position P is supported by such arguments. Then, as the most cursory reading of the history of philosophy shows, there must also be arguments against P answering to the same criteria of validity... No position in the history of philosophy is so strong that we should want to say that only the arguments favoring it are valid; and none so weak that we should want to say that only the arguments opposing it are valid (Johnstone Jr. 1978, p. 79).

Though Johnstone Jr. is using this reasoning in a *reductio* to support the view that validity is a problematic notion with respect to philosophical argumentation, the point he makes supports the point being addressed here. An adequate account of goodness for arguments must accommodate this insight. Formal logic cannot do so; there cannot be a sound argument for p and a sound argument for not-p. Therefore formal logic cannot accommodate this insight and cannot therefore provide an adequate account of goodness for argument.

One problem with the pro- and con- approach (viz., the idea that there are "two sides to every issue") is that it is simplistic. Take an issue like the existence of God on which there are at least three sides: the theist, the atheist and the agnostic. (For a wonderful treatment of this point, see Govier 1988.)

III: A good argument must satisfy the criteria of relevance, sufficiency, and acceptability. The premises of the argument must be relevant to the conclusion, sufficient to support the conclusion and acceptable to the audience to whom they are directed.

Three points follow. First, each of these concepts admits of degrees of satisfaction; a premise can be "more or less relevant" to the conclusion;[14] the premise set can be "more or less" sufficient to support the conclusion; a premise can be "more or less" acceptable. In this respect, these criteria differ from the on/off, all or nothing criterion of validity that underlies the FDL approach.

Second, some account must be given of these fundamental concepts: relevance, sufficiency and acceptability. Some (Hitchcock 1998) have claimed that the Informal Logic Initiative is compromised by the absence of supporting theory and make the point that compared with FDL, informal logic is, in this crucial area, short on supporting theory. In response to this, I would argue that we do have some fairly well-established theories of acceptability (Tindale 1999, Freeman 2005). There have been many attempts to develop a theory of relevance (Walton 1984, Blair 1989, Hitchcock 1992, Gabbay and Woods 2003), though none of them has been entirely successful. Sufficiency is the criterion which has received the least attention (Blair 2006). Third, in this discussion of criteria for the evaluation of the premises of arguments, some will wonder what has happened to truth? Do informal logicians not require that the premises of a good argument be true? I deal with this issue later in this paper.

IV: A good argument must anticipate and respond to appropriate objections; it must handle the appropriate dialectical material.[15]

An often-expressed view is that a strong argument is one that can withstand serious objections (Johnstone Jr. 1978). Perelman puts it this way:

[14] There is debate about whether relevance is susceptible of degrees.

[15] This idea contains the seed of what I later called the dialectical tier (Johnson 2000).

> The strength of an argument depends upon the adherence of the listeners to the premises of the argument; upon the pertinence of the premises; upon the close or distant relationship they may have with the defended thesis; upon the objections; and upon the manner in which they can be refuted (1982, p. 140).

But thus far little work had been done to unpack and develop this idea: What makes an objection a serious objection? How does one refute an objection? How exactly does the argument "withstand" an objection? Clearly, the argument, once encoded in text, cannot *do* anything; it is *the arguer* who must fashion a reply to the objection to show that it is not serious enough to undermine the argument. But what constraints govern this dimension of the argumentative process? Here our work is still in its infancy (Johnson 2008).

Those then are the tenets that characterize this theorist's understanding of how Informal Logic approaches argumentation.

4. Some Achievements of Informal Logic

Let me now discuss some achievements that are at least partly the result of what I am calling the Informal Logic Initiative. There will not be enough space to allow me to go into chapter and verse regarding all the details.

Improved teaching of logic. The first goal of the Informal Logic Initiative was to improve the way in which logic was taught to undergraduates in colleges and universities in North America (and elsewhere). If one looks at how introductory logic was being taught in the late 60s (Johnson and Blair, 1980) and then reviews the wide variety of approaches and textbooks that exist today, it is apparent that there have been huge changes, for which the Informal Logic Initiative is at least partly responsible.

For example, on the matter of how to understand and display the structure of an argument, numerous quite different approaches have been developed. Thomas (1973) – following in the steps of Beardsley (1960) – introduced the distinction between different types of argument: divergent, convergent – and an approach to laying out the structure of an argument that did not depend on the notion of logical form. Scriven (1976) introduced the method known as tree diagramming. Johnson and Blair (1977) features a natural language method of representing the structure of the argument. Freeman (1988) combines the tree diagramming method with a Toulmin-type approach. More sophisticated still are the methods developed by Horn to track how argumentation develops around a specific issue; see also Yoshimi (2005). Finally, we need to mention computer-driven approaches for representing the

structure of argument, the most prominent being Aruacaria developed by Walton and Reed [http://araucaria.computing.dundee.ac.uk] and Carneades [http://carneades.berlios.de].

New introductory logic texts continue to appear on an annual basis – perhaps the most popular of which has been *Hurley's A Concise Introduction to Logic* (2007, 9e), while old texts are updated to reflect advances in theory. Thus Johnson and Blair (2e) introduced changes to their treatment of faulty analogy to reflect Govier's introduction of the idea of *a priori* analogy. Govier herself whose *A Practical Study of Argument* has been a very successful text, wrote: "I have benefited from studying other texts in this field, and from my participation in conferences on argumentation held at the University of Windsor, Brock University and the University of Amsterdam, from writing and reading papers in the journal *Informal Logic* and from discussions with students ands colleague over many years" (Govier 2001, p. xi). Tindale's *Fallacies and Argument Appraisal* (2007) shows the influence of recent theoretical developments at every turn.

Success in revamping the approach to logic teaching in university and community colleges has been, however, far from universal. Many universities continue to offer introductory logic courses that are essentially courses designed to introduce students to FDL, and there is often some confusion about the aims of such courses (Blair 2006, Johnson and Blair 2009).

The revitalization of the fallacy tradition. In his famous 1970 book, *Fallacies*, Hamblin criticized fallacy theory as it had developed in the textbook tradition. That critique functioned as a summons. Among those who answered the call were Douglas Walton and John Woods, two Canadian philosopher/logicians, who in the 70s co-authored a series of papers in which they showed that the individual fallacies were susceptible of better treatment than the sort of worn dogmatic and debased approach that Hamblin had complained of. A collection of their papers can be found in Woods and Walton (2007): *Fallacies: Selected Papers 1972–1982.* Their pioneering work persuaded many that the fallacies were a topic for inquiry and research. Since that time, there has been ongoing interest in the fallacy tradition (see Hansen and Pinto 1995), though having said this, it must be noted that alongside of this development runs a resistance movement that takes the form of questioning whether there really are fallacies (McPeck 1981, Finocchiaro 1981, Willard 1990, Hitchcock 2007). In spite of continued and often justified criticism of how they have been presented historically, fallacies continue to be an object of both of practical and pedagogical interest, as well as historical and theoretical reflection, for informal logicians and argumentation theorists. The work of Douglas Walton is worth regarding here. He has

written a number of monographs on the individual fallacies, among them *Begging the Question* (1991), *Slippery Slope Arguments* (1992), *Appeal to Expert Opinion* (1997), *Ad Hominem Arguments* (1998), *Appeal to Popular Opinion* (1999). These monographs are important because not only do they synthesize the work that had been done by Walton, Woods and others, but also because they opened the eyes of many outside informal logic to the intellectual merits of the fallacy tradition.

Breaking the hegemony of deductivism & the inductive-deductive dichotomy. An important component of traditional logic is deductivism: the view that has sometimes been expressed by the claim that "all argument/inference is either deductive or defective." Informal logic challenges that view as not an adequate position for arguments. For more on this, see my (2007). A second related development consists in a modification of deductivism to allow for another kind of argument-inductive. This entrenched doctrine was one of the first focal points of the fledgling informal logic movement. The *Informal Logic Newsletter* featured an article by Weddle (1979: "Inductive, Deductive") that sparked a spirited discussion. (See Hansen 1990, p. 183 for the sequence of articles that followed.) Later Govier (1987) took explicit aim at deductivism. Most theorists are now of the opinion that while there is a distinction between the deductive and the inductive, that distinction is not exhaustive – that there exists some other form of inference, or link between the premises and conclusion. Scriven (1986) called it probative inference, Govier (1987), following Wellman (1970), called it conductive; Rescher (1977) called it plausible reasoning. Walton treats such matters under the rubric of defeasible inference (1996, 2002, 2004). The quest for an account of this third type of inference is ongoing.[16] (But see Blair – this issue – and Johnson (2007) for cautionary notes).

The development of a number of theoretical perspectives on argument. When we began our break with the traditional approach to how arguments are conceptualized and how they are evaluated, we started down the path that comes to be called informal logic. But gradually it became apparent that there are a number of alternatives and approaches to the study of argumentation. There are what are called *dialogical (dialectical) approaches* which look at argument as a dialogue, an exchange between two interlocutors. One of the most successful – Pragma-dialectics – aims at developing a list of rules (The Ten Commandments) to guide what the authors call

[16] Here I assume that the "it" refers to the same "thing;" that there is some specific form of inference or connection that can be thought of an alternative to induction and deduction. But it is far from clear what that alternative is.

a Critical Discussion. There are also *rhetorical approaches* (Tindale 1999) that focus on the role of the audience in argumentation. (For a discussion of the logical, rhetorical, dialectical perspectives and the basis for this distinction, see Wenzel 1990, Tindale 1999 and Johnson forthcoming.)

From both a practical/pedagogical and theoretical perspective, then, we are in a much better position now with respect to our understanding of argument than we were in 1970. While not all of these developments can be attributed to the Informal Logic Initiative, Informal Logic has certainly helped to bring fresh insights to bear on the study of argumentation.

5. Some Recent Developments

I turn next to a discussion of some recent developments in the Informal Logic Initiative.

Extensions of the concept of argument to include other modes and types of argument. Once we depart from the traditional idea of argument as a series of propositions – the view strongly associated with FDL – there is a tendency to want to expand the construct (Willard 1991), to increase the range of what can be termed "argument." Thus, Groarke (1996, 2002) and Blair 1996) have argued that pictures and images can be construed as arguments. Gilbert (1997) has argued that gestures and movements can be construed as arguments and has called attention to what he calls emotional arguments. Others still have argued such artifacts as buildings, music, and dance can be construed as argument. The logical conclusion of this direction is perhaps manifest in the title: *Everything's an Argument* (Lunsford & Ruskiewicz 2003) which, however, the authors quickly admit is an overstatement.

On the one hand, this burgeoning interest in extending the range of application of the term "argument" is refreshing and exciting. At the same time, we should avoid the situation described so well by Gilbert & Sullivan in *Patience*: "When everyone is somebody, then no-one's anybody." When everything is argument, the purpose and the utility of having *a distinct category* may be compromised. My own view is that we need to draw a line of demarcation between argument and other forms of communication, and we need to distinguish argument from other related uses of the practice of giving reasons, such as negotiation, conflict resolution, mediation, etc. (See my 2000, pp. 24–26).

Continued exploration of the role of warrants. For many (Hitchcock 2000, Freeman 2005, Pinto 2006) the idea of a warrant holds great promise

in helping to understand how the reasoning in argument works. The notion of warrant has a history in both epistemology and theory of argument. Toulmin (1958) "introduced" the term to assist his reconceptualization of argument, moving away from he what he called "the analytic paradigm" (sometimes he calls it "the geometrical ideal"). In Toulmin's work, the idea of a warrant is part of a new proposal for how the structure of arguments is to be understood in which a warrant functions to link the grounds with the conclusion. Blair (2008) believes that exploring how warrants function will help us see more clearly the distinct contribution that informal logic can make.

The notion of dialectical obligations. If the aim of an argument is rational persuasion among reasonable people with some interest, aptitude and openness to being rationally persuaded, then an argument does not have to be conclusive in order to achieve that purpose. It does, however, have to be dialectically appropriate, and more studies are needed of how this is achieved. In our 1987 paper, Blair and I referred to "the dialectical obligations of the arguer" which we saw as the duty of the arguer to defend against possible objections (1996, p. 100). As I reflected further on this important idea, it became clear to me that this vital dimension of our argumentative practice – namely, anticipating and responding to objections – had not been incorporated into our theorizing. In my *Manifest Rationality* (2000), I attempted to develop this insight, urging that our conceptualization of argument needed to be revised so as to make room for this important dimension that I called the dialectical tier. My current project is to explore the idea that an argument inhabits a dialectical environment – to attempt to understand just what constitutes that environment, and to argue that the strength of one's argument has to do with how one negotiates one's way through that environment. That means understanding what arguer's responsibilities are in dealing with objections, criticisms (which I distinguish from objections), and alternative positions.

The relationship of theory and practice. The whole development of informal logic illustrates an interesting twist on the conventional story about the relation between theory and practice. Massey asserted, somewhat dogmatically, that "textbooks are parasitic on theory, and properly so" (1981, p. 490).[17] This is one view – fairly widespread – about the rela-

[17] Textbooks have been the subject of criticism from various quarters. Hamblin (1970) thoroughly castigates the textbook tradition but he does not subject it to balanced and fair evaluation (see Johnson 1989). Massey (1981) berated informal logic textbooks for being obsessed with classification. But see my response (1989). Weinstein (1990) has

tionship between theory and practice, but in our experience informal logic has developed in just the opposite way. We began by attempting to improve the methods of and approaches to teaching logic in order to improve the ability of our students to engage in the practice. That effort brought us face to face with an enormous number of questions and concerns (like that of the adequacy of the inductive-deductive distinction) that were not dealt with by any theory of argument that we knew of and required better theoretical purchase. That theoretical gap prompted many of us to work on developing the necessary theoretical apparatus to deal with the issue. In this instance, then, theory has tended grow out of practice; i.e., out of reflection on what is necessary to teach students how to handle arguments. Being of the opinion that FDL was not viable as a theory of argument, we were forced to develop alternatives, with help from the fallacy tradition and other quarters.[18]

6. Looking to the Future

What does the future hold? What are some of the new developments that may affect the Informal Logic Initiative? I am happy to say that the future looks rife with possibilities. Here I shall mention three.

Influence of new media and technology. The future of informal logic is directly dependent on the status of the cultural practice of argumentation, so one important question is: how will argumentation fare in the evolving media environment – the digital environment? The practice of argumentation originated and flourished in a media environment dominated by the spoken and written word. These older forms of communication, while still with us, are jockeying for position and attention with the new media – particularly cyberpsace, the new environment created by the computer revolution. New technologies (text messaging, cells, ipods) create new forms

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frequently accused informal logicians of being obsessed with selling textbooks, a charge that is contradicted by the important role textbooks have played in the development of the Informal Logic Initiative: Kahane (1971). Thomas (1973) and Scriven (1976) all contained important theoretical innovations. A point to bear in mind is that innovation in texts was necessary when appropriate other opportunities were lacking. And those who disparage texts might remember what Kuhn has to say about how a textbook can serve as a paradigm (Kuhn 1968).

[18] Recently, discussion has turned to whether it is necessary always to look to the development of a theory to answer our needs. Are there not other ways to secure our argumentative practices? (See Pinto 2001, Chapter 13). The question of the relationship between theory and practice has been on the table for some time. See Toulmin (1958), Johnson (2000), Pinto (2001), Kvernbeck (2007).

of communication (chatrooms, blogs, text messages).[19] Some believe that these new forms of communication will create new audiences for the practice of argumentation. There do seem to be some distinct advantages for argumentation with the new media and technology. Fact checking (an important step in evaluating arguments) has become easier. To find out what so-and-so's position is, we can now "Google it." There are websites devoted to fact checking (www.factcheck.org) – and at least one devoted to checking arguments.[20] We know the effect that bloggers have had on the political process – so it may well be that blogging will have the effect of increasing time spent in arguing, thrashing things out, challenging, raising objections. If the practice of argumentation is to thrive in this new digital environment, then, it will need support from work done in informal logic, formal logic having little to say about these things. One advocate of the Informal Logic Initiative who has been quick to see how the work of informal logicians has an important role in the new electronic environment is Douglas Walton. His work on argument mapping and diagramming and argumentation schemes has already been put to important use in the new environment.

Understanding the past: a decent history of logic. It is always important to understand the past and where we have come from. But most histories of logic (Bocheński 1961, Kneale and Kneale 1962) have, quite naturally, tended to view logic from the perspective of traditional formal logic and have little to say about our subject. So we need our own histories of our subject matter. There is one such – *Historical Foundations of Informal Logic* (Walton & Brinton, 1997) – but more work is needed, as Walton himself acknowledges (2004, p. 277).

The truth issue. The whole issue of truth has come to the fore in the public sphere, viz., the recent admittance of truthiness[21] to the lexicon, and Frankfurt's *On Bullshit.* Why, then, one might ask, have some argumentation theorists dismissed truth from the criteria to be used in evaluating arguments? Some, especially those who practice the formal approach, may

[19] The telegram – which played a significant role in communications in the first half of the 20th century – is, according to a news report, a thing of the past. Western Union has discontinued them, a casualty of the new technologies: email and text messaging.

[20] For fact checking as regards political issues, there is www.factcheck.org. For argument checking, there is http://www.amherst.edu/askphilosophers.

[21] Truthiness is said to be the quality by which a person purports to know something emotionally or instinctively, without regard to evidence or to what the person might conclude from intellectual examination. The term was coined and popularized by Stephen Colbert after he used it during the first episode of his satirical television program, *The Colbert Report.*

find that fact surprising, since one of the most natural ways to criticize an argument is to challenge the truth of the premises. In part, this happened because colleagues in rhetoric and communication persuaded many involved in the Informal Logic Initiative that informal logicians had not been sufficiently sensitive to the role that audience plays in the enterprise. Even if the premises are true, if the audience won't accept them, then the goal of rational persuasion cannot be achieved. So it was argued that truth is not a sufficient condition for premise adequacy. There are also arguments that it is not necessary. Many were influenced by Hamblin's argumentation in *Fallacies* (1970) in which he argues for dialectical criteria as the appropriate measure of premise adequacy and argues against alethic (truth-based ones). However, I have argued that we need both criteria (truth and acceptability) available for the appraisal of arguments (2000, pp. 336–340). But there are difficulties with this view – not the least of which is providing an account of truth that gets the job done, while not being open to the longstanding objections to the truth requirement.

7. Conclusion

One of the first lessons we learned from feminist critiques of informal logic is that an argument is not a battle, the aim being to attack successfully and conquer the enemy; argument is not warfare (Ayim 1988). We inherited some of this militaristic way of thinking from our experience with traditional logic: the very title of our text, *Logical Self-Defense*, already suggests that argument is like an attack where you must be prepared to fight back. Gradually, we came to understand argument rather as an instrument in the search for the truth, or – if you are nervous about that formulation – as an instrument that helps us to arrive at a better view, a more rational position. Argument is a co-operative enterprise, not an adversarial one. However, to engage in this practice has not only the potential benefits alluded to but also risks – because to seek to *persuade* in this way presupposes that you are open to *being persuaded* that your argument is not a good one. Real argumentation (as opposed to indoctrination or advocacy parading itself as argument) expects criticism, expects to learn from criticism, and is therefore vulnerable to it. Without this risk, argument becomes indistinguishable from propaganda, indoctrination and advocacy – all of which have their uses, and their limits.

In these times when politicians and other leaders seek the guidance of spin doctors and media–gurus and propagandists seek to put the best

possible face on their message, to make "the optics" palatable, the practice of argumentation – which lies at the heart of our logical culture – has a crucial role to play in providing an alternative approach to what some have called the persuasion game. Those committed to the Informal Logic Initiative and the study of argumentation have something important to contribute to that alternative approach.

Appendix A: The Logical Culture in Poland

The proposal [referring here to my proposal on a topic for this paper] harmonizes well with the idea of comparing two traditions of logical studies. I recently addressed a similar problem concerning the relationship between informal logic and logic. Major representatives of the Lvov–Warsaw School (e.g. Kazimierz Ajdukiewicz) as well as Stanisław Kamiński distinguish a narrow and a broad understanding of the term "logic". In most contexts, logic in a narrow sense denotes formal deductive logic. For example, Kamiński claims that logic in a narrow sense denotes formal logic understood as a formal theory of sentences (propositions) and relationships between them. In later considerations he claims that there exists also another and broader concept of logic that embraces also semiotics, methodology of science, and argumentation theory. He does not however claim that formal logic includes the above-mentioned disciplines. Kamiński does not explain, whether systems of non-classical logic (e.g. modal logic, deontic logic or epistemic logic) should be understood as logic in a narrow sense of this term, or only in a broad one.

I think that if modal, deontic and epistemic logics are considered as formal systems, they should be treated as logic in a narrow sense. However, Ajdukiewicz or Kamiński are interested in justifying the claim that the term "logic" in one of its senses means something more than just formal logic. By using the distinction between *logic in a narrow sense* and *logic in a broad sense* I aimed to show that the tradition of Polish logic uses the concept of logic which: (a) is not restricted to formal deductive logic; and (b) encompasses not only formal-logical skills, but also skills which can be described as using tools elaborated in semiotics (e.g. universal tools of analyzing and evaluating utterances formed in various languages) and in the general methodology of science (e.g. tools for developing and evaluating definitions, classifications, questions occurring in scientific inquiry).

This broad concept of logic is maybe the most clearly expressed in the program of pragmatic logic developed by Ajdukiewicz (first published

in 1965, two years after his death; English translation: *Pragmatic Logic*, Trans. O. Wojtasiewicz, Dordrecht: D. Reidel 1974). Historical examples of such a broad understanding of logic can be found in *Port Royal Logic* of Antoine Arnauld and Pierre Nicole or in *The System of Logic. Ratiocinative and Inductive* of John Stuart Mill.

Thus, the term "logic" in a broad sense encompasses: (1) formal logic, (2) semiotics (understood as a formal theory of language) and (3) methodology of science. Some methodologists of science (e.g. S. Kamiński) claim that logic in a broad sense includes also (4) argumentation theory (this idea comes at least from Aristotle). In a narrow sense "logic" means only formal logic. In my opinion (2) and (3) share in fact a subject-matter with informal logic.

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STUDIES IN LOGIC, GRAMMAR AND RHETORIC 16 (29) 2009

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INFORMAL LOGIC AND LOGIC

Abstract: This article examines the relation between informal logic and logic. Informal logic originated with the rejection of formal logic in the analysis and evaluation of natural language discursive arguments. Various alternatives are mentioned: fallacy theory; acceptability, relevance and sufficiency; and argument scheme theory. The last is described at some length as involving warrants, schemes, and critical questions. Argument scheme analysis and critique, while informal, has been used in AI to develop computer programs to analyze, assess and even construct arguments in natural language. Thus informal and formal logic have come together.

Keywords: informal logic, formal logic, fallacy theory, relevance and sufficiency, argument schemes, argumentation schemes, warrants, critical questions, argument schemes in computer systems

1. Introduction

This article examines, in an unsystematic way, some of the features of the relation between informal logic and logic. Informal logic originated with the rejection of the use of formal logic for the purpose of the analysis and the evaluation of natural language discursive arguments. While not at all a rejection of formal logic, this declaration of independence required those who identified theoretically with the informal logic critique of formal logic's usefulness for this purpose to look elsewhere for analytic and normative tools. One of these was the theory of the informal fallacies. While the development of theory for informal fallacies has occupied considerable intellectual energy of the past three decades, it is merely mentioned here. Another approach, one that has been adopted in a number of textbooks, is to regard the acceptability of premises and the relevance and sufficiency of the premise-conclusion link as the informal criteria of a logically good argument. A third approach, and the one developed at some length in this article, is the use of argument scheme theory. An argument scheme is an abstract pattern that an argument exemplifies. A large number of such patterns that

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have been found to be used again and again in the arguments occurring in natural language discourse have been described and named. These schemes rely on the presumption that reasoning from the kinds of grounds and via the kinds of inferences that are identified by such a scheme is justified. They presume that such inferences are warranted, to use the concept introduced by Toulmin (1958). The premises, warrant, and other assumptions of any instance of a scheme may be tested by a set of what are termed the "critical questions" that pertain to that scheme. Argument scheme analysis and critique, while informal, has been used in Artificial Intelligence to develop computer programs to analyze, assess and even construct arguments in natural language. Since computer programs require necessary relations between premises and conclusions, that is, the deductive validity that characterizes formal logic, we find that at present informal and formal logic have come together.

2. The origins of informal logic

So-called "informal logic" began in the late 1960s and early 1970s in Canada and the United States in university philosophy classrooms in which students had signed up for a "logic" course that they expected to improve their reasoning and their ability to understand and criticize the public policy arguments of the day, particularly those published in the media, which at that time consisted of newspapers and magazines (see Kahane 1971, p. vii). The people teaching those courses were junior philosophy faculty members who had some training in formal logic.

Often the course was an elementary formal logic course and the logic was *not* applied by the instructor to the arguments the students were interested in analyzing. In such cases, the students became frustrated. The rationale sometimes given for studying formal logic without any application to the kinds of texts and arguments the students wanted to be better at critiquing was that training in formal logic improves one's reasoning ability, and thus indirectly helps one better to analyze and evaluate arguments. But the transfer of knowledge and skill alleged in this claim was never empirically demonstrated (nor has it yet been, to my knowledge), and anecdotally seemed minimal.

However, in other cases the instructors *did* try to teach the students to analyze and evaluate examples of such arguments using the tools of elementary formal logic. In those cases, both students and instructors became frustrated. There were several difficulties.

First, the text of discourse had to be translated into standard form so that its formal structure could be extracted. That turned out to be a nightmare, since often the text included other kinds of sentences besides present tense declarative sentences (such as interrogatives, imperatives, and others not readily classified), they were in past or future tenses of various kinds, or in the subjunctive mood, the expressions were vague, and so on. Efforts to force the text to fit the standard form required for formal appraisal tended to result in oversimplification or other distortion of the original meaning. None of the logic textbooks that were available at the time provided help, because their examples were designed to illustrate the logical principles, not the other way around, and so they were (quite appropriately) simplified and tailored to suit that purpose. As a consequence, they were highly oversimplified as compared to the language of public discourse.

Second, the logical structure of the texts was more complicated than the textbook material was able to handle. For instance, the arguments included – besides straightforward arguments directly supporting a thesis – anticipations of objections and replies to those objections, consideration of arguments against the thesis as well as those in its favour, several arguments for the same thesis, sometimes combined with contrary considerations, and so on.

Third, almost always the arguments seemed to rely on unstated assumptions. To render those assumptions explicit by turning the resultant translation into a valid argument seemed to beg the question, since the point of the reconstruction was to decide the validity of the argument, not prejudge it. But then the decision as to how to formulate the assumptions could not be determined using logic.

Fourth, even in cases in which some sort of translation of the argument into standard form that would permit it to be assessed was achieved, that assessment ran into a couple of further difficulties. For one thing, if the problematic feature was not the validity of the argument, then the truth of the premises was the issue. The standard line of the day was that the determination of premise truth lies outside the province of logic, and in epistemology or in science. But then the logic course had nothing to say about a key component of argument evaluation. For another thing, when the argument as reformulated proved deductively invalid, in many cases it remained a cogent argument: its premises supplied obviously good reasons for accepting its conclusion. But if that was so, then deductive validity was not the only criterion of argument merit, and the logic course had nothing to say about any other criterion to be used in argument evaluation. Finally, an argument with a premise that was equivalent to the conclusion would be

deductively valid, since any proposition implies itself, but it would be question-begging as an argument. These last two points showed that deductive validity is neither a necessary nor a sufficient criterion of a logically good argument.

As a result of these experiences, many of these philosophy instructors concluded that formal logic is not well-suited as the model for the analysis and interpretation of such argumentation, and that it does not provide an adequate basis for the evaluation of such argumentation. New tools for the analysis of arguments were needed, and new criteria for the assessment of arguments were needed. Since it was assumed that logic is the study of the norms distinguishing good from bad arguments, it was assumed that these new tools and criteria belong within logic, and since the term "informal logic" had been used in some quarters, it was adopted as the label for these departures from formal logic. (See Scriven 1976 and 1980, and Blair and Johnson 1980 for formulations of these points.)

In my view it is significant that "informal logic" was adopted as the name of a *critique* of certain applications of formal logic. It was *not* the name of a new theory or approach to the analysis and assessment of arguments except insofar as it identified such a theory or approach negatively – in terms of what it was not. As a result, a variety of tools and criteria have clustered under the rubric of "informal logic" that are not necessarily consistent and are often redundant (that is, they performed the same role in different ways).

It perhaps remains necessary to emphasize that in rejecting formal logic as the tool to be used for the analysis and the basis for the evaluation of natural language discursive argumentation, informal logicians did not and do not reject formal logic.

3. Is "informal logic" logic?

Meanwhile, critics of the attempts to develop non-formal analytic tools and criteria of evaluation raised a variety of objections. One line of attack (Hintikka 1985, Woods 2000) holds that logic is by definition a formal enterprise, and so the idea of an informal logic is a contradiction in terms. Something that complicates this line of objection is that 'formal' can be understood in a variety of senses, and in at least one sense of 'formal,' namely "involving reference to abstract patterns," informal logic is in some of its manifestations and in spite of the name, a formal enterprise, since most theorists focus on patterns of argument or argumentation schemes as tools to be used in the analysis and evaluation of arguments.

It remains true, however, that there is envisaged no calculus for the informal analysis and evaluation of arguments, and so in this respect informal logic is not formal. Is it therefore not logic? There is some precedent for calling the norms that warrant the inferences of arguments their "logic." Here is Daniel Bonevac in the article on the philosophy of logic in the *Cambridge Dictionary of Philosophy* (1995, p. 592): "Logic judges inferences good or bad and tries to justify those that are good." And here is Wilfred Hodges in the article on modern logic in the *Oxford Companion to Philosophy* (1995, p. 500): "Logic, whether modern or traditional, is about sound reasoning and the rules which govern it." If these very general formulations are accepted, then the identification of logic with deductive logic is best regarded not as a matter of definition, but rather as a contingent assertion. And it is an assertion that requires support in the face of the now widely held view that there can be arguments with sound reasoning or good inferences that are not deductively valid. It should be added that this view is shared by argumentation theorists, including, besides those in the speech communication community, informal logicians, and for several decades now, also scholars working in Artificial Intelligence modeling reasoning and argument, and many epistemologists among philosophers. Even so, here we enter the fray of *der Streit der Fakultäten*. Who owns the word 'logic'? Different camps can claim different historical precedents for their preferred terminology, but this is an un-illuminating controversy. What is of possible interest is the question whether there is any possible connection or overlap between formal logic in the narrow sense and informal logic in any of its manifestations.

For each smallest unit of argument – at a minimum one proposition supporting another or alleged to support another – at least two distinct features are open to evaluation from the point of view of whether the premises justify the conclusion: the supporting proposition, and the relationship of support.

The adequacy of the supporting proposition for the purpose of the argument seems appropriately to be determined according to the use to which the argument is being put, and as a result, in different ways. For instance, if the argument is supposed to establish the truth of the supported proposition, then the truth of the supporting proposition(s) would be the issue. However, if it is supposed to establish that an interlocutor is obliged to accept the supported proposition(s), then the interlocutor's acceptance of (or commitment to) the supporting proposition(s) would be the issue. And if it is supposed to establish that it would be reasonable for interlocutor to accept the supported proposition(s), then the acceptability to the interlocu-

tor of the supporting proposition(s) (its or their worthiness to be accepted by the interlocutor) would be the issue. These all seem to be either epistemological or else dialectical matters, and whether they belong to logic in a broad sense, they do not evidently belong to formal logic in the narrow sense.

What about the adequacy of the relationship of support between the supporting proposition(s) (the premise[s]) and the supported proposition (the conclusion) in an argument when the former does [or do] not deductively imply the latter? To those for whom logic is concerned only with "what follows *necessarily* from what" (see Harman and Kulkarni 2006) this question is by definition ruled to be outside the domain of logic. To the extent that anyone bothers to classify it, this is counted as an epistemological issue (see, e.g., Goldman 1999, Ch. 5). To those for whom logic is concerned with the norms of good reasoning or (what is not the same thing) of good arguments, this question belongs to logic, although to informal rather than to formal logic (see, e.g., Johnson 2000).

4. Defeasible arguments as the subject matter of informal logic

Whether or not they are entitled to use the term 'logic' to name their enterprise, it is with supporting relationships that are deductively invalid that informal logicians have been chiefly concerned. Moreover, they have focused on a sub-set of such relationships, setting aside those that can be quantified, that is, assigned a numerical statistical probability.

Such arguments are now recognized and classed as "defeasible" arguments. That is, their premises supply good reasons for accepting their conclusions if they constitute the only salient information or grounds available on which to decide the conclusion. However, challenges from critics or simply the discovery of additional information can "defeat" such arguments – that is, can reduce or removed the force of any justification that the original premises supplied for their conclusions.

Here are some examples of such defeasible arguments. The arguments outside the parenthesis in each case have grounds that supply good reasons for accepting their conclusions in ordinary circumstances, other things being equal. However, if such further information as that supplied or alluded to in the parenthesis were to obtain, the arguments would be weakened or lose any probative force completely. (In each case the reader is asked to imagine a situation in which such an argument might be made.)

1. Presumably she is a Canadian citizen, for she was born in Ottawa, Canada's capital city. (But she is Princess Margriet of the Netherlands, and when she was born, during WWII, while the Dutch royal family was living in exile in Ottawa, the hospital room in which she was born was temporarily declared Dutch territory so that she would have Dutch citizenship. [This circumstance happens to be true; the author was born in the same hospital a couple of years earlier.])
2. You ought to take your daughter to the circus because you promised her you would. (But the circus has been cancelled due to a fire; or, your daughter has influenza; or, ...)
3. My physician has just advised me that I should lose weight and take up some sort of exercise régime, so I'd better change my diet and exercise habits. (But my weight is in the normal range for my height and age, and I walk two kilometers to and from work every day; also my physician is a self-admitted health extremist.)
4. Given that you want to buy a kitchen knife with about a 7"-long single-edge blade about an inch wide and about 1/8" thick at the back tapering convexly to the cutting edge, you should ask at the store for a "chef's" knife. (But that store has its knives classified in an idiosyncratic way: they call a chef's knife an "all-purpose kitchen knife" and what *they* call a "chef's knife" is quite different.)
5. A good explanation of the kitten's death is that a dog mauled it, so probably the kitten was killed by a dog. (But the injuries are consistent also with an attack by a large cat, and there are no dogs living in the neighbourhood, only several cats.)
6. The witness has a track record of lying and deception, so his testimony should be taken with a grain of salt. (But since his incarceration the witness has converted to Islam and is a conscientious believer.)

The informal logicians' question has been, What norms are appropriate for assessing such inferences?

5. The theory of informal fallacies as a normative theory for informal logic

One normative basis for "informal" argument evaluation that was suggested early on was the use of the informal fallacies, which have a tradition tracing back to *Sophistical Refutations*. For many who identify with informal logic, the informal fallacies are a prominent tool for the analysis and assessment of discursive argumentation. Accordingly, a logically good

argument would be a non-fallacious argument. However, it soon emerged that what constitutes an informal fallacy was far from theoretically clear (see Hamblin 1970), so while fallacy theory might in principle supply the norms sought by an informal logic, that prospect remained a promise rather than delivered goods. Great strides have been made since that time in developing clear and consistent theories of the informal fallacies (see, for instance, the work of Walton 1995, or of van Eemeren & Grootendorst 1992a), however the emphasis must be placed on the plural – theories – for there is no consensus in the literature supporting just one conception of fallacy (see Hansen and Pinto 1995).

Moreover, there are a couple of reasons to leave the informal fallacies out of the present picture. One is that the informal fallacies must not be identified with informal logic; they do not constitute its defining subject matter. Such prominent informal logicians as Scriven (1976) and Hitchcock (1995) regard fallacy analysis as problematic, and certainly not central to the informal logic enterprise. Furthermore, the most fully developed analysis by an informal logician is due to Walton, and on his analysis argument scheme theory is essential to an understanding of the informal fallacies. Below, I will outline argument scheme theory in some detail.

6. Relevance and sufficiency as criteria of inference cogency in arguments

In the 1970s, Johnson and Blair (1977) introduced what seem to be generic norms that apply to the support relationship. In any logically good argument the premises would have to be *acceptable*, *relevant* and *sufficient*. That is, they would have to be worthy of belief or acceptance for the purpose of the argument, and they would have to have probative bearing on the truth of the conclusion (thus, by the way, ruling out question-begging premises), and the evidence or other kinds of grounds they supplied would have to include enough information of the appropriate kind(s) to justify accepting the conclusion on that basis. These are generic norms, since any cogent argument must and would satisfy them. Deductively valid arguments that are not question-begging will have both relevant and sufficient premises. And arguments whose premises supply a high numerical degree of probability to their conclusions will satisfy these conditions too. Moreover, arguments whose premises supply good reasons for accepting their conclusions (albeit with qualifications) – even though such arguments are deductively invalid and their evidence assigns no quantitative probability to their conclusions – also satisfy these norms.

It has been argued against these criteria (Biro and Siegel 1992, pp. 97–98), that the criterion of relevance is redundant, given the criterion of sufficiency, since sufficiency presupposes relevance: premises cannot supply sufficient evidence for a conclusion if they are irrelevant. The premise of this objection is true, but it is not so clear that the conclusion follows from it. It is possible for an argument that someone has advanced to contain (some) premises that supply sufficient support to the conclusion and also (other) premises that are irrelevant to that conclusion. Without the criterion of relevance, such an argument would have to be judged logically good when in fact its logical merit is mixed. As we might say, the arguer should have stopped when he was ahead with just the sufficient – and therefore relevant – premises; but he didn't, and went on to include some irrelevant premises. (To be sure, the irrelevant premises might have been offered first, or mixed among the relevant ones, and not just added at the end.) In order to identify such irrelevant offerings as "premises" it must be clear that the arguer intended them to serve as support for his conclusion. He (mistakenly) thought they were relevant. Otherwise, in interpreting his discourse, the listener or reader would be justified in discarding them as not belonging to the argument, on the ground that they are irrelevant to the conclusion. Thus we see that relevance also functions as a criterion of argument identification. In identifying arguments in texts of discourse in the absence of clues as to the intentions of the speaker or writer, we set aside assertions that have no probative bearing on a conclusion as not part of any argument, and assign to them some other function in the discourse. The parts of the text that we identify as belonging to an argument will then consist of one assertion whose contents function as a conclusion and other assertions whose contents all function as relevant premises adduced in support of that conclusion. For an argument so identified, the assessment of the cogency of the support the premises provide for the conclusion will thus focus exclusively on whether they supply sufficient support, given that they have already been judged relevant by virtue of their inclusion in the argument. So it seems that the critics who would exclude relevance as a criterion of argument evaluation are right for texts from which information or other speech act contents with no probative bearing on a conclusion have already been weeded out, whereas those who regard relevance as a needed criterion of argument evaluation are right for texts of what a speaker or writer intended to constitute an argument.

Although the *acceptability*, *relevance* and *sufficiency* criteria are intuitively plausible, the theoretical difficulty lies in specifying how to identify when they have been satisfied, and as a result, in operationalizing them

so as to be able to use them to judge in particular cases whether grounds adduced as probative really are relevant and whether grounds admitted as relevant really do suffice to justify accepting the conclusion. Attempts have been made to characterize relevance and sufficiency (e.g., Blair 1989, 1991; van Eemeren & Grootendorst 1992b), but no results have found widespread endorsement.

7. Argument (or argumentation) schemes as criteria for argument cogency

An alternative approach has been to use argument schemes as the basis for assessing defeasible arguments. It is an approach whose provenance is murky and probably mixed. One can find elements in it of Toulmin's model of an argument found in *The Uses of Argument* (1958) and in theories of argument schemes found in Perelman and Olbrechts-Tyteca's *Traité sur L'Argumentation* (1958) and especially in Hastings's dissertation, *A Reformulation of the Modes of Reasoning in Argumentation* (1962). It contains elements that seem clearly to have been influenced by the modeling of argumentation as a dialogue, popularized in van Eemeren and Grootendorst's "Pragma-Dialectical" theory (1984, 1992, 2004). Its fullest expression is found in the combination of a dialogue-modeling approach to argument scheme theory developed by Walton in, for example, *Argumentation Schemes for Presumptive Reasoning* (1996) and *Argumentation Schemes* (with Reed & Macagno, 2008).

Many arguments provide *prima facie* support for their conclusions. Toulmin (1958) notes both that the grounds adduced in such arguments provide qualified, but not unconditional, support, and also that the support will dissolve if unexpected but possible conditions of rebuttal turn out to obtain. Such arguments are thus defeasible (although Toulmin did not use that term). According to Perelman and Olbrechts-Tyteca (1958), it is possible to identify in texts of all sorts arguments that exhibit recognizable patterns or schemata (here called "schemes"). For Perelman and Olbrechts-Tyteca arguments – unlike demonstrations (such as the proofs of mathematics or logic) – are always in principle open to challenge or reconsideration. In fact this seems to be a definitional property of their concept of argument. Consequently, they took instances of the argument schemes they identified to be in principle open to question (and thus, again, defeasible). Hastings (1962) added the idea that to each argument scheme there can be associated a set of "critical question," which are questions that are a means of testing any

particular argument that is an instantiation of a scheme in order to decide whether in that case it establishes its conclusion or instead should be considered to be defeated.

To illustrate these ideas, I will use the example of the argument scheme for "Argument from Expert Opinion" quoted from Walton, Reed and Macagno (2008, p. 310):

Argument from Expert Opinion

Major Premise:	Source E is an expert in subject domain S containing proposition A.
Minor Premise:	E asserts that proposition A is true (or false).
Conclusion:	A is true (or false).

Following Toulmin (1958), any argument relies on a "warrant" or inference license. That is, the inference from the grounds offered in support of the conclusion to the conclusion presupposes that inferences from *such* grounds to *such* conclusions are legitimate or justified (thus: warranted, or licensed). Hitchcock (1995, 2002) has convincingly argued that Toulmin's concept of a warrant should be understood as a generalization of the associated conditional of the argument. The "associated conditional" of an argument is defined as the conditional proposition consisting of the conjunction of the premises of the argument as its antecedent and the conclusion of the argument as its consequent. The associated conditional of an argument cannot be a premise, for to so designate it entails a vicious regress. By the same reasoning, a generalization of an argument's associated conditional cannot be a premise either. So an argument's warrant is not a premise, but instead is an assumption of the argument. Whether or not it is expressed is immaterial; in some cases it is, but frequently it is not.

Arguments fitting the scheme Argument from Expert Opinion seem to rely on some such warrant or inference license as:

> *Argument from Expert Opinion Warrant*: If a proposition is asserted to be true (or false) by someone who is an expert in the domain to which it belongs, one may [i.e., one is justified or entitled to] presume that it is true (or false), other things being equal.

For some theorists, an argument (or argumentation) scheme is very like a warrant. For instance van Eemeren and Grootendorst write that in arguing, a person "relies on a ready-made *argumentation scheme*: *a more or less conventionalized way of representing the relation between what is stated in*

the argument [= the grounds or, roughly, the premises] *and what is stated in the standpoint* [= the opinion argued for or, roughly, the conclusion]" (1992, p. 96; my emphasis). To rely on such a relation in arguing is precisely to rely on a warrant; it is to assume that inferences from arguments or grounds of such a kind to standpoints or opinions of such a kind are licensed or justified. Similarly, van Eemeren and Grootendorst identify *modus ponens* as an example of a justificatory argumentation schema ("scheme" in my terminology) (1984, p. 66). *Modus ponens* can be expressed as follows (where p and q are variables ranging over propositions):

> *Modus ponens*: If p, and p implies q, then q.

But such a proposition may also be expressed as a warrant – in the case of *modus ponens*, as follows:

> *Modus Ponens as a warrant*: If a proposition is true and it logically implies a proposition, then one is entitled to infer that the latter is true.

Setting aside the problem that *modus ponens* is problematic as a warrant in some cases since it can warrant question-begging arguments (i.e., when $p = q$), it is easy to see why warrants and schemes can identified. Unpack the antecedent of a warrant expressed as a conditional as the group of schemata representing premises and its consequent as the schema for a conclusion and, presto, there is an argument scheme.

Besides presuming that the argument's warrant is justified, an argument's proponent typically makes certain other assumptions. For instance, an Argument from Expert Opinion, it is assumed that S is a domain of *factual knowledge*. If A were the proposition, "Beer tastes better than bourbon," or the proposition, "Abortion is *prima facie* immoral," no appeal to expert opinion would be appropriate because these claims are not factual claims, but rather, respectively, an expression of personal preference and a moral value judgement, neither of which is the kind of claim that can be settled by appeal to expert opinion. One way to explain why not is to point out that the appeal to expert opinion, as Walton notes, is a special case of a more general argument scheme, namely, the Argument from Position to Know. Here is Walton *et al.*'s depiction of that scheme (2008, p. 309):

Argument from Position to Know

Major Premise: Source a is in a position to know about things in a certain subject domain S containing proposition A.

Minor Premise: a asserts that A is true (or false).
Conclusion: A is true (or false).

What justifies our reliance on experts, when it is justified, is, among other things, that their claims have the status of knowledge and the subject domains to which the claims belong and to which their expertise pertains are fields of knowledge. Thus experts can be in a position to know what they are talking about and so can, in principle, convey that knowledge to others. Judgements of taste and of moral value do not belong to fields of knowledge (or so I contend), so appeals to expert opinion about matters of taste or moral value are inappropriate because such judgements lie outside the scope of *anyone's* epistemic authority. The use of the Argument from Expert Opinion scheme relies on the assumption that the scheme is applicable to the question at issue in the argument. In general, then, it is assumed that the use of an argument instantiating a given scheme is an appropriate use of that scheme.

Often, when arguments are made that employ such schemes, not only will such assumptions be left unexpressed, but also parts of the argument itself will be left unexpressed. When someone argues, "I should be cutting down on the salt in my diet, because my doctor said I'm getting too much," he (or she) leaves unexpressed the premise that the doctor has knowledge of the domain of what constitutes a healthy diet, to which belongs the amount of salt a person should ingest. For when we accept what someone said merely on the ground that he (or she) said so, it is because we believe or assume or presuppose that he is in a position to know about what he is talking about.

To be sure, a scheme can be any pattern whatsoever, since there is no requirement that argument schemes exhibit established logical principles. However, many schemes are used over and over, and their patterns are identified and named. Walton *et al.* (2008) describe and name sixty schemes, as well as one or more subtypes for several of them. These names and patterns of argument are familiar. Besides argument from authority, among others they include, for example: *ad populum*, argument from example, argument from analogy, composition, division, argument from waste, argument from cause to effect, argument from correlation to cause, argument from sign, *ad hominem*, slippery slope, argument from precedent.

What makes these schemes well known and often instantiated? I suggest it is that they are schemes with a *prima facie* plausibility. Arguments instantiating these schemes are, on the face of it, plausible arguments. What this amounts to is that their warrants – the generalizations of their associated conditionals that license the inference from their premises to their

conclusions – are defensible. That is, it can be shown that when these warrants are relied on in arguments, under appropriate conditions, the premises of the arguments serve to justify the conclusions.

Walton, following van Eemeren and Grootendorst (1992), following Hastings (1962), associate with each argumentation scheme a set of critical questions. The function of such questions is to test whether a particular instance of a scheme is actually a plausible argument. Here are the critical questions that Walton *et al.* (2008, p. 310) list for the Argument from Expert Opinion.

Critical Questions for Argument from Expert Opinion

CQ1: *Expertise Question*:
How credible is E as an expert source?

CQ2: *Field Question*:
Is E an expert in the field [S] that A is in?

CQ3: *Opinion Question*:
What did E assert that implies A?

CQ4: *Trustworthiness Question*:
Is E personally reliable as a source?

CQ5: *Consistency Question*:
Is A consistent with what other experts say?

CQ6: *Backup Evidence Question*:
Is E's assertion based on evidence?

The critical questions function to test whether other things are in fact equal in the case of the argument in question. Some of them (namely, CQ1, CQ4, CQ5 and CQ6) ask whether there exist in the case at hand any factors that *undercut* the inference from the premises to the conclusion, and thus block the justificatory force of the warrant (see Pollock 2008, p. 453, for his most recent account of his concept of defeaters: "... rebutting defeaters attack the conclusion of a defeasible inference, while undercutting defeaters attack the defeasible inference itself, without doing so by giving us a reason for thinking it has a false conclusion."). If the alleged expert's qualifications are weak, or the expert might be strongly motivated to lie or exaggerate, or if the expert is relying on someone else's say so and not on acquaintance with the evidence for the claim, then the inference is undercut and the argument is defeated.

One of the critical questions on the list (CQ5) tests whether there is an independent reason to question the conclusion. If other experts, especially

if they are equally or better qualified, disagree with E about A, then there exists a *rebutting* defeater of the argument. That is, there is a reason for thinking that it has a false conclusion.

The remaining critical questions on the list test whether the premises are true in the particular case (namely CQ2 and CQ3). If the person relied upon as an expert is not an expert, or if what the person actually said is different from, and does not imply, the claim he or she is cited as attesting to, then those premises are false and the argument has nothing to go on.

Although Walton *et al.*'s (2008) list of critical questions for Argument from Expert Opinion do not include one, it seems advisable to add a critical question to their list to test for the appropriateness of the use of this scheme for the topic at issue. Some such critical question as the following might suit:

CQ7: *Appropriateness Question*:
Is domain S to which A belongs a field of knowledge?

In the case of other kinds of argument – arguments using other schemes – the use of the scheme might be inappropriate for other kinds of reasons, for example a *straw man* argument might be inappropriate because its conclusion is not a denial of the claim in dispute, and an case of *poisoning the well* might be inappropriate because it functions illegitimately to exclude some party from engaging in the argument.

Finally, since any argument relies on the warrant that allegedly licenses the inference from the grounds adduced to the claim in question, it seems advisable to add a critical question to test for the *prima facie* legitimacy of the warrant of the argument. This critical question gets overlooked when the focus is on well-known and often employed argument schemes whose *prima facie* force is well established. Also, except in cases of deliberate deception, when someone offers an argument to another or others, the arguer *thinks* the warrant is justified; and even in cases of deliberate deception, the arguer expects that *the audience* will think the warrant is justified. However, as we know, people are capable of completely irrelevant reasoning, so in principle it would seem legitimate to include a critical question to test whether an argument scheme is a *non sequitur*. Some such question as the following might apply to the Argument from Expert Opinion:

CQ8: *Warrant-testing question*:
Is it plausible that if a proposition is asserted to be true (or false) by someone who is an expert in the domain to which it belongs, one may [i.e., one is justified or entitled to] presume that it is true (or false), other things being equal?

Whether any particular argument instantiating an argument scheme is actually plausible will depend, then, on whether all the critical questions associated with that scheme – questions that function to test for the various ways that scheme can go wrong in a particular case – can be answered satisfactorily. I have suggested that critical questions serve several different functions, namely, to test (1) whether the given premises are true or otherwise acceptable, (2) whether that *type* of reasoning is *prima facie* plausible, (3) whether the inference from the premises to the conclusion in the given case is actually warranted, (4) whether there are independent reasons for rejecting the conclusion, and (5) whether the argument employed is appropriate in the situation in question.

The preceding contention glosses over some complexities that need not concern us for present purposes. For one, plausibility is relative to persons, because it is a function of consistency with other beliefs and other attitudes. For another, the account so far ignores complexities related to questions of burden of proof. Walton and others model all arguments as dialogues, which is a convenient fiction that permits assigning dialogue roles (proponent, opponent) and associated burdens of proof (often differing with different kinds of argument situations, such as in law *vs.* in science, and with different stages of the argument process, such as at the initiation of the argument *vs.* during argumentative exchanges).

8. Argument scheme theory and formal logic

It might seem that there is nothing of interest to the formal logician in such a method of informal analysis and appraisal of arguments. Clearly the testing of any particular argument will require its examination in the particular circumstances of its use. The situatedness of the argument scheme approach seems to preclude the possibility of useful formal analysis. Moreover, only the answers to the critical questions about the type of reasoning in general and the inference from the premises to the conclusion in the particular case seem to be related to what might be thought of as the "logic" of such arguments. The truth or acceptability of the premise is a factual or a procedural matter, and the appropriateness of the use of the argument scheme on the occasion in question is also a procedural matter.

However, the fact is that theorists working in Artificial Intelligence have turned to argument scheme theory to help develop programs to enable computers to recognize, analyze and construct arguments in natural language.

Obviously, if such a project is to succeed, the schemes must somehow be formalized so they can be expressed with deductively valid inference structures, and the fact that such programs have been developed shows that such formalizations are indeed possible (see, for example, *Araucaria* by Reed and Rowe 1995, *ArguMed* by Verheij 1998, *Reason!Able* by van Gelder 2002, *Rationale* by Austhink 2008). One approach is in effect to express each scheme in a defeasible *modus ponens*-like form, with its warrant used as the conditional premise, its antecedent as the grounds or data and its consequent as the conclusion. Provided there are no defeaters and the assumptions are not challenged, then the inference from the grounds to the conclusion is an entailment. A similar (logically equivalent?) approach is to treat the answers to all the critical questions as premises, and the warrant as a conditional with the conjunction of all those premises as the antecedent and the conclusion as the consequent. In that case, if all the premises are true, then the conclusion follows necessarily. (Both approaches are discussed in Walton, *et al.*, 2008, Chapters 11 and 12.) The resultant approximations to actual contexts of argument are close enough for the practical purposes for which these computer programs are designed. Moreover, as the various argument scheme descriptions are refined and made more complete, their formalizations get closer and closer to modeling ordinary language informal argumentation.

9. Concluding remarks

It seems that there has been a sort of Hegelian dialectical process at work. What began in the early days of the informal logic movement as a rejection of formal logic as the tool for analyzing and evaluating arguments has evolved to the point that there have successfully been developed formalizations of the schemes introduced to provide a framework for the informal analysis and evaluation of arguments. However, the new synthesis correctly puts the priority on natural language discourse. Those old enough to recall the heyday of Logical Empiricism will remember that natural language was criticized for its imprecision, its vagueness, its ambiguity – its resistance to ready formalization! Inferences that were not deductively valid were considered defective (see Grünbaum & Salmon 1988 for critiques of this view). Today it is appreciated that probably most natural language arguments that are cogent are not deductively valid, and that the task of anyone wishing to formalize such arguments for one or another practical purpose needs to accommodate that reality.

In this article I have been focusing on the relation of informal logic to standard formal logic. It needs to be mentioned that in doing so I have left out or only lurking in the background any mention of the dialectical and rhetorical properties of arguments which, in addition to their logical properties, most informal logicians today want to account for. Only a partial picture of the contemporary theoretical interests of informal logicians is conveyed here.

This article has addressed some remarks to the relation between informal logic and logic. Informal logic originated with a rejection of formal logic as an adequate basis for the analysis and evaluation of natural language discursive arguments. Various alternatives were considered. One that has just been mentioned here is the use of informal fallacies as an analytic and evaluative tool. Another that has received some attention is the triple of acceptability (of premises) and relevance and sufficiency (of the premise-conclusion link). A third, and the one given most attention, is argument scheme theory. On my analysis of it, this is a combination of the Toulmin notion of warrant as inference license, the Perelman and Olbrechts-Tyteca emphasis on argument schemes, and Hastings idea that critical questions can be associated with argument schemes and serve as the basis for evaluating arguments that instantiate them – all developed most fully by Walton. Argument scheme analysis and critique is decidedly informal, and yet, perhaps paradoxically, it has seemed to some computer scientists to be the best approach to use in developing programs to permit the use of computers in analyzing, evaluating and even in constructing arguments in natural language. To this end, the tools of formal and informal logic have recently been joined.

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STRATEGIC MANOEUVRING BETWEEN RHETORICAL EFFECTIVENESS AND DIALECTICAL REASONABLENESS[1]

Abstract: This paper is aimed to provide an overview of the current state of affairs of argumentation research from a pragma-dialectical perspective. It is explained which are the difficulties in the study of argumentative discourse and what research components are to be included in an argumentation theory that seeks to be fully comprehensive. The development of the pragma-dialectical ideal model of critical discussion is explained and the pragma-dialectical conception of fallacies is elaborated on and compared with other approaches. It is argued that fallacious argumentative moves are essentially *derailments* of 'strategic manoeuvring', which is the balancing act performed by a discussant between making argumentative moves that are at the same time rhetorically effective and dialectically reasonable. Finally, the argument from authority is discussed as an example. When is its usage sound and when can its strategic exploitation be said to derail, resulting in the fallacy of the *argumentum ad verecundiam*?

Keywords: pragma-dialectics, argumentation (theory), dialectic(al reasonableness), rhetoric(al effectiveness), strategic manoeuvring, fallacy, argument from authority, *argumentum ad verecundiam*.

1. Argumentation as a subject matter for theorizing

The study of argumentation is prospering. This is a remarkable and fortunate fact because during a long period of neglect the study of argumentation seemed to have disappeared forever from the academic stage. After its brilliant start in Antiquity, highlighted in the classical works of Aristotle, after an alternation of ups and downs during the following millennia, in the post-Renaissance period its gradual decline set in. Revitali-

[1] This text is part of a research project on strategic maneuvering in argumentative discourse that I have carried out with Peter Houtlosser (1956–2008). The text is based on a combination of texts that were earlier published elsewhere and it will in the end be part of the monograph *Strategic Maneuvering in Argumentative Discourse*, to be published.

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zation took place only after Toulmin and Perelman published in the same year (1958) their landmark works *The Uses of Argument* and *La nouvelle rhétorique* (co-authored by Olbrechts-Tyteca and translated into English in 1969). Toulmin's model of argumentation and Perelman's inventory of argumentation techniques inspired a great many scholars in various ways to take up the study of argumentation in a serious manner. Nowadays there are well-established (formal as well as informal) logical approaches to argumentation, but also communicative, linguistic, social, psychological, juridical, and other approaches. Traces of the influence of the classical and neo-classical argumentation theories just mentioned could be found in most of these approaches (van Eemeren *et al.* 1996).

It is a truism recognized from Antiquity onwards that argumentation arises in response to, or in anticipation of, a *difference of opinion*, whether this difference of opinion is real or merely imaginary. When people argue their case, they are defending an opinion, or "standpoint," they assume not to be shared by the addressee or by some third party the addressee might associate with – otherwise the argumentation would be pointless (van Eemeren & Grootendorst 1984, pp. 39–46). The need for argumentation, the requirements of justification, and the structure of argumentation are all adapted to a context in which doubts, opposition, objections, and counterclaims arise.

When theorizing about argumentation it is vital to realize that the standpoints at issue in a difference of opinion can pertain to any kind of subject and that these standpoints can be descriptive as well as evaluative or practical. In argumentative discourse, an evaluative judgment, such as "The film *Infamous* is brilliant," or a practical prescription to do something, like "You should join me to that meeting," can be just as well at issue as a descriptive claim about a factual state of affairs such as "Amsterdam is much bigger than Rotterdam." Standpoints of any of these types, and the argumentation to defend them, can be encountered in all areas, from the family circle and the classroom to the law and the political arena, and it is imperative that the study of argumentation deals with the full breadth of argumentative practices.

Some philosophers have a *parti pris* that normative statements such as evaluative standpoints and prescriptive – traditionally dubbed "practical" – standpoints can never be subjected to a rational discussion. Some argumentation theorists viewing argumentation as "a fundamentally epistemic affair" nourish this prejudice by assigning a higher status to descriptive claims, which are deemed to fulfil a special role in the process of truth finding and truth preservation by "bring[ing] reasoners from recognized truths

or justified beliefs to previously unrecognized truths or not otherwise justified beliefs" (Biro & Siegel 1992, p. 99). Some argumentation scholars taking a rhetorical approach favour the other extreme by claiming that rhetorical argumentation is only about action claims, thus fostering the exclusion of descriptive and evaluative standpoints (Kock 2007).

The ultimate consequence of excluding evaluative and practical standpoints in a quasi-positivist fashion from the study of argumentation is that value judgments and choices for action are left entirely to subjective preferences and personal interests. Contrary to philosophers with such an "exclusionist" outlook, John Stuart Mill – who showed a keen interest in the discussion of ethical, political, and religious standpoints – and likeminded "inclusionist" philosophers believe that all subjects can be the objects of a rational argumentative discussion (Finocchiaro 2005). I emphatically agree with Mill and other representatives of this analytic tradition and see no justification for pronouncing positions implying a value hierarchy or action principle *a priori* unsuitable for such a discussion.

It is not only unnecessary to limit the study of argumentation to descriptive standpoints, but also highly undesirable, because in certain domains of discourse such a limitation would give free rein to those who are not at all interested in justifying their standpoints to others. In politics, for instance, it would provide them with an alibi for abstaining from making out a case for their actions and would offer them a chance to make their standpoints immune to criticism by proclaiming them beyond discussion. Because in every joint decision-making, not just in politics but also in other domains of the public sphere, and even in the personal sphere, argumentative discussions play – or should play – a crucial part, if we take this decision-making seriously, in all cases in which argumentation is used to defend a standpoint a careful analysis and critical evaluation of the argumentative discourse is required and the study of argumentation should provide the necessary conceptual tools.

When it comes to the pivotal notion of argumentation some striking differences can be observed between the meaning of the counterparts of the word *argumentation* in other European languages and the meaning this word has in English. Because these differences can have significant consequences for the way in which argumentation is conceptualized, it is important to take note of them. To start with, unlike its English counterpart, the Dutch word "argumentatie" is, just like its equivalents in many other languages, a very common word that everyone knows and uses in the same unequivocal way. More importantly, ordinary speakers use this word in basically the same way as argumentation theorists – or at least in virtually the same way as

the authors of the handbook *Fundamentals of Argumentation Theory* use the term *argumentation* (van Eemeren *et al.* 1996, p. 5).

The first noteworthy property of the Dutch word for argumentation and its equivalents in other languages is that it is immediately connected with trying to resolve a difference of opinion in a constructive way by convincing the other party of the acceptability of one's standpoint – a property it has in common with the theoretical term *argumentation* (van Eemeren & Grootendorst 2004, pp. 11–18). Unlike the word "argumentation" in English, the Dutch word for argumentation has nothing to do with quarrelling or other negatively charged verbal activities, such as skirmishing, squabbling, bickering, wrangling, and haggling. This lack of any negative connotations allows this word to be adopted as a technical term in the theorizing without having to introduce first several artificial stipulations. A second property that makes the Dutch word for argumentation different from its English counterpart is that it refers only to the constellation of reasons put forward by an arguer in defence of his standpoint and not to the standpoint itself. The distinction that is made here is similar to the logical distinction between premises and conclusion. A third distinctive property is that the process-product ambiguity characterizing the theoretical term *argumentation* is already inherent in the meaning of the Dutch word for argumentation, whereas this is not so clearly the case in the ordinary use of the English word "argumentation."

Conceptually, the lexical meaning of the non-English counterparts of the English word "argumentation" constitutes a better basis for a theoretical definition of the theoretical term *argumentation* than that of the English word *argumentation*. What other conspicuous characteristics of argumentation must enter into the theoretical definition because they have methodological consequences for the way in which argumentation research is to be conducted? Let me summarize the four characteristics that seem vital to me. First, argumentation is a *communicative* act complex, which is realised in ordinary communication by means of functional verbal (and sometimes non-verbal) behaviour. In the theorizing this characteristic leads to the adoption of the methodological principle of "functionalization." Second, argumentation is an *interactional* act complex directed at other people, which makes argumentation part of an explicit or implicit dialogue. The accompanying methodological principle is "socialization." Third, argumentation means issuing in some way or other propositions that involve commitments for which one can be held *accountable*. The methodological principle that goes with it is "externalization." Fourth, argumentation involves by its constructive nature an *appeal to reasonableness* that derives its force from the idea of

common critical standards. This leads to the adoption of the methodological principle of "dialectification."

The methodological principles I have just mentioned are meta-theoretical in the sense that their adoption precedes the actual theorizing. They are part and parcel of the theoretical approach to argumentation that I favour, but this is not to say that all argumentation theorists share them. Functionalization is in our approach achieved by making use of the fact that argumentative discourse occurs through – and in response to – speech act performances. Identifying the complex speech act of argumentation and the other speech acts involved in resolving a difference of opinion makes it possible to specify the relevant "identity conditions" and "correctness conditions" of these speech acts (van Eemeren & Grootendorst 1984, pp. 39–46, 1992, pp. 30–33). In this way, for instance, a specification can be given of what is "at stake" in advancing a certain "standpoint," so that it becomes clear what the "disagreement space" is and how the argumentative discourse is organized around this context of disagreement (Jackson 1992, p. 261). Socialization is achieved by identifying who exactly take on the discussion roles of protagonist and antagonist in the collaborative context of argumentative discourse. By extending the speech act perspective to the level of interaction, it can be shown in which ways positions and argumentation in support of positions are developed. Externalization is achieved by identifying the specific commitments that are created by the speech acts performed in a context of argumentative interaction. Rather than being treated as internal states of mind, in a speech act perspective notions such as "disagreement" and "acceptance" can be defined in terms of discursive activities that create well-defined mutual commitments. "Acceptance," for instance, can be externalized as giving a preferred response to an arguable act that commits the respondent to not attacking the act anymore. Finally, dialectification is achieved by regimenting the exchange of speech acts aimed at resolving a difference of opinion in an ideal model of a critical discussion that is based on a critical rationalist philosophy of reasonableness.

Taking these meta-theoretical starting points into account, argumentation can be defined as follows:

> Argumentation is a communicative and interactional (speech) act complex aimed at resolving a difference of opinion for a reasonable judge by advancing a constellation of reasons the arguer can be held accountable for as justifying the acceptability of the standpoint(s) at issue.

2. The pragma-dialectical theory of argumentation

Scholars of argumentation are often drawn to studying argumentation by an interest in certain practices of argumentative discourse and improving their quality where this is called for. To be able to satisfy this interest, they have to combine an empirical orientation with a critical orientation towards argumentative discourse. This challenging combination can only be achieved if they not only examine argumentative discourse as a specimen of actual verbal communication and interaction but also measure its quality against normative standards of reasonableness. If "pragmatics" is taken to be the study of communicative and interactive language use, as is customary among discourse analysts, then the need for uniting the empirical and descriptive angle of research and the critical and normative angle can be acknowledged by construing the study of argumentation as a branch of "normative pragmatics" (van Eemeren 1986).

In normative pragmatics, argumentation scholars make it their business to clarify how the gap between the normative dimension and the descriptive dimension of argumentation can be systematically bridged, so that critical and empirical insights can be integrated. The complex problems that are at stake in this endeavour can only be solved with the help of a comprehensive research programme consisting of various interrelated components (van Eemeren & Grootendorst 2004, pp. 9–41). On the one hand, there is a philosophical component in the programme in which a conception of reasonableness must be developed and a theoretical component in which, starting from this ideal of reasonableness, a model for acceptable argumentation is to be designed. On the other hand, there is an empirical component in which argumentative reality as encountered in argumentative discourse must be investigated, qualitatively as well as quantitatively. Then, in the analytical component the normative and the descriptive dimensions must be systematically linked by enabling a theoretical reconstruction of argumentative discourse that is justified empirically. Finally, in the practical component of the programme the problems must be identified that occur in particular argumentative practices and methods must be developed to solve these problems systematically.

As it happens, the conceptions of reasonableness argumentation scholars have developed in the philosophical component of their research programme diverge from the outset, so that in the theoretical component different outlooks emerge on what is considered to be an acceptable argument. When developing our approach to argumentation, Rob Grootendorst and I were strongly influenced by Barth and Krabbe's (1982) "formal dialec-

tics" and started from a conception of reasonableness that replaces "justificationism" with a critical testing procedure (van Eemeren & Grootendorst 1984, pp. 15–18). This dialectical conception of reasonableness is associated with the (Popperian) "critical rationalist" philosophy of reasonableness, which claims that, ultimately, we cannot be certain of anything and takes as its guiding principle the idea of critically testing all claims that are made to acceptability (van Eemeren & Grootendorst 1988). As Albert (1975) has emphasized, the critical rationalist conception of reasonableness is all embracing: it pertains to *any* subject that can be the object of a regulated discussion and covers – as we would like to have it – the discussion of descriptive as well as evaluative and prescriptive standpoints.

By implementing a critical rationalist view in the theoretical component of the research programme we pursued the development of a model of critical discussion that gives substance to the idea of resolving differences of opinion on the merits by means of dialectically regulated critical exchanges in which the acceptability of the standpoints at issue is put to the test (van Eemeren & Grootendorst 1988, pp. 279–280). The outcome of the discussion between the protagonist and the antagonist depends on the critical questions asked by the antagonist and the adequacy of the protagonist's responses to these critical questions. The systematic interaction that takes place between the speech acts performed by the protagonist to defend the standpoint and those performed by the antagonist to respond critically is characteristic of the "pragma-dialectical" resolution procedure we have designed, which combines a dialectical view of argumentative reasonableness with a pragmatic view of the verbal moves made in argumentative discourse.

The model of a critical discussion we developed provides an overview of the argumentative moves that are pertinent to the development of each of the discussion stages and further the process of resolving a difference of opinion on the merits in each particular stage. Analytically, in a critical discussion four stages can be distinguished that have to be completed in a constructive way in order to be able to resolve the difference of opinion on the merits. First, there is the "confrontation stage," in which the difference of opinion is externalized from the disagreement space. Next there is the "opening stage," in which the protagonist and the antagonist of a standpoint at issue in the difference of opinion determine their zone of agreement as far as common procedural and material starting points (or "concessions") are concerned. In the "argumentation stage" both parties try to establish whether, given the point of departure acknowledged by the parties, the

protagonist's standpoint is tenable in the light of the antagonist's critical responses. Finally, in the "concluding stage," the result of the critical discussion is established.

The pragma-dialectical model of a critical discussion is a theoretically motivated system for resolution-oriented discourse. In a critical discussion, the parties attempt to reach agreement about the acceptability of the standpoints at issue by finding out whether or not these standpoints are defensible against doubt or criticism. To be able to achieve this purpose, the dialectical procedure for conducting a critical discussion cannot deal only with inference relations between premises (or "concessions") and conclusions (or "standpoints"), but should cover all speech acts that play a part in examining the acceptability of standpoints. In pragma-dialectics, the concept of a critical discussion is therefore given shape in a model that specifies all the types of speech acts instrumental in any of the stages the resolution process has to pass. Because in actual argumentative discourse speech acts are often performed implicitly or indirectly, in practice, a great variety of speech acts may fulfil a constructive role in the resolution process (van Eemeren & Grootendorst 1984, 2004).

3. The pragma-dialectical treatment of the fallacies

3.1. Criticisms of the Logical Standard Treatment of the fallacies

The acid test for any normative theory of argumentation is to what extent the theory enables us to deal adequately with the fallacies. As we all know, in the study of argumentation the fallacies have been an important object of study from Antiquity onwards. Aristotle examined them extensively, both in his dialectical and in his rhetorical studies. In the *Topics*, his treatise on dialectic, Aristotle placed the fallacies in the context of a critical debate between the attacker and the defender of a thesis in which the attacker attacks and the defender defends the thesis. The attacker can win the debate first of all by refuting the defender's thesis. Aristotle discusses correct moves the attacker can make to refute the defender's thesis as well as incorrect moves that he considers fallacious. In general, in Aristotle's dialectical perspective, fallacies are false moves employed in the attacker's efforts to refute the defender's thesis. In *Sophistical Refutations*, Aristotle deals with the false ways of refuting a thesis that he ascribed to the popular debate experts known as the Sophists – hence the epithet "sophism." In his *Rhetoric*, Aristotle discusses from a rhetorical perspective some fallacious refutations that are only apparent refutations.

The fallacies have remained a popular subject of study ever since, which led in the course of time to the discovery of a number of "new" fallacies. These newly discovered fallacies were just added to the Aristotelian list of dialectical fallacies, in spite of the fact that, largely due to the huge influence of bishop Whately, a much broader (and vaguer) logical perspective had gradually replaced the dialectical perspective. The Latin names that were given to many of these fallacies may suggest that they all stem from the classical tradition, but this is not the case: without calling it fallacious, John Locke, for instance, was the first one to draw attention to the *argumentum ad hominem*.

In 1970, Charles Hamblin caused a revolution in the study of fallacies through his monograph *Fallacies*, in which he reported how he was struck by the observed similarities in the treatment of the fallacies in the leading logical textbooks of the time. He observed that each of the textbooks presented more or less the same list of fallacies and explained the fallacies in more or less the same way, using very often exactly the same examples. Hamblin suspected that the one author was just copying the other, without any further reflection. He noted that the Logical Standard Treatment he had detected in the textbooks started from a Logical Standard Definition of the fallacies as *arguments that seem valid but are in fact not valid*. Strangely, however, the treatment of the fallacies that was actually given was in several respects inconsistent with this definition. Firstly, a great many of the fallacies discussed in the logical textbooks, such as the *argumentum ad hominem*, are in fact no arguments. Or they are arguments, such as "circular reasoning," that are certainly not invalid; and there are also cases, such as the *argumentum ad verecundiam*, in which the reason for the fallaciousness is an entirely different one than invalidity.

The revelation of these incongruities caused a lot of turmoil, although open-minded argumentation theorists recognized immediately that Hamblin was basically right. Over time they came to share most of his objections to the Logical Standard Treatment of the fallacies. At present there are not many argumentation theorists left who consider "logical validity" the sole criterion for fallaciousness. Argumentation theorists also tend to agree that including a word like "seems" in the definition of a fallacy, as happens in the Logical Standard Definition, brings in an undesirable amount of subjective psychologizing. As it happens, a certain argument may seem OK to me, but why would it seem OK to you if you happen to know that it is invalid or otherwise deficient?

However pertinent they were, Hamblin's devastating criticisms were not always so productive in practice, as can be shown by referring to two extreme

reactions. First, there were author of leading logical textbooks, such as Copi (1972), who reprinted their exposes of the fallacies without making any serious attempt to deal with Hamblin's objections. Perhaps they thought that their textbooks were doing well as it was – and what did their students know about Hamblin? The opposite extreme reaction to Hamblin's criticisms consisted of abandoning the treatment of the fallacies altogether from the textbook. From an ethical perspective this may be better, but it is clear that it does not contribute to finding an appropriate way of dealing with the problem of the fallacies. A third option that one could have imagined to be chosen as an easy way-out is maintaining the Logical Standard Definition of the fallacies and leaving all fallacies out of one's treatment that are not covered by this definition, but – encouragingly – not many argumentation theorists seem prepared to throw the baby out with the bathwater and set aside their efforts of finding a proper treatment of the fallacies just for the sake of maintaining theoretical purity.

3.2. A constructive alternative to the Logical Standard Treatment

In my view, the theorizing about fallacies has to start from a general and coherent perspective on argumentative discourse that provides a common rationale to the treatment of all fallacies. Because a theory of wrongs cannot be constructed independently of a theory of what is normatively correct, a theory of fallacies must be an integral part of a normative theory of argumentation that provides well-defined standards for *sound* argumentative discourse. The theoretical account of the fallacies should be systematically related to these standards in such a way that it is clear in all cases why the fallacies are fallacious.

In Europe two dialectical approaches to argumentation were developed in the early 1980s that constitute a constructive sequel to Hamblin's criticisms in which the fallacies are systematically related to standards for sound argumentation. These approaches were both aimed at developing a theory of argumentation that starts from a "critical rationalist" perspective on argumentative discourse in which the fallibility of all human thought is the point of departure: formal dialectics developed by Else Barth and Erik Krabbe (1982), and the pragma-dialectical theory of argumentation I developed with Rob Grootendorst (van Eemeren & Grootendorst 1984, 1992, 2004) and extended with Peter Houtlosser (van Eemeren & Houtlosser 2002, 2003, 2004). Because I concentrate on the identification of fallacies in ordinary discourse conducted in natural language, I shall use pragma-dialectics as my theoretical framework rather than formal dialectics. Pragma-dialectics links up with formal dialectics, but views argumentative discourse and

fallacies occurring in argumentative discourse in the pragmatic perspective of the communicative and interactional context in which the discourse takes place.

The simplest argumentative situation is that a speaker or writer advances a standpoint and acts as "protagonist" of that standpoint and a listener or reader expresses doubt with regard to the standpoint and acts as "antagonist." In the discussion that develops the two parties try to find out whether the protagonist's standpoint can withstand the antagonist's criticism. In this exchange an interaction takes place between the speech acts performed by the protagonist and the speech acts performed by the antagonist that is typical of what we call a "critical discussion." This interaction can, of course, lead to the resolution of the difference of opinion only if it proceeds in an adequate fashion, which requires a regulation of the interaction through *rules for critical discussion* specifying in which cases the performance of certain speech acts contributes to the resolution of the difference on the merits. It is the task of dialectical argumentation theorists to formulate these rules in such a way that together they constitute a discussion procedure that is "problem-valid" as well as "conventionally valid" (Barth & Krabbe 1982, pp. 21–22). The procedural rules proposed in pragma-dialectics are claimed to be problem-valid because each of them contributes in a specific way to solving problems inherent in the process of resolving a difference of opinion on the merits. Their conventional validity is confirmed by systematic experimental research regarding their intersubjective acceptability (van Eemeren, Garssen & Meuffels 2009).

A procedure regulating the resolution of a difference of opinion cannot be confined exclusively to the logical relations by which conclusions are inferred from premises. As a matter of course, it must consist of a system of rules covering all speech acts that need to be carried out to resolve a difference of opinion. This means that the procedure should relate to all four stages that are to be distinguished in a critical discussion: the rules for conducting a critical discussion must state all the norms pertinent to resolving a difference of opinion on the merits. In principle, each of the pragma-dialectical discussion rules constitutes a distinct norm or standard for critical discussion. Any move that is an infringement of any of these rules, whichever party performs it and at whatever stage in the discussion, is a possible threat to the resolution of a difference of opinion and must therefore – and in this particular sense – be regarded as fallacious. In this way the use of the term *fallacy* is systematically connected with the rules for critical discussion. In the pragma-dialectical approach a fallacy is thus a hindrance or impediment to resolving a difference of opinion on the merits. The specific

nature of a particular fallacy depends on *the way in which* it interferes with the resolution process.

The pragma-dialectical approach differentiates a *functional variety of norms* for judging fallaciousness. Rather than considering the fallacies as belonging to an unstructured list of nominal categories inherited from the past, as is the case in the Logical Standard Treatment, or considering all fallacies to be violations of the validity norm (as in the logic-centred approaches), different (combinations of) norms may be pertinent. A comparison shows that fallacies which were traditionally only nominally lumped together are now either shown to have something in common or clearly distinguished, whereas genuinely related fallacies that were separated are now brought together. There are, for instance, two different kinds of *argumentum ad populum*, the fallacy of regarding something acceptable because it is considered acceptable by a great many people; the one variant is a violation of the Relevance Rule that a party may not defend his standpoint by advancing argumentation that is not pertinent to that standpoint, the other variant is a violation of the Argument Scheme Rule that a standpoint may not be regarded defended conclusively if the defence does not take place by means of an appropriate argument scheme that is used correctly. Among the fallacies that were separated and are now brought together are a variant of *ad verecundiam* (using an inappropriate symptomatic argument scheme by presenting the standpoint as right because an authority says it is right) and a variant of *ad populum* (using an inappropriate symptomatic argument scheme by presenting the standpoint as right because everybody thinks it is right). When they are analyzed as violations of the same Argument Scheme Rule it becomes clear that, seen from the perspective of resolving a difference of opinion, these variants are basically of the same kind.

In addition, the pragma-dialectical approach also enables the analysis of thus far unrecognized and unnamed "new" obstacles to resolving a difference of opinion on the merits. Examples are *declaring a standpoint sacrosanct*, a violation of the Freedom Rule that parties may not prevent each other from putting forward standpoints or casting doubt on standpoints; *evading the burden of proof* and *shifting the burden of proof*, both violations of the Burden of Proof Rule that a party who puts forward a standpoint is obliged to defend that standpoint if asked to; *denying an unexpressed premise*, a violation of the Unexpressed Premise Rule that a party may not falsely present something as a premise that has been left unexpressed or deny a premise that has been left implicit; and *making an absolute of the success of the defence*, a violation of the Closure Rule that a failed defence

must only result in the protagonist retracting the standpoint and a successful defence only in the antagonist retracting his doubt (van Eemeren & Grootendorst 1992, 2004).

4. Fallacies as derailments of strategic manoeuvring

Although I can safely claim that Hamblin's criticisms no longer apply to the pragma-dialectical theory of fallacies I have just sketched, in my view, this theory is still not entirely satisfactory. The main reason is that it ignores the intriguing problem of the *persuasiveness* that fallacies may have, which is in fact why they deserve our attention. To be sure, Daniel O'Keefe's (2006) "meta-analyses" of experimental persuasion studies seem to suggest that, generally speaking, sound argumentation is more persuasive than fallacious argumentation, and the results of our own empirical research point into the same direction (van Eemeren, Garssen & Meuffels 2008, section 5). Nevertheless, the inconspicuous persuasiveness of the fallacies is such a thorny issue that we cannot content ourselves with these indications but should give this issue our undivided attention.

In the Logical Standard Definition of fallacies as arguments that *seem* valid but are not valid, the persuasiveness of the fallacies was hinted at by the use of the word "seem," but since Hamblin (1970, p. 254) issued the verdict that including this qualification brings in an undesirable element of subjectivity, the treacherous character of the fallacies – the Latin word *fallax* means deceptive or deceitful – has been ignored and the search for its explanation abandoned. This means that fallacy theorists are no longer concerned with the question of how fallacies "work," that is, why they can be successful and why they go so often unnoticed. I think that the pragma-dialectical theory of argumentation can remedy this neglect, but that, because of the nature of the problem, it can only do so if it is first enriched by insight from rhetoric.

At this juncture, it is worth emphasizing that combining rhetorical insight with dialectical insight is not as unproblematic as one might think. In spite of their initial connection in Antiquity, when Aristotle described rhetoric as the mirror image (*antistrophos*), or counterpart, of dialectic, since the Scientific Revolution in the 17th century – starting, in fact, already with Ramus – there has been a sharp ideological division between dialectic and rhetoric. This division has resulted in the existence of two separate and mutually isolated paradigms, conforming to different perspectives on argumentation, which are generally considered incompatible. Rhetoric became

a field for scholars of communication, language, and literature in the humanities and social sciences while dialectic became the province of logicians and scientists – but almost disappeared from sight after the formalization of logic in the late nineteenth and early twentieth century. Although the dialectical approach to argumentation has been taken up again in the second half of the twentieth century by Hamblin and his followers, there was for a long time – and, to a large extent, there still *is* – a yawning conceptual and communicative gap between argumentation theorists opting for a dialectical perspective and argumentation theorists with a rhetorical perspective (van Eemeren 2001). In the last two decades, however, serious efforts have been made to overcome the sharp and infertile division between dialectic and rhetoric (van Eemeren & Houtlosser 2002).

The inclusion of rhetorical insight in the pragma-dialectical theory that Peter Houtlosser and I have brought about is a clear example of an effort to bridge the gap between dialectic and rhetoric (van Eemeren & Houtlosser 2002, 2003, 2004, 2005). We started from the observation that in argumentative discourse, whether it takes place orally or in writing, it is not the sole aim of the arguers to conduct the discussion in a way that is considered reasonable, but also, and from a certain perspective even in the first place, to achieve the outcome that is from their point of view the best result. The arguers' rhetorical attempts to make things go their way are, as it were, incorporated in their dialectical efforts to resolve the difference of opinion in accordance with proper standards for a critical discussion. This means in practice that at every stage of the resolution process the parties may be presumed to be at the same time out for the optimal rhetorical result at that point in the discussion and to hold to the dialectical objective of the discussion stage concerned. In their efforts to reconcile the simultaneous pursuit of these two aims, which may at times be at odds, the arguers make use of what we have termed *strategic manoeuvring*. This strategic manoeuvring is directed at diminishing the potential tension between jointly pursuing the "dialectical" aim of reasonableness and the "rhetorical" aim of effectiveness.

Strategic manoeuvring manifests itself in the moves that are made in argumentative discourse in three aspects, which can be distinguished only analytically: "topical choice," "audience adaptation," and "presentational design." Topical choice refers to the specific selection that is made in each of the moves from the *topical potential* – the set of dialectical options – available at the discussion stage concerned, audience adaptation involves framing one's moves in a *perspective that agrees with the audience*, and presentational design concerns the selection that the speaker or writer makes from the

existing repertoire of *presentational devices*. In their strategic manoeuvring aimed at steering the argumentative discourse their way without violating any critical standards in the process both parties may be considered to be out to make the most convenient topical selection, to appeal in the strongest way to their audience, and to adopt the most effective presentation.

A clearer understanding of strategic manoeuvring in argumentative discourse can be gained by examining how the rhetorical opportunities available in a dialectical situation are exploited in argumentative practice (see van Eemeren & Houtlosser 2008). Each of the four stages in the process of resolving a difference of opinion is characterized by having a specific dialectical objective. Because, as a matter of course, the parties want to realize these objectives to the best advantage of the position they have adopted, every dialectical objective has its rhetorical analogue. In each discussion stage, the rhetorical goals of the participants will be dependent on – and therefore run parallel with – their dialectical goals, because in each stage they are out to achieve the dialectical results that serve their rhetorical purposes best. As a consequence, the specifications of the rhetorical aims that may be attributed to the participants in the discourse must take place according to dialectical stage. This is the methodological reason why the study of strategic manoeuvring that we propose boils down to a systematic integration of rhetorical insight in a dialectical – in our case, *pragma*-dialectical – framework of analysis.

What kind of advantages can be gained by strategic manoeuvring depends on the particular stage one is in. In the confrontation stage, for instance, the dialectical objective is to achieve clarity concerning the issues that are at stake and the positions the parties assume. Each party's strategic manoeuvring will therefore be aimed at directing the confrontation rhetorically towards a definition of the difference that highlights precisely the issues this party wants to discuss. In the opening stage, the dialectical objective is to establish an unambiguous point of departure consisting of intersubjectively accepted procedural and material starting points. As a consequence, the strategic manoeuvring by the parties will be aimed at establishing rhetorically procedural starting points that secure an opportune allocation of the burden of proof and combine having desirable discussion rules with having material starting points that involve helpful concessions by the other party. In the argumentation stage, where the standpoints at issue are challenged and defended, the dialectical objective is to test, starting from the point of departure established in the opening stage, the tenability of the standpoints that shaped the difference of opinion in the confrontation stage. Depending on the positions they have taken, the parties will manoeuvre strategically

to engineer rhetorically the most convincing case – or the most effective attack, as the case may be. In the concluding stage, the dialectical objective of determining if, and in whose favour, the difference of opinion has been resolved leads to strategic manoeuvring aimed at enforcing victory for the sake of the party concerned by effectuating rhetorically either the conclusion that the protagonist may maintain his standpoint in view of the criticisms that were made or that the antagonist may maintain his doubt in view of the argumentation that was advanced.

Although, in our view, in strategic manoeuvring the pursuit of dialectical objectives can go well together with the realization of rhetorical aims, this does – of course – not automatically mean that in practice the two objectives will always be in perfect balance. If a party allows his commitment to a critical exchange of argumentative moves to be overruled by the aim of persuading the opponent, we say that the strategic manoeuvring has got "derailed." Such derailments occur when a rule for critical discussion has been violated. In that case, trying to realize the rhetorical aim has gained the upper hand – at the expense of achieving the dialectical objective. Because derailments of strategic manoeuvring always involve violating a rule for critical discussion, they are on a par with the wrong moves in argumentative discourse designated as *fallacies*. Viewed from this perspective, fallacies are derailments of strategic manoeuvring that involve violations of critical discussion rules.

The difference between legitimate manifestations of strategic manoeuvring and manifestations that are fallacious is that in the latter case certain soundness conditions applying to that way of strategic manoeuvring have not been met. Each mode of strategic manoeuvring has as it were its own continuum of sound and fallacious acting and the boundaries between the two are not always immediately crystal clear. More often than not, fallacy judgments are in the end contextual judgments that depend on the specific circumstances of situated argumentative acting. The criteria for determining whether or not a certain norm for critical discussion has been violated may depend to some extent on the institutional conventions of the "argumentative activity type" concerned (van Eemeren & Houtlosser 2005), that is, on how argumentative discourse is disciplined in a particular sort of case – referring to precedent, for instance, can be a perfectly legitimate appeal to authority in a law case but not so easily in a scientific discussion. This does not automatically mean, of course, that there are no clear criteria for determining whether the strategic manoeuvring has gone astray, but only that the specific shape these criteria take may vary to some extent from the one argumentative activity type to the other.

This account of the fallacies as derailments of strategic manoeuvring explains why it may, as a matter of course, not be immediately apparent to all concerned that a fallacy has been committed, so that the fallacy may pass unnoticed. In principle, each fallacy has sound counterparts that are manifestations of the same mode of strategic manoeuvring, so that it is much more difficult to tell them apart than when the distinction involved two completely different types of categories, like when all the legitimate moves would be cats and all the fallacious moves were dogs. It is fully in line with what Sally Jackson (1995) calls the *assumption of reasonableness* that a party that manoeuvres strategically will normally uphold a commitment to the rules of critical discussion, so that a presumption of reasonableness is conferred on every discussion move – and this assumption is also operative when the strategic manoeuvring that is used is fallacious.

Deviations from the rules for critical discussion may be hard to detect because none of the parties will be very keen on portraying themselves openly as unreasonable. It is to be expected that in order to realize a purpose that is potentially at odds with the objective of a particular discussion rule, rather than resorting to completely different means, they will stick to the usual dialectical means for achieving their objective and "stretch" the use of these means in such a way that they allow the other purpose to be realized as well. Echoing the Logical Standard Definition of a fallacy, we can then say that the strategic manoeuvring involved *seems* to comply with the critical discussion rules, but in fact it does not.

5. Arguments from authority and the *argumentum ad verecundiam*

The fallacies have now been characterized as violations of rules for critical discussion that manifest themselves in derailments of strategic manoeuvring which may easily escape our attention because the derailments concerned can be very similar to familiar instances of sound strategic manoeuvring. All the same, it is of course necessary to make the distinction. To mark the importance of the distinction between non-fallacious and fallacious strategic manoeuvring most clearly, I do not use the same labels indiscriminately for the fallacious as well as the non-fallacious moves, as Walton and others do, but reserve the traditional – often Latinized – names of the fallacies, such as *argumentum ad hominem*, for the *in*correct and fallacious cases only.

Strategic manoeuvring only derails into fallaciousness if it goes against the norms for having a reasonable exchange embodied in the rules for critical

discussion. This means in practice that the argumentative moves concerned are not in agreement with the relevant criteria for complying with a particular dialectical norm. As we already observed, these criteria depend on the soundness conditions the argumentative moves have to fulfil in order to remain within the bounds of dialectical reasonableness in the argumentative context in which they are made and they may vary to some extent according to the argumentative activity type in which the moves occur.

As a case in point, while avoiding the use of technical language as much as possible, I shall briefly discuss the demarcation of non-fallacious and fallacious moves in a particular mode of strategic manoeuvring taking place in the rather open argumentative activity type of an informal conversation. The mode of manoeuvring I have chosen is defending a standpoint by advancing an "argument from authority." The argument scheme used in an argument from authority is a subtype of the argumentation known as "symptomatic argumentation," also called "sign argumentation." In the argument scheme on which argumentation of this type is based the acceptability of the premise is presented as a sign that the conclusion is acceptable through the establishment of a relationship of concomitance between the property mentioned in the premise and the property mentioned in the conclusion. Such a fixed symptomatic association is, for instance, suggested in argumentation such as "Paul must be a cheese lover, because he is Dutch," where it is stipulated that being Dutch and loving cheese always go together. In the case of an argument from authority, the transition of acceptance is guaranteed by referring in the premise to an external source that has the knowledge or expertise required for drawing the conclusion so that having a certain kind of expertise is presented as a sign that the expert's assertions are acceptable: "The competence for learning a language is innate – Chomsky says so," or (from a Nigerian spam letter) "My choosing you for helping me solve this problem is the good choice because God told me to make this choice."

Like using other arguments from sign, using arguments from authority is potentially a sound way of strategic manoeuvring. In a great many cases we are fully justified in supporting our claims by referring to an authority that is supposed to know – more often than not this is, in fact, the only sensible thing we can do. If we have sound reasons to think that the source we are referring to is indeed a suitable source to rely on in the case concerned and was to be taken seriously when the observation referred to was made, provided that it is carried out correctly, an appeal to authority can be unproblematic and may even be conclusive. In argumentative practice, however, strategic manoeuvring by means of arguments from au-

thority can also derail. An appeal to authority may in a particular case not be justified because one of the "critical questions" that are designed to check whether the criteria for assessing arguments from authority in the activity type concerned have been fulfilled cannot be answered satisfactorily so that the argument violates the Argument Scheme Rule and must be considered an *argumentum ad verecundiam* (van Eemeren & Grootendorst 1992).

In different argumentative activity types specific, and to some extent different, criteria may apply for complying with the soundness norm incorporated in the argument-from-authority variant of the Argument Scheme Rule. In the informal activity type of a conversational exchange we took as our exemplary context it is, in principle, up to the participants to decide what the conditions are for sound strategic manoeuvring by arguments from authority. For our purpose of illustration, we distinguish between three subtypes of a conversational exchange, each characterized by its own set of "institutionalized" conventions. In the first subtype, (1a) the parties in the exchange have agreed beforehand that an appeal to authority is legitimate, and (1b) the agreement allows an appeal to a specific kind of authority. If in an argumentative practice of the first subtype the conditions (1a) and (1b) are met, no *argumentum ad verecundiam* has been committed when an argument from authority is used by appealing correctly to the allowed kind of authority, and using the argument from authority may thus be regarded as sound strategic manoeuvring. In the second subtype, (2a) the parties in the discussion have agreed in the course of their exchange that an appeal to authority is legitimate, and (2b) the agreement specifies precisely what kind of authority can be appealed to. If in an argumentative practice of the second subtype the conditions (2a) and (2b) are met in the actual strategic manoeuvring, again, no *argumentum ad verecundiam* has been committed and using the argument from authority may be regarded as sound strategic manoeuvring. If, however, in the first or the second subtype conditions (1a) and (1b) or (2a) and (2b) respectively are met but the actual argumentative behaviour does not agree with one or more of the criteria instigated by these conditions, then the strategic manoeuvring derails and must be considered fallacious.

One could imagine a third subtype of an informal conversation in which (3) the parties in the discussion have not come to any agreement about the legitimacy of an appeal to authority. In an argumentative practice of the third subtype no rule for critical discussion can be violated, but the use of the argument from authority may very well introduce its legitimacy as a new topic of discussion.

The cases I just briefly discussed are dealing only with agreement between the parties about the conditions for sound strategic manoeuvring by arguments from authority in informal conversations. In some argumentative activity types such self-created agreement may indeed be a sufficient condition; for instance, when I claim in a deliberation between you and me during a game of scrabble that the word I have just laid out is an English word because it is in *Oxford Advanced Learners Dictionary* after you and I have agreed earlier that this will be our criterion for Englishness. In other argumentative activity types, however, the relevant conditions may be predetermined institutionally or will be determined by specific members of the institution. In a scientific discussion, for instance, it is the "forum" of members of the scientific community that determines what sources count as authoritative and what further conditions apply to making an appeal to such a source. It is not hard to imagine that still other conditions for sound strategic manoeuvring by arguments from authority apply to other argumentative activity types, such as a parliamentary debate or an editorial in a newspaper. In a similar fashion, other modes of strategic manoeuvring, such as assigning the burden of proof or pointing out an inconsistency in the other party's position, may have different soundness conditions depending on the argumentative activity type in which they are used, so that in different argumentative contexts different criteria apply for complying with the rules for critical discussion. This brings argumentation theory back to the context of situated argumentative discourse, and this is exactly the context in which both Toulmin and Perelman and Olbrechts-Tyteca wanted argumentation to be studied.

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FORMAL TOOLS IN ANALYSIS OF ARGUMENTATION

STUDIES IN LOGIC, GRAMMAR AND RHETORIC 16 (29) 2009

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BUILDING BRIDGES BETWEEN EVERYDAY ARGUMENT AND FORMAL REPRESENTATIONS OF REASONING

Abstract: Argumentation theory, as a subdiscipline of philosophy, concentrates on the human expression of reasoning. It is an ancient area of research which has been enjoying a renaissance over the past thirty years or so with the development of two distinct theoretical branches: informal logic and pragma-dialectics. Both of these areas have influenced the development of mathematical and computational models of arguments that since the mid 90's has seen an explosion in research interest and output: with the area currently supporting two annual workshop series, a biennial conference series, a slew of journal special issues and, from 2010, its own dedicated journal. The links between the philosophical and formal ends of argumentation research, however, have been relatively sparse and ad hoc. This paper aims to build a bridge between the two areas that supports a more rigorous and extensive exchange of ideas and results to the benefit of both fields.

Keywords: argumentation theory, complex real-world argumentation, pragma-dialectics, informal logic, computer science, knowledge representation, argumentation strategy, computational models of argument, Araucaria, Arguing Agents Competition, Argument Interchange Format, argument diagramming

1. Introduction

The aim of this paper is to explore the links between, on the one hand, the philosophical and linguistic study of human reasoning and argumentation expressed in language, and on the other, the formal, logical and mathematical accounts of argument structures. Of course, this is not the first time that this has been attempted. The FAPR conferences from the late 1990's (Gabbay et al. 1996) and the Symposium on Argument and Computation in 2000 (Reed and Norman 2003) both took important steps in

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a similar direction. But since then, there has been an enormous increase in the volume of research in what might broadly be termed Artificial Intelligence models of argument. Popular graph theoretic accounts of the semantics of argument (Dung 1995), coupled with accounts of presumptive reasoning schemes (Walton et al. 2008) have aided the development of an increasing number of software tools (Kirschner et al. 2003) which have in turn allowed a rapid ramp-up in empirical work (Reed 2005) that has fed back into both philosophical and computational research in argument (Moens et al. 2007). And so this 'virtuous circle' has, over the past decade or so, produced a broad and extremely active community examining argumentation from a variety of perspectives (for a recent example, see the special issue of the eponymous *Artificial Intelligence* dedicated to the topic (Bench-Capon and Dunne 2007). As well as summarising some of the key landmarks on this newly emerging research landscape, this paper aims specifically to build a bridge between recent developments in the more computational and more philosophical approaches. The frontier coastlines of these two research landscapes are rugged and irregular, and there are many points at which one might attempt such bridge building. We select as our isthmus here the issue of argument diagramming. From a formal and computational point of view, in order to represent the structure of argument, one needs a clear semantics, a language and a set of clear definitions, and, ultimately, an engineered implementation (or several, in fact). From a philosophical point of view, analysis of argument structure touches most closely upon metaphysics, epistemology, and the philosophies of mind and language. Diagramming arguments is, of itself, of relatively little interest to philosophers (though see, e.g. Rowe et al. 2006) for one of a number of exceptions), and, similarly is of itself, not key to mathematical or computational models (though again there are exceptions such as those described in Tillers et al. 2007). What is important for our purposes is that both communities can see *some* value in the enterprise, and can work with the models that are expressed diagrammatically. After all, the bridge needs to be built before we can expect communities to start making the trek from one side to the other.

By building our bridge, we hope to be able to contribute to translating some of the problems from the two communities, to providing a common vocabulary and to sharing results and resources effectively.

We will start our discussion in section 2 from the presentation of the development of two distinct theoretical branches: informal logic and pragma-dialectics. It will be shown that the philosophical dimension of the two approaches is accompanied by linguistic and cognitive aspects of expression

of human reasoning. In section 3, a foundation for one of the supports of our bridge between philosophical and computational approaches – the Araucaria diagramming programme – will be introduced. The description of Araucaria will be followed by a detailed discussion on the relation between Araucaria, pragma-dialectics and complex real-world argumentation in section 4. In section 5, the focus will be on a number of computational models of argumentation and their relevance to the study of complex real-world argumentation. The problem of evaluation of these models will be addressed with the focus on dedicated computer systems. One example, the Arguing Agents Competition (AAC) will be presented and discussed. Attention will be drawn to the Argument Interchange Format (AIF) – a common language for existing argumentation formalisms. In section 6, the issue of strategy in dialogue and its representation in pragma-dialectics AND mathematical and computer science will be touched upon. A link between strategic maneuvering of pragma-dialectics and argumentation strategy development in AAC will be shown.

2. Background

Argumentation theory is a broad and ancient discipline within philosophy that covers cognitive and linguistic aspects of the expression of human reasoning, as well as intrinsic properties of such reasoning. Excellent textbook introductions can be found in (Walton 2006) and (van Eemeren et al. 1996). Over the past three decades or so, a number of distinct traditions have emerged from the general pool of research in the field. The first is, 'informal logic', named so as to emphasise a parallel with formal logic but to distinguish the field of study as informal (i.e. natural) reasoning rather than its formal counterpart. The second is 'pragma-dialectics', which, as its name too suggests, has roots in the linguistic tradition of studying pragmatics (i.e. linguistic structure at a level above the semantic relations) and the pre-Fregean philosophical tradition of examining dialectics and dialogue, which has been almost entirely eclipsed by the monological and monolectical accounts provided by twentieth century formal logic.

2.1. Informal Logic

Informal logic is a relatively young discipline. Among works that can be called its foundations the most important are Toulmin (1958), Hastings (1963) and Hamblin (1970). However, the establishment of informal logic as an independent field of scientific research is ascribed to works of Ralph

H. Johnson and J. Anthony Blair in the 1970s. In Johnson and Blair (1977) informal logic is defined as follows:

> Reasoning that doesn't feature certainty (e.g. analogy); it's based on the content of the statements being made.

The above definition is based on negation which doesn't seem to be an accident. Logic understood as a field of study on the nature and forms of human reasoning was founded by philosophers of Ancient Greece. Foundations for this field were laid by Aristotle, who defines reasoning to be the goal of his research (vide Aristotle 2008a, 24a, Aristotle 2008b, 100a), and the introduction of Marciszewski 1987) and pursues this goal starting with the definition of the *syllogism* as a basic structure of reasoning. The first and broadest definition of this term can be found in Aristotle 2008a, 24b and Aristotle 2008b, 100b:

> (...) discourse in which, certain things being stated, something other than what is stated follows of necessity from their being so.

But as Stephen Toulmin points out in (Toulmin 2003), mis-interpretation of Aristotle has led to a narrow conception of human reasoning:

> (...) logicians of the 19-th and 20-th century still focus on infallibility as defining feature of proper reasoning.

The requirement of infallibility leads to the development of standards for judging soundness of reasoning that are independent of the subject of reasoning. This can be easily seen when looking at modern formal logic. The characteristic feature of the basic inference mechanisms (such as *modus ponens*) is their deductiveness and complete field-independence. Inference drawn from true premises is *necessarily* true, no matter what the reasoning is about.

The same way of thinking lies at the bottom of Decartes' idea that in order to gain knowledge we need a scientific method that *ensures* its indisputability (vide Tatarkiewicz 1981, p. 47, Toulmin 2003, pp. 229–230).

As a result of this approach, we see a great dissonance between human reasoning that can be observed in real-life scenarios and the type of reasoning that can be found in books on formal logic, or the type of reasoning that is sometimes referred to as scientific reasoning.

As it is noted in (Walton and Godden 2007), informal logic came to being as a voice of opposition against this way of thinking. It is based on a simple observation that people *can* reason about the world around them without certainty. We have to live with the possibility that our conclusions

(e.g. about politics, economy or matters of everyday life) may be wrong and we can deal with this fact. In order to study the nature of human reasoning we have to reexamine how it is *actually* done without holding to the ideals of certainty and universal, context-independent validity of reasoning.

Presumably, this is why Johnson and Blair found negation the shortest way of defining what informal logic seeks to be.

It should be noted that statistical inference is not considered a sufficient replacement of the deductive. While in statistical reasoning the requirement of certainty is relaxed and replaced with statistical confidence, it is bounded to a very specific type of inference where from a certain portion called a *sample* we infer something about a bigger whole called a *population*. The example of inference from *analogy* given in the above definition of informal logic indicates immediately that this field of study doesn't limit itself to statistical reasoning. Some more examples of inferences that are neither deductive nor statistical, and nevertheless useful, are mentioned in the rest of the article.

2.2. Pragma-dialectics

Pragma-dialectics is an argumentation theory which was originally developed in the Speech Communication Department of the University of Amsterdam[1] in the 1970s. Two scholars initiated the work on the project: Frans van Eemeren and Rob Grootendorst. The Amsterdam school of argumentation integrates dialectical, pragmatic and rhetorical insights in their theory. The dialectical perspective of pragma-dialectical theory is rooted in the Aristotelian conception of dialectical syllogism (1966), Stephen E. Toulmin's (Toulmin et al. 1979) rational model for the analysis of argumentation on the macro-level, formal dialectics of Else M. Barth and Erik C. W. Krabbe (1982). The pragmatic perspective of pragma-dialectical theory pertains to the concept of speech acts introduced by John L. Austin in 1962 and developed in by John R. Searle in 1969 and 1979, the concept of cooperative behaviour introduced by Paul H. Grice in 1975, the concept of logical presumptions introduced by Scott Jacob and Sally Jackson in 1983 and the concept of complex relations between arguments introduced by Robert C. Pinto and J. Anthony Blair in 1989. Two other pragmatic notions are also dealt with in the theory: the notion of implicit meanings considered on the micro-level and the notion of qualifying expressions. No specification of the notions is, however, present in the theory. The rhetorical perspective relates

[1] In the twenty first century the Department of Speech Communication was renamed the Department of Speech Communication, Argumentation Theory, and Rhetoric.

to the Aristotelian rhetoric and Chaim Perelman and Lucie Olbrechts-Tyteca's "new rhetoric" (1969).

As mentioned in the previous section, in the contemporary literature on argumentation, the logical framework for evaluating arguments is often still preferred (cf. Eemeren et al. 1996, Snoeck Henkemans 1997). The logical framework deals, however, only with evidently true premises and logically valid inferences (cf. Copi 1982, Kahane 1973, Scriven 1976). In contrast, pragma-dialectics does not focus on monological reasoning and centres on the notions of 'interaction', 'audience' and 'discourse'.

A school of thought introduced by formal dialecticians inspired van Eemeren and Grootendorst (1984) to construct an ideal model of a critical discussion which is the major constituent of the pragma-dialectical theory. The ideal model of a critical discussion establishes a procedure for resolving differences of opinion by critical testing of standpoints. Despite the fact that the model exists only as a theoretically generated system for ideal resolution of a dispute, van Eemeren and Grootendorst (1984, 1992) believe that it can also be applied as a template for the evaluation of reasonableness of argumentation in naturally occurring discussions with externalised disputes. Therefore, the model performs both heuristic and critical functions. The perception of the model of a critical discussion as a series of guidelines emphasises its heuristic function. The evaluation of argumentative moves in terms of their contribution to the resolution of a dispute pertains to the critical function of the model (cf. van Eemeren and Grootendortst 2004, p. 58f). The critical function of the ideal model does not only reflect Toulmin's concept of critical reasoning, but also "the Socratic ideal of subjecting everything one believes in under a dialectical scrutiny" (van Eemeren and Grootendortst 2004, p. 57).

Pragma-dialectics rests on four meta-theoretical principles: the principle of externalisation, the principle of functionalisation, the principle of socialisation and the principle of dialectification (van Eemeren and Grootendorst 1984, p. 4ff). Viewed from the pragmatic perspective two of the principles appear to be the most valuable, the principle of functionalisation and the principle of socialisation. Van Eemeren et al. (1993, p. 104) maintain that the two principles underline the fact that a dispute is not necessarily about "the truth or justifiability of propositions" as the geometrical tradition of reasoning[2] suggests, but may also be about the propriety of speech acts.

[2] Toulmin (1976) differentiates between three ways of reasoning; anthropological, geometrical, critical. Geometrical philosophers believe that only these claims are valid which are true and that the truth must be based on the inconvertible certainty. Anthropo-

They also account for the fact that not only formal fallacies but above all informal fallacies are considered as deviations from the model of a critical discussion. The principle of functionalisation pertains to two conceptions of argumentation, the conception of argumentation as a product and the conception of argumentation as a process. Following Jacobs and Jackson (1982, p. 205ff), van Eemeren and Grootendorst (1984, 1992) believe that argumentation is a speech event which consists of a series of speech acts. The primary function of justificatory or refutatory potential of speech acts is concerned with convincing an interlocutor of acceptability or unacceptability of a standpoint (cf. van Eemeren and Houtlosser 2004, p. 2). The perception of argumentation as a complex speech act refers thus to the process-oriented approach. Following Fogelin (1978, p. v), pragma-dialecticans believe that only simultaneous perception of argumentation as a product and a process allows for the specification of the conditions which must be fulfilled for speech acts to be conceived as argumentation (cf. van Eemeren and Grootendorst 1984, p. 9).

The principle of socialisation underlines the dialogical dimension of the pragma-dialectical theory. In pragma-dialectics, a dialogue may proceed only if speakers take on commitments in a collaborative way (cf. van Eemeren and Houtlosser 2004, p. 2). Adapting Hamblin's idea of a 'commitment store', pragma-dialecticians believe that speakers anticipate each other's reactions and respond to them making use of each other's commitments. The commitment store is established as the discourse progresses. Commitments are not only created by the expression of a standpoint, but also by agreeing and disagreeing with any speech act expressed by an opponent during a discussion (cf. van Eemeren and Houtlosser 2004, p. 2). The principle of socialisation is thus concerned with the rejection of the terminology of the monologic perspective of argumentation and the introduction of the terminology of the dialogic perspective. Terms derived from logic such as 'conclusion', 'minor premise', 'major premise' are not applied in the description of the pragma-dialectical theory (cf. van Eemeren and Grootendorst 1984, p. 9). Instead, new terms are introduced such as 'expressed opinion', 'speech acts', 'argumentative illocutionary force'. The dialogic perspective of argumentation relates also to the role of a protagonist of an expressed opinion

logical philosophers, on the other hand, believe that reasoning and reasonableness are culture-dependent. According to Perelman and Olbrechts-Tyteca (1969), the anthropological tradition is often associated with epistemological approaches in which the knowledge, values and preferences of the audience are taken into account. Eemeren and Grootendorst (2004, pp. 14–15) add that the position of the anthropological philosophers is described in literature as anthrophologico-relativistic.

and the role of an antagonist of an expressed opinion (cf. van Eemeren et al. 1996, pp. 277, 279). Van Eemeren and Grootendorst maintain (1984, p. 10) that an antagonist must accept the pro-argumentation of a protagonist if the attempt at convincing is to be successful.

One feature that is common to both pragma-dialectics and informal logic, and indeed that characterises large swathes of argumentation theory (particularly in its more empirical guises) is the use of sketches or diagrams to capture analysis and the relations between arguments and parts of arguments. There are several reasons for the popularity of such diagrams. In the first place, it provides a quick route to unearthing difficult problems: enthymemes, the linked/convergent distinction, argument identification, circularity, schemes and fallacies all turn up in diagrammatic analysis, and all represent key challenges for argumentation theorists. In the second place, diagrams are (particularly within communities) quick and convenient ways of expressing problematic cases and challenging examples. To the extent that language of diagrams is shared, they can even become a *lingua franca*. Finally, argumentation theory (and its close stablemate, critical thinking) has a strong pedagogic ideal: normative structures of how one should argue in order to promote rationality, harmony or successful interaction, are not purely philosophical ideals. They can, and should be taught. Diagrams represent a way of engaging students and reducing the intellectual barrier to the subject by providing an intuitive entry point. For all these reasons, argument diagramming is almost ubiquitous through argumentation theory, critical thinking, informal logic and pragma-dialectics.

3. Argument Diagramming in Araucaria

To stay with our metaphor of constructing a bridge between everyday argument and formal structures, let us now introduce a pier; a foundation for one of the supports for our bridge. Given that argument diagramming can represent an intuitive and straightforward technique for getting at a formalised structure from the vagaries of text, diagramming might be expected to play some sort of role. There are a number of software implementations of tools that make argument diagramming easy. The one most closely linked with the theory of argumentation (and the one that provides the widest range of argumentation theoretic concepts with which to work) is *Araucaria* (Reed and Rowe 2004).

The technique of argument diagramming is widely used in informal logic (Hurley 2003), and in the teaching of philosophy and critical thinking

(Harrell 2005). It also has a long history going back at least as far as the start of the nineteenth century (Walton 2006a). It has recently been attracting attention in both decision support and computational linguistics, and there are a wide range of software tools available targeted at different markets (see Kirschner et al. 2003, for a good review). Perhaps surprisingly, most of these tools adopt a similar style of diagramming.

Araucaria (Reed and Rowe 2004) is a freely available, open source software package developed over the last few years at the University of Dundee. (See http://araucaria.computing.dundee.ac.uk/ for downloading instructions.) Araucaria allows the text of an argument to be loaded from a file, and provides numerous tools for marking up this text and producing various types of diagram illustrating the structure of the argument contained in the text. It also provides support for defining and marking up argumentation schemes (Walton 1996).

Araucaria allows the user to select a block of text with the mouse and create a node corresponding to this text which can be inserted into a diagram in the main display area. These nodes can be edited and adorned in various ways to add properties such as a label stating the owner of a given proposition in the argument, symbols on the edges connecting the nodes stating the strength of the inference from support to conclusion, and so on.

Araucaria is amongst a small number of diagramming tools that actively support and encourage the use of widely different styles of analysis. The next three sections briefly review three popular and influential styles (each of which reflects a theoretical architecture for argument understanding).

The most common diagramming technique does not have an official name, so we will refer to it simply as a *standard* diagram. A standard diagram is a tree with the conclusion of the argument as the root node. Some authors draw the root node at the top of the tree, while others invert the tree so that the root node is at the bottom of the diagram. We will use the former convention, although Araucaria allows either type of diagram.

Each node in the diagram can be supported by one or more additional nodes, each of which represents a premise in the argument. Premises can be of two main types: *convergent* or *linked*. A convergent premise stands on its own as support for another node, while a linked premise must link with one or more other premises to form support. As an example, the argument "a cat makes a good pet because it is friendly and it can look after itself" consists of a conclusion ("a cat makes a good pet") supported by two convergent premises ("it is friendly" and "it can look after itself"). Either premise provides support for the conclusion without the other, although the two together form a stronger argument than either on its own. A convergent

premise is drawn as a node with a single arrow leading to the conclusion it supports. See Fig. 1.

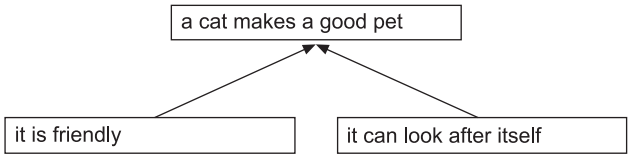

Figure 1. A simple convergent argument in Araucaria

An example of a linked argument would be the following. "Jon understands Newton's laws of motion because Jon got 90% in the first year physics course and the first year physics course covers Newton's laws of motion". Here the conclusion is that "Jon understands Newton's laws of motion" and this is supported by the premises "Jon got 90% in the first year physics course" and "the first year physics course covers Newton's laws of motion". These two premises are linked because neither on its own is sufficient evidence from which to draw the conclusion that Jon understands Newton's laws of motion. Linked premises are shown as connected by a horizontal line which in turn gives rise to a single arrow connecting all linked premises in that group to the conclusion they support. See Fig. 2.

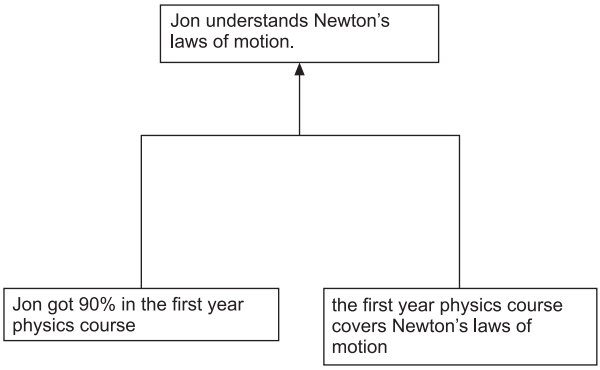

Figure 2. A simple linked argument in Araucaria

Standard diagrams support the notion of a *refutation*, which is an argument that refutes or argues against another node in the diagram. In propositional logic, the notion of refutation is that for a given statement P, there is a statement not-P which is the logical opposite of P. Since each statement can have only one logical opposite, the standard diagram allows only a single refutation for any given node. Of course, in a 'real' argument, there could

be a number of arguments against a given proposition. In the standard diagram, such a situation is represented by creating the single refutation node for the proposition which is to be refuted, and then to draw in the various arguments against the proposition as supports for the refutation. In the example above, the refutation to the conclusion "Jon understands Newton's laws of motion" is "Jon does not understand Newton's laws of motion". This refutation could be supported by the proposition "the first year physics course got a bad review from external assessors" as shown in Fig. 3.

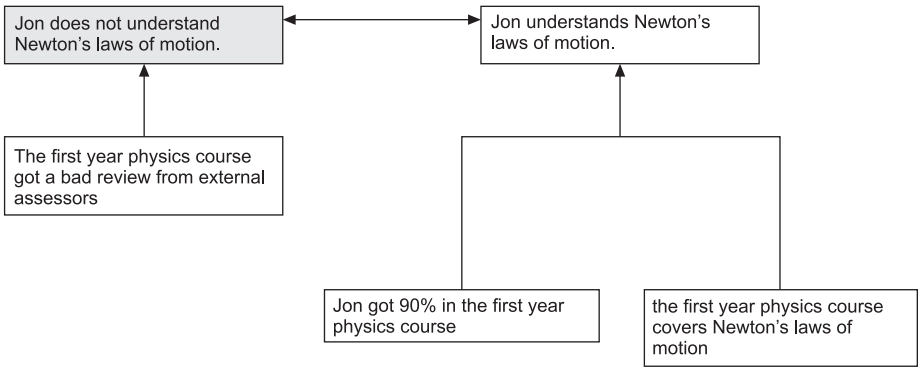

Figure 3. An argument with a refutation

In Araucaria, a refutation is drawn as a node to the left of the proposition it is refuting, and is connected to the proposition by line with arrows on both ends.

In addition to the basic structure of the tree in a standard diagram, Araucaria supports several other features. An argumentation scheme (Walton 1996) is a pattern based on the types of premises used to support the conclusion. For example, the argument "global warming is real and is caused by human activity because a recent UN conference came to this conclusion" is an *argument from expert opinion* because the evidence supporting the conclusion is that a panel of experts says that the conclusion is true. Each argumentation scheme is usually associated with a set of *critical questions* which should be answered in order to verify the validity of the argument. In the case of argument from expert opinion, for example, critical questions could include: "does the presumed expert have experience in an area related to the conclusion?", "is the expert free of bias?" and so on. Numerous other schemes can be defined for arguments of other types.

In Araucaria, a scheme can be drawn by selecting several supports or nodes and then selecting the scheme to which they belong. This is shown in the diagram by a coloured outline of the selected supports and nodes.

Full information on the particular scheme can be obtained by bringing up a dialog box which displays the role of each premise in the scheme and which critical questions have been answered. In addition, Araucaria allows the editing and creation of sets of schemes, so the user can customize existing schemesets or create new ones. The software currently supports approaches to schemes advocated by Walton (1996), Grennan (1997), Perelman and Olbrechts-Tyteca (1969), Katzav and Reed (2004) and Pollock (1995).

In the example above, the refutation and its support could be an example of the scheme "argument from expert opinion", in which a conclusion is stated to be true because experts in the field say it is true. Fig. 4 shows the scheme added to the diagram shown in Fig. 3.

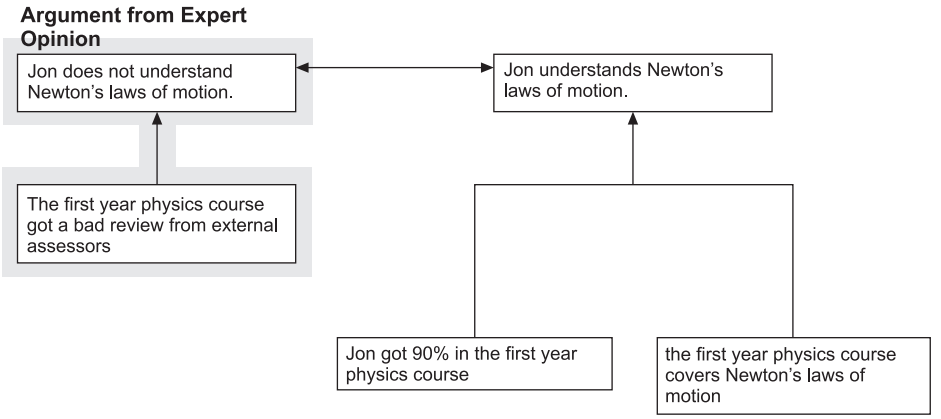

Figure 4. The refutation and its support form an example of the scheme 'argument from expert opinion'

In a natural argument, some propositions will have greater validity or force than others. In a standard diagram, a force can be represented as an *evaluation* of the support line connecting a proposition with its conclusion. Typically an evaluation is just a number such as a percentage value which indicates how strong the inference is between the two nodes. Araucaria allows evaluations to be defined for any support arrow, and evaluations can be any text (not just numbers).

When analyzing text, different propositions can be derived from different sources. For example, in the "cats make good pets" argument above, the various convergent arguments may have been obtained by a primary school teacher asking the class for reasons that cats make good pets, and each convergent argument may come from a different child. In such a case,

a proposition can have an *owner*, which is someone who proposed that argument. Araucaria allows a given proposition to have one or more owners, which can be defined as text strings.

Araucaria allows the saving and export of a marked up argument in the form of a text file using Argument Markup Language, or AML. AML is a form of XML which provides a standard by which argument can be stored and transmitted between software packages. Araucaria also provides an interface with the argument research corpus maintained at the University of Dundee (Katzav et al., 2004), allowing new arguments to be stored in the corpus and providing a search facility for retrieving arguments from the database. AML, however, suffers from a number of limitations, particularly in that it is difficult to share argument resources between the increasing number of tools and systems that are becoming available for processing such resources, including tools for processing the acceptability of sets of arguments based on their interconnections, tools for analysing linguistic coherence of arguments, systems for conducting and generating argument resources using dialogue, and more.

To tackle these challenges, an international consortium has recently produced the Argument Interchange Format (AIF) (Chesñevar et al. 2006). Central to the construction of the AIF is the idea that a single, abstract model of argument should be built, and that this model can be implemented in various ways. What this means is that the abstract model specifies the concepts that the AIF can represent and how these concepts can relate to each other. Once this model has been built, a number of machine-readable reifications of it can be created. In the case of the AIF, the modelling domain is the representation of argument, and the goal is to provide a complete set of concepts that allows all arguments in all argumentation representation systems to be described in a machine-readable way. Once the model has been built, we need to implement it using one or more computer languages. In principle, any computer language could be used, but one of the main purposes of the AIF, as the 'I' in its acronym suggests, is that the *interchange* of arguments should be easy to do. This implies that any implementation of the AIF should be compatible with methods of transmitting data over the web.

XML has been used increasingly often for data transmission over the internet, so a natural medium to use for AIF implementation is some form of XML. XML itself, however, is restricted to data that can be represented in a hierarchical tree structure. Although many arguments can be represented in this way, there are features, such as *divergent arguments*, where one premise can support more than one conclusion, of more gene-

ral arguments that require graphs rather than simpler trees to represent accurately.

For this reason, AIF is usually implemented using some form of Resource Description Framework (RDF), which is a generalization of XML that allows graph-like structures to be represented. In addition, since the specification of an ontology allows relationships between concepts to be defined, it is possible to use reasoners to derive information from the basic RDF representation of an argument. For example, if in a graph of an argument, vertex A supports vertex B, and B supports C, then it can deduced that A also provides support for C, given that the 'supports' relationship is transitive. Various extensions of RDF exist which allow such reasoning to be done. One such extension that is proving increasingly popular is the Web Ontology Language OWL. For examples of RDF and OWL reifications of the AIF, and their use in implemented argument manipulation systems, see (Rahwan et al. 2007).

4. Argument Diagramming and the Pragma-dialectical Model

The discussion in this part of the article will seek to determine whether it is in fact possible to reconcile the idea of understanding complex real world argumentation and formalisation. In other words, the major task here will be to show whether the structure of real-life argumentation may be analysed by the application of formal strategies.

Two formal strategies will be taken into account: the latest version of the argument diagramming programme Araucaria and the pragma-dialectical model. The pragma-dialectical model will serve here as a prototypical structure which has already been proved to be a useful tool for the study of single aspects of complex real world argumentation in dialogical exchanges (van Eemeren et al. 2003a, p. 275ff, 2003b, p. 281ff).

We should note that the analysis of argumentative discourse relates to both written and spoken argumentation viewed as a social practice (see Fairclough 1992, p. 199). Since the pragma-dialectical model is designed to study the real-life argumentative exchanges, its critical evaluation will provide the basis for the assessment of the Araucaria argument diagramming programme in terms of its applicability to the analysis of spoken argumentative discourse.

The pragma-dialectical model is, in comparison to purely logical and dialectical approaches, a substantial advancement in the study of efficacy of argumentation in dialogical exchanges. However, it cannot obtain an al-

together positive evaluation since it appears to neglect aspects of cognitive reinforcement present in natural language understanding process. In the latest approaches to the analysis of spoken discourse (e.g. the post-Gricean approach), attention has been drawn to the fact that pragmatic study of argumentation should rely on the reconstruction of cognitive processes of actual language users (Blakemore 1998, Carston 1993, 1995, 1999, 2002, Recanati 1993, 2006). Viewed from this perspective, pragma-dialectics seems to rest on a narrowed definition of pragmatics. It relates the scope and foci of pragmatics to the inter-play of language structure and the principles of language usage. It does not draw on the significance of the ability of language users to match utterances with the context through the process of inferential understanding.

The reason for the apparent rejection of the concept of contextual inference by pragma-dialecticians relates to its subjective evaluation of meanings in spoken discourse (van Eemeren et al., 1993). It should be noted, however, that, in the natural language study objectivity comes from subjectivity (Walton 2004a). Or in other words, pragmatically developed utterances,[3] local and contextual implicatures emerging from arguments in naturally occurring discussions strengthen the actual objectivity of the discourse analysis (Hobbs 2006, Carston 1998, 2002, Recanati 2002, Jacobs and Jackson 2006). Since they are considered as products of abductive reasoning,[4] they are studied in relation to real or virtual standpoints of disputants which are pragmatically developed (cf. Dębowska 2008a).

As Jackson and Jacobs (2006, see also van Eemeren et al. 1993) emphasise, however, the normative perspective adopted by pragma-dialecticians could be treated as a departure point for the further study of argumentation in non-ideal conditions in which abductive reasoning guides interpretation. The ideal structure appears to have all the aspects needed for the further study of inferential processes. The aspects relate to:

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[3] Pragmatically developed utterances are obtained in the process of reference assignment, disambiguation, saturation and free enrichment, see Carston (2002) and Recanati (2002) for a detailed explanation of these processes.

[4] Abduction is one of the three kinds of reasoning distinguished in contemporary literature on linguistics (cf. Hobbs 2006). The two other kinds of reasoning are induction and deduction. Hobbs (2006, p. 727) states that "In deduction, from P and $P \rightarrow Q$, we conclude Q. In induction, from P and Q, or, more likely, a number of instances of P and Q together with other considerations, we conclude $P \rightarrow Q$." If we can observe Q and we know that $P \rightarrow Q$, then we can abductively conclude that "P must be the underlying reason that Q is true" (Hobbs 2006, p. 727, see also Melrose 1994, pp. 493f). In other words, in abduction P is assumed because it provides explanation for Q.

1. complex argumentation relations
2. refutations/counter-arguments
3. missing premises
4. ownership/the protagonist vs. antagonist division

The first attribute of the inferential modality refers, as mentioned above, to complex argumentation relations. Recanati (2006, p. 450f, see also Jaszczolt 2002, p. 252, Lyons 1987, p. 157) points out that studying the relations between everyday utterances we should not only rely on the semantic representation of linguistically decoded propositions, but also on pragmatically developed propositions and implicatures. Since the process of understanding real-life argumentation is context-dependent, we cannot exclusively focus on the analysis of context-independent semantic representations. In other words, in real-life argumentation the sequential perception of speech acts relates to the consequences of abductive reasoning.

We will attempt to see whether Araucaria is also characterised by the four attributes of inferential modality. The focus will be on the relation between (1) complex argumentation relations (2) refutations/counter-arguments (3) missing premises (4) ownership/the protagonist vs. antagonist division AND pragmatic/abductive features of natural language understanding i.e. (1) sequential perception of pragmatically developed propositions and implicatures, (2) their dynamics and transiency (3) and their mulitidirectionality (see also Walton 1995, Jackson 2007).

The Araucaria diagramming programme allows for the sequential perception of speech acts through the distinction of complex argumentation relations. Thus, using Araucaria, you can provide a diagram of argumentation, in which independent and dependent premises are indicated. As mentioned in section 3, Arauaria provides the templates for the analysis of both convergent arguments considered independently in supporting a conclusion and linked arguments which need to be taken together in supporting a conclusion. Despite the fact that Araucaria does not allow for the indication of implicatures arising from convergent and linked arguments, it can help a teacher to elicit pragmatically developed propositions and contextually appropriate implicatures from students. The externalisation of possible argumentation relations through Araucaria facilitates thus the further actual process of inferential reasoning. Understanding relations created between semantic representations of propositions of arguments, pragmatically developed propositions of argument and implicatures arising from them is thus enhanced by application of the standard 'box-and-arrow' type diagram.

According to pragma-dialecticians (van Eemeren and Grootendorst 1992, p. 73ff, see also Snoeck Henkemans 1997), however, not only conver-

gent relations (known as multiple in pragma-dialectics) and linked relations (known as coordinatively compound argumentation in pragma-dialectics) are to be distinguished in everyday argumentation, but also subordinatively compound relations.

In coordinatively compound argumentation, each argument is believed to support a claim on its own.[5] However, the effective defence of a claim comes into being only when the arguments are considered together. Considered separately, the arguments are not sufficient defence of a claim. In multiple/convergent argumentation, each argument is sufficient defence of a standpoint when considered on its own. In subordinatively compound argumentation, only the first argument supports the claim while the next argument supports the first argument.

Araucaria does not ignore the premises which create subordinatively compound relations. It subsumes coordinatively compound relations and subordinatively compound relations under one heading, namely linked argumentation.

As stressed above, pragma-dialecticians maintain that definitions of interdependency and independency of real-life arguments should not only relate to the monological line of reasoning but also to dialogical one (Snoeck Henkemans 1997, p. 37). They emphasise that from a dialogical perspective complex argumentation comes into being only if two conditions obtain. The first condition refers to a critical reaction of an antagonist to an argument expressed by a protagonist. The second refers to a response of the protagonist to the critical reaction of the antagonist. If the argumentative moves by the proponent of an expressed opinion are to count as subordinatively or coordinatively compound argumentation (linked argumentation), then the response by the protagonist must be an attempt to overcome the criticism by the antagonist. Withdrawing the previous argument by the protagonist and advancing a new argument results in multiple argumentation. Snoeck Henkemans (1997, p. 131) argues also that the protagonist may anticipate the critical reaction of the antagonist. In such a case, the protagonist may introduce a counter-argument against his or her standpoint or argumentation and subsequently refute the counter-argument. In this way, the protagonist shows that his argumentation is defensible.

[5] Pragma-dialecticians indicate that coordinatively compound argumentation is either of a complementary subtype or a cumulative subtype. In the cumulative argumentation, each argument lends some support to the claim, but with each additional argument the support in strengthened. In contrast, in complementary argumentation, arguments complete each other to construct a successful defence of a claim.

According to the pragma-dialectical model, we can distinguish the critical reaction of an antagonist concerned with the acceptability of a pro-argument, the sufficiency of a pro-argument or the relevancy of a pro-argument. Two types of critical reactions of an antagonist may generate subordinatively compound argumentation. If an antagonist challenges an argument expressed by a protagonist because it seems unacceptable to him and the protagonist supports the previously expressed argument, then subordinatively compound argumentation is created between the two arguments expressed by the protagonist (cf. Snoeck Henkemans 1997, p. 92). If an antagonist challenges an argument expressed by a protagonist because it seems irrelevant to a standpoint and the protagonist overcomes the criticism by externalising an unexpressed premise, then also subordinatively compound argumentation is created between the two arguments expressed by the protagonist (cf. Snoeck Henkemans 1997, p. 92). Two types of critical reactions of an antagonist may generate coordinatively compound argumentation in pragma-dialectical terms. An antagonist may either cast doubt on a protagonist's argument or advance a counter-argument against the pro-argument's acceptability, sufficiency or relevancy (cf. Snoeck Henkemans 1997, p. 92). In the first case, the protagonist may overcome the criticism by advancing an additional argument. In the second case, the protagonist may refute the antagonist's counter-argument.

If we take into account the possibility of the indication of ownership in Araucaria, then it appears to offer dialogical diagramming of argumentation. In Araucaria, as mentioned in section 3, the nodes representing premises, refutations and claims can be labelled to specify who expresses them. Thus, in fact, we can ascribe the ownership to a protagonist or an antagonist of a certain claim. Creating the protagonist in linked or convergent argumentation, we can then analyse separately a possible counterargument introduced by the antagonist. The analysis of the counter-argument (or counter-arguments) facilitates further discussion among students in class. They may provide reasons for the particular reaction of the antagonist and then specify types of relations between pro-arguments resulting from the introduction of the counterargument. Moreover, the possibility of ascribing the ownership facilitates drawing out inferences to the best explanation of a claim from the convergent or linked argumentation separated by a critical reaction of an antagonist. Pragmatically developed propositions of linked and convergent pro-argumentation, pragmatically developed propositions of counter-argumentation and implicatures arising from them point to multidirectional perception of meaning.

The last point we are about to consider is concerned with the role of missing premises in Araucaria. As Jacobs and Jackson (2002, p. 121) note, real-life exchanges may involve premises which are implicit or tacit. Such premises, usually called enthymemes, can be inserted in Araucaria diagramming programme.

Discussing enthymemes, pragma-dialecticians refer to the concept of 'pragmatic optimum'. The concept introduced by Eemeren and Grootendorst (1992) allows for the study of implicit meanings in agreement with the goal of resolution of a dispute. Within pragma-dialectical standards of reconstruction, all argumentative moves which do not appear to purse the dialectical goal are rejected from the analysis. Pragma-dialecticians believe, however, that a potentially fallacious move can be saved if the pragmatic optimum externalises the link between the move and a standpoint. The indication of pragmatic optimum relates thus to the determination of pragmatic relevancy of an argument. If an argument does not appears to fulfil the 'logical minimum', then its pragmatic optimum should be ascertained. Both the 'logical minimum' and the 'pragmatic optimum' are concerned with referring an argument expressed by a speaker to the standpoint of the same speaker. The 'logical minimum' has the form of modus ponens "If p, then q", where 'p' refers to an argument advanced by a speaker and 'q' refers to the standpoint of the speaker. The 'logical minimum' is thus an unexpressed premise of an argument which externalises no new information. The generalised form of the logical minimum which refers to closest possible context of the speech act is called the 'pragmatic optimum'. The 'pragmatic optimum' does not ascribe any additional commitments to the speaker than those present in the speech act (cf. van Eemeren and Grootendorst 1992, p. 62ff). In agreement with the critical function of the pragma-dialectical model, the pragmatic optimum of an argument should be determined only if an analysed argument appears to be inappropriate justification of a standpoint.

According pragma-dialectical standards, the 'pragmatic optimum' should be specified in line with the Interaction Principle. The term 'interaction principle', introduced by van Eemeren and Grootendorst (1984, see also van Eemeren and Grootendorst 1992) refers to four principles, namely the principle of clarity, the principle of honesty, the principle of efficiency and the principle of relevance. The 'principle of clarity' determines the propositional content condition and the essential condition for the performance of a complex speech act carrying an argumentative illocutionary force at the higher textual level. The 'principle of honesty' determines the responsibility conditions for the performance of a complex speech act carrying an argumentative illocutionary force at the higher textual level. The 'effi-

ciency principle' determines the preparatory conditions for the performance of a complex speech act carrying an argumentative illocutionary force at the higher textual level. The 'principle of relevance' pertains to the relation between different speech acts in a speech event. Both the relations between speech acts of the same speaker and the relations between speech acts of interlocutors are taken into account. The principle does not, however, determine any speech act condition.[6]

If the determination of the pragmatic optimum does not involve the closest possible context or some additional commitments are ascribed, or the Interaction Principle is not observed, then the argument is not validated. Van Eemeren and Grootendorst (1992, p. 65) provide the following example of the reconstruction of the logical minimum and the pragmatic optimum of argumentation:

> Standpoint: Maggie is progressive.
> Argumentation: Maggie is liberal.
> Logical minimum: [If Maggie is liberal, then Maggie is progressive]
> Pragmatic optimum: [Liberals are progressive]
> (van Eemeren and Grootendorst 1992, p. 65)

The pragmatic optimum "Liberals are progressive" of the argument "Maggie is liberal" is an acceptable defence of the speaker's standpoint "Maggie is progressive" as it complies with the Principle of Clarity, the Principle of Honesty, the Principle of Efficiency, and the Principe of Relevance and no extra commitments are attributed to the speaker.

The Araucaria diagramming programme allows for the indication of a missing premise in the form of pragmatic optimum. Therefore, it does not concentrate on the fixed meaning of logical minimum but allows for a more dynamic and transient perception of meaning. The use of Araucaria facilitates the discussion on the significance of emergent meanings in externalisation of the relations between missing premises and evaluation of the reasonableness of complex argumentation. The non-monotonic nature of inferences is thus taken into account. Certain argumentative moves may carry the potential to misdirect, suppress or fabricate and may not appear to support a claim when analysed by the application of a standard box and arrow approach in Araucaria. Still, they may turn out to be reasonable when the missing premise is linked to other arguments through emergent meanings

[6] See van Eemeren and Grootendorst (1992, p. 31) for a detailed description of the felicity conditions of a complex speech act carrying an argumentative illocutionary force at the higher textual level.

such as the pragmatically developed propositions and implicatures which ascribe additional commitments to the speaker.

The discussed points clearly indicate that Araucaria proposes a construction of a network of features needed for the comprehension of real-life argumentation. It points to the interdependence of the creation of complex argumentation relations, the introduction of counterarguments, the ascription of protagonist and antagonist roles and the externalisation of missing premises. This interdependence underlines the process of natural argumentation occurrence in dialogical circumstances.

5. Argument Representations and Computer Science

As discussed in earlier sections, representing real world argumentation is a very difficult problem. This is in large part due to lack of a single, easily extractable formal structure that every argument would reveal. Research in fields that somehow overlap with argumentation theory (e.g. philosophy, logic and law) gave birth to a number of formalisms that try to capture the structure of arguments and the rules governing dialogues in which arguments are exchanged.

5.1. Argumentation Frameworks

One of the approaches to formalisation of argument's inner structure (found e.g. in Vreeswijk 1997 and Prakken 2005) is a definition which, with accuracy to vocabulary, states that arguments are structures of the form $p_1, \ldots, p_n \rightsquigarrow c$, where $p_1, \ldots, p_n \in L$ are propositions called *premises* and $c \in L$ is a proposition called *conclusion*. The jagged arrow $\rightsquigarrow$ indicates that the inferences are in general defeasible. L is most generally a set of propositions that constitutes the language in which subject of argumentation can be expressed.

This definition can be extended in order to distinguish between various types of inferences: $p_1, \ldots, p_n \rightsquigarrow_{ai} c$, where $\{\rightsquigarrow_{a1}, \ldots, \rightsquigarrow_{am}\}$ is a set of legal inferences (they correspond to *argumentation schemes* in argumentation theory). But even this broad definition can be deemed insufficient. Some formalizations (e.g. Gordon and Walton 2006) define alongside arguments *for* proposition c arguments *against* c, which are not captured by the above definition. There are approaches to modeling a counter-argument against c as an argument for $\neg c$ or as an argument pro some proposition s which is asserted to be in conflict with c. It is not obvious whether all these approaches are interchangeable.

With a specified definition of argument we are able to make the next step in formalizing monologic argumentation which is to define how arguments relate to each other. Definition of this relation, arguably with the definition of an argument itself, form what is referred to as an *argumentation framework* or *argumentation system*. There exist a number of various argumentation frameworks, out of which the simplest and most popular in common literature is Dung's Argumentation Framework defined in (Dung, 1995) as a pair (A, *attacks*) where A is a set of arguments and $attacks \subseteq A \times A$ is an attack relation. This approach abstracts from the inner structure of arguments.

A more elaborate, yet still very abstract formalism can be found in Vreeswijk (1997) where we find a set L called a language and two types of inference rules: *defeasible* and *strict* which can link elements of L into tree-like structures. A formal system based on the more conventional conception of argument is Carneades Argumentation Framework defined in Gordon and Walton (2006), which sees argument as a kind of conditional linking of a set of premises to a conclusion. It is also the first formal argumentation framework which takes into account, in a nontrivial way, the concept of argument's *context*.

5.2. Bringing Theories Together

Informal logic has produced a number of models of monologic and dialogic argument. This naturally produces the need to evaluate and compare these models. The most important question is of course: how good are those models in expressing natural argumentation? More specifically, it is important to determine whether specific models are able to express every possible form of natural argumentation and if not, what sets of monologic/dialogic arguments are left out. It is then interesting to explore the relation between expressiveness of different models and their suitability for further research on argumentation, e.g. development of measures for *persuasiveness* in dialogues (Amgoud and Dupin de Saint Cyr 2008). In order for this evaluation research to yield significant results, it has to be based on large scale argumentation data. The problem of acquisition and processing of this data implies the application of dedicated computer systems, and with a plethora of such systems becoming available, the key challenge is interchange between them. This is the job tackled by the newly proposed Argument Interchange Format (Chesñevar et al. 2006). The AIF is essentially an ontology (McGuinness and van Harmelen 2008) which can be instantiated in various ways in order to represent specific models of monologic argument. On its own this is not enough to cover areas of argumentation theory, such as pragma-dia-

lectics, that have a strong dialogical component. Various authors including Modgil and McGinnis (2007) and Reed et al. (2008) introduce extensions to the AIF intended to cater for dialogic argumentation.

5.3. Argument Interchange Is Knowledge Representation

Any nontrivial information system needs to have a method of representing knowledge about the domain it is designed to process. Such a method, in order to serve its purpose needs to satisfy certain conditions. As stated in (Baader 1999) such a formalism should first of all allow for the symbolic representation of all the knowledge relevant in a given application domain. Moreover, it should satisfy the following requirements:

- it must be equipped with a *declarative semantics* – the meaning of the entries in a knowledge base must be defined independently of the programs that operate upon it;
- a notion of "truth" must be defined;
- there must be an *"intelligent" retrieval mechanism*, which allows inference of knowledge not explicitly present in the knowledge base.

Additionally, knowledge representation formalisms are usually required to allow for *structured representation* of the knowledge.

Knowledge Representation methods, especially logic-based KR methods like first-order predicate logic or Description Logic generally comprise of two elements: a way of describing fact-graphic knowledge (i.e. *knowledge base*) and a generic (fact-independent) inference mechanism (*knowledge query mechanism*) that allows to draw conclusions from gathered facts. To give an example, in the case of Description Logic we have a knowledge base (comprising general TBox statements and specific ABox statements) that can be viewed as a set of facts along with the terminology they are expressed in, and a set of standard inference mechanisms: satisfiability, subsumption, etc.

Argument representation provides an interesting version of this approach. Regarding the fact that an atomic argument contains a set of premises and a conclusion which are propositions, we see that any argument representation that takes into account arguments' inner structure is built upon a propositional knowledge base. But the formalism doesn't stop here and provides a neat and intuitive way of representing the atomic inferences that can be made between propositions from this knowledge base. This means that formal argument representation has the ability of modeling one of the key features of informal logic: inference that is dependent on the subject of reasoning. To cite Johnson and Blair (1977) again: formal argument representation models inferences "based on the content of the statements being made".

To have a formalism that truly is an alternative to standard knowledge representation methods we need what Baader calls an "intelligent" retrieval mechanism which would allow inference of knowledge not explicitly represented in the knowledge base by propositions or arguments. This is the role of formal strategic argumentation. We can say that a proposition not explicitly present in the knowledge base is true/false if one can successfully argue for/against it.

Given this interpretation, we can say that formal argument representation *is* a knowledge representation method. Moreover, it is a KR method of great potential as it overcomes the main limitation of formal reasoning pointed out in Toulmin (2003), namely, being detached from the domain of discourse it takes place in. The AIF can thus serve as a contextualised knowledge representation format that works particularly well for information that is in conflict and that is relativised to particular agents.

5.4. Putting Argument Interchange to Work: The Arguing Agents Competition

There is an increasing need for development of a platform which would allow for massive evaluation of various argumentation models against different argumentation scenarios within a single environment. This would also give a solid base for research on automated argumentation strategies. Following successful initiatives within multi-agent systems, the international community has posited a competitive platform for this environment: the *Arguing Agents Competition* (AAC) project described in Yuan et al. (2008) and Wells et al. (2008). AAC is a competitive environment in which heterogeneous agents argue against one another according to the rules of one of a number of dialogue games, and with a specific set of argumentation resources available. The project aims at providing a multi-agent platform which would allow specification of dialogue games based on different argumentation models and provide an easy way of developing agents which could compete in those games. Statistical data collected as a result of such competitions would be an invaluable resource in research on both argument representation and automated argumentation strategies.

The project is challenging, especially looking from the information systems design perspective. In order to create an environment in which heterogeneous agents (e.g. implemented using various agent definition frameworks) could have free access to various argumentation competitions the system must be distributed, i.e. it must allow participants of a competition to execute on different machines (preferably around the world). The system also needs to implement a way of distributing argumentation in-

formation between participants and enforcing rules of a given dialogue game on them.

An initial server side component, called *Argumento* developed at the University of Akureyri in Iceland has been repurposed to provide an prototype back-end for AAC, which has been integrated with agent based middleware from the University of Dundee (Yuan et al. 2008). This will now be further developed at the Warsaw University of Technology to provide an infrastructure for distributed, competitive play providing:

- management of graphs of arguments which agents use to argue with one another; and
- enforcing rules of the dialogue game by checking the legality of every move being made in a competition.

Teams at IRIT in France, at the Asian Insititute of Technology in Thailand, and at the University of Groningen in the Netherlands are also planning to contribute to the initial stages of work.

Though it is a preliminary step towards creating a fully developed AAC it already reveals a number of interesting information systems design issues. For instance, the assumption is that agents receive all information about the argumentation graph allows them to plan their argumentation strategy very carefully, with respect to all possible consequences of their moves. This approach is often referred to as *closed world assumption* which, generally speaking, means that the system has full knowledge of the world it reasons about. This is of course a good start to work on argumentation strategies, but in case of real-world argumentation domains this can be very resource-consuming and is inefficient, because eventually only a subset of the domain will be used in the dialogue. Additionally, it limits the system's ability to approximate the natural dialogue, because only in fairly simple cases humans are able to grasp and process the whole domain of dispute at once, especially at the beginning of the discussion.

Relaxing the closed world assumption constitutes a key challenge facing AAC. To allow situations where agents have only access to certain argumentation subgraph at any moment of the dialogue makes computation more challenging – and the competition more interesting. Of course, their subgraphs must overlap in order to make any dialogue possible. For example, a referee (e.g. located at the server) could initiate the dialogue by sending each participant a certain subgraph of arguments, and than provide them with more knowledge as needed. The agents could also acquire the knowledge from each other during the course of dialogue.

The function of AAC as a tool for evaluating argumentation strategies gives rise to both computational and argumentation theoretic issues. On the

computational side, the fact that agents participating in a discussion run on different, remote machines makes comparing strategies a complex problem. Obviously, the faster the machine is, the more agentive deliberation can take place in a given amount of time. So from the fact that a certain agent won a dialogue (without specifying what exactly this means) it does not immediately follow that it has a better strategy. Additionally, in a distributed environment it is always difficult to determine how much time was spent on processing of the information and how much on inter-agent communication. On the argumentation theoretic side, we first of all need a definition of what does it mean that an agent *wins* a dialogue, and consequently, what does it mean that a given strategy is *better* than another. The current prototype of AAC implements a very simple rule: "the agent that puts forward an argument that has no attackers wins" but, of course there is more then one answer to this question for any given argumentation model. Retaining flexibility in defining the evaluation criteria would allow to use AAC for verification of the criteria themselves (e.g. using "benchmark" manually analysed dialogues).

The Arguing Agents Competition is primarily a project of creating a platform for evaluation of various argumentation theoretical concepts and algorithms ranging from formal argumentation models to dialogue strategies which will be tackled with more detail in the following section. Though challenging in its design, such a platform could form an important tool in advancing the state of the art in the understanding of argumentation theory in both computational and philosophical guises.

6. Strategy in Dialogue

To demonstrate how argument diagramming and argument representation in particular might be used to create a bridge we sketch a specific application that is a current 'hot-topic' for both philosophers and computer scientists. The issue is strategy. Where much argumentation theory, both philosophically and computationally, has focused on normative models that describe what is argumentative moves are permitted, there is an additional step that is much less well understood: determining what argumentative moves are good or effective. This is the topic of argument strategy, and although it has some parallels in formal logic (e.g. in proof strategy) it is a relatively new idea in both communities. In argumentation theory, it is the pragma-dialecticians who have the most developed theoretical components in their account of strategic manoeuvring. In mathematical and computer

science, it is in multi-agent systems and distributed computing that strategic considerations come first to the fore.

Pragma-dialecticians assume that in each stage of a critical discussion – confrontation, opening, argumentation and conclusion – disputants simultaneously pursue the rhetorical aim of making a strongest case and the dialectical aim of resolution of a difference of opinion. The concept of 'strategic manoeuvring' was introduced by van Eemeren and Houlosser (2002a, 2002b) to talk about the employment of reasonable argumentation in a critical discussion by maintaining a balance between the simultaneous pursuit of the dialectical and rhetorical aim. It is assumed, however, that the rhetorical and dialectical objective will not always be balanced. If a dialectical objective is overruled by a rhetorical objective, then the derailment of strategic manoeuvring is said to occur (cf. van Eemeren and Houtlosser 2003a, pp. 290, 291). Van Eemeren and Houtlosser (2002b, p. 142) maintain that "all derailments of strategic manoeuvring are fallacious and all fallacies can be regarded as derailments of strategic manoeuvring." Since every violation of a rule of a critical discussion[7] points to an evidently rhetorical nature of an argument, it is considered a 'derailment of strategic manoeuvring'.

Van Eemeren and Houtlosser (2007) adopt the idea to integrate the rhetorical and dialectical perspective from Johnstone's (1978) idea of philosophical argumentation. Johnstone (1978, p. 92) believes that a philosophical argument is to a large extent rhetorical, but the "final account of philosophical argumentation will have to be given by a philosophy which endorses dialectics." Van Eemeren and Houtlosser (2007) indicate, however, that in pragma-dialectics the rhetorical perspective is included into the dialectical one, not vice versa.

Let us now focus on the inclusion of rhetorical perspective in each of the stages. In the confrontation stage of an ideal model of a critical discussion, the main objective of the parties is the determination of a disagreement space. From the rhetorical perspective, each party aims at the most beneficial framing of the disagreement for him or her. This means that in a mixed discussion speakers try to express their standpoints in the way which allow them to discuss the aspects of an issue they favour. Rhetorical part of strategic manoeuvring focuses thus on "acquiring the most expedient burden of proof" (van Eemeren and Houlosser 2002a, p. 22). In the opening stage, the

[7] See van Eemeren and Grootendorst (1992, p. 208f) for the description of the pragma-dialectical rules for rational conduct, known also as 'Ten Commandments' of a critical discussion.

rhetorical objective of the parties is the determination of starting points[8] and discussion roles. This influences the possibility of discharging the burden of proof in the argumentation stage. While deciding on the common starting points in the opening stage each party tries to reject those propositions which could discard his or her standpoint. The determination of the mutual concessions influences the allocation of the discussion roles. Both the challenge expressed by one of the speakers and acceptance of the challenge by the other speaker is framed in a way that not only upholds the commitment incurred by the expression of a standpoint but also predicts 'the argumentative duties' of each speaker (cf. van Eemeren and Houlosser 2002a, p. 23). In the argumentation stage, the rhetorical objective is concerned with advancing effective argumentation. Each party tries to win the argument by "making the strongest case and launching the most effective attack" (cf. van Eemeren and Houlosser 2002b, p. 139). In the concluding stage, the rhetorical objective refers to making a claim that a party has won a victory in the discussion. Thus, in a non-mixed discussion a protagonist may underline in what ways he has satisfactorily dealt with a burden of proof acquired in the confrontation stage. An antagonist, on the other hand, may indicate all propositions he challenged in the course of the discussion (cf. van Eemeren and Houlosser 2002a, p. 25). Van Eemeren and Houtlosser (2002a, 2002b) note that the introduction of the concept of 'strategic manoeuvring' in the model of a critical discussion emphasises the fact that the dialectical objective of resolution of a dispute is never to be overruled by a rhetorical objective characterising a particular stage.

In pragma-dialectics, the concept of 'strategic manoeuvring' is also related to the concepts of 'topical potential', 'audience demand' and 'presentational devices' (cf. van Eemeren and Houtlosser 2002a, p. 16). Van Eemeren and Houtlosser (2002b) state that the focus on topos is derived from Aristotle ([1959], [1966]). In the case of pragma-dialectical approach, the term pertains to the restriction of a disagreement space in the confrontation stage and to the creation of starting points in the opening stage (cf. van Eemeren and Houtlosser 2002b, pp. 139, 140). Both disagreement space and starting points are to be based on the same topos. The term 'au-

[8] The pragma-dialectics differentiates between two kinds of starting points, namely, the 'procedural starting points' and the 'material starting points'. The 'procedural starting points' refer to propositions describing the rules for rational conduct. The 'material starting points' refer to propositions describing the aspects of an issue under discussion on which disputants agree. Van Eemeren and Houtlosser (2004a, p. 12, 2005, p. 351) emphasise that in an ordinary discussion starting points may be "temporary or locally distributed" and are not neccesserily expressed in the opening stage.

dience demand', as van Eemeren and Houtlosser (2002b) indicate, refers to Perelman and Olbrechts-Tyteca's (1969) idea of particular and universal audience. Van Eemeren and Houtlosser (2002b) note, however, that Perelman and Olbrechts-Tyteca's idea of the stimulation of the immediate adherence of the mind of the audience should be integrated with the idea of the objective consideration of an issue. Special attention is drawn to Perelman and Olbrechts-Tyteca's idea of 'preferable objects of agreement', i.e., values and hierarchies. In the ideal model of a critical discussion, the creation of starting points in the opening stage is assumed to be based on shared values and hierarchies. The meaning of the pragma-dialectical term 'presentational devices' is derived, as Eemeren and Houtlosser (2002b) point out, from Aristotle's and Perelman and Olbrechts-Tyteca's definitions of rhetorical figures. In pragma-dialectics, the main focus is on the application of the figure of conciliatio (cf. van Eemeren and Houtlosser 2002b, p. 141). The figure of conciliatio refers to the presentation of a possible argument of an antagonist by a protagonist to support protagonist's own standpoint. Describing the application of the figure of conciliatio in a critical discussion, Eemeren and Houtlosser (2002b) develop the pragma-dialectical idea introduced by Snoeck Henkemans (1997) that a counter-argument expressed by a disputant may strengthen his pro-argumentation. Only in the case where a protagonist provides direct support for the use of an antagonist's argument is the strategic manoeuvring in the form of conciliatio perfectly balanced. The protagonist of a standpoint should foresee that the acceptance of the justificatory potential will not be automatic and should explain why the application of the antagonist's argumentation justifies his position.

As indicated above, pragma-dialectical concept of strategic manoeuvring in the argumentation stage pertains to the retention of the balance between the dialectical goal of resolution of a dispute and the dialectical goal of launching the most effective attack. Following Walton (1995, see also Walton and Godden 2005, Walton 2006), however, we believe that the concept of strategic manoeuvring in the argumentation stage should take into account potential plurality of rhetorical and dialectical aims. Walton (1995, 2006, 2007) constructs ideal structures for the study of other rhetorical and dialectical goals than the ones specified in the ideal model of a critical discussion, namely persuasion dialogue, examination dialogue, explanation dialogue and clarification dialogue. In this way, he gives priority to the 'educational value' of a dialogue which relates to constructive handling of an issue from different angles, i.e., taking into account different potential goals of participants in a discussion. It should be noted that the persuasion dialogue emphasises also that if in a mixed discussions the rhetorical aim of launching

the most effective attack overrides the dialectical aim of the resolution of a difference of opinion, then a derailment of strategic manoeuvring does not necessarily occur. Launching the most effective attack may not take into account resolution of a dispute. It may, however, be exercised, as Walton (1995, see also Walton and Godden 2005, p. 273ff) emphasises, to increase an insight into a speaker's own and the other party's position. A clarification dialogue provides a framework for the analysis of requests for clarification expressed by one party and subsequent clarifications expressed by the other party (Walton 2007a, p. 127ff). The global goal in the model of a clarification dialogue is partly concerned with the second goal of an examination dialogue. The model of the examination dialogue (Walton 2006) focuses on the exegetical function of a dialogue. Two goals are established in the examination dialogue by Walton (2006b, p. 772): the 'goal of the extraction of information' and the 'goal of the testing of reliability of this information'. It is assumed that in the ideal model of an examination dialogue shifts from 'an argument mode' to a 'clarifiaction mode' may frequently occur in contributions of both speakers. The Waltonian model of an explanation dialogue also partly pertains to the second goal of an examination dialogue. Both explanation dialogue and clarification dialogue may be embedded in the template of the persuasion dialogue (Walton 2006, 2007a, 2007b). However, Walton (2007a, p. 148) emphasises that the speech acts of explanation and clarification have separate felicity conditions. In the clarification dialogue, "the global communal goal of solving a problem caused by ambiguity, obscurity of expression, or some other difficulty that prevents a discussion for moving forward" (2007a, p. 127) is pursued. On the other hand, in the explanation dialogue, the central speech act of explanation pertains to clearing up more complex problems in which 'facts currently known' deny the occurrence of a certain phenomenon (2007a, p. 147). Although all the ideal models of dialogues are designed for the analysis of naturally occurring discussions with externalised disputes, only the Waltonian persuasion dialogue is characterised by the features of an examination dialogue and a critical discussion and thus appears to be the adequate direction for the extension of the pragma-dialectical concept of startegic manovering. The extension would, however, have to involve the determination of special parameters for the specification of the possible relations between the goals. It would have to be indicated step by step which relations between the actual and potential plural goals point to the expression of effective argumentative moves which are non-fallacious. The pragma-dialectical conception of strategic manovering is thus a good starting point for further theoretical and empirical considerations.

Where pragma-dialectics has focused from its outset upon situated, dialogic interaction, many formal and computational models are still tied to the monlogical safety that is familiar from predicate calculus. The next step that is to be made in order to make a connection between argument representation and computer science involves development of formal representations of dialogues that would capture the mechanics of argumentation that occurs between two or more participants.

These formalisms generally base on a concept of *dialogic game* which is known from the studies on *dialogue logic* initiated by Paul Lorenzen. In Lorenzen's dialogue logic *truthfulness* of a proposition t is defined as existence of a winning strategy for t in a dialogic game with t at stake. The game typically can be described as a finite, opened, two-party and zero-sum. The player that starts the game by stating t is called a *proponent* and the player who disagrees with t is called *opponent*. The idea is that with appropriately constructed game rules, the exchange of arguments between players will lead to the winning of one of them and thus prove t or $\neg t$. For a more detailed description of dialogue logic we refer the reader to Lorenz (1987).

A number of formal dialogue games with different properties and different level of formalization have already been specified, e.g. the game of Hamblin (1970) or *Permissive/Rigorous Persuasion Dialogues* defined in Walton and Krabbe (1995). For a detailed analysis of the subject the reader is referred to:

- (Prakken 2005) where a very precisely defined *dialogue framework* for specifying different formal dialogue games is introduced; and to
- (Wells 2006) which features a complete survey of existing dialogue games and introduces a generic format for their representation called *A4A*.

Research on dialogue strategies that could be implemented in autonomous or semi-autonomous agents is still in its infancy. This might be surprising, because strategy is one of a few most vital subjects in argumentation theory and its applications. For example, as was indicated in section 5, we cannot speak about an argumentation-based method for knowledge representation until we have a successful strategy that would allow us to determine through dialogue whether a given proposition is true with respect to knowledge gathered in the information system. Of course, there is a good reason for this being so: to recall our leading metaphor, the bridge between everyday argumentation (where dialogue strategy occurs, and can be studied) and formal representations of reasoning (where until now the focus has been primarily on monological reasoning) is not there yet. Only relatively recently have a number of formal representations of argumentation been developed and

what still makes research on strategic argumentation difficult is the lack of tools for their dynamic use.

The Arguing Agents Competition seeks to overcome these difficulties by providing argumentation strategy researchers with a catalogue of implemented dialogue games to choose from, whether it will be Walton and Krabbe's (1995) Rigorous Persuasion Dialogue, Bench-Capon's (1998) Toulmin Dialogue Game, etc. Such platform allows the researchers to focus solely on implementing arguing agents that, according to various criteria, evaluate and choose moves to make in a dialogue, which is the essence of argumentation strategy. The platform also provides a way of evaluating created strategies by maintaining an environment in which strategies can be played in different games with any competitor around the world and by allowing different criteria of evaluation. Finally, acquisition of information from occurring competitions allows for creating a corpus of dialogues which can that be used as empirical data for further research.

If an argument diagramming tool like Araucaria can be called a pier of our bridge, the Arguing Agents Competition seeks to be a span. There is, as yet, no implemented link between strategic manoeuvring and strategy in AAC. But the bridge we are trying to build here shows how it can be done. By analysing argumentation according to the pragma-dialectical model using Araucaria, we can represent the underlying structure using AIF. The strategic manoeuvring of the interlocutors can be marked up similarly (though we may need to extend AIF to allow this, in much the same way that AIF+ extends AIF to handle dialogue). With an explicit representation of what strategic developments have occurred there are two possibilities. First, those specific representations can themselves be used by autonomous reasoning components that can take the same strategic decisions under identical conditions. This is a direct analog to the computational autonomous re-use of analysed human argumentation explored in (Reed and Walton 2005). Second, those specific representations can be used as the basis for generalisation, in the same way that machine learning techniques are being used on analysed human argumentation to try to derive generalisations about clue word use (Moens et al. 2007). These generalisations about strategy use can be represented in the same way as protocols are represented currently in A4A. The A4A framework allows such representations to be operationalised automatically, so that agents playing the Arguing Agents Competition could directly employ those strategic rules in determining what moves to play. In this way, the theoretical advances in understanding strategic maneouvring in human argumentation can be translated directly into operationalisable programs for autonomous computational systems.

7. Bridging the Gap: Concluding Remarks

The gap between natural argumentative text and formal, machine processable argument structures is wide and challenging. By simultaneously harmonising the concepts and vocabulary, and building practical tools that are specifically designed to be usable by those on either side, we can start to construct a bridge. We have shown how one part of the construction, argument diagramming, can work to solve problems in both domains, and most excitingly, can allow solutions in one to contribute towards solutions in the other. By making use of a common argument representation language, the Argument Interchange Format, we can support the transport of linguistic resources into formal and computational data structures upon which reasoning can be conducted, or autonomous agent behaviour can be configured. With this generic bridge in place, specific issues, such as the hot-topic of strategic argumentation can then be tackled. Though some pieces of the puzzle remain to be worked out (such as how strategic detail is represented in the AIF), the broad shape of the solution becomes clear, and a part of the research programme is mapped out.

As the movement in both formal and informal; philosophical and computational communities of argumentation theory continues to increase in size and pace, these bridges will become vital in supporting rapid uptake, application and testing of new results. And as we have shown, they are already starting to support fruitful exchanges.

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STUDIES IN LOGIC, GRAMMAR AND RHETORIC 16 (29) 2009

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NON-LOGICAL CONSEQUENCE

Abstract: Contemporary philosophers generally conceive of consequence as necessary truth-preservation. They generally construe this necessity as logical, and operationalize it in substitutional, formal or model-theoretic terms as the absence of a counter-example. A minority tradition allows for grounding truth-preservation also on non-logical necessities, especially on the semantics of extra-logical constants. The present article reviews and updates the author's previous proposals to modify the received conception of consequence so as to require truth-preservation to be non-trivial (i.e. not a mere consequence of a necessarily true implicatum or a necessarily untrue implicans) and to allow variants of the substitutional, formal and model-theoretic realizations of the received conception where the condition underwriting truth-preservation is not purely formal. Indeed, the condition may be contingent rather than necessary. Allowing contingent non-trivial truth-preservation as a consequence relation fits our inferential practices, but turns out to be subject to counter-examples. We are left with an unhappy choice between an overly strict requirement that non-trivial truth-preservation be underwritten by a necessary truth and an overly loose recognition of non-trivial truth-preservation wherever some truth underwrites it. We need to look for a principled intermediate position between these alternatives.

Keywords: consequence, logical consequence, non-logical consequence, Alfred Tarski, truth-preservation, necessity, substitutional, formal, model-theoretic

1. Consequence in contemporary philosophy

In contemporary philosophy, consequence is generally construed as necessary truth-preservation. A conclusion is said to follow from the premiss(es) from which it is drawn if and only if it is necessary that, if the premiss or premisses are true, then the conclusion is also true (Tarski 2002/1936, pp. 178, 183–184; Salmon 1963, p. 18; Etchemendy 1990, pp. 81–82; Forbes 1994, p. 3; Copi & Cohen 2001, p. 43; Hurley 2006, p. 41; Jeffrey 2006, p. 1). Equivalently, it is impossible for the conclusion to be untrue while the premiss(es) are true.[1]

[1] I write 'untrue' rather than 'false', in order to leave open the possibility of a conclusion's being neither true nor false.

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The impossibility in question is most commonly construed as logical or formal, meaning that the form of the conclusion and the premiss(es) rules out the combination of an untrue conclusion with true premiss(es). The application of this conception to reasoning and arguments in a natural language requires that the sentences of the language be regimented into a "canonical notation" (Quine 1960), which can then if desired be recast in a formal language whose extra-logical constants may be in themselves uninterpreted. For example, the logical operation of conjunction, indicated in English by the word 'and', is commutative, in the sense that, from the conjunction of one sentence with a second sentence, there follows the conjunction of the second sentence with the first.[2] Thus, from 'Snow is white and grass is green' there follows 'Grass is green and snow is white'. But one cannot apply this principle directly to all English-language sentences in which the word 'and' is the main connective joining two clauses. To take a mildly scatological example, the situation in which a man pulls down his pants and pees is different from the situation in which he pees and pulls down his pants. What needs to be made explicit in regimenting the sentence 'he pulled down his pants and peed' is that in English a sequence of two tensed clauses joined by 'and' implicitly claims that the event or state of affairs described in the first-mentioned clause precedes the event or state of affairs described in the second-mentioned clause. In canonical notation, the sentence might be recast as follows: In some time interval k before now he pulls down his pants, and in some time interval l before now he pees, and k precedes l. With this explicitation, any sentence obtained by permutation of the clauses of the recast sentence that are joined by 'and' follows from it.

2. Tarski's conception of consequence

Although the necessity in the condition of necessary truth-preservation is most commonly construed as logical necessity, there is a minority philosophical tradition – whose members include Bolzano (1972/1837), Peirce (1955/1877), Sellars (1953), Ryle (1960/1954), Toulmin (1958), George (1972, 1983), and Brandom (1994, pp. 97–104; 2000, pp. 52–55) – that construes it as including other kinds of necessity as well. Perhaps surprisingly,

[2] For simplicity, I am taking sentences to be the relata of the consequence relation. Nothing in this article should depend on this decision. The same points about consequence could be made if one takes entities other than sentences to be the primary truth-bearers – e.g. utterances, statements or propositions.

Alfred Tarski can be counted as a member of this tradition. In his classic paper "On the concept of following logically", Tarski lays down the following necessary condition (F) for the material adequacy of an account of what it is for a sentence X to follow logically from the sentences of a class $\mathcal{K}$:

(F) *If in the sentences of the class $\mathcal{K}$ and in the sentence X we replace the constant terms which are not general-logical terms correspondingly by arbitrary other constant terms (where we replace equiform constants everywhere by equiform constants) and in this way we obtain a new class of sentences $\mathcal{K}'$ and a new sentence X', then the sentence X' must be true if only all sentences of the class $\mathcal{K}'$ are true.* (Tarski 2002/1936, pp. 183–184; italics in original)[3]

Tarski's condition (F) in fact combines two conditions, which he articulates separately before stating condition (F). The first condition is the condition of necessary truth-preservation, stated quite generally in a way that does not restrict consequence to logical consequence:

> ...it cannot happen that all the sentences of the class $\mathcal{K}$ would be true but at the same time the sentence X would be false. (Tarski 2002/1936, p. 183)

This condition combines an impossibility condition ("cannot") with a co-temporality condition ("at the same time"). Tarski does not explain what he means by either of these conditions. Given that Tarski's focus was on deductive mathematical theories, whose sentences do not change their truth-value over time, the co-temporality condition "at the same time" is most plausibly construed as a metaphor for co-situatedness, "in the same situation" or "in the same circumstances". That is, Tarski is claiming that what cannot happen when a sentence X is a consequence of all the sentences of a class $\mathcal{K}$ is that, given one and the same situation, all the sentences of the class $\mathcal{K}$ are true but the sentence X is false. As for the impossibility condition, I have argued (in Tarski 2002, pp. 168–170) that it is the condition that there are no circumstances in which both the implying sentences are true and the implied sentence false. On this interpretation, the impossibility condition and the co-temporality condition are the same condition: that there is no

[3] Here and elsewhere, I use the exact translation into English by Magda Stroińska and myself of the Polish version of Tarski's paper (Tarski 1936a), which I argued in (Tarski 2002) is more authoritative than the German version, also written by Tarski (Tarski 1936b), which was used as the basis of the previous rather inexact translation of the paper into English (Tarski 1956 and 1983, pp. 409–423).

(possible) situation in which all the sentences of the class $\mathcal{K}$ are true but the sentence X is false.

Tarski immediately follows his statement of the requirement of necessary truth-preservation with an argument for the following additional requirement for a specifically logical consequence relation:

> ... following ... cannot be lost as a result of our replacing the names of ... objects in the sentences under consideration by names of other objects (Tarski 2002/1936, p. 183).

As is well known, Tarski argued that this substitutional condition, although necessary for logical consequence, is insufficient, because a language might lack names for the objects that would constitute a counter-example when a sentence X does not follow logically from the sentences of a class $\mathcal{K}$. He therefore proposed what became the contemporary model-theoretic conception of logical consequence:

> *We say that the sentence X follows logically from the sentences of the class $\mathcal{K}$ if and only if every model of the class $\mathcal{K}$ is at the same time a model of the sentence X.* (Tarski 2002/1936a, p. 186; italics and extra spaces in the original)

In this definition, Tarski meant by a model a sequence of objects that satisfies a sentential function, a rather different conception than the contemporary notion of a model as an interpretation. In contemporary work in formal logic, formal languages are usually constructed with a distinction between interpreted logical constants (such as the signs signifying logical conjunction and universal quantification) and uninterpreted extra-logical constants. The semantics for such a language specifies what constitutes an interpretation of sentences in the language, which typically includes specification of a domain or "universe of discourse" (a non-empty set of objects) and an assignment to each extra-logical constant of some object defined in terms of the domain (a member of the domain, a subset of the domain, a set of ordered pairs of members of the domain, etc.). A sentence X of a language is said to follow logically from the sentences of some class $\mathcal{K}$ of sentences of the language if and only if every true interpretation of the sentences of the class $\mathcal{K}$ is also a true interpretation of the sentence X. Although not identical to Tarski's conception, this definition captures its spirit in the contemporary framework for formal work.

In his article, Tarski pointed out quite rightly that the scope of logical consequence as thus defined depends on how one divides logical terms from extra-logical terms. In a substitutional conception of logical consequence,

the logical terms are those not subject to substitution when searching for a substitutional counter-example – i.e. a parallel argument with true premisses and an untrue conclusion, obtained by uniform substitution on the original argument's extra-logical terms. In a model-theoretic conception of logical consequence, the logical terms are those not needing interpretation in the search for a model-theoretic counter-example – i.e. an interpretation in which the premisses of the argument are true but its conclusion untrue. If all terms are extra-logical, then on either the substitutional or the model-theoretic conception any sentence is a logical consequence only of itself (either alone or in combination with other sentences). If all terms are logical, then on the substitutional conception any true sentence is a logical consequence of any sentences and any sentence is a logical consequence of any class of sentences that are not all true. That is, logical consequence reduces to the so-called "material implication" of medieval logicians (*consequentia materialis*), a relation that holds in all cases except those in which the sentences of the class $\mathcal{K}$ are true but the sentence X is untrue. Tarski made the same claim about his version of the model-theoretic conception (2002/1936, pp. 188–189). I argued in (Tarski 2002, p. 171) that Tarski's claim can be defended if we suppose that the domain for the language is fixed, as Tarski's article implicitly assumed. On the contemporary model-theoretic conception of logical consequence, however, the domain with respect to which sentences of a formal language are interpreted is not fixed, and so fixing the interpretation of all terms does not reduce logical consequence to material implication. For example, the sentence 'There are at least two objects' does not follow from the sentence 'there is at least one object', since the first sentence is false but the second sentence true when the domain consists of just one object. Nevertheless, treating all terms as logical, in the sense that their interpretation is fixed for each possible size of the domain (e.g. from one object to denumerably many objects) greatly expands the extension of the concept of logical consequence.

Between the extreme that narrows the extension of logical consequence so that any sentence is a logical consequence only of itself, and the extreme that makes it coextensive with material implication, many intermediate positions are possible. In his 1936 article, Tarski confessed ignorance of any objective basis for dividing logical from extra-logical terms (2002/1936, p. 188), i.e. for selecting a particular intermediate position between the extremes just mentioned. Tarski speculated that no such objective basis might be found, in which case the model-theoretic conception of logical consequence would be relative to a definite but somewhat arbitrary division of the terms of a language into logical and extra-logical terms (pp. 189–190).

In his condition (F), Tarski referred to logical terms as "general-logical terms", a locution apparently reflecting his belief at the time that the logical terms are those that occur in all axiomatized deductive theories and in everyday life, whereas extra-logical terms are "specifically metalinguistic" or "specifically mathematical" (Tarski 2002, pp. 161–162). In later work (Tarski 1986/1966), Tarski proposed that the logical terms are those denoting notions that are invariant under all transformations of a domain into itself. For example, no name of an individual object in a domain is a logical term, because one can always transform any domain into itself in such a way that an arbitrarily selected individual member of it becomes another individual object. On the other hand, terms signifying the universe class and the empty class are logical, because their denotation remains the same under any transformation of any given domain into itself. Other logical "notions", as Tarski calls the denotata of logical terms, are the relations of identity and non-identity between individuals, the cardinality of classes of individuals, and the relations of inclusion, disjointness and overlap between classes (Tarski 1986/1966, pp. 150–151). But the criterion of invariance under transformations of a domain into itself, objective as it is, allows for some terms to be logical terms in one language but extra-logical in another. As Tarski points out (1986/1966, pp. 152–153), set membership is a logical notion if set theory is constructed in the fashion of Whitehead and Russell's *Principia Mathematica* via a higher-order logic involving a theory of types, but a non-logical notion if set theory is constructed in the fashion of Zermelo in a first-order logic in which a single domain includes individuals, classes of individuals, classes of classes of individuals, and so on. The ambiguous status of set membership leaves indeterminate the question of whether mathematical notions are logical notions, since set theory is basic to mathematics and all the notions of set theory can be defined in terms of set membership with the help of logical notions.

3. Extending Tarski's condition (F) to non-logical consequence

However the line is drawn between the logical and the extra-logical terms of a language, one can modify Tarski's condition (F) so as to permit some extra-logical terms to be treated as if they were logical. That is, in the search for a counter-example, these terms would not be subject to substitution (on a substitutional approach) or to variant interpretations (on a model-theoretic approach). The revised condition (F′) might be written as follows:

(F′) If in the sentences of the class $\mathcal{K}$ and in the sentence X we replace some or all of the constant terms which are not logical terms correspondingly by arbitrary other constant terms (where we replace equiform constants everywhere by equiform constants) and in this way we obtain a new class of sentences $\mathcal{K}'$ and a new sentence X', then the sentence X' must be true if only all sentences of the class $\mathcal{K}'$ are true.

In a more contemporary idiom, we might phrase the condition as follows:

(F″) For some non-empty subset of the extra-logical constants in the sentences of the class $\mathcal{K}$ and in the sentence X, if uniform substitution on these constants produces a new class of sentences $\mathcal{K}'$ and a new sentence X', then the sentence X' must be true if all the sentences of the class $\mathcal{K}'$ are true.

The requirement that the set of substitutable extra-logical constants be non-empty is meant to rule out treating the "material implication" of medieval logicians as a consequence relation. Intuitively, the mere fact that it is not the case that all the sentences of the class $\mathcal{K}$ are true and the sentence X is untrue does not suffice to make X follow, even non-logically, from the sentences of the class $\mathcal{K}$; for example, nobody would suppose that 'grass is green' follows from 'snow is white'.

The revised condition (F″) is a generalization of Tarski's condition (F), which then becomes the special case in which necessary truth-preservation continues to hold when substitution is allowed on the entire set of extra-logical constants. In general, however, application of (F″) would require multiple tests to see whether an argument met it. Take the hackneyed standard philosopher's example, 'Socrates is human, so Socrates is mortal', which we might put into a regimented language as 'HUMAN(Socrates), so MORTAL(Socrates)', where the extra-logical constants are the one-place predicates 'HUMAN' and 'MORTAL' and the name 'Socrates' and there are no logical constants. We have seven non-empty subsets of these extra-logical terms with respect to which condition (F″) might be met: {'HUMAN'}, {'MORTAL'}, {'Socrates'}, {'HUMAN', 'MORTAL'}, {'HUMAN' 'Socrates'}, {'MORTAL', 'Socrates'} and {'HUMAN', 'MORTAL', 'Socrates'}. Treating condition (F) as a necessary condition for logical consequence, we find that the conclusion that Socrates is mortal is clearly not a logical consequence of the premiss that Socrates is human, since condition (F″) is not met when all the extra-logical constants are subject to substitution, i.e. with respect to {'HUMAN', 'MORTAL', 'Socrates'}. In particular, substitution of 'PERSIAN' for 'MORTAL' produces an argu-

ment in which the premiss is true but the conclusion false, showing that the conclusion of this parallel argument need not be true when its premiss is true (since what is actually not the case is not necessarily the case). The same counter-example shows that the conclusion is not a consequence of the premiss with respect to any set of extra-logical constants that includes the predicate 'MORTAL'. On the other hand, since the conclusion is true, no substitution solely for 'HUMAN' will produce a parallel argument with a true premiss and an untrue conclusion, so that we cannot so easily show that the conclusion does not follow with respect to the set {'HUMAN'}. Here one needs to fall back on intuitive judgments of necessity, looking for a substitution for 'HUMAN' on which the premiss, though true, clearly does not necessitate the truth of the conclusion. For example, it is true that Socrates weighs more than a kilogram, but intuitively it is not necessary that Socrates is mortal if Socrates weighs more than a kilogram. The name 'Socrates' might for example refer to a large boulder, one that weighs more than a kilogram, but boulders are not mortal: since they are never alive, they never die. A similar reflection shows that the conclusion does not follow with respect to the set {'HUMAN' 'Socrates'}, since we can substitute a name of the aforesaid boulder for the name 'Socrates'. The remaining option is that the conclusion follows with respect to the set {'Socrates'}. Here we find not only that no substitution on 'Socrates' produces an argument with a true premiss and an untrue conclusion, but also that it is plausible to hold, in a way that it was not when we substituted for 'HUMAN', that, if the parallel argument has a true premiss then the conclusion must be true. That is, it is not just true as a matter of fact that, if someone is human, that individual is mortal, but it is a matter of necessity. Intuitively, this necessity is not logical, since there is no specifically logical inconsistency in supposing that a particular human being is immortal. Nor does the necessity seem semantic, since the postulation of an immortal human being, say in a work of science fiction, does not seem to involve a confusion about the meaning of terms, in contrast to the way in which the postulation of a married bachelor would involve semantic confusion. Rather, the necessity seems to be physical, or more specifically physiological. Human beings inevitably undergo a process of aging that eventually results in death due to failure of one or more of their life-support systems (circulatory, respiratory, excretory, etc.) if they do not die earlier from some other cause.[4]

[4] At least, so we suppose. Research on aging may lead to techniques of preventing human aging, in which case human immortality would become physiologically possible. But the "may" here is epistemic. At the moment, as far as we know, it is physiologically inevitable that every human dies.

The need to appeal in applications of condition (F″) to intuitive judgments of necessity is a weakness, since one person may come to a different judgment than another as to whether a particular conditional is necessary. Without stated criteria of necessity, it is impossible to resolve such differences of intuitive judgment rationally, except by inviting the disputants to reconsider their judgments or to take notice of the considered judgments of others about the necessity of the conditional in question. Tarski solved this problem by abandoning the requirement that truth-preservation be necessary. His model-theoretic conception of logical consequence simply specifies that every model (i.e. true interpretation) of the input sentences is also a model (true interpretation) of their logical consequence. Interpretations are constructed with reference to the world as it is, not to the world as it might be.

In *The Concept of Logical Consequence* (1990), John Etchemendy objected that Tarski's reduction of logical consequence to the simple truth of a universal generalization both undergenerates and overgenerates consequences. Even where it gives the right result, he claimed, it does so for the wrong reason. Etchemendy even accused Tarski of committing what he called "Tarski's fallacy", inferring from the necessary truth of a conditional the necessary truth of its consequent given the truth of its antecedent. Specifically, Tarski claims (2002/1936, pp. 186–187) that, if a sentence follows logically in his sense from true sentences, then it must be true. Rephrased in contemporary terms, the claim would be that a sentence that is true on every interpretation on which one or more sentences are true must be true on any interpretation on which the latter sentences are true. Or, to put it in the form of an argument:

> Sentence X is true in every interpretation in which the sentences of class $\mathcal{K}$ are true.
>
> Therefore, if the sentences of class $\mathcal{K}$ are true in an interpretation, then the sentence X must be true in that interpretation.

It is not obvious that this argument is valid, since its premiss is assertoric and its conclusion is apodictic. What licenses the transition from a claim about how things are as a matter of fact to how things must be? Defenders of Tarski's claim, such as Gila Sher (1996), have argued that, because all the extra-logical constants in the sentences are subject to reinterpretation, and variation of the domain is possible, the absence of a counter-interpretation is not just a matter of empirical fact, but a matter of logical necessity. Sher's argument for this claim depends on an appeal to set theory, which thus becomes in a certain sense prior to logic.

It is thus possible to defend the claim, ubiquitous in contemporary work in logic, that absence of a counter-interpretation is a matter of necessity and not just a matter of fact.

What about a similar claim for extensions of the model-theoretic conception to non-logical consequence?

4. Revision and expansion of substitutional, formal and model-theoretic conceptions of consequence

In previous work (Hitchcock 1998), I proposed a revision of the existing generic conception of logical consequence and an extension of the revised generic conception to cover what I there called, following George (1972), 'enthymematic consequence'. In the present article I shall review and then modify that proposal, in the process answering some questions left open in its concluding section.

I begin by distinguishing five specific conceptions of logical consequence that one can find in the literature.[5]

1. According to the *deducibility conception*, a sentence is a logical consequence of one or more sentences if and only if it can be deduced from them in a formal system. The deducibility conception is usually taken to be parasitic on the model-theoretic conception, in the sense that the soundness of a formal system is proved by treating the model-theoretic criterion of logical consequence as the "gold standard" and showing that any sentence deducible from given sentences using the rules of the formal system does follow from them in the model-theoretic sense: if the sentence is deducible, then there is no interpretation on which it is untrue when the given sentences are true. Likewise, the completeness of a formal system is shown by proving that any sentence of the formal language deducible from one or more sentences is true in any interpretation that makes true the sentence or sentences from which it is deduced. The deducibility conception can however be taken as basic if one takes the meaning of a sentence to be what it implies, as proposed by Gentzen (1969/1935) in his formulation of natural deduction systems and sequent calculi with a pair of rules for each logical constant, a so-called "elimination rule" indicating what one may deduce from a sentence in which that constant is the main logical operator and a correlative "introduction rule" indicating what one may deduce such

[5] The description of these five conceptions and my remarks about them incorporate material from pages 20–24 of (Hitchcock, 1998).

a sentence from. Gentzen's proposal has been elaborated and extended from logical constants to all terms by Wilfrid Sellars (1953) and Robert Brandom (1994, 2000) in what Brandom calls "inferential semantics". We will return to the Sellars-Brandom proposal later.

2. According to the *modal conception*, articulated for example by Stephen Read (1994), an argument's conclusion follows logically from its premisses if and only if there is no possible situation where the premisses are true and the conclusion untrue. The modal conception is identical to the conception of consequence as necessary truth-preservation identified at the beginning of the present article. Proponents of this conception are distinguished from proponents of the other four conceptions now being distinguished in their willingness to apply the conception directly rather than giving an account of it in terms of deducibility or some other relation. The modal conception can account for cases where a conclusion follows necessarily from given premisses, even though it does not follow formally. That is, it is not deducible from them in a formal system, nor does it follow if substitution or (re-)interpretation is allowed on all extra-logical constants. Thus the conclusion of the argument 'Iain is a bachelor, so Iain is unmarried' follows from its premiss, because the meanings of the terms 'bachelor' and 'unmarried' rule out any situation in which the premiss is true and the conclusion untrue. Read (1994, p. 257) explicitly argues against the claim that the conclusion of this argument only really follows when a 'suppressed premiss' that all bachelors are unmarried is made explicit. The modal conception requires clarification of what sense of 'possible' is involved. Its proponents seem to intend a sense which is relative to the meaning of an argument's component sentences. So their conception might be reworded more precisely as the notion that an argument's conclusion follows from its premiss(es) if their meaning is incompatible with there being a situation where the premisses are true and the conclusion untrue. If so, the modal conception coincides in its extension with the Sellars-Brandom proposal for an inferential semantics. However, it is possible to embrace the modal conception without making the deducibility relationships of a sentence semantically prior to its truth-conditions.

3. On the *substitutional conception*, a conclusion is a logical consequence of given premisses if and only if there is no substitution on its extra-logical constants which produces an argument with true premisses and an untrue conclusion. This conception stems ultimately from Bolzano (1972/1837), who according to George's reconstruction (1972, 1983) accommodated not only logical consequence but also enthymematic consequence, by allowing substitution on some but not all extra-logical constants. Bolzano's version

of the substitutional conception is immune to Tarski's objection that a language might lack names for objects that would constitute a counter-example, because Bolzano postulated a realm of abstract ideas on which substitutions were to be made. However, Quine has argued that the substitutional conception of logical truth is equivalent to the model-theoretic conception, provided that the language used for substitution is rich enough for elementary number theory (Quine 1970, pp. 53–55). Presumably his argument would apply as well to a comparison between the substitutional and the model-theoretic conceptions of logical consequence.

4. On the *formal conception*, a conclusion follows logically from given premisses if and only if the argument is an instance of a form of argument which has no instances with true premisses and an untrue conclusion. A form of argument is a linguistic schema which includes at least one meta-linguistic variable but no extra-logical constants and from which an argument can be derived by replacing all occurrences of each variable with the same extra-logical constant or grammatically parallel complex content expression. The formal conception is open to the same objection from the possible poverty of a language as the substitutional conception, and can make use of the same reply.

5. On the *model-theoretic conception*, a sentence X follows logically from given sentences if and only if every true interpretation of those sentences is also a true interpretation of the sentence X. As pointed out earlier, this conception is standard in contemporary work in formal logic.

All five conceptions give rise to two paradoxes, which are in fact generic problems with the conception of the consequence relation as one in which it is impossible for the premisses to be true and the conclusion untrue. If the word 'and' in this standard conception is construed as expressing truth-functional conjunction, then this conception implies that any conclusion at all follows from premisses which cannot all be true: if it is impossible for the premisses to be true, then it is *a fortiori* impossible for the premisses to be true and the conclusion untrue. Thus the sentence 'Amsterdam is the capital of Canada' would follow from the sentences 'There are living organisms beyond the planet earth' and 'There are no living organisms beyond the planet earth'. Intuitively, however, it does not follow, since the sentences about extra-terrestrial life have nothing to do with whether Amsterdam is the capital of Canada. The medieval rule of inference *ex falso quodlibet* ('from a falsehood anything follows') should be rejected. Similarly, the standard generic conception implies that any conclusion which must be true (i.e. cannot be untrue) follows from any premisses whatever: if it is impossible for the conclusion to be untrue, then it is *a fortiori* im-

possible for the premisses to be true and the conclusion untrue. Thus the sentence 'whenever it is raining, it is raining' would follow from the sentence 'The Hague and Amsterdam are capitals of the Netherlands'. Intuitively, however, it does not follw, since the sentence about the capitals of the Netherlands has nothing to do with the weather. The medieval rule of inference *ex quolibet verum* ('from anything a truth follows') should likewise be rejected.[6]

One could avoid these paradoxes by adding two requirements for consequence, that it is possible that all the premisses are true and that it is possible that the conclusion be untrue. This strategy, however, would introduce new paradoxes, by barring a set of sentences that cannot all be true from having any consequences and barring any sentence that must be true from being a consequence of any set of sentences. Intuitively, impossibilities do have consequences, and necessities can be consequences. For example, any sentence is a consequence of itself, even if it cannot be true or must be true. To avoid the new paradoxes, one needs to introduce the concept of a content expression, which I first used in (Hitchcock 1985). A content expression is an expression in a sentence that can be replaced by an extra-logical constant without loss of grammaticality. Content expressions may themselves be extra-logical constants, in which case they are atomic content expressions. Otherwise they are molecular content expressions. A whole sentence is a content expression, assuming that one's language possesses sentence constants. A conjunctive predicate like 'square and circular' is a content expression. And so forth. We also need the concept of a set of content expressions that exhausts the extra-logical constants in a set of sentences, in the sense that replacement of these content expressions in the sentences in question with metalinguistic variables produces a set of sentence schemata in which there is no extra-logical constant (cf. Hitchcock 1998, pp. 25–26).

With the concept of a content expression, we can redefine the substitutional, formal and model-theoretic conceptions of logical consequence so as to avoid both pairs of paradoxes.

3′. On the *revised substitutional conception*, a sentence X is a logical consequence of the sentences of the class $\mathcal{K}$ if and only if there is an exhaustive set of content expressions in these sentences on which no uniform substitution produces an untrue sentence X' and a class $\mathcal{K}'$ of true sentences, at least one such substitution produces a class $\mathcal{K}''$ of true sentences, and at least one such substitution produces an untrue sentence X''.

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[6] The preceding paragraph summarizes and adapts (Hitchcock 1998, pp. 24–25).

4′. On the *revised formal conception*, a sentence X is a logical consequence of the sentences of the class $\mathcal{K}$ if and only if they are instances of a set of sentence schemata in which there are no extra-logical constants and for which no instance consists of an untrue sentence X' and a class $\mathcal{K}'$ of true sentences, at least one instance includes a class $\mathcal{K}''$ of true sentences, and at least one instance includes an untrue sentence X'''. This conception is essentially that advanced by Smiley (1959, p. 240).

5′. On the *revised model-theoretic conception*, sentence X is a logical consequence of the sentences of the class $\mathcal{K}$ if and only if there is a an exhaustive set of content expressions in these sentences for which no interpretation produces an untrue sentence X' and a class $\mathcal{K}'$ of true sentences, at least one interpretation produces a class $\mathcal{K}''$ of true sentences, and at least one interpretation produces an untrue sentence X'''. The concept of an interpretation can be redefined so that interpretations assign objects to content expressions as wholes, or alternatively one can allow replacement of molecular content expressions in the set by extra-logical constants of the same grammatical type and apply the model-theoretic definition to the sentences thus constructed.[7]

All three conceptions imply a relevance condition of topical overlap between implying sentences and implied sentence. That is, if the implied sentence X contains an extra-logical constant, there is at least one extra-logical constant that occurs both in the sentence X and in at least one sentence of the class $\mathcal{K}$.[8]

Development of these revised conceptions of logical consequence permits their natural extension to non-logical consequence, simply by dropping the requirement in each definition that the set of content expressions be exhaustive. Logical consequence would then be just the special case in which the set with reference to which the definition is met subjects all the extra-logical constants in the sentences, either directly or by their inclusion in a molecular content expression in the set, to substitution or replacement by another instance or (re-)interpretation. It should be noted that the additional clauses in the definitions, added to rule out the paradoxes of *ex falso quodlibet* and

[7] These revised conceptions adapt the conceptions found in Hitchcock (1998, p. 26), with the additional constraint that the set of content expressions is exhaustive.

[8] For a proof with respect to Bolzano's substitutional conception, applied to the language of classical propositional logic, see George (1983). The qualification that the implied sentence contains an extra-logical constant is needed to accommodate cases where the consequence relation obtains but the implied sentence contains no extra-logical constants. For example, the sentence 'there is at least one object' follows from the sentence 'there are at least two objects' on any of the three revised conceptions, even though it contains no extra-logical constants.

ex quolibet verum, automatically rule out so-called 'material implication' (the medievals' *consequentia materialis*) as a consequence relation. For, if there are extra-logical constants in the sentence X or the sentences of the class $\mathcal{K}$, then the mere fact that we do not have the sentences of $\mathcal{K}$ true and sentence X untrue is not sufficient for consequence on any of the revised conceptions. For, if the set of content expressions with respect to which the criterion for consequence is to be applied is empty, then either the clause requiring X to have an untrue parallel will fail or the class requiring the sentences of the class K to have parallel sentences that are all true will fail. That is, the only parallel in this case for X is X itself and the only parallel sentences of the sentences of the class $\mathcal{K}$ are those sentences themselves. But, by hypothesis, either X is true or not all the sentences of the class $\mathcal{K}$ are true, or both.

The revised conceptions of consequence thus make it easier to test for non-logical consequence. It is necessary to consider only sets of content expressions that include at least one expression common to a premiss and the conclusion of an argument. As a matter of heuristics, the best strategy to use in seeking consequence-implying content expressions in an argument is to generalize as broadly as possible with respect to all the maximal repeated content expressions, whether these are repeated within the premisses or between a premiss and a conclusion. If the conclusion turns out not to follow with respect to this set, one can then try narrower generalizations or smaller sets of content expressions or less maximal content expressions, always retaining at least one content expression common to a premiss and a conclusion (Hitchcock 1985, 1998).

5. The problem of contingent non-trivial truth-preservation

With this revised and expanded conception of consequence in place, we can return to the question posed earlier: Is consequence a mere matter of fact or also a matter of necessity?

The answer is in fact quite obvious. Not only on the revised and expanded model-theoretic conception just articulated, but also on the parallel substitutional and formal conceptions, there are cases where a sentence X is a consequence of the sentences of some class $\mathcal{K}$ as a mere matter of contingent fact and not as a matter of necessity. For example, no president of the United States of America in the first 230 years of its existence was a woman. This fact is contingent, but it nevertheless underwrites a consequence relation between the sentence 'Abraham Lincoln was president of the United

States of America for a period during the first 230 years of its existence' and the sentence 'Abraham Lincoln was not a woman'. For, given the contingent fact, no substitution on the name 'Abraham Lincoln' will produce parallel sentences with the first untrue and the second true; furthermore, the substitution of 'Hubert Humphrey' for 'Abraham Lincoln' produces an untrue parallel to the first sentence and the second sentence is already true. Similarly for the sentence schemata 'x was president of the United States of America for a period during the first 230 years of its existence' and 'x was not a woman', and for (re-)interpretations of the name 'Abraham Lincoln'.

Does the contingency of the revised and expanded conception of consequence matter? After all, a contingent fact gives just as strong an assurance of truth-preservation as a necessary connection. Assurance is weakened only if there is some doubt about the truth of the inference-underwriting sentence, but doubt is possible with respect to necessary truths as well as with respect to contingent ones.

Additional support for a consequence relation that can obtain merely contingently comes from the strikingly close match between the covering generalization that underwrites each such consequence and the supposed 'unstated premiss' that skilled argument analysts intuitively supply. For example, application of the revised and expanded conception of consequence to arguments traditionally regarded as incomplete Aristotelian syllogisms will generate a covering generalization, with respect to the term shared between premiss and conclusion, that is logically equivalent in all cases to a sentence whose addition as a premiss would transform it into a complete Aristotelian syllogism. As another example, the revised and expanded conception of consequence was easily applied to all but one of a sample of 50 arguments in scholarly books selected by random methods, as well as to all of a sample of 37 arguments uttered in phone calls to radio and television talk shows, also selected by random methods (Hitchcock 2002, forthcoming).[9]

Furthermore, reinterpretation of a supposed unstated premiss as a claim underwriting a consequence relation explains why the supposed unstated premiss is typically a covering generalization of the stated argument, or something from which such a covering generalization can be derived, rather than the "logical minimum" (Van Eemeren and Grootendorst 1992,

[9] In testing the applicability of my conception of good inference to actual arguments that scholars and callers to talk shows advance, I used an even more expanded conception that allowed for probabilistic and presumptive inferences, underwritten respectively by for-the-most-part and *ceteris paribus* covering generalizations. In the present article, I do not discuss this further expansion of the concept of consequence.

pp. 64–67) whose addition as a premiss would make the stated argument formally valid. That logical minimum is the "associated (material) conditional" (Hitchcock 1985) of the argument, the ungeneralized negation of the conjunction of the conjunction of the premisses and the negation of the conclusion. Someone who reasons to a conclusion or adduces evidence as conclusively supporting a claim does more than rule out the combination of true reasons (evidence) and untrue conclusion (claim). Such a person makes a commitment to the same sort of inference in parallel cases, as is shown by the strategy of "refutation by logical analogy", constructing a parallel argument with true premisses and a false conclusion. Thus the person is implicitly using a general rule of inference, which is typically not purely formal. If Mary's mother tells her, "You can't have dessert, because you didn't eat your peas", Mary can quite legitimately reply: "But Johnny got dessert, and he didn't eat his peas." It would be "illogical" for the mother to reply, "I'm talking about you, not about Johnny". She has committed herself to the form of argument, 'x can't have dessert, because x did not eat x's peas', and she must explain why this form of argument does not apply to Johnny when it applies to Mary.

It turns out, however, that acceptance of merely contingent consequence relations has counter-intuitive implications in particular cases. On any of the revised and expanded conceptions of consequence, the sentence 'Napoleon was imprisoned on Elba' follows from the sentences 'Napoleon ruled France' and 'Napoleon was born in Corsica'. For, since Napoleon has been (I am assuming) the only Corsican-born ruler of France, and he was in fact imprisoned on Elba, and many other people have not been imprisoned on Elba, there is no re-interpretation of the name 'Napoleon' on which 'Napoleon was imprisoned on Elba' is untrue but 'Napoleon ruled France' and 'Napoleon was born in Corsica' are true, even though there is a re-interpretation of 'Napoleon' on which 'Napoleon was imprisoned on Elba' is untrue and there is a re-interpretation of 'Napoleon' (namely, the trivial "re-interpretation" on which 'Napoleon' refers to Napoleon) on which 'Napoleon ruled France' and 'Napoleon was born in Corsica' are true. But intuitively, 'Napoleon was imprisoned on Elba' does not follow from the sentences 'Napoleon ruled France' and 'Napoleon was born in Corsica'. The mere fact that Napoleon was born in Corsica and ruled France, we might say, does not count as evidence that he was imprisoned in Elba, does not entitle us to conclude that he was imprisoned in Elba.[10]

[10] The reflections in the preceding paragraph were stimulated by an article by Robert Pinto (2006) and by subsequent correspondence with Pinto and James B. Freeman.

An initial response to this difficulty might be to move back from the truth-based conception of consequence to the concept of necessity that it was trying to explicate. Such a strategy would force us to abandon the substitutional and model-theoretic versions of the revised and expanded conception of consequence, and to focus on the formal version. For substitutions and (re-)interpretations shed no new light on whether the clauses of the definition hold necessarily or merely contingently. With the formal version, however, we can ask whether the non-existence of an instance with untrue X and true sentences of a class $\mathcal{K}$ is a matter of necessity, by asking counter-factually whether there could be such an instance, even if as a matter of fact there is none. That is, we would be testing whether the covering generalization is lawlike rather than accidental, in a way that would support counter-factual inferences. We can see immediately that our two examples with contingently true generalizations would fail this test. If Walter Mondale had been elected president in 1984 and had died in office, with the result that his running mate Geraldine Ferraro became president of the United States of America, it would not be true that Geraldine Ferraro was not a woman. Similarly, we could tell a variant story of the history of France in which it had a ruler who was born in Corsica but was never imprisoned on Elba; indeed, if by chance some other ruler of France than Napoleon was born in Corsica, it is most unlikely that he would have been imprisoned on Elba.

This strategy takes us back to the difficulty of deciding when non-trivial truth-preservation is a matter of necessity. Sellars (1953) and Brandom (1994, 2000) propose to construe all such necessity as a matter of meaning, and in Brandom's case to get rid of "representational semantics" based on the concept of truth in favour of "inferential semantics" based on the concept of necessary inference. This approach accommodates our practices of reasoning and arguing much better than a formal or logical conception of consequence. But it does so at a cost. First, consequence relations that are most naturally understood as grounded in some physical necessity (such as an objects' exercise of gravitational attraction being a consequence of its mass) or legal necessity (such as a person's being at least 35 years of age being a consequence of the person's having been elected president of the United States of America) are implausibly treated as grounded in the meanings of the related sentences.[11] Second, having discarded representational seman-

[11] In the preceding sentence, I use the word 'consequence' in an inferential rather than a causal sense. To be a consequence of something in the inferential sense is to be legitimately inferable from it.

tics, Brandom is left with nothing to ground our inferential practices except our inferential practices. This strategy flies in the face of our ordinary way of justifying our inferences. If I argue that John F. Kennedy must have been at least 35 years old by the end of 1960, since he was elected U.S. president in November 1960, and you ask me how that follows, I will most naturally point to the provision in section 1 of Article II of the U.S. constitution that "neither shall any person be eligible to that office [of president – D. H.] who shall not have attained to the age of thirty-five years". It is the fact of this constitutional requirement that grounds the inferential practice that I exemplify in this situation. It would be quixotic to treat the clause in the constitution as a product of our inferential practices.

If we hold on to a representational semantics and treat our inferential practices as grounded in that semantics, then we can rule out merely contingent consequence relations by requiring that the schema in virtue of which X is a consequence of the sentences of some class $\mathcal{K}$ have no counter-instances not only as a matter of fact but also necessarily. We can leave open-ended the types of necessarily true generalizations that can underwrite a consequence relation, except that we exclude deontic necessities. Any type of necessity that implies actuality will do. Thus the necessity of a true covering generalization that underwrites a consequence relation may be logical, semantic, physical, mathematical, biological, constitutional, and so forth.

By requiring such a true covering generalization to be lawlike, supporting counter-factual instances, have we given up too much? Counter-examples in the opposite direction, where the only true covering generalizations are merely contingent but a consequence relation seems to obtain, come to mind. The sentence "Jesus was mortal" seems intuitively to follow from the sentence "All humans are mortal". But the minimal non-trivially true covering generalization for an argument from "All human are mortal" to "Jesus is mortal" is the generalization "If all humans are F, then Jesus is F", which is logically equivalent to the sentence "Jesus is human".. And the sentence "Jesus is human" is arguably contingent. Some Christian theologians may take it to be false, supposing that the divinity of Jesus is incompatible with his (full) humanity. Or perhaps Jesus was an alien, and lacked at least one property shared by all human beings.

If such counter-examples are persuasive, they raise the challenge of discovering a principled intermediate position between a very broad consequence relation groundable in merely contingent true covering generalizations and a somewhat narrower consequence relation that requires an inference-licensing covering generalization to be true as a matter of necessity.

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STUDIES IN LOGIC, GRAMMAR AND RHETORIC 16 (29) 2009

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FORMAL MODELS FOR PERSUASIVE ASPECTS OF ARGUMENTATION

Abstract: The aim of the paper is to provide a comprehensive survey of logical models for the persuasive argumentation. We show how different aspects of persuasion can be described formally. In particular, we present the frameworks representing protocols of persuasive dialogs, rhetorical tools such as threats, rewards and appeals, argumentation changing beliefs vs. argumentation changing behavior, interaction among goals, result and success in persuasion, and finally – persuasiveness and nonverbal arguments.

Keywords: protocols of dialog, emotional appeals, practical reasoning, success of persuasion, nonverbal arguments

1. Introduction

Among various processes of argumentation, we can distinguish logical arguments and persuasive (rhetorical) arguments. The aim of logical argumentation is to support a given statement i.e. to prove a claim, while the aim of **persuasive argumentation** is to influence an audience, i.e. to change its beliefs, attitudes or behavior. Obviously, supporting a statement should obey the general rules or conditions of valid justification, while persuading – is absolutely opposite – its effect depends on the subjective, and thus upredicatable, judgement of its audience.

In consequence, **formal models** pay much attention to representation of logical argumentation and little to rhetorical one. As long as no general rules governing the phenomenon can be found, there is no possibility for its formal description. On the other hand, unlike formal models **psycho-**

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logical models prefer persuasive to deductive argumentation since it is closer to the social practice (an excellent review of these models is given in (O'Keefe 2002)). One of the most influential contemporary approach to representing persuasion is Elaboration Likelihood Model proposed by Petty and Cacioppo (1986).[1] According to ELM there are two different processes which underly persuasion represented as central route and peripheral route to persuasion. Which one is activated depends on the degree of elaboration (issue-relevant thinking) in which the audience engages. In the central route, the persuasion's success is the result of its systematic consideration of the issue-relevant information (the arguments' quality). The peripheral route uses cognitive shortcuts such as simplifying decision rules. The success may be a result of the persuader's credibility or the audience's emotions.

The third type of models is provided by **informal logic**. Their main feature is an attempt to loosen the assumptions made by the formal logic and to bring logical models of argumentation closer to the every-day practice. It investigates rational (critical) argumentation which can be viewed as combination of logical approach with the elements of rhetorical or psychological account. That is, the informal logic tries to extend the model of the logical argumentation with the aspects specific for a real life communication. Nevertheless, the informal logic has still a different perspective than rhetoric itself, i.e., it is focused on different criteria of argument's evaluation – on the rationality of argumentation and not on its effectiveness. Moreover, informal logic considers some elements of ELM, e.g., the appeal to expert opinion or appeal to fear can be treated as the equivalents of some mechanisms of peripheral route, i.e. the communicator credibility and the fear arousal.

The aim of this paper is to show how different persuasion aspects included into the argumentation model by the informal logic were **again adopted** by various formal models. As noted above, since logical description of these aspects is an extremely difficult task, there are not a lot of such proposals. Thus, this becomes all the more significant and interesting to examine those several attempts which take up this challenge.

The remainder of this paper is structured as follows. Each section describes proposal of how to represent different aspects of persuasion such as protocols that govern the course of persuasion dialogs (Section 2), emotional

[1] Observe that the notion of persuasion is broader than the notion of persuasive argumentation. In this paper, we are interested in persuasion as long as its aspects refer to the argumentation process.

appeals like threats and rewards (Section 3), practical arguments aiming at the influence on audience's actions (Section 4), success as the measure of achieving goals in the real result of persuasion (Section 5), the gradation of persuasion success and nonverbal arguments (Section 6). The sections start with general informal description of a given aspect. Then, its formal model is presented. Throughout the paper, we make some changes in the original symbols for the needs of consistency of the notation.

2. Protocols of persuasion dialogs

Initially protocols of persuasion dialogs were studied within philosophical logic and argumentation theory (e.g. Hamblin 1970, Mackenzie 1979). An important moment was a work by Walton and Krabbe (1995). They identified a number of distinct **dialog types** used in human communication: persuasion, negotiation, inquiry, information-seeking, deliberation and eristic dialogs. Their specification was determined for criteria such as initial situation of a dialog and its main goal. Specifically, persuasion is defined as a dialog which initial situation is a conflict of opinion and the main goal is to resolve it by verbal means. This approach is related to the dialectical account of argumentation. Later, these concepts were adopted by theories in computer science and computational models of persuasion dialog.

The **protocols** determine the rules that the participants of a persuasion dialog must obey to resolve the conflict. In particular, such a protocol may regulate what utterances the participants can make and under which conditions, what are the effects of their utterances on their propositional commitments, when a dialog terminates and what is the outcome of the dialog.

In the field of multi-agent systems persuasion dialogs are incorporated into models of agents' interactions. In order to achieve given goals, intelligent agents often need to interact with other agents. The main modes of interaction where persuasion can be applied are information seeking, deliberation or negotiation. In these cases participants may disagree about relevant factual matters, credibility of an information resource, effects of plans or actions etc. and need to resolve the conflict to fulfil their goals.

L. Carlson (1983) proposes a **game-theoretic approach** to dialogs, in which speech acts are viewed as moves in a game and rules for their appropriateness are formulated as rules of the game. Almost all the works

on formal dialog systems follow this approach and two aspects are discussed: rules of the game (which moves are allowed) and strategies and heuristics for individual players (how to play the game successfully). The critical review of the persuasion dialog systems is presented in (Prakken 2006). H. Prakken compares approaches introduced by J. Mackenzie (1979), D. Walton and E. Krabbe (1995), L. Amgoud, N. Maudet, S. Parsons, P. McBurney, M. Wooldridge (Amgoud, Maudet & Parsons 2000, McBurney & Parsons 2002, Parsons, Wooldridge & Amgoud 2002, Parsons, Wooldridge & Amgoud 2003), H. Prakken (2005) and others, and shows the expressiveness and strictness of their models. On the basis of his work we describe the main features and elements of persuasion dialogs.

Let Agt be a set of **participants** of a dialog (agents). To describe a topic of the conversation, the participants use **topic language** $\mathcal{L}_t$, which is a language of some logic L. This logic may or may not be monotonic and may or may not be argument-based. The only assumption is that $\mathcal{L}_t$ is closed under the classical negation. Sometimes in the set $\mathcal{L}_t$ a subset K called the **context** is distinguished. The context contains fixed knowledge which must be respected during the dialog, e.g., relevant laws in a legal dispute.

The persuasion dialog is initiated by conflict of opinion about one or more topics $T \subseteq \mathcal{L}_t$ and the **dialog purpose** is to resolve this conflict, i.e. to lead to a situation in which all parties share the same point of view on the topic. Thereby the participants can play different roles. Suppose that $t \in \mathcal{L}_t$ is a conflict topic. Then, $prop(t) \subseteq Agt$ is a set of **proponents**, i.e., all participants with a positive point of view towards t, and $opp(t) \subseteq Agt$ is a set of **opponents**, i.e., all participants with a doubtful point of view towards t. For any t, the sets $prop(t)$ and $opp(t)$ are disjoint but do not necessarily jointly exhaust Agt. So in the set Agt may be also participants which are neutral towards t.

Furthermore, a participant i may or may not have a, possibly inconsistent, belief base $\Sigma_i \subseteq 2^{\mathcal{L}_t}$ which may or may not change during dialogs. The most important attribute of every participant i is, possibly empty, set of **commitments** $C_i(d) \subseteq \mathcal{L}_t$ which usually changes during a dialog d. Commitments of a participant are publicly declared points of view about some topics and may or may not coincide with the participant's beliefs.

Agents communicate using **communication language** $\mathcal{L}_c$. Formally **dialog** is defined as a sequence from $\mathcal{L}_c$. The set of all dialogs is denoted by $M^{\leq\infty}$ and the set of all finite dialogs is denoted by $M^{<\infty}$. The most common speech acts applied in dialogs are:

- *claim* φ – the speaker asserts that φ is the case,
- *why* φ – the speaker challenges that φ is the case and asks for reasons why it would be the case,
- *concede* φ – the speaker admits that φ is the case,
- *retract* φ – the speaker declares that he is not committed (any more) to φ,
- φ *since* S – the speaker provides reasons why φ is the case,
- *question* φ – the speaker asks another participant's opinion on whether φ is the case.

As an example of a persuasion dialog let us consider one quoted from (Prakken 2006).

Paul: My car is safe. (*making a claim*)
Olga: Why is your car safe? (*asking grounds for a claim*)
Paul: Since it has an airbag. (*offering grounds for a claim*)
Olga: That is true (*conceding a claim*) but this does not make your car safe. (*stating a counterclaim*)
Paul: Why does that not make my car safe? (*asking grounds for a claim*)
Olga: Since the newspapers recently reported on airbags expanding without cause. (*stating a counterargument by providing grounds for the counterclaim*)
Paul: Yes, that is what the newspapers say (*conceding a claim*) but that does not prove anything, since newspaper reports are very unreliable sources of technological information. (*undercutting a counterargument*)
Olga: Still your car is not safe, since its maximum speed is very high. (*alternative counterargument*)
Paul: OK, I was wrong that my car is safe. (*retracting a claim*)

Every utterance $\varphi \in \mathcal{L}_c$ can influence participants commitments. Results of utterances are determined by **effect rules** which are specified as functions

$$C_i : M^{<\infty} \to 2^{\mathcal{L}_t}$$

for a participant $i \in Agt$. For example if in the above dialog we assume that stating a claim "My car is safe" by Paul is denoted by d then $C_{Paul}(d) = = \{safe\}$. This means that after a sequence of utterances d Paul becomes committed to this claim.

Legal moves at each stage of a dialog are defined by **protocol**, which is a function

$$P : 2^{\mathcal{L}_t} \times D \to 2^{\mathcal{L}_c}$$

where $D \subseteq M^{<\infty}$ is a set of **legal finite dialogs**. For instance, $P(K, d) = = \{m_1, m_2, m_3\}$ where K is a context, d – claiming by Paul "My car is

safe", and the move m_1 is Olga's question "Why is your car safe?", m_2 is Olga's claiming "Your car is not safe", m_3 is Olga's concede "Your car is safe". That is, on the stage of the dialog d the possible moves that Olga has are $m_1,\ m_2,\ m_3$. In dialog systems for every speech act a set of acceptable **replies** is defined (see Table 1).

Table 1

Speech acts and typical replies

Speech act	Replies
claim φ	*why* φ, *claim* $\neg\varphi$, *concede* φ,
why φ	φ *since* S (alternatively: *claim* S), *retract* φ
concede φ	
retract φ	
φ *since* S	*why* ψ $(\psi \in S)$, *concede* ψ $(\psi \in S)$
question φ	*claim* φ, *claim* $\neg\varphi$, *retract* φ

For the example dialog, used speech acts and possible replies are depicted in Figure 1. The structure of the dialog shows key features of a persuasion dialog. Notice that participants of a dialog may exchange arguments and counterarguments or claim as well as challenge, concede or retract some propositions.

Announced arguments can be **attacked**. According to J. Pollock's theory about rebutting and undercutting counterarguments (Pollock 1995), the attack can be performed in two ways: (1) by giving argument for the opposite conclusion, (2) by saying that in the given circumstances the premises of the argument do not support its conclusion. For example Paul says "My car is safe since it has an airbag". Then Olga can reply giving argument for opposite conclusion: "Your car is not safe since its maximum speed is very high" or saying that the premises do not support the conclusion: "That is true that your car has an airbag but this does not make your car safe". The second situation is related to the fact that in natural language some parts of arguments can be implicit. That is, Paul may say that his car is safe since it has airbag while having in mind that cars with airbags are usually safe. Observe that the participants may give replies for arguments and counterarguments immediately or may postpone their replies or return to earlier choices and provide alternative arguments.

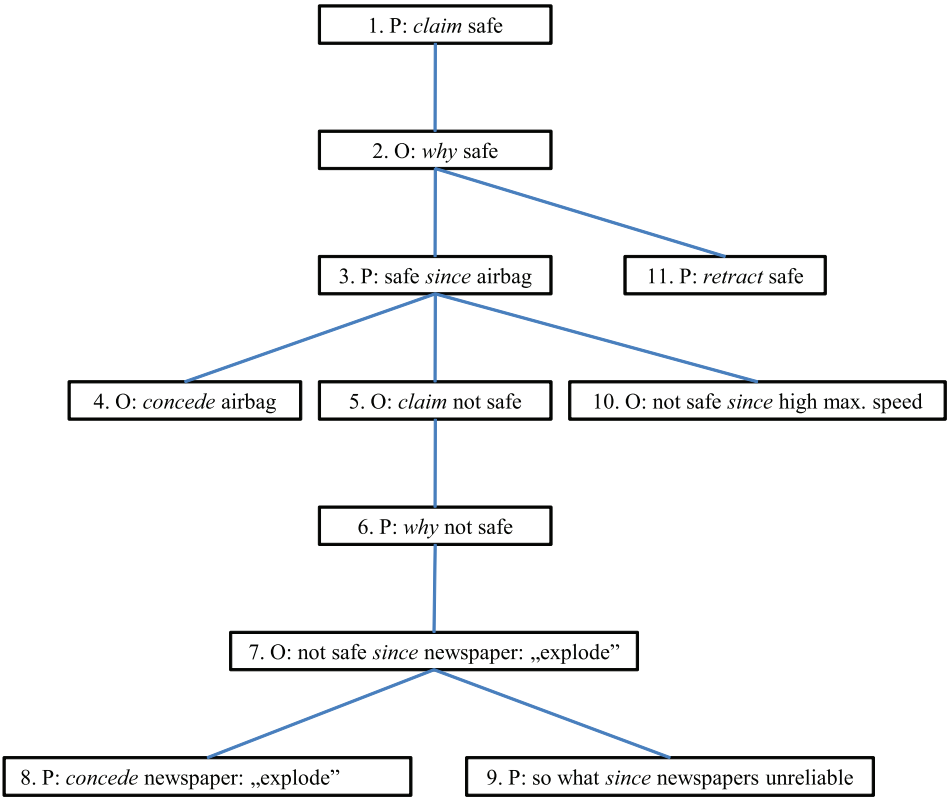

Figure 1. Reply structure for the example dialog

A dialog **terminates** in a situation where no next move is legal or some specific conditions hold. Moreover a **turntaking function** is defined. It determines which player (or players) can move next. The outcome of a dialog is established by **outcome rules** O, which in persuasion dialogs fix the winner and the loser. More precisely, O consists of two functions win w and loss l:

$$w : D \times 2^{\mathcal{L}_t} \times \mathcal{L}_t \to 2^{Agt},$$

$$l : D \times 2^{\mathcal{L}_t} \times \mathcal{L}_t \to 2^{Agt}.$$

In the running example for terminated dialog d' the winner is Olga, $w(d', K, safe) = \{\text{Olga}\}$ and the looser is Paul, $l(d', K, safe) = \{\text{Paul}\}$.

The functions w and l satisfy the following conditions. For every legal finite dialog d, context K, and topic t it holds:

– $w(d, K, t) \cap l(d, K, t) = \emptyset$ – a participant can not be a winner and a looser at the same time,

- $w(d, K, t) = \emptyset$ iff $l(d, K, t) = \emptyset$ – there is no winner iff there is no looser,
- if $|Agt| = 2$, then $w(d, K, t)$ and $l(d, K, t)$ are at most singletons – if there are two players then both of them can not be winners and losers at the same time.

In persuasion dialogs it is assumed that at the start of dialog ($d = \emptyset$) commitments of proponents and opponents must tally with their points of view, i.e.:

- if $i \in prop(t)$ then $\overline{t} \notin C_i(\emptyset)$,
- if $i \in opp(t)$ then $t \notin C_i(\emptyset)$,

where the complement $\overline{t}$ of a formula t is $\neg t$ if t is a positive formula and t' if t is a negative formula $\neg t'$. Moreover, only one side (proponents or opponents) give up and the winner does not change its point of view:

- $w(d, K, t) \subseteq prop(t)$ or $w(d, K, t) \subseteq opp(t)$,
- if $i \in w(d, K, t)$ then
  - if $i \in prop(t)$ then $t \in C_i(d)$,
  - if $i \in opp(t)$ then $t \notin C_i(d)$.

On the basis of the above notions a **pure persuasion** is defined. A dialog system is for pure persuasion iff for any terminated dialog d it holds that $i \in w(d, K, t)$ iff

- either $i \in prop(t)$ and $t \in C_j(d)$ for all $j \in prop(t) \cup opp(t)$,
- or $i \in opp(t)$ and $t \notin C_j(d)$ for all $j \in prop(t) \cup opp(t)$.

Informally it means that after the dialog all participants share the point of view of the winner. Otherwise, i.e., if the outcome is not fully determined by the participant's point of view and commitments, a dialog is for **conflict resolution**. For example a proponent loses the dialog about t even if at termination he is still committed to t – like in a trial when a crime suspect is found guilty by a jury (the third party) even though he maintenances his innocence.

In this section we showed how persuasion is modeled within the game-theoretic framework for dialogs. In the next section we will discuss the proposal of representing the persuasive tools in negotiation.

3. Threats, rewards and appeals

Douglas Walton distinguishes three types of critical argumentation: deductive argument (such as Modus Ponens), inductive argument (probabilistic generalization) and plausible argument (such as appeal to expert opinion) (Walton 2006). He also describes some persuasive tactics of distraction in argumentation which are most often fallacious but still effective. Most of

them, including threats (argumentum ad baculum), fear or pity are classified as **emotional appeals**. Such peripheral means of persuasion seems to be extremely difficult for formal modeling, as they refer to the emotions which rely on unpredictable factors. In this section, we describe a formal model which addresses this challenge, i.e. the model of persuasive negotiation proposed by S. Ramchurn, N. Jennings and C. Sierra (2003).

Negotiation is understood as an exchange of proposals and counter proposals between a proponent and an opponent until either a mutually acceptable agreement is reached or one of the parties withdraws. **Persuasive negotiation** is a negotiation where proposals are supported by rhetorical arguments (threats, rewards or appeals). Their model consists of the following items:

- $i, j, ... \in Agt$ is a set of agents
- $A = \mathrm{I} \cup \mathrm{EA}$ is a set of **actions** available where
  - $ai_1, ai_2, \ldots \in \mathrm{I}$ are illocutionary acts, i.e. utterances or speech acts (Searle 1969)
  - $ae_1, ae_2, \ldots \in \mathrm{EA}$ are environment actions, i.e. performed on the environment of the agents
- S: $B^{Agt} \times \mathrm{W}$ is a set of **world states** where
  - B^{Agt}: $B^{i_1} B^{i_2} \times \ldots \times B^{i_{|Agt|}}$ is a set of possible mental states of all agents, where B^{i_n} is a mental state of an agent i_n
  - $\omega, \omega', \omega'', \ldots \in \mathrm{W}$ is a set of fully observable environmental states
- agents can make various **evaluations**:
  - $V^i : S \rightarrow [0, 1]$ is an evaluation function that indicates the desirability of a particular **state** assigned by an agent i
  - $EV^i : S \times A \rightarrow [0, 1]$ is an expected value of an **action**(s) to an agent in a given state
  - $T : Agt \times Agt \rightarrow [0, 1]$ is the **trust** between agents, i.e. the value of one agent assigned by the other; it has a value between 0 (no trust) and 1 (absolute trust)
- $p_1, p_2, \ldots \in \mathrm{P}$ are **proposals** exchanged in the negotiations; they suggest to perform some actions by a proponent and an opponent, defined as $p = (a^i, a^j)$, where $p \in \mathrm{P}$, $a^i \subseteq A$, $a^j \subseteq A$, and $i, j \in Agt$.

Among illocutionary acts, we can distinguish acts specific for negotiations and those specific for persuasion. The negotiation illocutions (I_{neg}) for a proposal $p \in \mathrm{P}$ are: $propose(i, j, p)$, $accept(i, j, p)$ and $reject(i, j, p)$. The **persuasive illocutions** specific to persuasive negotiations (I_{pers}) are: $threaten(i, j, p, th)$, $reward(i, j, p, rw)$, and $appeal(i, j, p, m)$ where $i \in Agt$ is a sender, $j \in Agt$ is a hearer, $th, rw \in A$ and $\mathrm{m} \in \mathrm{I}$. For example, an agent i can send to an agent j a proposal p which is a verbal threat th

to remove a privilege, a promise rw to give a bribe of 100 000 dollars or an appeal m to assert the mental state of the sender, i.e. m is $assert$(b) where b $\in B^i$.

What is interesting, in this model threats and rewards can be understood broader, i.e. as any kind of actions. If it is the illocutionary action as discussed above, the argument is **verbal**, e.g. while saying "I will kill you". If it is the environmental action, the argument becomes **nonverbal**, e.g. when threatening by showing a knife. An appeal is a slightly different type of rhetorical argument. It cannot be any action – it is always an illocution. The item being appealed to is a hearers belief about the state of the world. A sender may appeal to beliefs about a past promise, common practice or the hearers possible preferences and goals.

Each action a has pre-conditions that must be true before the action can be executed ($pre(a)$) and post-conditions that follow from its execution ($post(a)$). One of the important characteristics of the persuasive illocutions is that the sender anticipates what the hearer believes rather than is interested in the logical defeasibility or truth of the statements. The primary **precondition** for a persuasive illocution $\iota \in \mathrm{I}_{pers}$ to be sent is that the persuader i prefers the execution of the proposal in ι to its current state, i.e., for each $p \in \mathrm{P}$, $\{EV^i(s,p) > V^i(s)\} \subseteq pre(propose(i,j,p))$. The **post-condition** is that the hearer j believes that i prefers the proposal to be executed rather than staying in its current state s, i.e., $\{B^j(B^i(EV^i(s,p) > > V^i(s)))\} \subseteq post(propose(i,j,p))$.

The interesting part of this model is the attempt to **represent rhetorical means** in terms of specification of their pre- and post-conditions. Let $i,j \in Agt, th \in A$, $s \in S$, $p \in \mathrm{P}$. If $\iota = threaten(i,j,p,th)$, then:

1. the preconditions $pre(\iota)$ are:
   (a) $B^i(V^j(s) > EV^j(s,p))$ – a sender i must believe that a hearer j prefers a current state s than the execution of a proposal p,
   (b) $B^i(V^j(s) > EV^j(s,th))$ – i should believe that j can be threatened, i.e. that j prefers the current state than the execution of the threat,
   (c) $B^i(V^j(\delta(s,p)) > V^j(\delta(s,th))$, where $\delta(s,a) = s'$ (for $a \in \mathrm{A}$) is a transition between world states caused by an action a; the condition means that i must believe that the state after the execution of the proposal is more preferred by j than the state obtained after the threat,
2. the post-condition $post(\iota)$ is:
   (a) $B^j(B^i(V^j(s) > V^j(\delta(s,th))))$ – j believes that the persuader i believes that the current state is more preferred by j than the state achieved after the execution of the threat.

The preconditions of the threat are true in the example given in Figure 2a. The figure describes not the reality, but the beliefs of the proponent i about preferences of the audience j. The arrows represent the actions which can be proposals or rhetorical arguments. The numbers show evaluation assigned by the audience j to the states (number placed inside the circle in the figure) or to the actions performed (number placed on the arrows). The precondition (1a) is true since the current state s is evaluated as 0.5, and the execution of the action p is evaluated as 0.2 and, obviously, $0.5 > 0.2$. The precondition (1b) is true since j evaluates the current state s as 0.5 and the execution of the threat th as 0.4 and $0.5 > 0.4$. The last precondition (1c) is true since $\delta(s, p)$, i.e. the state reached from the current state after the execution of the proposal, is evaluated as 0.6 and $\delta(s, th)$, i.e. the state reached from the current state after execution of the threat, is evaluated as 0.3 and $0.6 > 0.3$. Intuitively, the preconditions mean that the persuader thinks that even though the audience doesn't want the proposal to be executed ($0.5 > 0.2$) and doesn't want the threat to be performed ($0.5 > 0.4$), the audience still prefers to end up in the state reached after the proposal ($\delta(s, p) = 0.6$) than in the state reached after the threat ($\delta(s, th) = 0.3$).

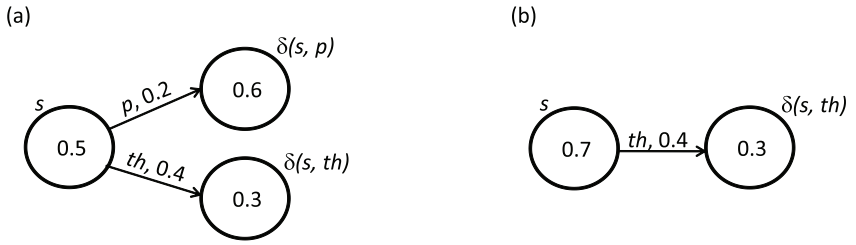

Figure 2. (a) The threat *th*'s preconditions: persuader's beliefs about audience's preferences on states and actions; (b) the threat *th*'s post-condition: the audience's opinion about the persuader's beliefs about preferences of the audience

The post-condition following execution of the threat is illustrated by Figure 2b. This time, the figure shows what the audience thinks about the beliefs of the proponent with respect to the audience's preferences. That is, the audience is convinced that the proponent believes that the current state is evaluated by the audience higher (0.7) than the state reached after the execution of the threat (0.3). Intuitively, the post-condition means that the audience assumes that the persuader believes that the audience doesn't want the threat to be executed ($0.7 > 0.3$).

Let $i, j \in Agt, rw \in A$, $s \in S$, $p \in$ P. If $\iota = reward(i, j, p, rw)$, then:

1. the preconditions $pre(\iota)$ are:
   (a) $B^i(EV^j(s,p) < V^j(s) < EV^j(\delta(s,p), rw))$ – a sender i should believe that the execution of a proposal is less preferred by j than the current state, and the current state is less preferred by j than the execution of the reward following the proposal,
   (b) $B^i(V^j(\delta(s,p)) < V^j(\delta(\delta(s,p), rw)))$ – i must believe that the state reached after the execution of the proposal is less preferred by j than the state reached after the execution of the reward (which followed the proposal),
2. the post-conditions $post(\iota)$ are:
   (a) $B^j(B^i(V^j(\delta(s,p)) < V^j(\delta(\delta(s,p), rw))))$ – j believes that the second precondition is fulfilled,
   (b) $B^j(B^i(V^j(s) > V^j(\delta(s,p))))$ – j believes that i thinks that the current state is more preferred by j than the state reached after the execution of the proposal.

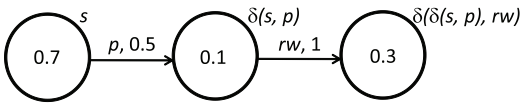

Figure 3. Reward *rw*'s preconditions: persuader's beliefs about audience's preferences on states and actions

The preconditions of the reward are true in the example illustrated by Figure 3. The figure depicts the beliefs of the proponent i. The precondition (1a) is true since: (i) the current state is evaluated as 0.7, (ii) the execution of the proposal is evaluated as 0.5, (iii) the execution of the reward after the proposal is evaluated as 1, and (iv) $0.5 < 0.7 < 1$. The precondition (1b) is true since the state reached after execution of the proposal is evaluated as 0.1 and the state reached after execution of two actions (first – the proposal and then – the reward) is evaluated as 0.3 and $0.1 < 0.3$. Observe that in such an example, even though the audience was rewarded it will end up in the state less preferred by that audience (0.3) than the state from where it begins (0.7). This model assumes that an audience feels rewarded by an action (rw) itself and not by a state reached after this action ($\delta(s, rw)$). This means that a briber thinks that I will feel rewarded by the action of giving me 100 000 dollars and not by the state in which I will be after this bribe, i.e. the state where I have 100 000 dollars. This could seem counterintuitive in some cases.

Let $i, j \in Agt$, $m \in \mathrm{I}$, $s \in S$, $p \in \mathrm{P}$. If $\iota = appeal(i, j, p, m)$, then:

1. the preconditions $pre(\iota)$ are:
   (a) $B^i(EV^j(s, m) > V^j(s) > EV^j(s, p))$ – the sender i must believe that appeal is more preferred by j than the current state and the current state is more preferred by j than the execution of the proposal,
   (b) $B^i(V^j(\delta(s, p)) < V^j(\delta(\delta(s, m), p)))$ – i should believe that the state reached after the execution of the proposal is less preferred by j than the state reached after the execution of two actions: first the appeal and then the proposal,
2. the post-conditions $post(\iota)$ are:
   (a) $B^j(B^i(V^j(\delta(s, p)) < V^j(\delta(s, m))))$ – j believes that the persuader i thinks that the state reached after the execution of the proposal is less preferred by j than the state reached after the execution of the appeal,
   (b) $B^j(B^i(V^j(s) > V^j(\delta(s, p))))$ – j believes that i thinks that the current state is more preferred by j than the state reached after the execution of the proposal.

To the best of authors knowledge, this is the only model formally representing the rhetorical techniques such as threat and reward that are extremely common in the social practice. However, when we describe peripheral factors it would be worth to include into the model the distinction between central and peripheral route to persuasion. According to ELM, the peripheral factors such as threat influence a given audience differently depending on which route is activated for this audience. This would give a more adequate representation of that type of persuasive tools.

Observe that in this model, the goal of the persuasion is an act of choosing the proposal offered in negotiation. The nature of arguments which aim to change acts in order to achieve a given goal is specified in the next section.

4. Beliefs and behavior

Psychological models emphasize the difference between argumentation aiming to change beliefs and argumentation aiming to change behaviors (acts, actions). As a result, these two kinds of arguments should have different formal representation. In logic this issue was recognized as the distinction between theoretical reasoning and **practical reasoning**. The practical reasoning is a reasoning about what *should be done* according to some crite-

rion such as moral, financial, health or pleasurable criterion. However, the issue how to adequately represent reasoning about actions appeared to be much more controversial or not obvious.

This type of reasoning is discussed in a model proposed by K. Atkinson, T. Bench-Capon and P. McBurney (Atkinson, Bench-Capon & McBurney 2003, Atkinson 2005). They consider arguments in which one agent persuades another to adopt a course of action. The reasons for the choice of action are the possibility of achieving some goal and promoting some values. The proposed model consists of the following items:

- $a, a_1, a_2, \ldots \in A$ – a finite set of actions
- $p, q, r, \ldots \in V_0$ – a finite set of propositions
- $s, s_1, s_2, \ldots \in S$ – a finite set of states; each element of S is an assignment of a truth value $\{T, F\}$ to every element of V_0
- $g, g_1, g_2, \ldots \in G$ – a finite set of goals that are propositional formulas
- $v, w, \ldots \in V$ – a finite set of values
- $value$ – a function mapping each element of G to a pair $\langle v, sign \rangle$, where $v \in V$ and $sign \in \{+, =, -\}$
- $apply$ – a ternary relation on $A \times S \times S$ with $apply(a, s_1, s_2)$ to be read as: "Performing action a in state s_1 results in state s_2".

Imagine that Kasia wants to see Magda before Magda leaves London at 4.30. Kasia thinks: "I have to be in London at 4.15, so I should catch the 2.30 train". Traditionally, this type of cognitive process was treated as practical reasoning. One of the first approach was to treat the practical reasonings similarly to the deductive theoretical reasonings, i.e. as **practical syllogisms**: "I'm to be in London at 4.15" and "If I catch the 2.30 train, I'll be in London at 4.15" therefore "I'll catch the 2.30 train". As a result, this process has the following representation:

P1: An agent wants to achieve g
P2: If a is done, g is achieved
T: a will (should) be done

where g is being in London at 4.15, a is catching the 2.30 train, P1, P2 are the premises and T is the claim of the reasoning. This representation is criticized since the conclusion is weakly supported by the premises. The following observations are made:

1. the reasoning has not a form of deduction, but of abduction, i.e. β, $\alpha \rightarrow \beta$ therefore α,
2. execution of action a typically excludes execution of other action a_1 which could have other result g_1 even more desirable than g, e.g. a_1 could be staying at home and g_1 is watching a movie with a boyfriend,

3. execution of action a typically has a number of results: $g_1, g_2, \ldots$; some could be undesirable so that it will lead us to abandon the goal g, e.g. g_1 is canceling the meeting with a friend, g_2 – travel sickness, etc.

These observations lead to the conclusion that the representation of practical argument must take into account the **alternative actions and the alternative goals** that an agent may have. Thus, Searle proposes to represent this kind of arguments in the following manner (Searle 2001):

P1: An agent wants, all things considered, to achieve g
P2: The best way, all things considered, to achieve g is to do a
T: An agent will (should) do a

There are two weak points of this model: the notion "best" and "all things considered". The criticism of the first point is based on the Searle's observation that the preference ordering and utility function (which are typically used to model the notion of "best") are rather the product and not the input for practical reasoning. The criticism of the second point refers to limitation of reasoning resources and imperfection of information.

The other account associates the practical reasoning with the **critical questions**. Walton proposes to represent these arguments in the following manner:

P1: An agent wants to achieve g
P2: If a is done, g is achieved
T: a should be done
Q1: Are there alternative ways of realizing g?
Q2: Is it possible to do a?
Q3: Does an agent have goals other than g which should be taken into account?
Q4: Are there other consequences of doing a which should be taken into account?

where Q1-Q4 are critical questions.

Atkinson, Bench-Capon and McBurney propose to **modify this model** criticizing Walton's account. First they say that the notion of a goal is ambiguous. Observe that catching the 2.30 train which arrives in London at 4.15 may be justified by different reasons: (1) direct consequences of the action, e.g. Kasia needs to be in London before 4.30, i.e., before Magda leaves (e.g. at 4.15) – in this case g is being in London before 4.30, (2) a state of affairs that follows from the action, e.g. Kasia wants to see Magda before she leaves – in this case g is seeing Magda before she leaves London, (3) an underlying social value which an agent hope to promote by the action, e.g. friend-

ship requires that Kasia meets with Magda before she leaves – in this case g is promoting friendship with Magda. Thus, they propose that the first premise should have the following representation:

P1: An agent wants to achieve a state s to bring about g which promotes a value v

Such representation influences the structure of the critical questions Q1, Q3 and Q4. That is, they should be extended in the following manner:

Q1a: Are there alternative ways of realizing the same consequences?
Q1b: Are there alternative ways of realizing the same goal?
Q1c: Are there alternative ways of promoting the same values?

Q3a: Would doing a promote some other value?
Q3b: Does doing a preclude some other actions which would promote some other value?

Q4a: Does doing a have a side effect which demotes the value v?
Q4b: Does doing a have a side effect which demotes some other value?

Secondly, they criticize the premise P2 since it is assumed to be representing what an agent knows or reasonably believes. Finally, they suggest the following model of the practical reasoning:

In the current situation s_1
Performing action a
Will result in the new situation s_2.
g is true in s_2.
The truth of g promotes some value v.

and they add more critical questions into the model:

Q5: Are the circumstances such that doing a will bring about g?
Q6: Does g promote v?
Q7: Is g possible?

Each of this question should be further extended. The question Q5 has four variants: (Q5a) whether the believed circumstances are possible, (Q5b) whether the believed circumstances are true, (Q5c) assuming both of these, whether the action has the stated consequences, (Q5d) assuming all of these, whether the action will bring about the desired goal. The critical question Q6 has two variants: (Q6a) whether g does realize the value intended, (Q6b) whether the value proposed is indeed a legitimate value. Finally, the critical question Q7 has two variants: (Q7a) whether the situation s_2 believed by an agent to result from doing a is a possible state of affairs,

(Q7b) whether the particular aspects of s_2 represented by g are possible. All these critical questions correspond to different attacks that could be formulated against a given practical reasoning.

Notice that four statements must hold for this representation to be valid:

Statement 1: s_1 is the case.
Statement 2: $apply(a, s_1, s_2) \in apply$.
Statement 3: $s_2 \models g$ (g is true in state s_2).
Statement 4: $value(g) = \langle v, + \rangle$.

In this section we discussed how to persuade to perform some action in order to achieve a goal. In the next section, we will show the model where we represent persuasion's goals instead of agent's (action's) goals. Together with the notion of the persuasion's result they allow to characterize the notion of success of the persuasion.

5. Success: goals and result

The essential feature of persuasion is that it is always performed to achieve a goal (changing somebody's mind or action). In the informal model of coalescent argumentation, Michael Gilbert assumes that all persuasive arguments have two levels of goals (Gilbert 1997). The macro level has so-called **face goals** of the interaction and the maintenance of the relationship between the agents. They may involve e.g. some version of Gricean maxims of cooperation. At the micro level there are the **task goals** which refer to the specific desired effect that started the argumentation. Imagine that a man meets a woman at a dinner and starts the discussion about some movie. His task goal may be to pick her up, while face goal may be to share opinions about the movie. Recognizing the goals of the agents is the first step to achieve a success in coalescent argumentation.

The formal model which captures the aspects of persuasion's goal, result and success is a model proposed by M. Tokarz (1985, 1987). The model is based on the following assumptions: (a) a persuasive act starts with sending some message, (b) the act is always performed in some situation, (c) the act is able to (at least potentially) change that situation, (d) the persuasion is executed with such *goal*, i.e. to change the situation given into the direction planned and favorable for the sender, (e) the real change (*result*) induced by sending the message might not be the change planned, i.e. the persuasive act might be *unsuccessful*.

Let $\mathcal{L} = \mathcal{L}_s \cup \mathcal{L}_e$ be a **language**, where $\mathcal{L}_s$ is a set of sentences which describe situations and $\mathcal{L}_e$ is a set of other meaningful expressions. A situation expressed by a sentence $\alpha \in \mathcal{L}_s$ is called objective of that sentence.

The **pragmatic model** is a structure:

$$\mathcal{M} = (\mathcal{S}, O, R)$$

where:

- $\mathcal{S} = (S, \leq)$ is a pair in which
  - S is a **set of situations**,
  - $\leq$ is a binary relation on $S \times S$ and for $s_1, s_2 \in S$ if $s_1 \leq s_2$, we say that s_1 is a **part** of s_2,
- $O : S \longrightarrow S^{\mathcal{L}_s}$ is a function which for each situation (state) assigns to each sentence $\alpha \in \mathcal{L}_s$ an **objective** of α (i.e. a state),
- $R : S \longrightarrow S^{\mathcal{L}}$ is a function which for each situation (state) assigns to each $\alpha \in \mathcal{L}$ (to a sentence describing situation or other expression) a **result** of α (i.e. a state).

The model assumes two types of pragmatic functions of messages. When an agent utters a sentence $\alpha \in \mathcal{L}_s$ in a situation s_1 then α *describes* some situation s_2 (i.e. $s_2 = O(s_1, \alpha)$) and α *creates* some situation s_3 (i.e. $s_3 = R(s_1, \alpha)$). This means that s_2 is an objective of α and s_3 is its result.

A **persuasive act** is an intentional sentence expressed in intentional language which is a product of the language $\mathcal{L}$ (a set of all sentences) and the language $\mathcal{L}_s$ (a set of "descriptive" sentences):

$$(\alpha, \beta) \in \mathcal{L} \times \mathcal{L}_s$$

where α is understood as a message uttered and β is the sentence describing the goal of uttering α.[2]

In such specified model, various phenomena characteristic for persuasion can be described. We say that a persuasive act (α, β) is **successful** in a situation s in the model $\mathcal{M}$, if $O(s, \beta) \leq R(s, \alpha)$. It means that the success of persuasion (α, β) depends on the relation between its goal $O(s, \beta)$ and its result actually achieved $R(s, \alpha)$. More specifically, the goal must be a part of the result. We can interpret relation $\leq$ in terms of persuader's preferences. Then, we would say that in successful persuasion the goal must be at least as good or as much preferred by a persuader as the result. In

[2] In this model, the first element of persuasive act can consist of the sequence of utterances, where a utterance is defined as $(\alpha, s) \in \mathcal{L} \times S$. However, for the clarity of the review we limit the persuasion to sending a single message.

other words, a persuasion ends with success when its goal (or even more) is achieved. Imagine that Kasia wants to persuade Magda to lend her 100 dollars. Kasia will be successful when Magda gives her 200 dollars (if, of course, Kasia would prefer to have more money). In this example, α could be the expression "Please lend me 100 dollars", β – "Magda lends Kasia 100 dollars", $O(s, \beta)$ is a situation when Magda lends Kasia 100 dollars and $R(s, \alpha)$ is a situation when Magda lends Kasia 200 dollars.

Observe that better and worse success can be expressed in that model. Say that $s_1 < s_2 < s_3 < s_4$ is a persuader's preference relation on the set of situations S and s_2 is her minimal goal. The more successful a persuasive act in a situation s is, the higher in this preference relation a result R(s, α) is. For example, if Kasia's preference relation is: 0 dollars $< \ldots <$ 100 dollars $< \ldots <$ 1000 dollars, and 100 dollars is a minimal loan Kasia is interested in, then a persuasive act (α_1, β) resulting with 200 dollars is more successful than a persuasive act (α_2, β) resulting with 100 dollars.

Moreover, we say that the goal $\beta \in \mathcal{L}_s$ is **achievable** in a situation s in the model $\mathcal{M}$, if there is a successful persuasion (α, β) in that situation s. This notion allows to specify two types of failure in persuasion. We make a tactical mistake when the goal was achievable however we failed to achieve it. While we make a genetic mistake when we didn't achieve the goal but it was not achievable anyway, so it was pointless to start the persuasion.

In the work (Tokarz 2006), Tokarz discusses the other notion of a persuasion goal. $Z(\alpha)$ is a persuasive meaning of a message α, i.e. publicly "announced" goal of sending a message. It may be the case that a persuader declares different goal with a message (**suggested** goal) than the **real** goal that he wants to achieve, i.e. for persuasion (α, β) it may be that $Z(\alpha) \neq O(\beta)$. For example, when a man asks a woman how does she find some movie (α), then the suggested goal is to know her opinion on the movie (Z(α)) while his real goal is to pick her up ($O(\beta)$). It corresponds to the macro and micro levels of argumentation considered in Gilbert's account. The suggested goal can be treated as face goal, while the real goal – as task goal.

Tokarz shows how this distinction allows to express two types of strategies described in psychological models: $foot - in - the - door$ (FITD) and $door - in - the - face$ (DITF). The strategy FITD makes use of the psychological mechanism of consequence. In order to achieve something bigger (100 dollars), first we try to achieve something small (10 dollars). Since people tend to be consequent in decision-making process, the first "small" decision gives a big chance that a persuasion's audience repeat the analogous decision in the "bigger" case. In an experiment (Freedman & Fraser 1966), one group of people were asked to put in their garden an ugly sign advising

to drive carefully. Almost nobody agreed on it. The other group was first asked to put a small sign in their window. After they agreed, they were asked to put the ugly sign in their garden. The most of the subjects in that group agreed to do it. Tokarz proposes to describe this strategy in the following way: $(\alpha, \beta) \in$ FITD iff $Z(\alpha) < O(\beta)$, i.e. the goal suggested is smaller than the real goal of persuasion. The other strategy, i.e. $door - in - the - face$, makes use of the psychological mechanism of reciprocation, i.e. people's tendency to return a favor. To achieve something smaller (100 dollars), first we suggest that we want something much bigger (e.g. 1000 dollars). The rejection of that request may cause a discomfort felt by a persuasion's hearer what in turn will make him prone to accepting the second, smaller request. Formally speaking, $(\alpha, \beta) \in$ DITF iff $Z(\alpha) > O(\beta)$.

In this section we described different types of persuasion goals and specified the "degrees" of preferring its results. In the next section we will show how the degrees of beliefs can be changed by verbal or nonverbal persuasive arguments.

6. Persuasiveness and nonverbal arguments

In his work (Blair 1992), Anthony Blair emphasizes that an argumentation aims to move the audience beliefs from the lower level of **certainty** (e.g. from $\frac{1}{4}$) to the higher one (e.g. to $\frac{3}{4}$). In this section, we introduce the notion of persuasiveness understood as the degree of audiences' belief generated by the persuasion (Budzyńska, Kacprzak & Rembelski 2008). Furthermore, in this section we want to address the aspect of nonverbal means of persuasion. The theory of **visual arguments** by Leo Groarke (e.g. Groarke 2007) shows that different components of argumentation may be expressed via other cues than the verbal ones, e.g., the photography or drawings can play the role of arguments. Nonverbal (visual) means of persuasion can be expressed in the model of persuasive acts (Section 5) as well as in the model of persuasive negotiation (Section 3). The first model assumes that a message remains the same no matter whether it is said (e.g. uttering "Get out") or executed without words (e.g. pointing a finger at a door). In the second model, threats and rewards were allowed to be performed by illocutions (verbal actions) or environmental actions (nonverbal ones).

The example of the formal model which enables to describe *both* of those aspects is a **multimodal logic of actions and graded beliefs** $\mathcal{AG}_n$ proposed by K. Budzyńska and M. Kacprzak (see e.g. Budzyńska

& Kacprzak 2008, Budzyńska, Kacprzak & Rembelski 2008). We use and join elements of Algorithmic Logic (AL) (Mirkowska & Salwicki 1987), Dynamic Logic (DL) (Harel, Kozen & Tiuryn 2000) and Logic of Graded Modalities (LGM) (Hoek 1992). The logic $\mathcal{AG}_n$ can be applied for reasoning about persuasion process where the focus is on influencing beliefs or behavior of audience. This impact is caused by using both verbal and nonverbal means. Furthermore, it is not assumed that this process is initiated by conflict of opinion. The process does not terminate when all parties share one point of view about a thesis but when the audience believes the thesis with the degree which satisfies the proponent. Degrees of beliefs may be changed by provided arguments. It is assumed that arguments are **actions** which can modify environment and/or doxastic relations of agents. Consequently, the logic $\mathcal{AG}_n$ allows for modeling and analyzing persuasiveness of arguments. It can be applied for reasoning about what arguments can bring a success, expressing how the order of provided arguments induce a success or determining optimal sequences of arguments. However it does not deal with the problem of constructing and evaluating arguments and counterarguments as well as studying their correctness.

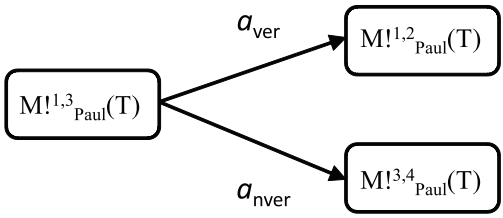

Figure 4. Different results of verbal and nonverbal arguments

To illustrate this approach take into account a scenario in which a dealer tries to convince Paul that a car is very safe and he should buy it. First of all observe that in this situation it is not important what the dealer really thinks about safety of the car and what he publicly declares. Moreover Paul doesn't want to persuade the dealer that it is not true that the car is safe. The focus is only on Paul's beliefs and decisions. **Degrees of agents' beliefs** are modeled by Kripke structure of possible worlds. Say that at the beginning of the persuasion Paul considers 3 possibilities (doxastic alternatives): (1) the car does not have an airbag, (2) the car has an airbag which prevents severe injuries in the case of accident, (3) the car has an airbag but it cannot prevent severe injuries in the case of accident. In only one of three doxastic alternatives it is true that the car is safe, so Paul believes the thesis with

a degree $\frac{1}{3}$ what is denoted by modal formula $M!^{1,3}_{Paul}(safe)$. The doxastic alternatives which an agent i subjectively assume to be true are determined by doxastic relation RB_i defined in the model of $\mathcal{AG}_n$ logic. So, initially Paul is doubtful about the thesis. Then, the dealer says "This car is safe since it has an airbag" (verbal argument denoted by a_{ver}). In consequence the degree of Paul's belief will rise to value $\frac{1}{2}$. This change is expressed by formula $\Diamond(a_{ver} : dealer)M!^{1,2}_{Paul}(safe)$. Instead of the utterance the dealer can show a film with a crash test (**nonverbal argument** denoted by a_{nver}). Now the result may be such that Paul believes the thesis with a degree $\frac{3}{4}$ and the formula $\Diamond(a_{nver} : dealer)M!^{3,4}_{Paul}(safe)$ holds (see Figure 4 where T means the thesis "car is safe"). In this manner we can compare verbal and nonverbal arguments and study their **persuasiveness**. In real life situation it is often the case that a customer buys a product although he is not absolutely sure that this product fulfills all his requirements. So, the dealer may finish the process of argumentation when Paul's belief about safety of the car reaches a degree $\frac{3}{4}$ since it is enough to make him buy the car. It is worth noticing that the arguments which can rise Paul's beliefs to a degree $\frac{3}{4}$ can exist while arguments which rise the beliefs to a degree 1 may not exist – Paul will never absolutely believe that the car is safe. Therefore if we assume that the proponent wins only when the point of view of an audience about the thesis is absolutely positive then such an argumentation would not have a chance to be successful.

Now we are ready to give formal syntax and semantics of the logic $\mathcal{AG}_n$. Let V_0 denote an at most enumerable set of *propositional variables* (also called *propositions*) and Π_0 an at most enumerable set of *program variables* (also called *atomic actions*). Propositional variables represent atomic assertions such as: "the car is safe", which can be either true or false. Further, program variables represent things happening. In the formalism they express giving *arguments*. In addition, we assume the boolean connectives: $\neg$, $\wedge$, $\vee$, $\rightarrow$, $\leftrightarrow$ and one program connective: ; which is a sequential composition operator. By means of this operator we compose *schemes of programs* which are defined as finite sequences of atomic actions: $a_1; a_2; \ldots; a_k$. Intuitively, the program $a_1; a_2$ for $a_1, a_2 \in \Pi_0$ means "Do a_1, then do a_2". We denote the set of all schemes of programs with Π. The last components of the language are modalities. We use modality M for reasoning about beliefs of individuals and modality $\Diamond$ for reasoning about actions they perform. Recall that intended interpretation of $M^d_i\alpha$ is that there are more than d states which are considered by an agent i and verify α. Whereas, a formula $\Diamond(i : P)\alpha$ says that after execution of a program P by an agent i a condition α may be true.

The set of all **well-formed expressions** of $\mathcal{AG}_n$ is given by the following Backus-Naur form (BNF):

$$\alpha ::= p|\neg\alpha|\alpha \vee \alpha|M_i^d\alpha|\Diamond(i:P)\alpha,$$

where $p \in V_0$ is a proposition, $d \in \mathbb{N}$ is a natural number, $P \in \Pi$ is a sequence of arguments (actions), $i \in Agt = \{1, \ldots, n\}$ is an agent.

Other boolean connectives are defined from $\neg$ and $\vee$ in a standard way. The necessity operator $\Box$ is the modal dual of the possibility operator $\Diamond$ and is defined as $\Box(i:P)\alpha \leftrightarrow \neg\Diamond(i:P)\neg\alpha$. We use $B_i^d\alpha$ as an abbreviation for $\neg M_i^d\neg\alpha$ – at most d states considered by i refute α. We use also $M!_i^d\alpha$ where $M!_i^0\alpha \Leftrightarrow B_i^0\neg\alpha$, $M!_i^d\alpha \Leftrightarrow M_i^{d-1}\alpha \wedge \neg M_i^d\alpha$, if $d > 0$. From the definition above, it is clear that $M!_i^d$ means "exactly d". The most important formula that we shall use in reasoning about the persuasion process is $M!_i^{d_1,d_2}\alpha$ which is an abbreviation for $M!_i^{d_1}\alpha \wedge M!_i^{d_2}true$. It should be read as "$i$ believes α with a degree $\frac{d_1}{d_2}$". Thereby, by a **degree of beliefs** of agents we mean the ratio of d_1 to d_2, i.e. the ratio of the number of states which are considered by an agent i and verify α to the number of all states which are considered by this agent. It is easy to observe that $0 \leq \frac{d_1}{d_2} \leq 1$. Intuitively, if an agent believes a thesis α with a degree 1 then he is absolutely sure that α holds while if he believes α with a degree 0 then he is absolutely certain α is false.

The semantics of the language is based on the notions of *valuation* and *interpretation*. A valuation is a function which assigns a logical value of "false" (denoted by **0**) or "true" (denoted by **1**) to every propositional variable at every state. An interpretation assigns to every program variable and to every agent a binary relation in the set of states S. Furthermore, we consider a doxastic function which assigns to every agent a binary relation which will give interpretation of the belief operator. The **model** is defined as follows.

Let Agt be a finite set of names of agents. By a semantic model we mean a Kripke structure $\mathcal{M} = (S, RB, I, v)$ where

- S is a non-empty set of states (the universe of the structure),
- RB is a doxastic function, $RB : Agt \longrightarrow 2^{S\times S}$,
- I is an interpretation of the program variables, $I : \Pi_0 \longrightarrow (Agt \longrightarrow 2^{S\times S})$, where for every $a \in \Pi_0$ and $i \in Agt$, the relation $I(a)(i)$ is serial, and $I(Id)(i) = \{(s,s) : s \in S\}$, where Id is a program constant which means identity,
- v is a function which assigns to every state a valuation of propositional variables $v : S \longrightarrow \{\mathbf{0},\mathbf{1}\}^{V_0}$ and for every $s \in S$, $v(s)(true) = \mathbf{1}$, where $true$ is a propositional constant.

Function I can be extended in a simple way to define interpretation of any program scheme. Let $I_\Pi : \Pi \longrightarrow (Agt \longrightarrow 2^{S\times S})$ be a function defined by mutual induction on the structure of $P \in \Pi$ as follows:

- $I_\Pi(a)(i) = I(a)(i)$ for $a \in \Pi_0$ and $i \in Agt$,
- $I_\Pi(P_1; P_2)(i) = I_\Pi(P_1)(i) \circ I_\Pi(P_2)(i) =$
  $= \{(s, s') \in S \times S : \exists_{s''\in S}((s, s'') \in I_\Pi(P_1)(i)$ and $(s'', s') \in I_\Pi(P_2)(i))\}$
  for $P_1, P_2 \in \Pi$ and $i \in Agt$.

In other words, $(s, s') \in I_\Pi(P)(i)$ for $P = (a_1; \ldots; a_k)$ and $i \in Agt$ iff there exists a sequence of states $s_0, \ldots, s_k$ such that $(s_{j-1}, s_j) \in I(a_j)(i)$ for $j = 1, \ldots, k$. Intuitively, it means that the state s' can be achieved from the state s if the agent i performs actions $a_1, \ldots, a_k$ in order they appear.

The **semantics** of formulas of $\mathcal{AG}_n$ is defined below.

For a given structure $\mathcal{M} = (S, RB, I, v)$ and a given state $s \in S$ the boolean value of the formula α is denoted by $\mathcal{M}, s \models \alpha$ and is defined inductively as follows:

$\mathcal{M}, s \models p$ iff $v(s)(p) = \mathbf{1}$, for $p \in V_0$,
$\mathcal{M}, s \models \neg\alpha$ iff $\mathcal{M}, s \not\models \alpha$,
$\mathcal{M}, s \models \alpha \vee \beta$ iff $\mathcal{M}, s \models \alpha$ or $\mathcal{M}, s \models \beta$,
$\mathcal{M}, s \models M_i^d\alpha$ iff $|\{s' \in S : (s, s') \in RB(i)$ and $\mathcal{M}, s' \models \alpha\}| > d$, $d \in \mathbb{N}$,
$\mathcal{M}, s \models \Diamond(i : P)\alpha$ iff $\exists_{s'\in S}$ $((s, s') \in I_\Pi(P)(i)$ and $\mathcal{M}, s' \models \alpha)$.

We say that α is true in a model $\mathcal{M}$ at the state s if $\mathcal{M}, s \models \alpha$.

7. Conclusions

The purpose of our work was to present a brief survey of selected models for argumentation in which elements of persuasion are included and emphasized. In this article we tried to juxtapose models based on informal logic with more formal approaches. In conclusions we succinctly list what aspects of persuasion are considered in what proposals and what role they play in argumentation.

Let us start with the model for persuasion dialogs. They are strongly ingrained in the **game theory**. It is assumed that there are two parties in a **conflict** who play the role of a proponent and an opponent. The aim of the game is to resolve the conflict. In pure persuasion, every player tries to convince the adversary to accept his point of view. Thus, this approach allows for modeling systems in which agents need to establish common standpoint to execute joint actions or achieve a collective goal. The next feature of this

model is that it expresses different kinds of **interactions** between participants of the persuasion process. They are modeled by means of speech acts. Players of a game do not limit they utterances to claim a thesis and give arguments supporting them but also can concede, retract, ask questions. Another important element of the model are protocols. They determine stages of a persuasion dialog, i.e. define legal moves, possible requests, show how to create and evaluate arguments, etc. In fact, they form methods of **resolving a conflict**. Since it is a model of dialogs the conflict's resolution can be done only with the use of **verbal means**. Other tools are not considered. The last feature of the approach is that agents argue about the publicly declared **commitments** rather than beliefs. It is especially important in scenarios where a proponent, e.g. a car dealer, does not believe a thesis which he claims but he tries to defend it in order to obtain a desired result, e.g, to sell a car.

The second proposal we describe is a model of the persuasive negotiation. The most important feature of this model is that it takes into consideration arguments that **appeal to emotions**. Thereby in this approach we can reason about argumentations in which participants apply not only logical arguments but also arguments which refer to feelings such as fear, greed, desire etc. Moreover, arguments can be **illocutionary actions** or **environmental actions**. It means that arguments are verbally expressed or they change the world in which participants exist. Another feature is possibility of expressing **trust** between agents. It is the crucial element of persuasion since the result of this process depends not only on issue-relevant arguments but also on an agent who gives them. In many cases, a proponent who enjoys huge respect may accomplish much more than the most convincing reasons.

The main feature of the third approach is that it models a reasoning, the aim of which is to influence somebody's behavior and activity rather than beliefs. Thereby, it allows the formalization of elements of **practical reasoning**. Indeed, in many scenarios a persuader wants to make somebody do something and does not care about his beliefs. For example, Mary intends to convince her friend Paul to drive her to work. Assume Paul thinks that it is not a good idea since he is very busy now. Notice that in such a situation Mary will be satisfied when Paul gives her a lift even though he does not change his mind and still believes it was abuse of his courtesy. Furthermore, this model takes into consideration the **values** of actions and the goals of these actions. The goals that we consider in practical arguments may promote the different values such as friendship, convenience or low financial cost.

In the fourth approach the most important thing is the distinction between the **intended goal** of performing action and its **real result**. So, the model makes possible to reason about success of arguments and relation between an argument and circumstances in which it is provided. It is obvious that if somebody gives an argument, he may or may not be successful depending on a situation in which it is executed (e.g. when an audience is in a good mood or when it is nervous). Moreover, in this model two types of arguments' goals are distinguished: **suggested** (face) and **real** (task). The first one refers to those which performers publicly declare. The second goals are the real ones but possibly hidden. Awareness of these two types of goals is very helpful when we want to recognize and attack real reasons for which somebody believes something or acts in some way. The model also expresses two different **mistakes** that cause failure of a proponent: tactical and genetical. The tactical mistake consists in realization of wrong strategy. The genetical mistake points at specific situations in which no argument is effective.

The fifth approach is a formalization of persuasion process specified by two key elements: **grades** of beliefs and **actions** which can result in changes of these grades. It is the proposal where intermediate stages leading to a success can be modeled and signified by values. Application of beliefs' degrees allows for reasoning about **persuasiveness** of arguments, i.e., not only whether they can bring a success but also how big such a success is. Furthermore, it is assumed that an argument is effective when it causes that audience believes a thesis with a fixed degree which is not necessarily equal to the highest one. It means that in some situations persuasion finishes with success although audience is not absolutely sure that a thesis is true. Next, in this approach the change of a state of a system is a result of actions. Actions can model **verbal** and **nonverbal** arguments. Moreover, they can influence both beliefs or situations in which a persuasion is executed. Therefore, a proponent can make an audience modify the degree in which it believes the thesis or actions it wants to perform. The other important fact is that the **result** of persuasion may depend on (1) arguments, (2) proponent (especially his credibility), (3) audience. This means that the same arguments can bring different results depending on who is the audience or who is the persuader. The model also allows to show the difference in the effects of performing the same arguments in various **orders**.

The review shows that there is no uniform model of persuasion which captures all its elements. The problem of formalization of persuasive argumentation is difficult and ambitious since it is extremely hard to identify, capture and formally model some of its aspects. Although there is little work

on formal systems for persuasion, this field arouses big interest. Therefore the described approaches offer very valuable base which may give rise to the further research.

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DEDUCTIVISM IN FORMAL AND INFORMAL LOGIC

Abstract: Deductivism is explained and defended. The thesis holds that logic generally, both formal and informal, is primarily concerned with the normative distinction between good and bad reasoning, and interprets good reasoning as minimally deductively valid inference. If deductivism is true, then it follows that all fallacies of reasoning, including the so-called informal or rhetorical fallacies, are deductively invalid. Deductivism as an ideology nevertheless cuts across the distinction between formal and informal logic. To defend deductivism against potential counterexamples, it is necessary to show that common fallacies are reconstructible as deductively invalid inferences. The present essay undertakes the groundwork of such a defense by arguing that even inductive argumentation, including inductive fallacies, along with circular reasoning, can be interpreted deductively. A large selection of other informal fallacies are also reconstructed as explicit deductive invalidities following a pattern that can be used to bring other fallacies under the deductivist umbrella.

Keywords: argumentation, circular reasoning, deductive validity, deductivism, fallacy, formal and informal logic, inductive reasoning, informal (rhetorical) fallacy, philosophical logic, validity.

1. The Deductivist Thesis

Deductivism is the philosophical thesis that good reasoning in logic generally is minimally a matter of deductively valid inference. According to deductivism, formal logic is therefore the continuation of informal logic by more rigorous symbolic mathematical methods, while informal logic is the continuation of formal logic by non-symbolic nonmathematical means. As logicians generally agree, an inference is deductively valid if and only if it is logically impossible for its assumptions to be true and its conclusion false. If deductivism is correct, then what unites formal and informal logic is primarily:

- A common concern with the exact distinction between good and bad reasoning.
- The promotion of good reasoning, and the detection, diagnosis and prevention of bad reasoning, alternatively by formal or informal methods.

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- The requirement that a principal factor in distinguishing good from bad reasoning is, respectively, inferential deductive validity or invalidity.
- More particularly, a shared perspective by which deductively valid inference is determined by a universal concept that can alternatively be formally or informally defined and applied.

Whether or not deductivism is in fact correct is understandably the focus of considerable philosophical dispute. Among the most revealing and hence most interesting test cases for deductivism is the analysis of the so-called informal or rhetorical fallacies. No sensible defender of deductivism suggests that every aspect of good reasoning boils down exclusively to deductive validity. The issue is rather whether all informal fallacies are deductively invalid. If even the informal fallacies are fallacies because they are deductively invalid, then that is enough for deductivism to avoid certain standard criticisms. If, on the contrary, there are informal fallacies that are deductively valid, implying that at least some fallacies do not represent species or specimens of bad reasoning because of deductive validity failure, and thus, further, that deductivism is accordingly false. A single deductively valid informal fallacy is sufficient as a fatal counterexample to deductivism. The challenge in trying to defend deductivism is to treat *all* recognized informal fallacies, showing plausibly by careful review that each one distributively involves a deductive invalidity of inferential reasoning. The trouble is that there are indefinitely many informal fallacies, each of which undoubtedly requires its own customized analysis. There may therefore be no such thing as a truly exhaustive survey of all the informal fallacies for purposes of detecting how each in its own peculiar way might fall afoul of the demands of deductively valid inference.[1]

2. Deductivism and Burden of Proof in Fallacy Theory

The argumentation situation between deductivism versus nondeductivism with reference especially to the informal fallacies is therefore the following. The best that deductivism can do, and consequently the most

[1] I first systematically explored deductivism as a philosophical response to the informal or rhetorical fallacies in Dale Jacquette, 'Deductivism and the Informal Fallacies' (Jacquette 2007b). This essay develops the position originally presented in my ancestral paper of the same title (Jacquette 2007a), in the *Proceedings of the Sixth Conference of the International Society for the Study of Argumentation* (ISSA), edited by Frans van Eemeren, J. Anthony Blair, Charles A. Willard, and Bart Garssen, from the Sixth International ISSA Conference, University of Amsterdam, Amsterdam, The Netherlands, June 27–30, 2006.

that can reasonably be expected of efforts to justify deductivism philosophically, is that every informal fallacy that comes under scrutiny, including all well-known and frequently cataloged informal fallacies, surrender positively to a reconstruction under which an inferential deductive invalidity is exposed, with no recalcitrant counterexamples having come to light and no effort to avoid informal fallacies that are potentially problematic to the deductivist thesis. If deductivism succeeds at least to such a degree, then it seems legitimate to conclude that deductivism provisionally makes a solid though obviously not final or definitive claim for the truth of its proposition that all and only good reasoning is, minimally, deductively valid inference.

Deductivism in that case effectively shifts the burden of proof to nondeductivism to disprove the deductivist thesis, either by delivering its mortal counterexample in the form of a deductively valid informal fallacy, or by showing that there are instances of other types of informal reasoning that are correct despite being deductively invalid. Unless or until such a refutation of deductivism is forthcoming, it can then be said that deductivism, while clearly not defeasible, is at least the leading contender and currently undefeated master of the field, with no serious obstacles to its continued acceptability appearing on the horizon. If this partial proof and redistribution of argumentative burden can be achieved, then at the very least deductivism will have established itself as a strongly viable alternative to nondeductivism, and probably something more. The demonstration would then allow deductivism, in lieu of credible counterexamples, to emerge as the dominant force in philosophical logic, albeit looking over its shoulder all the time in the event of the discovery of a deductively valid informal fallacy or of informally correct albeit deductively invalid reasoning.

The importance of such a gain in theoretical systematization and simplification in philosophical logic cannot be overstated. The precise meaning of such a qualified defense of deductivism should be carefully explicated. What would it show, and what would it not show? To begin, what would most definitely not be established by this strategy in support of deductivism is that formal logic is necessarily to be preferred over and above informal logic. Informal logic, treating the logic of good and bad reasoning almost entirely by non-symbolic nonmathematical methods in stylized natural language, is completed untouched by the deductivism–nondeductivism controversy. One can alternatively be either a self-respecting deductivist or nondeductivist informal logician, although there is evidently no prospect for the same sort of parallel liaison between formal logic and nondeductivism. Still, the fact that deductivism versus nondeductivism cuts across at least the informal side of the formal-informal logic divide indicates that informal logicians need not

be hostile to deductivism, that they are fully at liberty to be philosophically open-minded about whether or not deductivism is true, both generally and more specifically as it relates to the proper diagnosis and advice for avoiding the informal fallacies of logical reasoning in all its applications.

3. Deductivism and Formal-Informal Logic

On a positive note, even the sort of qualified justification of deductivism that we have described has interesting further ramifications. The most significant dividend is undoubtedly the identification of a vital common ground between formal and informal logic. Deductivism, as emphasized, by no means collapses informal into formal logic. The informal logician is as much entitled to embrace deductivism as the formal logician is ideologically obligated to do.[2]

The longstanding problem of the relation between formal and informal logic is thereby solved at least in large part. For if deductivism is true and formal and informal logic alike are dedicated in their distinctive ways to good reasoning, among other things, as generally deductively valid, and bad or fallacious reasoning in particular, again, among other things, as generally deductively invalid, then logic in the most general sense can be properly understood as the normative study of reasoning, where good and bad reasoning are distinguished in turn both in formal and informal modes as depending on whether or not a corresponding logical inference is deductively valid. Formal and informal logic are not then such entirely different creatures; they are rather different approaches ranged along a continuum of logical methods, directed toward the same purpose of promoting deductively valid reasoning and exposing, analyzing, and guiding thinkers in resisting the deceptive charms of deductively invalid reasoning.

There is but one logic, then, whose gold standard is deductive validity, with purely formal and purely informal logical methods appearing at the extremes of a spectrum of ways of understanding the deductive validity status of inference. The model thereby also makes good intuitive sense of the otherwise inexplicable fact that what is called informal logic, as taught, for example, in critical reasoning courses, often contains explicitly formal devi-

[2] The view I offer of the connections, mutual dependence, and potential for fruitful interaction between formal and informal logic is a special application of my consideration of these topics in Jacquette, 'On the Relation of Informal to Symbolic Logic' (Jacquette 2007c).

ces. These generally include the partly symbolic theory of Aristotelian categorical syllogisms, involving such logical forms as A, E, I, O propositions and their formal combinatorial possibilities within the formal constraints of the classical three term three proposition syllogism, formally arranged for visual display in the traditional Aristotelian square of opposition, Venn, Euler or Lewis Carroll diagramming, and Beardsley argument diagramming, among other formal logical devices. The model additionally helps to explain the fact that what is called formal logic is never strictly formal, but involves informal explanations, minimally at the metalogical level, of formal logical terms and operators, of the intuitive meanings even of formal truth value and set theoretical semantics. Finally, the proposal accounts for the pre-symbolic preparation of propositions and arguments for purposes of symbolic translation and analysis by decision algorithms in what is professionally identified and standardly taught as formal logic, along with derivation of deductively valid inferences by axiomatic or natural deduction proof structures and formally deductively valid inference rules.

Formal and informal logic overlap significantly and grade off almost insensibly into one another. Each has elements that are essential to and traditionally associated with the successful pursuit of the other. This evident aspect of formal and informal logic, properly so-called, is unintelligible if formal and informal logic are fundamentally different logics with no greater shared concern than a general interest in the nature of logical thinking and the distinction between good and bad reasoning, with no further specification as to what constitutes the difference. Since questions of deductive validity and invalidity can in principle be handled either formally or informally, deductivism in this fashion ideologically bridges the formal-informal logic gap.

4. Formal and Informal Logical Methods in Deductivist Service

How, then, is formal logic to be distinguished from informal logic, if not on grounds that only formal logic is primarily concerned with deductive validity and invalidity? A useful recommendation is to distinguish between formal and informal logic by applying the arguably less controversial because criteriologically more sharply defined distinction between specialized symbolic versus non-specialized non-symbolic logic. More generally, it seems appropriate to suggest that a logical theory or procedure is formal if and only if it adopts a specialized symbolism for representing logical forms that does not occur in ordinary non-specialized non-symbolic thought and language.

Although all of logic has to do with logical form, we need not agree that all expressions of logical form must themselves be formal. This distinction captures much of the received concept, since it includes all of symbolic logic and excludes non-symbolic evaluations of validity or invalidity. As we might expect, formal logic by the proposed distinction will roughly include everything belonging to what has become the *de facto* criterion for formal logic in relations expressed by means of standard and nonstandard notational variations and extensions of the propositional and predicate-quantificational calculus. The definition additionally includes schematic and graphic treatments of syllogistic logic that have traditionally been regarded as belonging more properly under the aegis of informal logic and critical reasoning. Informal logic, in contrast, on the present proposal, is limited to the consideration of a proposition's or argument's logical form by discursive reconstruction within natural language, the use of counterexamples to discredit inferences, identification of arguments as committing any of the so-called rhetorical fallacies, and the like.

The relegation of syllogistic logic, square of opposition, and argument diagramming methods to the genus of informal logic can now be seen as a kind of historical accident. Were it not for the emergence of more powerful algebraic methods of formal logic with the development of mathematical techniques in Frege's *Begriffsschrift* and C. S. Peirce's proto-quantificational logic, there is little doubt that the logic of syllogisms, Venn and other styles of diagramming, would constitute the whole of formal logic as opposed to purely informal non-specialized non-symbolic and extra-mathematical logical methods. Logic would then have remained today just as it was in the late eighteenth century, when Immanuel Kant was able to declare that no significant advances had been made since the time of Aristotle.[3] Why, then, should such logical tools be displaced as informal given the development of contemporary algebraic and rigorously algorithmic methods of mathematical logic?

On the present proposal, it is more appropriate to classify syllogisms and logical techniques that have standardly been turned over to the informal

[3] Immanuel Kant, *Critique of Pure Reason* [1787], translated by Norman Kemp Smith (New York: St. Martin's Press, 1965), Bviii: 'That logic has already, from the earliest times, proceeded upon this sure path is evidenced by the fact that since Aristotle it has not required to retrace a single step, unless, indeed, we care to count as improvements the removal of certain needless subtleties or the clearer exposition of its recognised teaching, features which concern the elegance rather than the certainty of the science. It is remarkable also that to the present day this logic has not been able to advance a single step, and is thus to all appearance a closed and complete body of doctrine'.

logic and critical reasoning textbooks as less powerful, general, and technically advanced, but every bit as *formal* as symbolic mathematical logics. As a consequence, it seems advisable to include Aristotelian syllogistic and all related graphic and diagramming paraphernalia as part of genuinely formal logic. We may thereby be committed to saying that these methods are properly part of formal logic despite their usually being included in what are called informal logic texts as adjuncts to the standard but misleadingly denominated informal logic curriculum. If so, then it may be time for logicians to admit that insofar as they use syllogistic logic and argument diagramming they are doing formal logic, despite falling under the deceptive rubric of informal logic. It may equally be time in that case for formal logicians to admit that there are weaker less universal methods of logic that are just as formal as the algebraic methods of formal symbolic logic, which they may prefer to use, but which do not for that reason alone have exclusive title to the category of formal logic.

There are many ways in which formal and informal logic interact. There are situations in which formal and informal logic can profitably cooperate in order to critically evaluate arguments. Formal symbolic logics are always accompanied by and presented within a discursive framework of informal metalanguage introductions and explanations, or can be traced back through a genealogy of formal conventions to an informal context. Without grounding in ordinary language and a relation to informal ideas, even the formalisms most familiar to practicing logicians lack meaning and application. If symbolic logic is not always needed, if it can be an impediment to understanding, and if it cannot function effectively entirely on its own for theoretical purposes in the explication of logical connections and deductive proof of consequences, then the use of specialized formalisms must be justified by a sufficiently powerful and comprehensive philosophical rationale. Informal logic is useful and often essential in working through a preliminary heuristic analysis of a problem before it can be decided whether and if so what kind of formal logic to apply in modeling a given choice of logical relations or in solving a logical problem. Sometimes informal methods provide a better, easier, or more understandable conceptual analysis of the logic of a proposition or argument, where there is no need to get out the heavy artillery.

Accordingly, we should now consider a pragmatic principle that allows informal and formal logical methods to be used individually or in combination to achieve the best analysis of the logic of arguments as determined situationally by their specific features and requirements. The ideal is for logicians to cultivate proficiency in as many formal and informal logical

methods as are available, not excluding efforts to discover or invent new techniques as each task may demand. The exigencies of every analytic task should accordingly then be considered independently on its own terms as a challenge for logical investigation in its own right.

5. Informal Fallacies as a Test Case for Deductivism

We illustrate the ecumenical deductivist approach to the entrenched division between formal and informal logic by turning now to the logical analysis of the so-called informal or rhetorical fallacies. One and all of these deductivism maintains in distinctive ways are deductively invalid.

More importantly, the most reasonable, complete and charitable reconstructions of these species and specimens of the informal fallacies are instructive with respect to the individual character of each distinct informal fallacy. If deductivism is true, then reconstructions of the informal fallacies as deductive invalidities are possible in every case. This means in turn that in every case the informal fallacies should also theoretically be formalizable in a sufficiently expressively comprehensive formal symbolic deductive logic.

If deductivism is true, and if deductivism is further interpreted formally as positive conformity with the requirements of deductively valid inference, then any species or specimen of reasoning that upon the most complete charitable reconstruction does not conform to such a deductively valid form will automatically be fallacious. If deductivism is true, then all fallacies, once again, on the most complete and charitable reconstruction, are first and foremost logical fallacies involving a deductive invalidity. Such fallacies can sometimes be collected together into more general categories, including but by no means limited to '*ad hominem*', '*ad ignorantiam*', '*ad vericundiam*', 'slippery slope'. In other cases, fallacious reasoning is so distinctive in content and specific in application as to deserve a descriptive name, as we find especially in the case, among numerous others, of 'the open question fallacy', 'the naturalistic fallacy', 'the intensional fallacy', 'the intentional fallacy', and 'gambler's fallacy'. If deductivism is true, then it is appropriate to speak of these fallacies as 'informal' only in contrast with such blatantly 'logical' fallacies as affirming the consequent or denying the antecedent. In fact, however, if deductivism is true, all fallacies are deductive invalidities, even when they are also something more. If deductivism is true, then all fallacies of reasoning are most reasonably, completely and charitably reconstructible as deductive invalidities.

The logical analysis of a fallacy takes some work, which is easily lost sight of when the analysis is presented in its most economical expression. The complete logical analysis of each specific fallacy poses unique problems of its own, but this fact does not contradict the proposition that all fallacies might yet be guilty of an underlying deductive invalidity. The argument requires a more precise statement of what is meant by a fallacy, and it is in the effort to clarify the concept of a fallacy that the real value of the exercise consists.

We begin by remarking that a *fallacy* is any logically incorrect argument. Informal logicians often further describe a fallacy as an incorrect argument that can look to be correct, or that can easily be mistaken for one that is correct, and that is potentially persuasive, unless we successfully challenge it, despite its logical failures. Human gullibility being what it is, however, absolutely any argument can be found persuasive regardless of its logical merits or liabilities. An adequate understanding of the concept of a fallacy as a result should not be based on its ability to deceive, but rather on its *logical* failures, however formally or informally considered. It follows that if we want to understand the concept of a fallacy, then we must arrive at a defensible theory of what distinguishes logically correct from logically incorrect reasoning. Persuasive many a fallacy of reasoning may be, but the concept of a fallacy is not exhausted by its persuasiveness. Our best arguments are not always sufficiently persuasive, as we know from Socrates' courtroom defense. A fully rational thinker should always want to work toward or otherwise support and hold open the hope that many of the best arguments will eventually prevail against bad reasoning, even against such fallacies as pack a punch with real, direct and meaningful practical consequences for health and happiness, such as the *ad baculum*.

6. Classical Fallacies and the Deductivist Reduction

There is no universal method of classifying fallacies. Logicians have resorted to devising taxonomies that try to make sense of as they comprehend as many of the recognized fallacies as possible. Logicians disagree about how to arrange fallacies into categories, and there are advantages and disadvantages in all of their proposals. They also sometimes even disagree about whether all of the traditionally recognized types really are genuine fallacies, and, for that matter, about what exactly is or should be meant by the concept of a fallacy.

Here, despite lack of unanimity in the field, is a relatively standard taxonomy of fallacies. Some have been discussed since ancient times, and are identified by classical Latin or Greek terms as well as more contemporary names. In the standard schema, fallacies of validity or *non sequiturs* are distinguished from fallacies of soundness, truth or credibility, and also from fallacies of significance. This division tracks a common definition of a good argument as one that is deductively valid, sound (containing only true assumptions), and significant (relevant and non-circular, among other catch-all virtues). This is a good method of explaining the features looked for in a good argument, to be associated with distinct categories of logical fallacies, including the informal or rhetorical fallacies usually taught in courses on critical reasoning.[4]

Taxonomy of Logical Fallacies

I. Fallacies of Validity (*non sequiturs*)
    A. Formal
        1. Deductive
            Invalid inference
                Denying the antecedent
                Affirming the consequent
            Fallacy of equivocation
                Four terms fallacy
            Naturalist (is-ought) fallacy
            Intensionalist fallacy
                Use-mention confusion

[4] Standard treatments of the informal or rhetorical fallacies are to be found in almost any competent introductory informal logic or critical reasoning textbook, and in a variety of more systematic theoretical works in the field. Beyond the usual suspects, see, especially, C. L. Hamblin, *Fallacies* (Studies in Critical Thinking) (Newport News: Vale Press, 1970). Frans H. van Eemeren and Rob Grootendorst, *Argumentation, Communication, and Fallacies: A Pragma-Dialectical Perspective* (Philadelphia: Lawrence Erlbaum Associates, 1992). Morris Engel, *With Good Reason: An Introduction to Informal Fallacies*, 5th edition (New York: St. Martin's Press, 1994). Robert J. Gula, *Nonsense: A Handbook of Logical Fallacies* (Mount Jackson: Axios Press, 2002). Christopher W. Tindale, *Fallacies and Argument Appraisal* (Cambridge: Cambridge University Press, 2007). A whimsical treatment is offered by Aaron Larsen and Joelle Hodge, *The Art of Argument: An Introduction to the Informal Fallacies* (Camp Hill: Classical Academic Press, 2006). A useful recent collection of essays on the subject is compiled by Hans V. Hansen and Robert C. Pinto, editors, *Fallacies: Classical and Contemorary Readings* (University Park: The Pennsylvania State University Press, 1995). I have been especially influenced by John Woods and Douglas Walton, *Fallacies: Selected Papers 1972–1982 with a Foreword by Dale Jacquette* (London: King's College Publications, 2007). See my Foreword to this collection, titled, 'Reasoning Awry: An Introduction to Woods and Walton, *Fallacies: Selected Papers 1972–1982*' (Jacquette 2007d).

2. Inductive
    Hasty generalization
        Insufficient or unrepresentative data
            Cause-effect confusion
            Post hoc propter hoc
    Gambler's fallacy

B. Informal or Rhetorical
1. Deductive
    Ad hominem
        Tu quoque
        Poisoning the well
    Appeal to authority (*argumentum ad verecundium*)
    Appeal to majority (*argumentum ad populum*)
    Appeal to ignorance (*argumentum ad ignorantiam*)
    Appeal to emotion (*argumentum as misericordiam*)
    Appeal to force (*argumentum ad baculum*)
2. Inductive
    False analogy
    Slippery slope (*sorites*)
    Guilt by association
        Genetic fallacy

II. Fallacies of Soundness (truth or credibility)
    Contradiction
    False alternatives
    Fallacy of composition
    Fallacy of division

III. Fallacies of Significance (irrelevance or circularity)
    Irrelevant conclusion (*ignoratio elenchi*)
        Straw man
        Diversion (red herring)
    Circularity (begging the question, *petitio principii*)
        Complex question (many questions)

Such a division evidently contradicts the radical version of deductivism now being defended. It does not affect weaker forms of deductivism that choose merely to emphasize a concern with deductively valid or invalid logical structures as a preoccupation of both formal and informal logic. We have nevertheless been aiming at something more enterprising in the thesis that all logical fallacies are matters of deductive invalidity. Thus, we also have a bit more explaining to do where some of the traditional fallacies are concerned.

Our strategy will be first to address those fallacies that seem most opposed to deductivism in the strong sense according to which all fallacies are deductive invalidities. If deductivism is true, then paradigm fallacies must include the deductively invalid inferences known as affirming the consequent and denying the antecedent. In these instances, it is obvious by informal methods such as imagining a scenario in which the assumptions are true and the conclusions false, as well as being confirmable by formal decision procedures such as truth table or truth tree analysis, that it is deductively invalid to infer P from the assumptions that if P then Q, and Q, or to infer Q from the assumptions that if P then Q and not-P. When we try to evaluate these obvious examples of deductively invalid inference, however, they do not seem at all to bear positive comparison with inductive fallacies or the so-called fallacy of circular reasoning, begging the question, or *petitio principii*.

6.1. Inductive Reasoning

What shall we say about such apparent counterexamples to deductivism? The inductive fallacies, such as hasty generalization, *post hoc propter hoc*, and the like, are bad enough, but the situation is compounded by the fact that according to deductivism all good reasoning is supposed to be deductively valid, whereas there are perfectly acceptable non-fallacious instances of inductive reasoning adopted for scientific purposes and deemed correct by philosophers and inductive logicians, that are apparently deductively invalid. From the fact that a sampling of objects or events has revealed a recurrent pattern of constant conjunction, even if exceptionless and highly confirmed experientially, it does not follow with deductive validity that therefore another or future object or event of the relevant kind will also display the same pattern of properties. It is logically possible in every instance of inductive reasoning, in the sense of the complete and correct description of the situation containing no logical contradictions, for all prior evidence, such as all previously observed swans being white, to indicate with only a high degree of probability rather than deductive certainty that the next encountered swan will also be white; it is possible, in other words, that not all swans are white and even that the next swan to be observed will not be white. We nevertheless consider many inductive inferences to be correct, useful and reliable, despite the fact that they appear one and all to be deductively invalid.

Despite the intuitive force of this first proposed counterexample to deductivism, it is possible, as Wilfrid Sellars has also shown, to reduce inductive inferences to deductive inferences involving the same probabilistically

qualified propositions taken as probably (to some definite degree) true assumptions, and, together with a choice of probability principles such as the Bayesian formula, *deduced* as probably (to some definite degree) true conclusions.[5] Thus, instead of construing an inductive inference as P, Q therefore-probably R, we can read it instead as Probably-P, Probably-Q, if probably-P and probably-Q then probably-R, therefore probably-R. If we build probability values into the statement of the evidence itself on which an inductive inference is based, and into the statement of the conclusion, together with a commitment to an appropriate inductive law, of which there are several from which to choose, relating evidence to conclusions, then in the case of properly chosen inductive laws, Bayes's theorem or the like, as each case demands, our inductive reasoning can be correct precisely because the inference is deductively valid. In every other instance, an argument will constitute a faulty inductive inference, in fact, an inductive fallacy, precisely because the inference is deductively invalid, just as deductivism implies.

6.2. *Post hoc, ergo propter hoc*

The case of *post hoc propter hoc* is instructive in this regard. Here and throughout, the short horizontal line serves as an inference indicator, dividing an inference's assumptions appearing above the line from its conclusion, below. The fallacy, schematically speaking, states:

1. Event E1 happened before event E2.
2. [Assuming true probabilistic laws L1-LN.]

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3. Event E2 happened because of event E1.

This type of reasoning is commonly described as an inductive fallacy, but it is clearly an instance of deductive invalidity. It is always logically possible that an event occurs before another event but is not designated as a cause of the later event, regardless of the truth of the background probabilistic laws that the fallacious reasoning might try to invoke.

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[5] Wilfrid Sellars, 'Are There Non-Deductive Logics?', edited by Nicholas Rescher on behalf of the editorial committee, *Essays in Honor of Carl G. Hempel: A Tribute on the Occasion of his Sixty-Fifth Birthday,* Synthese Library (Boston – Dordrecht: D. Reidel Publishing Co., 1970), pp. 83–103. The same reductive principle by which inductive reasoning can be interpreted as deductive argument at Sellars' later philosophical home is undoubtedly responsible for the legendary slogan circulating in the halls and seminar rooms at the University of Pittsburgh that 'An inference is either deductive or defective'.

6.3. *Gambler's Fallacy*

As a final inductive fallacy in this category, consider the so-called *gambler's fallacy*. This is the fallacy of supposing that an established pattern of occurrences of a probabilistically random series of events implies that a present or future event of the same type will have a nonrandom, significantly higher or lower probability, because or by virtue of the chance patterns of past occurrences.

The fallacy has this inductively invalid logical form:

1. Inductively random events E1-EM of type or with property F have occurred in the past with probability P.
2. [Assuming true probabilistic laws L1-LN.]

---

3. Event EN of type or with property F will probably occur in the present or future with probability significantly different (higher or lower) than P.

The name 'gambler's fallacy' is appropriate to this common gambling superstition. When a series of random events like the ball spinning on a fair roulette wheel lands in red or black compartments in a particular pattern, it is tempting to believe that there is a greater likelihood for the next random event in the sequence will be red, or, on the contrary, that it will be black. Yet if the events are truly probabilistically random, as the assumptions state, then it is a fallacy to conclude from a long-running sequence of reds that the next spin of the wheel will also be red, or on the contrary that it is therefore more likely to change on the next spin to landing on black.

There is simply no predicting one occurrence or the other as having greater or lesser probability. If the events in question are inductively random, and if there are just two possible outcomes for each event, in this instance, to fall red or black, then the *a priori* probability that the next occurrence will be red is precisely the same as the *a priori* probability that the next occurrence will be black, namely, .5. From the fact that there has been a long run of reds there is no predicting that the next turn will also probably be red, nor that because the reds have gone on for so long that the wheel is probably due for a change and the next turn will probably be black. Each turn of an honest roulette wheel has precisely the same probability, and the entire sequence of turns has no predictability whatsoever, but by hypothesis is inductively random. What is important for the defense of deductivism in the present context is to notice that the gambler's fallacy is a fallacy because it represents a deductively invalid inference in which it is logically possible for all of the assumptions to be true and yet for the conclusion to be

false, even though a specified measure of probability is built both into the assumptions and conclusion and the relevant background laws of probability are assumed to be true.

6.4. Circular Reasoning, *Petitio principii*

An even more obvious putative counterexample to deductivism would appear to be circular reasoning or *petitio principii*. Here, in its simplest and most transparent form, circular reasoning attempts to infer that P from the assumption that P. Inferring the truth of P from P itself, however, is evidently deductively valid.

Whatever other reasoning offenses a subject may have committed in concluding that God exists from the assumption that God exists, the thinker can hardly be accused of deductively invalid reasoning. If circular inference is a fallacy, then it appears to be an informal or rhetorical fallacy of relevance rather than of deductive validity, as identified by the traditional classification of informal fallacies, and hence an example of fallacious but deductively valid reasoning.

There are two possibilities for defending deductivism against the alleged counterexample involving circular reasoning. The first is to argue that circular reasoning is not fallacious in the true sense of the word, but objectionable and to be avoided in argumentation for another reason. It might be said in this vein that *petitio principii* is generally lacking in significance, but is not for that reason alone fallacious. Another example is that of an inference that is in every way logically circumspect, formally and informally, but in any case deductively, but that involves, without equivocation in any of its terms appearing in any of its assumptions or conclusion, a concept that simply lacks relevant application. Thus, it is not a *fallacy*, properly so-called, if a thinker argues that God exists, meaning by 'God' her (existent) dog. The reasoner in that instance has not violated any principle of logic, formal, informal or rhetorical. The argument might and perhaps should be judged logically correct in every way, despite lacking significance for those who have something different in mind when considering a demonstration of the existence of God. If such a strategy can be sustained, then there is an immediate answer also for the supposed circular reasoning or *petitio principii* counterexample to deductivism, where significance for another reason is also conspicuously lacking in an otherwise logically correct and undeniably deductively valid argument.

The second method of defending deductivism against similar counterexamples is to allow that circular reasoning is fallacious, but that, properly expanded, it is also deductively invalid, and, as such, more grist for the

deductivist mill. We might accordingly represent the full context of circular reasoning in something like the following fashion:

1. P

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2. It is significant (worthwhile, informative) to conclude that P.

If this is the actual intent of a given instance of circular reasoning, whether known or recognized as such by the reasoner or not, then the argument is evidently deductively invalid and properly designated as a fallacy under the deductivist reduction of all fallacies to deductive invalidities. For in all such cases it is logically possible for the assumption to be true and the conclusion false. The same lack of significance need not plague logically more complex deductively valid inferences, such as *modus ponendo ponens* or *tollendo tollens*, *reductio ad absurdum*, or the like, if these inferences are considered as issuing in worthwhile or informative conclusions. It may be an informal rather than formal matter to judge the relevance of the conclusions in question, regardless of the degree of inferential simplicity or complexity at stake, but it is a lemma of deductivism in any event not to preclude informal logic from its applications.

We see that there are at least two directions from which deductivism can be defended against circularity counterexamples. It is open to the deductivist to deny that *petitio principii* is a formal or informal logical fallacy in the first place, or to hold on the contrary that it is a fallacy precisely because it does after all involve a deductive invalidity when the circularity is more completely expanded upon reconstruction as an instance in which the thinker falsely supposes that it is significant, worthwhile or informative to conclude that a certain proposition is true from an assumption base that includes the very same true or false proposition. We turn then from inductive inference and circular reasoning to a representative selection of some of the more notable informal or rhetorical fallacies in defense of deductivism.

6.5. Equivocation and *Four Terms Fallacy*

A frequently encountered classical fallacy that embodies deductively logically invalid reasoning in a more subtle disguise is the so-called *fallacy of equivocation*. The same word or phrase can sometimes have different meanings in different sentences or linguistic contexts. If a term occurs with one meaning in the assumptions of an argument, but with another meaning in its conclusions, then the conclusions need not deductively follow from the assumptions, but might be false even when the assumptions are true.

The fallacy of equivocation can have several schematic forms, depending on where the equivocal terms appear. For a given equivocal subject term 'T' that admits of two (or more) distinct meanings or senses, any of the following conclusions are deductively invalidly derived from hypothetically true assumptions:

$T_{sense\text{-}1}$ has property F
$T_{sense\text{-}2}$ has property G

$T_{sense\text{-}1}$ has property G
$T_{sense\text{-}2}$ has property F
Something with property F has property G

Alternatively, it can also be the predicate terms that are equivocal in the logical fallacy of equivocation, as in the following example:

T has property $F_{sense\text{-}1}$.
If T has property $F_{sense\text{-}2}$, then T has property G.

T has property G.

The obvious point is that where there is equivocation or plural meanings involved in an inference, the truth of the assumptions of an argument does not deductively guarantee the truth of the conclusions. Arguments guilty of the fallacy of equivocation are therefore deductively logically fallacious.

In syllogistic logic, where classical categorical syllogisms contain exactly three terms, major, minor, and middle, the fallacy of equivocation, which in effect introduces another term by giving different meanings to at least two of the three required terms, is also known as the *four terms fallacy*. An example is this variation of a standard syllogism in BARBARA, All men (in the sense of being male in gender) are mortal; Xanthippe (Socrates' wife) is a man (in the generic sense of being a human being); therefore, Xanthippe is mortal. The argument as explicated does not state that Xanthippe is male, nor that all human beings as opposed specifically to males are mortal. We can therefore imagine that Xanthippe despite being a (non-male) human being is immortal, without contradicting the major premise that all men (males) are mortal.

6.6. *Intensionalist Fallacy*

Another commonly found deductive fallacy involves the attempt to draw inferences from assumptions containing an *intensional* or *nonextensional context*. An intensional or nonextensional context is one in which substi-

tuting codesignative terms or logically equivalent propositions sometimes changes the proposition's truth value from true to false or false to true. Some of the particular inferences from assumptions containing an intensional or nonexistensional context are deductively valid, but others are invalid. The argument form considered in general nevertheless commits the *intensionalist fallacy*. There are several main types of intensionalist fallacy. The most frequently encountered are known as *quotation* or *indirect discourse* and *propositional attitude intentionalist fallacies*.

As an example of a quotation or indirect discourse version of the intensionalist fallacy, consider the following proposition. The name 'Mark Twain' contains nine letters. This is a true proposition. However, the context [The name '_____' contains X letters] is intensional or nonextensional. When we substitute different codesignative terms that refer to the same thing in the blank, we are not guaranteed of preserving the proposition's truth value. We know that Mark Twain is the same person as Samuel Clemens, so we can affirm the truth of the identity statement, Mark Twain = Samuel Clemens. When we try to substitute the name 'Samuel Clemens' for 'Mark Twain' in the above proposition containing the intensional quotation context [The name '_____' contains X letters], we turn a true proposition, that the name 'Mark Twain' contains nine letters, into the false proposition, that the name 'Samuel Clemens' contains nine letters.

We say that intensional contexts do not support substitutions of terms equivalent in meaning in such a way as to save or preserve the truth, *salva veritate*; while purely extensional contexts by contrast always sustain the truth value of propositions in which they occur under any such substitutions. It is because intensional contexts do not support the intersubstitution of codesignative terms *salva veritate* that they constitute deductively invalid inferences. The quotation of a single term, phrase, or larger unit of discourse, is standardly said to *mention* rather than *use* that language item, predicating properties of the linguistic entity itself rather than whatever object or states of affairs to which it refers. Failing to observe the distinction between quote-mentioned and unquoted used terms and phrases is a common error of reasoning related to the intensionalist fallacy known as the *use-mention confusion*.

Another frequent form of the intensionalist fallacy involves propositional attitude or intentional contexts. Again, the fallacy requires a nonextensional context that does not permit intersubstitution of equivalent terms or propositions *salva veritate*. If Madelaine believes that Mark Twain wrote *Life on the Mississippi*, she does not necessarily believe that Samuel Clemens wrote *Life on the Mississippi*. She may have never heard of Samuel

Clemens, and may not know that 'Mark Twain' is the pseudonym or *nom de plum* of Samuel Clemens. The fact that Mark Twain is the same person as Samuel Clemens, and that Samuel Clemens wrote *Life on the Mississippi* does not deductively validly imply that Madelaine believes these things. The inference in which the fallacy occurs concerns only her beliefs, not the facts about which she may truly or falsely believe. We see the same kind of deductive fallacy arising in this form as before, but this time involving the psychological state or propositional attitude context, [X believes that _____]. Here we have:

1. Madelaine believes that Mark Twain wrote *Life on the Mississippi*.
2. Mark Twain = Samuel Clemens (Mark Twain wrote *Life on the Mississippi* if and only if Samuel Clemens wrote *Life on the Mississippi*).

---

3. Madelaine believes that Samuel Clemens wrote *Life on the Mississippi*.

The deductive invalidity of this type of intensionalist fallacy is clear enough from previous examples. It is logically possible for the assumptions to be true, but the conclusion false. The truth of the assumptions does not logically guarantee the truth of the conclusion. The same type of fallacy occurs for any choice of propositional attitude or psychological state context. We can generate unlimited instances of intensionalist fallacies for similar contexts involving the psychological predicates, 'believes', 'doubts', 'fears', 'hopes', 'desires', 'expects', 'knows', etc. The fact that propositional attitude or intentional psychological state descriptions are intensional or nonextensional is philosophically interesting.[6]

6.7. *Ad hominem*

We briefly now consider a suite of common classical fallacies, generally described in the informal logic or critical reasoning literature as informal or rhetorical fallacies. Upon reconstruction and analysis, all can be revealed as deductively invalid, and hence as positive instances of the deductivist thesis.

The *ad hominem* is an argument form directed literally against the person. There are *abusive* and *nonabusive* types of *ad hominem*. *Ad hominem* is nonabusively used whenever in argument we try to convince an opponent of the truth of a conclusion by drawing on propositions we believe the opponent to accept. In such cases, our arguments go against the person in the

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[6] See Jacquette, 'Intentionality and Intensionality: Quotation Contexts and the Modal Wedge' (Jacquette 1986).

sense of attempting to turn some of an opponent's beliefs against some of the opponent's other beliefs. Such a strategy is not generally fallacious, but can offer a legitimate method of persuasion by argument, beginning with what an interlocutor regards as true as a dialectical starting place. This sort of argument is indeed quite common, since we can often only make headway in arguing against an opponent by appealing to something the person already accepts.

There is also an abusive form of *ad hominem* which is generally deductively invalid. The typical form of this fallacy is to raise logically irrelevant objections to someone's character, actions, or beliefs in order to discredit another proposition to which the person is committed. Thus, it is a fallacy to reason as follows:

1. Person X has claimed that P.
2. Person X has (morally or socially) undesirable property F.

---

3. P is false (improbable).

The argument is manifestly deductively invalid, and in that sense it is a logically fallacious form of inference. We see informally that the inference is deductively invalid because we can easily imagine circumstances under which the assumptions are true, but the conclusion false.

This type of *ad hominem* is abusive because it impugns someone's character as a reason for rejecting the person's beliefs. Typical applications of the abusive *ad hominem* occur when the charge is made that what an opponent has said should be disregarded as false, improbable, or unbelievable, because the person is a known thief, liar, member of a disreputable organization, or anything else that is likely to find disfavor with the arguer's intended audience. The abusive *ad hominem* in certain contexts can even include such factors as the opponent's race, gender, erotic orientation, or the like. Other versions of the fallacy make irrelevantly *honorific* rather than abusive attributions. These should also be considered under the broadest category of the *ad hominem*. It is just as fallacious to reason in this way:

1. Person X has claimed that P.
2. Person X has (morally or socially) desirable property F.

---

3. P is true (probable).

If person X states that $E = mc^2$, the truth or falsehood, probability or improbability, believability or unbelievability, has nothing in the least to

do with whether or not X is a genius or saint, a thief or sexual deviate. We cannot generally decide anything about the merits of proposition P from the praise or condemnation of the person's character. This type of rhetorically fallacious argument can nevertheless be effective in moving opinion through subtle but logically irrelevant psychological manipulation. The fact that a particular person of good or bad character has asserted a proposition or tendered an argument by itself has absolutely nothing whatsoever to do with whether the proposition is true or the argument correct, even when the judgments about the person are true. A genius or saint can make false pronouncements and propound unreasonable arguments just as well as anyone else. A thief or sexual deviate can similarly make true pronouncements and propound reasonable arguments just as well as anyone else, and can even truly assert or correctly deduce that it is wrong to steal or that certain types of sexual deviance in which they themselves indulge are morally impermissible.

6.8. *Tu quoque*

A subcategory of the abusive *ad hominem* is the *tu quoque*. This is another deductively invalid fallacy in which a critic is met by the logically irrelevant reply that the critic is guilty of the same offense or subject to the same objection. The Latin term *tu quoque* is an appropriate label for this kind of fallacy, because it means in effect, 'You too' or 'The same to you'. The *tu quoque* typically has this form:

1. My critic claims that I have wrongly done A.
2. However, my critic has also on at least some occasions done A.

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3. My critic's claim that I have wrongly done A should be disregarded.

The *tu quoque* is more often presented as an enthymeme, in which the perpetrator merely asserts the equivalent of the first or second assumptions, and lets it go at that, leaving the conclusion implicit. Suppose a critic accuses me of being an embezzler. I reply that the critic has also been an embezzler. My counterclaim might be perfectly true, but it by no means absolves me of the crime. The *tu quoque* is a kind of abusive *ad hominem* because it does not speak to the proposition, but to the person. I say nothing to contradict the charge that I have embezzled, but in a logically irrelevant way I merely impugn my critic as having done the same. The *tu quoque* is often used as a psychological ploy, raising doubts about whether a critic who has made the same kind of mistakes is qualified to make an objection against others. As a rule with exceptions, *tu quoque* generally does not pro-

vide good reasons for overlooking a critic's objection; like other forms of abusive *ad hominem*, however, *tu quoque* can have the effect and may therefore serve the strategic purpose of leading an audience to reject or ignore a position or argument.

6.9. *Poisoning the Well*

A second subcategory of abusive *ad hominem* is *poisoning the well*. This type of *ad hominem* fallacy occurs when an attempt is made irrelevantly to discredit a source of information or authority. The well is poisoned, so to speak, when an audience is fallaciously led to believe that the target of the criticism is not a reliable source from whom to accept any judgment. The fallacy is *ad hominem* or against the person, because it seeks to devalue the credibility of someone's judgment on the basis of facts irrelevant to the person's expertise. The argument is not a fallacy by virtue of its logical form, because it is sometimes legitimate to cast doubt on the merit of the opinions given by a supposed authority. The fallacy of well-poisoning occurs in arguments with the following structure:

1. X maintains proposition P.
2. However, X has also maintained the false proposition Q.

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3. The opinion of X should be disregarded in evaluating the truth (probability) of proposition P.

The fallacy tries to poison the well by discrediting someone's opinion generally on the grounds that the person is not universally knowledgeable or infallible. Often, the fallacy appears in the form of an objection to the effect, 'Why should we believe the expert (witness, etc.) now, when we know that he or she has been mistaken in the past?' This criticism has a certain force, because it raises a doubt about the person's reliability. Yet it is strictly deductively invalid, other things being equal, to conclude that persons are likely to be mistaken in any particular belief just because they have been mistaken about something else.

6.10. *Appeal to Authority (argumentum ad verecundiam)*

Less obviously rhetorically fallacious is the *appeal to authority* or *argumentum ad verecundiam*. As we have seen in connection with the *ad hominem* fallacy of poisoning the well, we must often rely on the judgment of experts. We do not always have the full knowledge necessary to evaluate the material truth of every proposition or soundness of every argument. There is a difference between genuine authorities and questionable or irre-

levant authorities, and the appeal to questionable or irrelevant authorities is a common fallacy of argument.

The *ad verecundiam* usually arises as an appeal to a questionable authority who is biased in some way with respect to the matter in which expert opinion is required, or who is an authority about some subject other than that involved in the question at issue. What makes such an argument fallacious is clear enough from the deductivist standpoint when we consider that we cannot reasonably infer, in the sense of deductive validity, the likely truth of opinions given by a questionable or irrelevant authority. The fallacy has this form:

1. Authority A maintains proposition P.

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2. Proposition P is true (probable).

The argument is evidently deductively invalid when the authority in question is prejudiced in certain ways, so that the opinion offered as authoritative derives from a bias or special motive. An obvious case is when somehow who is legitimately an authority on a subject has been bribed or has some other definite stake in the acceptance of the inference, so that the pronouncement made, although given by a recognized authority, carries no reliable guarantee of its truth, probability, or believability. A similar case is when the source is an authority, but only in another irrelevant subject matter. An authority on computer technology need not be qualified to offer expert opinion on a matter of contract law; a specialist in ornithology need not be in a sound position to pronounce on the truth or falsehood of a hypothesis about genetic fingerprinting. This is not to say that the judgment of an authority from an irrelevant field must be false, but only that if such a judgment is true, its truth cannot reasonably be inferred from the fact that the expert is an authority about some other subject.

6.11. *Appeal to Majority (argumentum ad populum)*

A related fallacy is the *appeal to majority* or *argumentum ad populum*. From the fact that a majority of persons accepts a proposition it by no means logically follows that the proposition is true, or even probable or believable. The form of the *ad populum* fallacy is similar to that of the *ad verecundiam*:

1. A majority of persons maintains proposition P.

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2. Proposition P is true (probable).

There is a natural presumption that if many persons accept a proposition, then the proposition is likely to be true. Yet from a logical standpoint such an inference is clearly invalid. On any particular issue, everyone, and certainly a 50%+ majority of persons, might be wrong. The *ad populum* typically arises in conjunction with a subtle appeal to emotion. We have a psychological tendency not to want to be excluded from any generally accepted opinion. If many people believe some proposition, we may suppose it is more likely than not that the proposition is true, and we may wish to be included among those who have come to accept the proposition, rather than be left out of what others claim to know. The fallacy capitalizes on this assumption of likelihood and desire to conform in belief.

6.12. *Appeal to Ignorance (argumentum ad ignorantiam)*

It is a fallacy to infer from the fact that we do not know a particular proposition to be false that therefore it is true. This is the fallacy of appealing to ignorance or *argumentum ad ignorantiam*. The argument has this form:

1. It is not known that (or whether) proposition P is false.

---

2. Proposition P is true (probable).

The fallacy is often found where the lack of evidence for a proposition is taken as implying that the proposition is false. Many examples are not so obviously fallacious as in the above simplified schematization. I might fallaciously conclude from the fact that I see no lights burning in a house at a certain hour of night that no one is home. This conclusion may but need not be true, and in any case is not deductively validly supported by the truth of the assumption. Or I might hear someone say that we have no reason to believe that God exists, and conclude that therefore God does not exist. Again, the conclusion may or may not be true, but cannot in any case be validly derived from the negative proposition expressing the lack of or ignorance of relevant information in the assumption.

6.13. *Appeal to Emotion (argumentum ad misericordiam)*

The *appeal to emotion* or *argumentum ad misericordiam* is a fallacy that plays on logically irrelevant emotional response. Stylistically, appeals to emotion can be very different in appearance, sometimes invoking feeling by facial expression, tone of voice, depiction of moving circumstances, or even more theatrical dramatic effects, that are logically irrelevant to the merits of the inference to a conclusion.

There is a wide range of emotions to which a use of the *ad misericordiam* fallacy can appeal. As the Latin name suggests, a common form is the appeal to pity. A fallacy of this type might seek to convince a jury that someone accused of a crime should go free after describing the pitiful but factually irrelevant conditions under which the person was raised, or another entirely unrelated trauma they have recently experienced in life. If the jury can be made to feel sufficient sympathy for the person, its members might accept the defense attorney's conclusion. This may indeed be a humane decision, and the attorney's efforts in this regard might be effective courtroom practice, yet any such argument is logically fallacious. There are also other emotions that are irrelevantly called upon to win support for a conclusion, in fallacies that evoke feelings of anger, fear, joy, resentment, and the like. Back in the courtroom, we can imagine the prosecuting attorney in the same case evoking feelings of anger and resentment against the accused, possibly by baiting the person into a show of hostility. The possibilities are endless – as rich and potentially misleading as the conflicts of emotion and reason in everyday experience may cause us to expect. The fallacy has the following schematic form:

1. Emotional response R is somehow made to occur.
2. Emotional response R is psychologically associated with acceptance of proposition P.

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3. Proposition P is true (probable).

The error here is easy enough to spot when the argument is made explicit. The *ad misericordiam* relies on the strength of emotion as a driving force in our lives, to which even the most disciplined reason sometimes yields. The panoply of theatrical devices by which emotions can be provoked easily leads thought astray. A classic example is the spread of mob violence among normally sedate law-abiding citizens when their fear or anger has been incited. Other instances include the use of propaganda by political demagogues to manipulate opinion in logically irrelevant ways by arousing pity, anger, fear, and the like emotions.

6.14. *Appeal to Force (argumentum ad baculum)*

A final example in which an informal or rhetorical fallacy is reduced to deductively invalid inference is the fallacy of trying to convince someone of the truth of an argument's conclusion by appeal to force or *argumentum ad baculum*. This fallacy is similar to if not just a special case of the *argumentum ad misericordiam*. If we are persuaded that a conclusion should

be accepted because of the threat of force, then this undoubtedly occurs in part at least because of the emotional force of fear. The Latin phrase used for this fallacy means literally an argument 'with a club'. The *ad baculum* is a blunt weapon that threatens to beat us into submissive agreement. The threat need not be physical, but could be financial, psychological, or any perceived danger or evil.

An *ad baculum* is often raised by persons who want to stress the urgency of adopting a certain proposal in order to avoid a real or imagined disaster. Whether or not the argument is valid or fallacious can depend on whether or not the threat is real or imagined, and on whether or not the proposal if adopted could in fact or be reasonably expected to avert the threat. There is a difference between the fallacy of conjuring up a threat merely for the psychological effect of producing acceptance of a certain conclusion, and describing a potential danger and outlining a sensible response by which the danger might be avoided. An example of the fallacy of appeal to force is to say that if a certain tax is not approved, then essential military spending will go unfunded, and our enemies will find us so vulnerable that they will be tempted to attack. The argument is fallacious if there is no relevant connection between approval of the tax, the military spending projected, and aversion of the danger of foreign military threat, or if the threat of foreign military invasion is imaginary or contrived. Another common example is the explicit threat of certain religious teachings, that unless we accept a given set of beliefs and conduct our lives in certain ways we can expect disadvantages in this life, or the eternal punishment of our immortal souls after death. Again, whether an argument of this sort is a fallacy depends on the facts of the case.

The *ad baculum* has this logical form:

1. If proposition P is not accepted as true, then danger D threatens a definite harm.

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2. Proposition P is true (probable).

The deductive invalidity involved in the *ad baculum* by now should be clear on inspection as fitting the same pattern as the reconstructions of previous informal or rhetorical fallacies. All in different distinctive ways are deductively invalid in that they represent inferences in which it is logically possible for the assumptions to be true and the conclusions false. Deductivism maintains that the same is true of any inference token or type that is correctly described as a logical fallacy.

7. Fallacies as Logically Defective Deductively Invalid Arguments

A fallacy can appear in anyone's thought, most embarrassingly in one's own. We can improve our thinking by healthy criticism, with the aim of minimizing logically incorrect reasoning by learning to recognize and avoid the most common fallacies. Fallacies, according to deductivism, are logically defective arguments that can be categorized as failing to satisfy the most basic logical requirement by being deductively invalid. The list of fallacies is open-ended, and, in that sense, there may be innumerable fallacies, the most notable of which are cataloged in the taxonomy we have considered. Although the present venue does not permit more searching and exhaustive examination even of some of the most commonly identified fallacies, we have hopefully presented a wide enough selection to indicate the kinds of reconstructions of fallacies the deductivist can present in defense of the thesis that all informal or rhetorical fallacies are at bottom instances of deductively invalid reasoning.[7]

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CYCLIC PROOFS IN ARGUMENTATION. THE CASE OF EXCLUDING BORIS PASTERNAK FROM THE ASSOCIATION OF WRITERS OF THE USSR

Abstract: In the paper we consider some principal notions of non-well-founded proof theory in argumentation. This theory is based on the assumption of Anti-Foundation Axiom that every graph tree has a unique decoration. A decoration of a graph is an assignment of a derivable formula to each node of the graph in such a way that the premisses of the root-derivable formula assigned to a node are the derivable formulas assigned to the children of that node. According to Anti-Foundation Axiom in proof theory, cyclic graph and infinite graph trees have a decoration too. This means that there are cyclic and infinite proof trees. The natural interpretation of cyclic proofs in argumentation is their consideration as confirmation procedure, where premisses are compatible with a derivable statement, but they do not prove this in the standard meaning. As model example we use the case of excluding Boris Pasternak from the Association of Writers of the USSR.

Keywords: Non-well-founded proofs, cyclic proofs, Anti-Foundation Axiom, proof argumentation, confirmation argumentation.

1. Introduction

Boris Pasternak is a prominent Russian poet who wrote the best known Soviet novel *Doctor Zhivago* (Pasternak 1958) that brought him the Nobel Prize for Literature in 1958. Pasternak had to decline the honour because the protests in his home country. *Doctor Zhivago* was published first in Russian and in Italian translation by the publisher Feltrinelli in Milan in 1957, after the Italian journalist Sergio D'Angelo had smuggled the manuscript out of Russia. The English translation appeared in 1958. So, *Doctor Zhivago* was soon translated into 18 languages.

Pasternak probably completed the work in 1954. It was started in 1945, after the death of his father. He tried to publish his novel, but this effort turned out to be unsuccessful. It was expected taking into account that in the 1930s and 1940s Pasternak's works were criticized by the Russian

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Association of Proletarian Writers as the older literary type and they were not printed. However, at Stalin's time he did not die in the Gulag Archipelago as others because Stalin's respect for him.

Recall, at the Soviet time censor had a duty to inspect material before publication to ensure that it contains nothing offensive to government. As a result, everybody who lived in the Soviet Union knew that all scientists, artists, and other intellectuals were the objects of censorship. Official Soviet censorship, i.e. censorship that emanates from governmental authority determined all the information to be inspected.

As an example, Soviet literature had to find the "positive" hero among the builders of communism. This main character of Soviet literature had to reflect "socialist reality" and the "true traits of the new man." Soviet artists, members of registered associations, were obliged, as stated in one of the statutes, to "present life in light of socialist ideals." This meant that emotions and experiences that were not related to socialist development, from the socialist viewpoint, were not interesting enough to become the subject of art. It was one of the basic claims of socialist realism ("soc-realism"), the dominate Soviet treatment of authentic literature and painting.

The author's treatment of the early years of the October revolution presented by Pasternak in *Doctor Zhivago* formed a considerable contrast with the official propaganda on the period, which suggests only heroism and self-sacrifice. This treatment went against socialist realism. He explained the key idea of novel as follows: "When I wrote *Doctor Zhivago* I had the feeling of an immense debt toward my contemporaries. It was an attempt to repay it. This feeling of debt was overpowering as I slowly progressed with the novel. After so many years of just writing lyric poetry or translating, it seemed to me that it was my duty to make a statement about our epoch – about those years, remote and yet looming so closely over us. Time was pressing. I wanted to record the past to honor in *Doctor Zhivago* the beautiful and sensitive aspects of the Russia of those years. There will be no return of those days, or of those of our fathers and forefathers, but in the great blossoming of the future I foresee their values will revive. I have tried to describe them. I don't know whether *Doctor Zhivago* is fully successful as a novel, but then with all its faults I feel it has more value than those early poems. It is richer, more humane than the works of my youth."[1] This novel was banned in the Soviet Union. Pasternak was rehabilitated posthumously in 1987, which made possible the publication of his major work in Russia.

[1] It is an interview given by Pasternak to Olga Carlisle in 1960.

In the paper we consider an argumentation model used at the session of the Association of Moscow Writers (held on October 31, 1958), which made the decision to expel Boris Pasternak from the Association of Writers of the USSR, to condemn his literature, and to evict him from the USSR. According to the records of this session (*Literaturnaya Gazeta*, 1 November 1958), 13 members are reported to have spoken but no indication was given of how many members attended. From the records one can read different statements made by writers against their colleague. These statements contained **cyclic proofs** for increasing the acceptability of the standpoint that Pasternak should be expelled from the Association of Soviet Writers and from the USSR. The notion of cyclic proofs in argumentation will be formally explicated in the third section. Its informal meaning is as follows:

- *there are no opponents, each speaker is proponent*,
- *speakers use just confirmation arguments and do not use proof arguments*,
- *the standpoint itself can be viewed as a reasonable argument.*

This session was chaired by S. Smirnov, the editor of Literaturnaya Gazeta (the best known literature newspaper in the USSR). All speakers who were prominent Soviet writers such as L. Oshanin, I. Zelenin, V. Pertsov, A. Bezymensky, A. Sofronov, S. Antonov, B. Slutski, G. Nikolayev, V. Soloukhin, S. Baruzdin, B. Polevoy and many others encouraged very negative attitudes towards Pasternak. At the end of Session Smirnov said: "I fully agree that the novel *Dr. Zhivago* is trash and I think that this internal emigrant, B. Pasternak, should be expelled from the USSR." He proposed to submit the request to the Soviet government to evict Pasternak from the USSR. The resolution demanding what amounts to Pasternak's deportation from the USSR was passed unanimously.

2. Non-well-founded proofs

Now consider some basic notions of proof theory further to formalize cyclic proofs used at the session of the Association of Moscow Writers. First of all recall that a proof (or derivation) of a well-formed formula S from a set of premisses U is a finite tree such that:

- S is the root of the tree and is called the end-formula.
- The leaves of the tree are all axioms or members of U.
- Each child node of the tree is obtained from its parent nodes by an inference rule, i.e. if S is a child node of $S_1, \ldots, S_n$, then $\frac{S_1,\ldots,S_n}{S}$ is an instance of a rule.

If we have a proof tree with the root S and $U = \emptyset$, then S is called a provable (or root-provable) formula. If we have a proof tree with the root S and $U \neq \emptyset$, then S is called a derivable (or root-derivable) formula from premisses U.

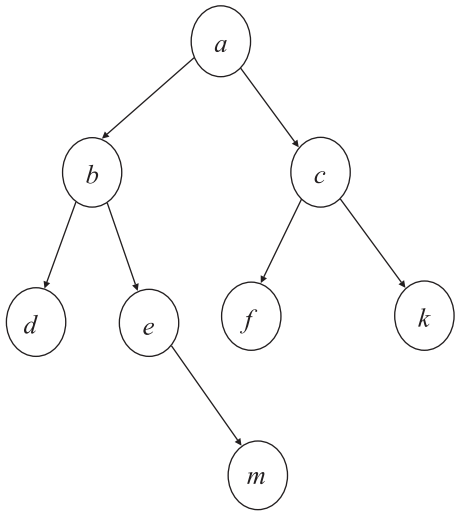

Figure 1. The example of well-founded graph tree decorated by the proof tree in Figure 2

$$1.\quad \frac{m}{e},$$

$$2.\quad \frac{d,\quad e}{b},\qquad \frac{f,\quad k}{c},$$

$$3.\quad \frac{b,\quad c}{a}.$$

Figure 2. The example of well-founded proof pictured by the graph in Figure 1. Each step is inferring

So, proofs may be pictured using downward growing trees of graphs; see Figure 1, where the root is a root-derivable formula. Each *graph* consists of a set of nodes and a set of edges. Every edge is an ordered pair of nodes (in Figure 1, we have a pair $\langle a, b\rangle$ as an example). If $\langle a, b\rangle$ is an edge then we will say that b is a child of a. A *path* is a finite or infinite sequence of nodes a, b, e, m linked by edges $\langle a, b\rangle$, $\langle b, e\rangle$, $\langle e, m\rangle$. A pointed graph is a graph together with a distinguished node called its point. This graph is

said to be accessible if for every node m there is a path from the point a to the node m. If this path is always unique then the pointed graph is a tree and the point is the root of the tree (the end-formula).

We will use accessible pointed graphs as our pictures of proofs. In the diagrams the point will always be located at the top. A *decoration* of a graph is an assignment of a derivable formula to each node of the graph in such a way that the premisses of the root-derivable formula assigned to a node are the derivable formulas assigned to the children of that node. A *picture* of a proof is an accessible pointed graph which has a decoration in which the root-derivable formula is assigned to the point.

Definition 1

A graph (tree) is called well-founded if it has no infinite path.

According to Mostowski's collapsing lemma (Aczel 1988), we can obtain the unique function d defined so that $dn = \{dn' : \langle n, n' \rangle \text{ is an edge}\}$ for each node n of the graph. The decoration d assigns the derivable formula dn to the node n. From this it follows that every well-founded graph has a unique decoration. As an example, a unique decoration of the graph in Figure 1 is obtained in Figure 2.

Notice that in the standard proof theory we assume the well-foundedness of trees. This means that we accept just derivable formulas with finite paths. By this assumption, the notion of proof is understood as well-founded and proof theory considers only such well-founded proofs. However, we can suppose the existence of derivable formulas with infinite (e.g., cyclic) paths. For accepting these formulas we need to postulate the following axiom formulated first by Aczel[2]:

[2] Using the decoration of a graph for describing non-well-founded notions was proposed first by Aczel, see Aczel (1988), for more details see Barwise (1992). He defined a non-well-founded set by the decoration construction. More precisely, a *decoration of a graph* is regarded by him as an assignment of a set to each node of the graph in such a way that the elements of the set assigned to a node are the sets assigned to the children of that node. A picture of a set is an accessible pointed graph which has a decoration in which the set is assigned to the point. For example, the well-founded set $a = \{\{d, \{m\}\}, \{f, k\}\}$, where $b = \{d, e\}$, $e = \{m\}$, $c = \{f, k\}$, is pictured by the graph of Figure 1. The non-well-founded set $a = \{\{d, \{e\}\}, \{f, a\}\}$, where $a = \{\{d, e\}\} = \{d, e\}$, $e = \{e\}$, $c = \{f, k\}$, is pictured by the graph of Figure 3. This set has an infinite notation: $a = \{\ldots\{\{d, \{\{\{\ldots\}\}\}\}\}\ldots\} = \{\{d, \{\{\{\ldots\}\}\}\}, \{f, \{\{d, \{\{\{\ldots\}\}\}\}, \{f, \{\{d, \{\{\{\ldots\}\}\}\}, \{f, \ldots\}\}\}\}\}\}$.

Anti-Foundation Axiom

Every graph has a unique decoration.

According to this axiom, the graph in Figure 3 is decorated by the proof tree in Figure 4. However, this graph is not well-founded because of containing infinite (cyclic) paths, for example the cyclic path $\langle a, c\rangle$, $\langle c, k\rangle$, $\langle k, a\rangle$, $\langle a, c\rangle$, $\langle c, k\rangle$, $\langle k, a\rangle$, ... So, Anti-Foundation Axiom allows us to use non-well-founded trees of proofs in decorating graphs. According to **foundation axiom**, *every graph has at most one decoration*. As a result, the graph of Figure 1 has one decoration and the graph of Figure 3 have no decoration in the case foundation axiom holds true.

Definition 2

A proof (tree) is called non-well-founded if it is pictured by the graph containing at least one infinite path.

For instance, the non-well-founded proof of Figure 4 is pictured by the graph of Figure 3. It is an example of the proof tree with three cyclic paths.

The notion of cyclic proof tree first was introduced in Brotherston (2005), Brotherston (2006), Brotherston, Simpson (2007), and Sprenger (2003). The notion of non-Archimedean proof was introduced in Schumann (2007), Schumann (2008). The proof tree of latter kind is non-well-founded, too.

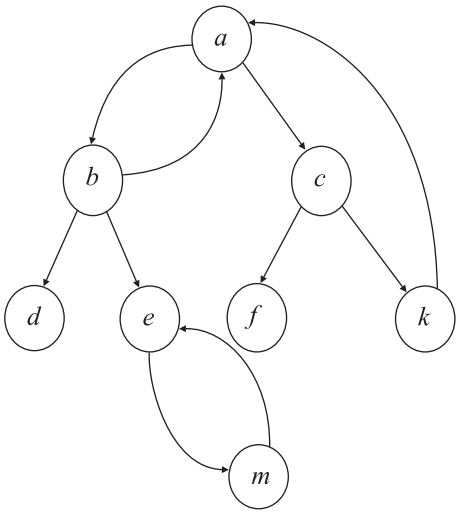

Figure 3. The example of non-well-founded graph tree decorated by the proof tree in Figure 4

$$1.\quad \frac{m}{e},$$

$$2.\quad \frac{e}{m},$$

$$3.\quad \frac{d,\quad e}{b},\qquad \frac{f,\quad k}{c},$$

$$4.\quad \frac{b,\quad c}{a},$$

$$5.\quad \frac{a}{b},\qquad \frac{a}{k}.$$

Figure 4. The example of non-well-founded proof pictured by the graph in Figure 3

3. Cyclic proofs

Argumentation is a kind of inferring from premisses. We will differ two argumentation ways:

- *proof argumentation* ("the standpoint A is provable by arguments $B_1, \ldots, B_n$"), it is a derivation in which the conjunction of premisses $B_1, \ldots, B_n$ implies a derivable statement A,
- *confirmation argumentation* ("the standpoint $\neg A$ is not provable by arguments $B_1, \ldots, B_n$", i.e. "A is confirmable by $B_1, \ldots, B_n$"), it is a derivation in which the premisses are compatible with a derivable statement.

By these definitions, the derivation supposed in proof argumentation is a reflexive and transitive relation. Indeed, the standpoint A is provable by the argument A and if the standpoint A is provable by the argument B and B is provable by the argument C, then A is provable by the argument C. The derivation supposed in confirmation argumentation is a reflexive, symmetric and transitive relation. For instance, if the standpoint A is confirmable by the argument B, then the standpoint B is confirmable by the argument A and vice versa. As we see, confirmation argumentation can be viewed as a kind of non-well-founded (cyclic) proof. More precisely, define the binary relation Der of derivation as the least relation satisfying: whenever there is a proof tree containing P in the conclusion and Q among the premises, then $Der(P, Q)$ holds. Further, define Der' to be the reflexive and transitive closure of Der. We say two statements P and Q are *mutually dependent* if both $Der'(P, Q)$ and $Der'(Q, P)$ hold, i.e. Der' is symmetric also.

Usually, confirmation argumentation is regarded as probabilistic inferring, but there is the one more natural way to consider it as a kind of non-well-founded proof, because in the real speech practice the argumentation "if B then A" means "A is confirmable by B" very often. As an example, let us compare the following two proof trees stated at the session of the Association of Moscow Writers:

1. $\dfrac{\textit{Pasternak is an individualist}}{\textit{He is closed into his internal world}}$,
2. $\dfrac{\textit{He is closed into his internal world}}{\textit{He spites at our people, at our business}}$,
3. $\dfrac{\textit{He spites at our people, at our business}}{\textit{Pasternak is an individualist}}$

(a) *Pasternak wanted to receive the Nobel Prize,*

(b) *Many enemies of Soviet people received the Nobel Prize such as the Fascist-like French writer A. Camus,*

(c) *Usually, the Nobel Prize for Literature is awarded for reasons of anti-Soviet policy*

Pasternak is an enemy of Soviet people

The first reasoning belongs to G. Nikolaeva, the second to S. Smirnov. Evidently, Nikolaeva's argumentation (her proof tree) is of the form of cyclic proof because her statements "Pasternak is an individualist", "He is closed into his internal world", "He spites at our people, at our business" are mutually depended, while Smirnov's argumentation is a standard (well-founded) inferring though his derivation is probabilistic.

The majority of proof trees used at the session of the Association of Moscow Writers is cyclic. So, the common root-derivable statement (standpoint) of this session "Pasternak should be sent from our country" means that according to his world outlook, Pasternak is an enemy of Soviet people. The main arguments of Soviet writers that had to prove the root-derivable statement were mutually depended with this standpoint. For instance, G. Nikolayev's argument "The story of Pasternak is the story of treason", V. Soloukhin's argument "That book is the Cold War weapon against Communism", S. Baruzdin's argument "Our people have not known Pasternak as a writer, but they will remember him as a traitor" are compatible with the standpoint, i.e. they just confirm it, but do not prove (in the standard meaning of well-founded proof trees).

Definition 3

An argumentation is cyclic if main arguments and a standpoint are mutually depended.

Notice that the cyclic argumentation has the form of a cyclic (non-well-founded) proof tree, where the root-derivable expression is a standpoint. Obviously, this argumentation is pictured by the graph containing at least one cyclic path.

4. Conclusion

The logical part of argumentation is not reduced to the standard, well-founded proof theory. For example, in the case of excluding Boris Pasternak from the Association of Writers of the USSR the logical part of argumentation contained non-well-founded (cyclic) proofs. This does not mean that it was an exception to the rule. Cyclic argumentation is used very often in human speeches.

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DEFINITIONS IN ARGUMENTATION

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DEFINITION WITHIN THE STRUCTURE OF ARGUMENTATION

Abstract: The purpose of this paper is to precisify and compare three relationships between definition and argumentation: argumentation about definition, argumentation from definition and argumentation by definition. Some modification of the standard understanding of these relationships is suggested. Additionally, it is argued that although real definitions are fallible and subject to revision and change, this does not imply that they have to be persuasive, manipulative definitions.

Keywords: real definition, nominal definition, stipulative definition, lexical definition, persuasive definition, manipulative definition, argumentation, evaluation of definition and argumentation, condition of adequacy

1. Introduction

Let us begin with some general remarks on logic in the broad sense, formal logic, informal logic (or critical thinking) and differences between formal and informal logic. It can be said that logic in the broad sense consists of formal logic (i.e. the logic of inference), the logic of language (i.e. logical/formal semiotics or semantics) and the logic of cognition or of knowledge (epistemology, formal epistemology).

The field of formal logic is divided into traditional and contemporary logic. Contemporary logic breaks down into classical and non-classical, mathematical and philosophical. The distinction between formal logic and its metalogic is also useful. Metalogic consists of model theory, definition theory, recursive theory and proof theory. Set theory is considered a part of formal logic.[1]

[1] Some Polish logicians have played an important role in the development of formal logic (including the formal theory of definition), see e.g. Tarski 1994; Słupecki, Borkowski 1967; Kuratowski, Mostowski 1976; Grzegorczyk 1974; Adamowicz, Zbierski 1997; the history of this topic see e.g. Kamiński 1977.

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Informal logic can be characterised as a theory and a practice (art), which investigates a set of rules, useful for an analysis and evaluation of formal (structural) and material correctness of everyday human thinking. Informal logic (critical thinking) instructs:

a) how to express questions correctly (a theory of questions/problems),[2]
b) how to define words and objects (a theory of definition),
c) how to classify different concepts and objects (a theory of classification),
d) how to determine when instances of reasoning, persuasion, argumentation and justification are correct and when they are incorrect (a theory of reasoning, of persuasion and manipulation, of argumentation, of justification[3]),
e) how to discuss various topics in a proper and effective way (a theory of discussion/discourse),
f) how to competently use language as a tool of communication (a theory of linguistic communication, a theory of language),
g) how knowledge on a specific topic may be gained by exercising the relevant form of reasoning (a theory of knowledge, of rationality, of action).

These procedures and their results are listed in this order to emphasise that the concepts of action, rationality, knowledge, language and linguistic communication that appear later in the list are superior to those appearing at its beginning, such as discussion, justification, argumentation, etc.

The boundary between formal and informal logic is rather vague, because the domain of informal logic is formal to a certain extent. For it is the type of logic, which constitutes a theory of correct forms of thinking: questioning, defining, classifying, reasoning, arguing, discussing, etc. The difference between formal and informal logic is that the latter does not use formal methods or, if it does, uses them only in a limited way. On the other hand, informal logic is informal in the sense that its approach is practical or pragmatic. In other words, it is logic "with a human face". The goal of informal logic is to make everyday argumentations more logical, that is, more precise and effective.

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[2] The following distinction is worthy of noticing: a knowledge-gaining *procedure* (such as questioning, defining, classifying, etc.) and its *result* (a question, a definition, a classification, etc.). About the distinction: an action – a product (a procedure – a result) see Twardowski 1999, pp. 103–132.

[3] The theories of argumentation and justification are both the theories of knowledge-gaining procedures. But the theory of argumentation is more practical, than the theory of justification, and it focuses on everyday argumentations, their rules and logical fallacies (tricks) employed in such argumentations.

2. Argumentations and Definitions

There is a relationship between argumentation and definition as well as between a theory of argumentation and a theory of definition. A theory of argumentation deals with analysis of the structure (form), roles (functions), and goals of argumentations. It also evaluates whether argumentations are logically correct (valid) or not. A theory of definition similarly concerns the structure, roles, and goals of definitions and their usefulness.

3. Definitions

At least two types of definition theory may be distinguished: (a) a formal theory of definition, which is a part of metalogic (see e.g. Curry 1958; Czelakowski 2009) and (b) an informal theory of definition, which is included in textbooks concerning informal logic (practical logic or critical thinking). In this paper I am mainly interested in the informal analysis of definitions.

3.1. Some Types of Definitions

According to the contemporary, standard theory of definition[4] (see e.g. Robinson 1950; Ajdukiewicz 1958a, pp. 114–126; Ajdukiewicz 1974, pp. 57–84; Ajdukiewicz 1984, pp. 236–256; Jadacki 1995, pp. 139–152; Kamiński 1958a; Marciszewski 1994, pp. 183 ff.; Pawłowski 1980; Ziembiński 1976, pp. 51–66; see also Hansson 2006, pp. 5–30) there are explicit (full) and implicit (partial) definitions (This pertains to the structure of definitions). An *explicit* definition consists of a word being defined (*definiendum*), which occurs on the left side of the definition, and the formula defining the word (*definiens*), which occurs on the right side of that definition. The *definiendum* and *definiens* are connected by a *copula*: an expression such as "is", symbolised by the identity functor with abbreviation "df" ($=_{\mathrm{df}}$, $=_{\mathrm{Df}}$, = df, = Df) or "if and only if", symbolised by the equivalence functor ($\equiv$, $\leftrightarrow$) in the case, when the *definiendum* is a sentence. An *implicit* definition takes the form of a conditional ("*if* ..., *then* ...", symbolically, $\rightarrow$).

Among other types of definitions, the *ostensive* definition is fundamental. Its practical role is to characterise the meaning of primitive terms

[4] I do not intend to present all types of definitions. I rather focus on those types which are relevant for the main topic of my paper.

(concepts), which have to be introduced into a language not only by linguistic (verbal) means, but also by a gesture (indication). Janina Kotarbińska explains that "it consists in pointing with a suitable gesture at a single designatum of the term which is being defined and in making at the same time a statement of the type 'This is N', where 'N' stands for the term being defined" (Kotarbińska 1960, p. 2; see also Czeżowski 2000a, pp. 103–109; Marciszewski 1993b, pp. 95–106; Marciszewski 1994, pp. 183 ff.; Marciszewski 1995, pp. 189–190).

The theory of definition distinguishes between real (empirical) and nominal definitions. The role of a *real* definition is to characterise the status of an object (a thing or a phenomenon). A *nominal* definition indicates what a word (name) means or denotes. It should be noted that "the concepts of nominal definition and real definition are by no means mutually exclusive, since there are statements which can be classed as both real and nominal definitions" (Ajdukiewicz 1974, p. 84; see also e.g. Robinson 1950, pp. 24 ff.). It is worthwhile to remember that if, for example, we want to provide a real definition for what human life is (or rationality, freedom, democracy, law, discrimination, etc.), then we use a name such as "human life" ("rationality", "freedom", "democracy", "law", "discrimination", etc.) and formulate a nominal definition which expresses what this word means (denotes).

A definition by *genus* and *differentia* (i.e. an essential definition, which is a kind of form of real definition) indicates what a given class of things[5] (*species*) is in terms of a broader class, the *genus*-class, which includes the defined *species*-class, and a specific (essential, important) property (*differentia specifica*) which only objects of the defined *species*-class have (e.g. Man is a *rational* animal). This property distinguishes the defined *species*-class from other *species*-classes belonging to the same *genus*-class.

A *descriptive* definition gives a description of the class of things defined but does not have a "classical" form (structure) of the definition in terms of *genus* and *differentia*.

A *connotative* definition includes a group of properties (especially essential ones) that belong to the class of things defined. A *denotative* definition fixes the class of things, which belong to the *definiendum* of such a definition.

Stipulative, lexical, and persuasive definitions are also distinguished in the theory of definition. A *stipulative* definition (stipulation) establishes how

[5] The topic of natural kinds (classes) of things or phenomenon – like e.g. chemical elements, biological species, etc. – is important in contemporary philosophy of language and science (see e.g. Kripke 1981, pp. 106–155; Putnam 1975, pp. 139–152, 192–271).

a new word, which is to be introduced, will be understood (e.g. the term "e-mail" was introduced in such a way). The function of a *precising* definition is to precisify an imprecise (ambiguous and vague[6]) meaning of a word. This type of definition is useful, among other things, in law when one needs to characterise for example what "disabled person" means. A *lexical* definition gives the meaning of a given word as it is used in a language-using society. Dictionaries are full of such definitions.

The purpose of a *persuasive* definition is to promote whichever meaning of a word is thought to be the right or the most useful one (see e.g. Stevenson 1938, pp. 331–350; Stevenson 1944, pp. 206 ff.; Schiappa 1993, pp. 403 ff.; Macagno, Walton 2008a, pp. 203–228; Macagno, Walton 2008b; pp. 525–549). "If a persuasive definition is meant to persuade, and thus has a function as an argument, it could perform this function quite appropriately, provided there is no deception or confusion about what its real purpose is. This formal dialogue model of persuasion throws a new light on persuasive definitions. Viewed within such a model, a persuasive definition is not just a stipulation or fiat" (Walton 2005, p. 179). The intention of a persuasive definition may be misleading or may not (e.g. Walton 2001, pp. 119 ff.; Walton 2005, pp. 164 ff.). It is worth of noting that stipulative and lexical definitions both may be used in a persuasive role.

3.2. Rules of Definitions (Conditions for Correctness of Definitions)

Traditionally, the most important and frequently quoted rules for definitions[7] are the following (see e.g. Ajdukiewicz 1974, pp. 68–70; Ziembiński 1976, pp. 61–64):

a) In the case of an explicit definition, the word defined (*definiendum*) must not be used in the *definiens*. If the rule is not fulfilled, then a fallacy occurs ("*circulus (vitiosus) in definiendo*" – "*idem per idem*").[8]
b) An unknown word must not be defined by using other words which are also unknown to someone (the fallacy of "*ignotum per ignotum*").

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[6] An interesting thing is that on the one hand people, who specialise in the theory of definition claim that the role of a precising definition is the precisification of terms which are imprecise, i.e. ambiguous or vague. But on the other hand in the contemporary theory of vagueness definitional strategy is not considered a useful tool to deal with vagueness. The question is whether it is possible to build an agreement between these points of view. If yes, then how? But it is a topic for yet another paper (see e.g. Kublikowski 2003).

[7] Some rules can be already found in the ancient or modern theories of definition, for example in Thomas Hobbes' remarks on definitions (see e.g. Kamiński 1958b, pp. 53–54).

[8] Traditional theory of definition does not allow a definition to be circular. But today some logicians do not acknowledge the circularity of definitions as a fallacy (see e.g. Walton 1985; Gupta 1988–89; Gupta 2008).

c) With regard to a lexical definition the connotation (intension) and denotation (extension) of the *definiendum* and the *definiens* must be identical, i.e. mutually interchangeable (the condition of adequacy). This condition is problematic in the case of real (empirical) definitions. I will try to show this in a subsequent part of this paper.
d) The extensions of the *definiendum* and *definiens* of a lexical definition must not be mutually exclusive.
e) The extension of the *definiens* of a lexical definition must not overlap with the extension of the *definiendum* (see (f) and (g)).
f) The extension of the *definiens* of a lexical definition must not be superior to the extension of the *definiendum* (i.e. the definition must not be too wide).
g) The extension of the *definiens* of a lexical definition must not be inferior to the extension of the *definiendum* (i.e. the definition must not be too narrow).

In this paper I focus on what makes a definition or argumentation *materially correct* (the condition of material or empirical correctness, i.e. the condition of adequacy), rather than on what makes either of these *formally correct* (the condition of formal correctness).

In order to analyse the issue of correctness and incorrectness in argumentation, it is useful to introduce a distinction between explicit and implicit incorrectness (fallacy). *Explicit* incorrectness in argumentation occurs when an argumentation itself is not correct: an example of this form of incorrectness occurs when an invalid scheme of inference is applied so that the conclusion of an argumentation does not follow from the premises of the argumentation. *Implicit* incorrectness occurs when knowledge-gaining procedures and their results (i.e. questioning and questions, defining and definitions, classifying and classification, etc.), applied in argumentation, are not correct.[9]

Argumentations and definitions are interconnected in many different ways. Let us now analyse some of these ways.

4. Argumentation about Definition

Edward Schiappa (1993, p. 404) observes an interesting distinction that is expressed in *The New Rhetoric* written by Chaim Perelman and Lucie

[9] For some fallacious usages of definitions in argumentations see also e.g. Koszowy 2007.

Olbrechts-Tyteca: "the argumentative character of definitions always presents two closely connected aspects which must nevertheless be distinguished, since they deal with two phases of the reasoning: definitions can be supported or validated by argument; they themselves are arguments" (1969, p. 213). The distinction between argumentation about definition and argumentation from definition has been known since the time of Plato and Aristotle (Weaver 1953, p. 86). An argumentation about definition is designed to arrive at definition, which is useful to further discussion (Schiappa 1993, pp. 403 ff.; Schiappa 2003, pp. 33 ff.; see also McGee 1999, pp. 141 ff.).

I understand argumentation about definition in a similar way to Schiappa. It is a useful enterprise, a procedure in which people seek to formulate a definition of something, for example, a definition of human life. In such cases people try to obtain – by means of argumentation – a specific result: an adequate definition of human life. Such a definition is needed to guide social debate and legal regulations concerning whether abortion involves killing human life or is just a type of surgery, similar to a surgical removal of the vermiform appendix.

In the case of argumentation about definition an argumentative process is finished when a definition is obtained. In other words, a definition is an ending point (a conclusion) of a discussion. In the next case a definition already obtained is a useful tool in a further discourse.

5. Argumentation from Definition

A definition can be the starting point of a discussion. It is good to have a definition of the topic at the beginning of a discussion. The definition delivers the meanings of key words, involved in a discussion, explaining how these words – like "human life", "abortion", "euthanasia" or "human death" – are understood by members of the discussion. This kind of a definition usually is an explicit, nominal definition.

Yet, it is important to remember that the concepts of nominal definition and real definition are not mutually exclusive (see e.g. Ajdukiewicz 1974, p. 84). For in some cases a statement may function as a nominal definition and also as a real definition.

"Standard definitions represent temporary agreements of an audience as to how particular words are to be understood. [...] Well-established and uncontroversial definitions (dormant definitions-as-arguments) are a rhetorical resource that an arguer can draw upon in constructing arguments"

(Schiappa 1993, p. 404; see also Schiappa 2003, p. 169; Walton 2008, pp. 129 ff.; Walton and Macagno 2008, pp. 81 ff.). The problem amounts to finding a definition which is well-established and uncontroversial for users of a language.

An argumentation from definition is similar to an argumentation by definition and it is difficult to distinguish them in a precise way (see e.g. McGee 1999, pp. 141 ff.). However, in the next section I will try to make this distinction clearer.

6. Argumentation by Definition

In my view the most powerful usage of a definition occurs in the case of an argumentation by definition, when a definition plays the role of a premise in an argumentative structure.

A nominal definition – which gives an understanding of a key word for a discussion – may be used in this role (see argumentation from definition). But such a function may also be played by a definition, which has been traditionally called "a real definition". According to the ancient Aristotelian tradition, the goal of a real definition is to establish (discover) essential properties of the class of things which are being defined.

However, despite the fact that the concept of real definition has a long tradition, some scholars – for example Schiappa – have criticised it. The definition of death can be an interesting illustration of his point of view.

6.1. Case Study: Death

For many centuries a person was determined to have died when a physician had examined whether that person's heart and lungs had stopped functioning, that is, whether the person's pulse and the breathing had ceased. A mirror had been a traditional instrument used to look for signs of breathing. If these signs of life were determined absent, then the person in question was certified dead. The technological advancement in medicine (e.g. life-support machinery) made this traditional definition of death problematic (Schiappa 1993, p. 408; see also Schiappa 2003, pp. 35–48). According to the definition later introduced "permanent loss of whole brain functioning *has always been* the underlying criterion of death" (Culver and Gert 1982, p. 187; see also Walton 1980). Schiappa objected that such definitions are traditionally understood, unchangeable real definitions (in other words, traditionally understood, unchangeable real definitions by *genus* and *differentia* or real descriptive definitions, etc.). Ac-

cording to Schiappa, even if we assume that it is possible to obtain real definitions, then such definitions must not be understood as uncontroversial, permanent and unchangeable, but as redefinitions, subject to revision, renegotiation and modification in the context of change in people's perceptions of reality. Rather than counting the presented definitions of death as real, Schiappa would considered these as nominal (lexical, dictionary), stipulative,[10] persuasive, and in some cases, manipulative definitions (Schiappa 1993; Schiappa 2003; see also McGee 1999; Titsworth 1999, pp. 171–184; Walton 2008, pp. 129 ff.; Walton and Macagno 2008, pp. 81 ff.).

I share Schiappa's objections only partially. A criticism of his view may be expressed by the following question: Is it a sufficient reason to disqualify and even abandon the concept of real definition just because so-called real definitions must be revisable and changeable?

Discovering an essential property (a nature) of a class of things does not involve a unique, intuitive act, but a difficult, long-term – perhaps unending – empirical and discursive process. The purpose of this process is to deliver a real definition. But the meaning of a *definiendum* and *definiens* of an obtained definition – as Schiappa also claims – may be revised and changed (corrected). This type of a definition in fact is only approximately, but not totally, adequate[11] (see e.g. Ajdukiewicz 1958b, pp. 29–46; see also Kotarbiński 1966; Putnam 1975, p. 200; Kublikowski 2007). It can be called "a real-hypothetic definition" (Marciszewski 1995, pp. 187 ff.). Let us illustrate this claim by means of a few examples.

6.2. Case Study: Scurvy, Puerperal Fever and Influenza

In fact, the revision and change of a real definition is a standard process in the development of empirical research. In theories, which try to explain the nature (i.e. fundamental properties) of objects of a species, the definition of species is modified to characterise more and more adequately the fundamental properties of the things of a class. For example, some time ago, due to the definition of infectious disease as something caused by communicable micro-organisms, scurvy – which was wide spread among

[10] According to David Zarefsky argumentation by definition is an argumentation, in which the "key definitional move is simply stipulated, as if it were a natural step along the way of justifying some other claim" (1998, p. 5).

[11] See the rules of correctness of definitions.

seamen in polar regions – had been considered a highly infectious disease, whereas puerperal fever had been considered a non-infectious disease. However, later this disease, which really satisfied the definition was included into the extension of the term "infectious disease" and that one, which did not satisfied the definition was excluded from that extension (Czeżowski 2000b, pp. 98–99). Some different strategies can be distinguished in this example:

a) If a thing (or phenomenon) does not satisfy an already established definition, then such a thing (or phenomenon) is not considered an element of the extension of the *definiendum*. For example, in the past scientists had supposed that scurvy had been caused by infection. So on the basis of the definition of infectious disease they had considered it to be a highly infectious disease. But when it was discovered that the real cause of this disease was a deficiency of vitamin C, then scurvy was excluded from the extension of "infectious disease". On the other hand, in the past scientists had not known that puerperal fever is caused by infection. So they had not acknowledged this disease as an infectious one. Later they discovered the real cause and agreed that puerperal fever satisfied the definition of infectious disease. In this way puerperal fever came to be included in the extension of the term "infectious disease".
b) On the basis of empirical research the whole definition (*definiens*) can be revised, acknowledged as inadequate (e.g. too narrow) and in effect corrected or completely changed (see the rules of correctness of definitions).

The case of influenza provides an interesting example of such a definitional change (Marciszewski 1994, p. 212; see also Marciszewski 1993a, pp. 169 ff.; Marciszewski 1995, pp. 181 ff.). According to etymology influenza had been defined as the epidemic caused by the influence of heavenly bodies. The meaning of "influenza" had been linked to a naive astrological concept. After the decline of astrology, this primitive, pre-scientific definition of influenza was abandoned for a new definition, which expressed the results of clinical observations: Influenza is "an acute highly contagious infectious virus disease that occurs in endemic, epidemic, or pandemic forms, is characterized by sudden onset, fever, prostration, severe aches and pains, and progressive inflammation of the respiratory mucous membrane" (Webster 1993, p. 1160). When biologists – on the basis of empirical research – discovered that a virus had been the real cause of this disease, they agreed that it would be reasonable to redefine influenza according to the results of their research.

7. Definitions and Their Pragmatic, Persuasive and Manipulative Role

Schiappa claims that:

> definitions are human-made, not found; constructed, not discovered. Accordingly the question arguers should be asking is not "What is X?" but rather "How *ought* we use the word X?" or "What should be described by the word X?" Normative questions of this sort cannot be answered acontextually; they virtually compel interlocutors to address the *pragmatic* needs of a given community of language-users located in a particular historical moment. The theoretical phrase "denotative conformity" should not obscure the fact that advocates of new definitions seek to alter the behavior of an audience (Schiappa 1993, p. 413; see also McGee 1999, pp. 141 ff.).

I accept the distinction between "What is X?" and "How *ought* we use the word X?" ("What should be described by the word X?"). Nevertheless, if we understand the expressions "ought"/"should" in a normative way – as Schiappa does (and I agree with him on this point) – and if we realise, that the meaning of the expressions "ought" and "should" is *normative* but not *arbitrary*, then the following problem remains: On what foundation (basis) do we fix the specific definition (description) of the meaning (connotation/denotation) of a word X? Is mere social agreement this unique foundation? I do not think so.

I agree with the claim that definitions may play pragmatic, persuasive, or even manipulative roles. A wider (broader) or a narrower definition may be promoted (see the rules of correctness of definitions) for manipulative purposes. For example, adherents of radical anarchist social systems support a wider and less restrictive definition of human freedom, as the ability to do what s/he wants etc., for political purposes.

But it is important to remember that definitions – real (empirical) definitions – play not only a pragmatic role, but also a syntactic and a *semantic* role. Namely, on the one hand, the *definiendum* of a real (empirical) definition denotes (refers to) the class of things, which are being defined. But on the other hand, the *definiens* continues to be revised in the light of new empirical findings. So, the *definiens* expresses an acquired, realistic, empirical knowledge. Thus, the *definiens* is not just arbitrary constructed by a community of scientists, politicians, etc., as epistemological constructivism may suggest (see Kublikowski 2007, pp. 136 ff.).

8. Conclusions

The theory of definition is useful for the theory of argumentation, because it helps to distinguish different types of definitions. In addition, the rules of definitional correctness indicate which definitions satisfy conditions and which do not. Such knowledge of definitions allows one to use definitions in argumentations in a proper and effective way, as well as to analyse and evaluate the correctness of those argumentations in which definitions are applied. Such knowledge also permits one to detect fallacious definitions and to correct them.

The theory of definition explains how real (empirical) definitions are fallible, revisable, changeable, corrigible, and not totally adequate. But this fact constitutes no evidence for the claim that real definitions are fallacious and that they are simply persuasive, manipulative definitions. It is simply the case that human, realistic, empirical knowledge is fallible, revisable, changeable, and corrigible, and that this phenomenon has to be taken into account in the context of the theory of argumentation when dealing with human argumentative discourse.[12]

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STUDIES IN LOGIC, GRAMMAR AND RHETORIC 16 (29) 2009

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CLASSIFICATION AND AMBIGUITY: THE ROLE OF DEFINITION IN A CONCEPTUAL SYSTEM

Abstract: With the advent of the semantic web, the problem of ambiguity is becoming more and more urgent. Semantic analysis is necessary for explaining and resolving some sorts of ambiguity by inquiring into the relation between possibilities of predication and definition of a concept in order to solve problems of interpretation of natural language discourse. Computing is now confronting such problems of linguistic analysis (Diggelen et al. 2004), and it is worth inquiring into the development of linguistic studies that can be useful for developing the theoretical background of ontologies. Our proposal is to develop a workable solution that passes between the horns of the dilemma posed by the traditional metaphysical approach versus the modern relativistic account. We interpret the ancient notion of essential definition in a pragmatic perspective, and show how the dialectical definition by genus and difference corresponds to the semantic analysis of the *definiendum*.

Keywords: semantics, argumentation, definition, ontologies, classification

1. Introduction

Semantic analysis of a certain sort is shown in this paper to be necessary to allow interlocutors understand each other, and to deal with problems of polysemy and ambiguity. What ontologies deal with is not simply the relationship between words and meanings, but rather the organization of concepts in systems. The distinction (see for instance Niremburg and Raskin 2001, p. 154) between names of concepts and the structure of concepts, and the analysis of the latter as a tool to resolve ambiguity, suggests the need for an instrument of semantic analysis, providing a description of the concept. What will be offered in this paper is a pragmatic system of definition to be used as a dialogical tool for resolving misunderstandings and conflicts of opinion. Conceiving definition in a dialogical way is shown to conflict with both traditional and modern approaches to definition. The concept

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of "essential definition" was regarded in longstanding philosophical tradition as a purely metaphysical concept, expressing the immutable essence of a thing. However, this quest for the essence of things led only to metaphysical speculations and to unsolvable conflicts of opinion arising from them. The approach failed to achieve any real success in helping rational persons to reach agreement what a thing essentially is, and as a consequence the notion of essence has long been considered as an unknowable and useless abstraction. Modern studies on definition have long abandoned the theory of essential definition and have generally moved a relativistic approach in which definitions are seen as stipulative and even arbitrary. For example, on Schiappa's influential view (Schiappa 2003) definitions are seen as a matter of choice, preference or convenience. On this perspective, the evident impossibility of knowing what a thing essentially is, and therefore which definition is properly acceptable, or objectively better than a competitor, becomes a reason to accept any definition. The new dialogical approach to definition presented below offers a middle way between the old metaphysical account of essential definition and the dominant relativistic view that has been accepted as its alternative. The dialogical definition is based on the concept of an *endoxon*, a commonly accepted proposition that can be used to lead to a particular conclusion and, when questioned, has to be supported by arguments. In this new pragmatic approach to definition, the problem of the essential characteristics of a thing is resolved in terms of common opinion: the question the dialogical definition wants to answer is not "What a thing absolutely is", but "What a thing is commonly considered to be, based on evidential considerations pro and contra".

Definitions can be analyzed from a dialogical viewpoint in two regards. On the one hand, definitions are instruments for classifying, or naming, reality, and therefore potential instruments for supporting a viewpoint or leading to a further conclusion (see Zarefsky 2006, p. 404). Naming reality can be in itself an implicit argument used to support an unstated conclusion. For instance, if we classify a fragment of reality as "monopoly", we elicit an implicit judgment on the denoted thing. As monopolies are commonly considered hindrances to the free market economy, they are commonly judged as bad. However, if we name the same fragment of reality as "strong company", the value judgment will be noticeably different. What determines the attribution of the two distinct predicates to the same entity, and the different value judgments they can elicit, is their definition. Whereas "monopoly" presupposes that there is not competition, a "strong company" is simply a company that defeats the competition. On the other hand, definitions can be challenged, or not accepted by the interlocutor, and need to be

grounded on arguments. Definitions, in other words, cannot be considered matters of choice, but, on the contrary, should be seen as matters of common ground, or commitment. The best definition is the definition that is shown to be grounded on the deepest commitments.

Placing the notion of definition in the domain of dialogical evaluation allows one to interpret it as an instrument of semantic analysis. Definition becomes in this perspective an instrument for building what in computing is called a shared ontology (Bennett 2004; 2005), which can be organized by means of primitive concepts. The purpose of this paper is to show the role and importance of semantic analysis in communication and argumentation, and to propose reconsidering a pragmatic reconfiguration of the ancient notion of Aristotelian definition as an instrument for situating concepts within a conceptual system. In particular, we focus on the evidential ground of the concept of definition and its argumentative consequences, distinguishing it from the modern idea of definition and ontology in computing.

2. Implicit knowledge and levels of commitment

One of the most fascinating aspects of human communication is not what is actually said in a conversation, but what is not said. All human communication is grounded upon what is already known or accepted as information that can be taken for granted, and makes verbal interaction possible. We can call this basis of human communication "common ground" or "common knowledge", adopting respectively a linguistic or an argumentation terminology. In the latter approach to the implicit aspects of communication, the set of data taken for granted in a dialog is analyzed in terms of commitment (Walton and Macagno 2006), defined as propositions a participant in a discussion has gone on record on accepting, or what is implied by these. A participant in a dialog is dialogically held to defend her commitments in case they are challenged. In a discussion, participants assert propositions and explicitly commit themselves to particular propositions, but what is actually said is only the tip of the iceberg of what the participants are implicitly committed to. For instance, consider the following claim:

> Dr. Johnson said that you have the flu, therefore you should stay in bed

In asserting this proposition, the speaker is taking for granted:

1. That Dr. Johnson's opinion is a ground to support the point of view that the interlocutor has the flu, that Dr. Johnson is an expert, that having the flu is a reason to stay in bed;

2. That the speaker is supposed not to be lying, the expert is taken not to be biased and is taken to be telling the truth as he knows it;
3. That the speaker and hearer are in a particular relationship;
4. That both know who Dr. Johnson is, that flu is an illness, that a doctor is a human being, that staying in the bed helps when a person is ill, that beds are in houses, and so on.

We should also notice that these implicit propositions are not on the same level. Some of them (1) are directly involved in the argument, or better (Rigotti and Cigada 2004; Rocci 2007) in the communicated inference, while others (2) are the ground for the burden of proof, or rather, are dialectical rules establishing who has to prove his point of view or criticism. The implicit premises indicated at level 4 represent the deepest level, which encompasses the shared knowledge of the world, which may conceived as the common ontology. Common ontology is the fundamental condition of human communication, because it structures the possibility of talking about the same concepts. The third layer, in turn can be divided into two different levels. The relationship between doctors and human beings, concerning matters such as between flu and illness, is established by a semantic constraint, whereas the fact that beds are normally in houses depends upon the knowledge of society, customs, and ways of living. The first level represents the semantic information the interlocutors have to share in order to understand each other, while the second level represents a different kind of encyclopaedic information. The first level pertains to how reality is organized within a conceptual system, and thereby a linguistic, system, while the second represents the way things usually are or should be. We can represent these layers of common knowledge as follows:

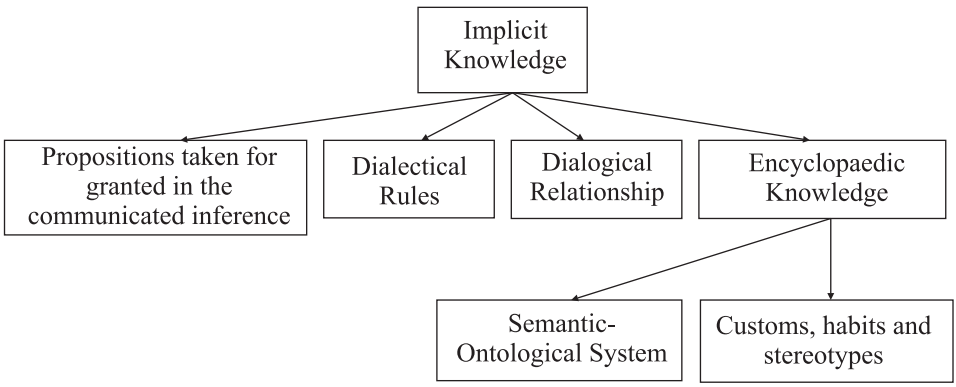

Figure 1. Levels of Common Knowledge

The focus of this paper is on the layer of knowledge of the world, and in particular on the ontological-semantic system shared by the interlocutors. This level is the most important one, since it constitutes the basis for mutual understanding, and is the object of inquiry in computing in the field of ontology. The crucial problems are how to distinguish it from the other type of encyclopaedic knowledge, how to ground it, and how to organize it.

3. Conceptual system and semantics

The semantic-ontological conceptual system is the basis for communication, because it represents the level of meaning which words manifest. The failure to share a common system of concepts and instruments for situating a concept in the system itself inevitably leads to failures in understanding. To use an Aristotelian expression, the risk is one of talking about the same words and not about the same things (Aristotle, *Topics* I, 18). In computing the problem has been tackled by the study of ontology, which we now show, indicates the usefulness of a turn towards a linguistic and structuralist kind of semantic analysis. Several ontologies, as will be explained, seem not to distinguish between the two types of encyclopaedic knowledge mentioned above, risking the error of classifying concepts according to their role in a society, as opposed to classifying them according to their properties in a semantic system. The need for a linguistic grounding of ontologies stems from the necessity of finding a common ground for communication independently from cultural and sociological considerations. The solution is to reconsider the ontological-semantic structure of language in a pragmatic sense, that is, in relation to the conditions of predication.

3.1. Ontologies and semantics

Ontologies are systematizations of entities that we can interpret as concepts, independently from their existence (see for instance, Guarino 1995, p. 628). Ontologies, in particular formal ontologies, are concerned with relations between concepts, including syntagmatic relations establishing the possible inferences that can be drawn from a concept. These relations, such as the part-whole or the causal relation, generate inferences that cannot be grounded upon logical form alone, that is on the simple relation between quantifiers (see also Winston, Chaffin and Herrmann 1987, p. 489). In ontologies, in Guarino's view, there is a logical abstract level that needs to be distinguished from an epistemological and ontological layer, in which the relations are not between abstract entities but hold between concepts on

the basis of the way the concepts are organized according to their internal structure. The expression "organization of concepts" is however, extremely vague. How can concepts be organized? What are the grounds for such classifications? What problems arise from different types of classifications and how can they be resolved?

In computer science (see Dahlgren 1995, p. 813, Passin 2004, p. 142), an ontology is a system of concepts within a given domain. Ontologies are grounded on classifications of entities according to different criteria, such as the "natural", or "social" system of classification that can be articulated into sub-systems like "foods in the store". For instance, the concept of law can be described according to two different ontologies, the legal and the scientific one. The polysemy of the word 'law', which can be described as having the two interrelated meanings of statutory law and scientific law, is explained in terms of two different systems of classification, or ontologies (see Walton 2006, p. 13). The problem of ambiguity is thereby simply shifted from the equivocation caused by the use of a word to the equivocation generated by different ontologies. The solution proposed (see for instance van Diggelen et al. 2004) is to create connections between ontologies, namely a metadialogue constituted by a "ground" ontology allowing one to find a common ground between different onotological systems. However, the crucial question is how to build a ground ontology on which an ontological system is based. A solution to this problem is suggested by some theoretical developments in computer science, which propose, instead of taxonomies of concepts, definitions of concepts based on natural language. In other words, a possible answer can be a semantic-ontological description of a concept, instead of a taxonomy based upon epistemological or other encyclopaedic knowledge.

The question of how to ground an ontology might be taken as the starting point for a brief survey on some developments of ontologies. In (Dahlgren 1995, p. 810) ontologies are described as about "what there is", that is, about the world conceived as a possible perspective on reality, such as language, mind, and culture. Language, in Dahlgren's theory, is in particular a ground of ontology encompassing both the objects of the world and the culture that classifies them, namely, in Bateman's (1995, p. 934) terms, common sense, intersubjective reality. In other terms, the analysis of a conceptual system should be based on the semantic properties that exist in a natural language.

The study of natural language is the basis for the construction of several ontological systems, considering both the semantic and syntactic level (see for instance, Dölling 1995; Nirenburg and Raskin 2001; Dahlgren 1995).

On the one hand, the analysis of the differences between words in the same language and in different ones is useful to discover the simpler constituents of meaning (Nirenburg and Raskin 2001, p. 154). On the other hand, linguistic theories about collocations and analysis of words in context are useful to discover semantic-syntactic properties of predicates. For instance, the predicate 'round' can be predicated only of things (Dölling 1995, p. 790), while 'alive' can be predicated only of animate beings (Jan-Beun et al. 2004, pp. 7–8). The analysis of predicates into ontological sorts becomes an instrument to analyze the possibilities of predication, and thereby a useful tool for disambiguating polysemy or homonymy (see for instance Dölling 1995). For example, the predicate 'to telephone' can be semantically well-formed only in contexts in which the first argument (the subject) is characterized by the feature 'to be a person'. In a sentence such as 'The newspaper telephoned', the semantic ambiguity of 'newspaper' (the paper or the group of people forming the institution) is resolved by the semantic constraints of the predicate.

Several types of ontologies, we should notice, suggest semantic representation of concepts in order to explain the possibilities of predication. These studies can be taken as an effort to ground the concept of "what things are" in natural language.

To conclude, computer science needs to recognize two different types of answers to the problem of concept description for avoiding equivocation in communication: taxonomies of concepts and what we can call "essential" definitions of concepts. While in the former polysemy and ambiguity is described in terms of domains and standards of classification, in the latter the concept is described according to its syntactic and semantic properties. For instance, whereas the polysemy of 'law' is taxonomically explained referring to two different ontologies, at a semantic level it can be analyzed describing the characteristics of the two concepts denoted by the word. One cannot choose to compel a decision to act with a scientific law, but a jurisprudential law can compel a decision to act through the use of penalties. The analysis of semantic properties of concepts introduces the problem of what a semantic description is and, as a consequence, what a definition is. Some possible answers to the first question can be found in contemporary linguistic theories.

3.2. Ontological semantics in linguistics

One of the first theoretical models approaching the problem of how to analyze predicate structure was that of Katz and Fodor (1964). Their approach was grounded on the notion of anomaly, or conceptual absurdity

(Katz 1972, p. 91). For instance, consider the following examples given by Katz (1972, pp. 91, 93):

(1) Saturday is in bed.
(2) Propositions feel oily.

The incongruity of these propositions is described in terms of predicate structure (p. 91): "a concept has a range of predication specified as a category that determines the concepts with which it can combine in forming assertions". The structure of the predicate 'to feel' in (2) determines a range of predication (a category) characterized by the feature 'animate sentient being' occurring as subject. Likewise, in order for (1) to be meaningful, the concept occurring as subject must have the feature 'animate being'. The categorical conditions determine what constitutes the anomaly. Anomaly is distinguished by Katz (1972, pp. 181, 221) from contradictoriness, the impossibility of attributing determinate opposed properties or relations to an entity (e.g. 'John has a hairy bald head').

In Katz and Fodor (1964), every lexical entry is analyzed into its semantic fundamental features, called semantic markers and distinguishers. For instance, consider the example below (p. 496):

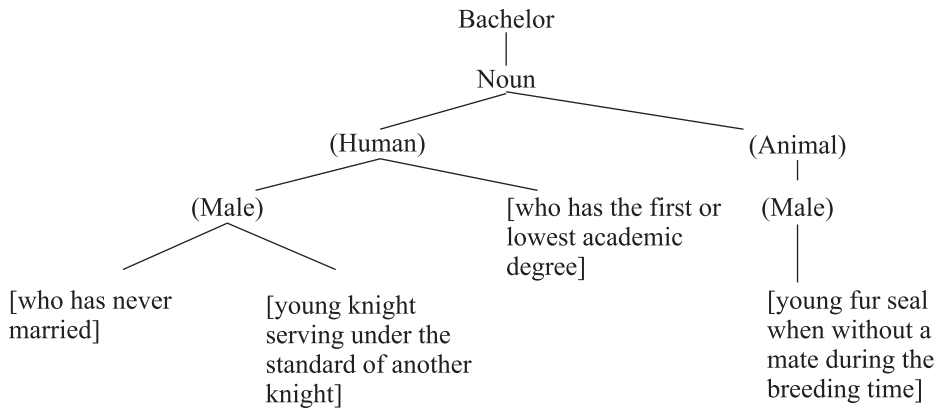

Figure 2. Lexical analysis by fundamental semantic features

Category mistakes cause conceptual anomalies of a kind that, in Katz' view, are necessary conditions for the semantic anomalies. For instance, the conceptual incongruities analyzed above lead to the sentences they occur in being semantically anomalous.[1]

[1] This distinction between semantic anomaly and categorical incongruity is drawn in order to explain meaningful sentences such as 'He says he smells itchy' (p. 95).

As with the theories of ontology mentioned above, the theory of semantic analysis of predicates can be applied to ambiguity, resolving potential sentential ambiguity to semantic polysemy or homonymy (for the notion of sentential ambiguity see Edlow 1977, p. 12). Adopting this perspective, (Katz 1964, p. 93) explained semantic anomaly as the limit of composition of the possible meanings of words. For instance, we can analyze the following case (p. 93): "The division was slaughtered by cannon fire". Here, the possibility of the lexical item 'division' to refer to a kind of 'mathematical operation' is ruled out by the incongruity that would arise by the composition with the predicate 'to be slaughtered'.

Katz' predicate analysis has been developed in Rigotti (1997; 2006) and Rigotti and Rocci (2004) by explaining absurdity and congruity in terms of presuppositions and argument places. A predicate, on this view, imposes on its arguments a series of presuppositions,[2] namely, a set of semantic traits the argument must have in order to fit the argument place of the predicate. For instance, the predicate 'to read' can be analyzed as follows:

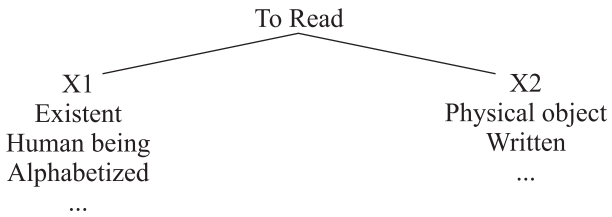

Figure 3. Predicate-argument analysis

The argument paradigms X1 and X2 are characterized by a set of semantic features; the failure in satisfying these congruity conditions leads to absurdity. For instance, a dog cannot read a stone. However, the failure in satisfying the presuppositions of argument paradigms can be a helpful tool for discovering polysemy. The *signifiant* 'to read' can manifest several predicates, whose arguments are characterized by different semantic features. In the sentence 'The computer reads the file', the predicate presupposes in X1 a decoding machine, and in X2 a coded piece of information. In this case the apparent incongruity can be solved by retrieving a different meaning of 'to read', namely 'to decode'.

From this brief overview of computational and linguistic theories on meaning analysis, it is possible to come to understand the roles of clas-

[2] Presupposition is a controversial notion in linguistics (see for instance Dineen 1979). Presuppositions in Rigotti's approach are necessary conditions of meaningfulness.

sification and definition in resolving problematic cases of ambiguity. The classification of concepts and the analysis of predicates by means of semantic features bring us back to reconsidering the Aristotelian account of essential definition as an instrument to retrieve and describe concepts in a semantic-ontological system.

4. Classification and definition

Computing studies have pointed out how ontologies need to be grounded on a semantic-ontological system. Linguistic studies, in their turn, showed how the deep structure of predicates and concepts can be founded on a hierarchy of predicates determining the conditions of congruity and meaningfulness. These investigations introduce another crucial question: how can given semantic information be organized to retrieve and situate a concept within a conceptual system? Even though several studies can be mentioned, which take into consideration definition in its different types and uses (see for instance Robinson 1950; Stevenson 1944; Schiappa 2003), none of them has analyzed definition in terms of semantic analysis, that is, a concept as used in a natural language. If ontologies can be developed as organizations of concepts according to their semantic properties, the instrument that can be used for this purpose can be found in the ancient notion of definition (*horismos*). The idea of organizing concepts by means of "logical priority" (*Topics*, VI, 4) and conditions of meaninglessness bring us to the idea of definition as a predicable, that is, a logical-semantic relation between predicates. The concept of "real" definition can be interpreted not on a metaphysical level regarding what reality is, but on a logical level concerned with the issue of how predicates should be structured (see Vanni Rovighi 2002, p. 68).

4.1. Predicables and definition

In the history of definition, including the dialectical, rhetorical, and logical traditions, different types of definition have been described. For instance, Victorinus in *De Definitione* surveyed 15 types of definitions, while the modern accounts of Robinson (1950) and Leonard (1957) list 18 and 57 different types. These methods of defining are not equivalent; on the contrary, their logical and semantic properties are noticeably different. For instance, we can take into consideration four kinds of definition: etymological definition (cartoon from *cartone*, that is, heavy paper), definition by genus and difference (man is a rational animal), definition by definite de-

scription (man is a being that laughs), and definition by integral parts (a car is made up of an engine, four wheels ...). While an etymological definition can be considered to be a definition of the *signifiant*, more than of the thing signified, a definite description is useful only for identifying the concept, definition by genus and difference shows the essential semantic features of the concept signified. Moreover, while definition by genus and difference and by definite description is convertible with the *definiendum*, the same does not apply to definitions by integral parts and etymology.

In order to understand the function and role of essential definition, it is useful to define it. Definition (*horismos*) in the Aristotelian topics is described as a predicable (*Topics* I, 5), namely a class of semantic-logical relations of predication. Predicates can be attributed to a species, and consequently to individuals, in four different fashions: genus, definition, property and accident. The species, which we can interpret as the concept, is what is predicated of more individuals different in number and is conceived as a dialectical semantic relation. For instance, 'man' can be predicated of different people (John, Karl ...), but does not explain a semantic feature of John. For this reason, species was held to fall outside the domain of dialectic.[3]

The four predicables, namely definition, genus, property, and accident, are divided into two main categories: predicables revealing the essence of the "thing" and predicables not expressing the essential features of the subject. We present the Aristotelian classification as follows (see Rigotti 2006):

Showing the essence		Not showing the essence	
Definition	**Genus**	**Property**	**Accident**
Convertible with the thing. Expresses the essence.	Not convertible with the thing. Expresses the essence.	Convertible with the thing. Does not express the essence.	Not convertible with the thing. Does not express the essence.
Ex: Man is a **reasonable animal**.	Ex: Man is an **animal**.	Ex: **to talk** (man)	Ex: This man is **strong**.

Definition shows the essence of the thing, here defined pragmatically as its fundamental (most important) features. For instance, if something is a "man", it is necessarily an animal and it is potentially reasonable. The

[3] See also Crowley & Hawhee, 1999, p. 54; Green Pedersen, 1984, p. 119. Aristotle (*Topics*, I, 10), considers a dialectical proposition to be a proposition held by everybody, or the majority, or the wise. Dialectic (*Topics*, I, 14) is about science, and science is not concerned with particulars.

genus shows what the species is, but it is not convertible with the thing itself. For instance, "man" is necessarily an "animal", but an animal is not a man.

Definition and property are convertible with the species they are predicated of. For instance, if we accept that "reasonable animal" is the definition of "man", we can substitute "man" for "reasonable animal" in any sentence. Likewise, a property of man, one that is predicated of only one species, is "*grammaticus*", or "able to learn grammar". If we describe "man" as "the being able to learn grammar", we can substitute the species with its description in any sentence, but the description does not show what the thing is.

Consider the recent controversy that led to a debate within the International Astronomical Union that led to Pluto being classified as a non-planet.[4] In 2006 the IAU presented a definition laying down three essential criteria for a celestial body to count as being a planet (Soter 2007, p. 1). First, it has to be in orbit around the sun (the orbit criterion). Second, it has to have sufficient mass so that it has formed into a nearly round shape (the roundness criterion). Third, it has to have cleared the neighborhood around its orbit (the sufficient clearance criterion).

Property is what is predicable of only one species. It is divided into absolute and relative. An instance of absolute property can be "pitch", used as an adjective, which can be only be predicated of the term "black", or "talkative", which can only be predicated of "man". The notion of property is extremely interesting for understating Aristotle's approach to semantics. An absolute property can be interpreted as the relation between a predicate and its argumentative class. For instance, the predicate 'to read' presupposes an argument which is characterized by being human. In Aristotelian terms, we can say that "to read" is a property of human and that a human is a being who is able to read. Property is distinct from difference, because the latter express the characterizing feature of the predicate and is a condition for the predication of the property. For instance, 'reasonable' distinguishes 'man' from other kinds of animate beings, but only rational beings can laugh or read. 'Reasonable' can in this view be seen as the semantic feature characterizing the predication of property. Property can be also relative, permanent, or temporary. For instance we can describe man as the two legged animal if we want to identify him in a group constituted by quadrupeds. Such a relative property holds only generally, and can be subject to exceptions.

[4] The debate can be found at this site: http://www.astronomy2006.com/media-stream-archive.php

For instance, if we describe a bird as a flying animal, the property holds only generally. Although Tweety is a bird, and birds generally fly, the inference defaults in the case that Tweety is a penguin.

Accident is described by Aristotle as "something which can belong or not belong to some one particular thing" (*Topics* 102b, 6–7). A man, for instance, can be drinking or not drinking, but this accident does not affect the fact that he is a man. However, man can drink or not drink inasmuch as he is an animal (we could also say that to drink is one of the properties of being an animal), but a stone cannot be predicated of the action 'to drink', because it is not under the genus 'animal' (see Rigotti 2006). The possibilities of predication, in other words, are established by the essence of the thing predicated.

Definition is constituted by the proximate genus and the specific difference. Aristotle defined the genus as answering the question "what is it?", asking for the essence of the thing. For instance, a human is a being, a living being, and an animal. All these predications fall within the category of the genus of 'human', but only 'animal' is the proximate genus. In fact, if we accept the definition of man as rational animal, 'rational' specifies the genus animal into the two concepts of humans and irrational animals. The genus 'animal' can be predicated of several species, such as humans and donkeys or dogs. It expresses the fundamental features of the concept, but not all of them. Definition of relative terms (*Topics* VI, 6), which we can interpret as predicates in the predicate-argument theory, must specify the characteristics of the argumentative places it presupposes. For instance, (*Topics* VI, 8), knowledge is "conception of a knowable".

We suggest that this system of predicables is useful for understanding the criteria underlying the concept of an essential definition and its ontological-semantic grounding. An essential definition involves the situation of the concept defined within a conceptual system by means of its distinctive semantic features. Moreover, definition by genus and difference is basically an instrument of semantic analysis in which the possibilities of predication are explained in terms of hierarchy of predicates. The approach to definition at a logical level allows one to distinguish between predicates that are essential from other accidental or proper predicates.

If we conceive the essential definition in a dialectical perspective, defining the essence of a thing becomes highlighting the simpler predicates the *definiendum* is constituted of, allowing the interlocutor to understand what the *definiendum* is. The *definiendum* is in this fashion connected with the interlocutor's more basic commitments, or rather his shared ontology. From an argumentative point of view, the notion of "essential" characteristics

is of twofold importance: it is a criterion for distinguishing between what a thing is and how a thing is, and for separating definitions from metaphorical descriptions. We can explain these characteristics using three different definitions of "embezzlement".

1. Embezzlement is theft of assets (usually money) entrusted in your care
2. Embezzlement is siphoning of another's money
3. Embezzlement is a fraud committed by many employees

In (2) the definition does not show the essential properties of the definiendum, but, instead of explaining what it is, it hides its meaning under a metaphor. In (3) the *definiendum* is described by means of one of its properties (or accidents), but its meaning is only explained in a vague and general fashion. In (1), at last, the *definiendum* is explained by connecting it to the more generic and shared concept of "theft", and differentiating the thing defined by the other types of theft using the difference "of assets entrusted of your care".

Knowing what a concept is, and situating it within his own conceptual system is essential for judging the thing defined. For instance, whereas in (1) "embezzlement" is clearly connected with concepts the interlocutor is acquainted with, and is able to judge, in (2) and (3) a clear value judgment is harder to be elicited. Whereas the notion of "theft" is shared and commonly judged as negative, "siphoning" or "fraud" are vague and less known. For this reason the value judgment cannot be clearly expressed (for the use of euphemisms or vague terms in law to avoid eliciting value judgments, see Blakey 1982). Definition, therefore, is a dialectical instrument for knowing the thing defined. Knowledge is argumentatively relevant because it allows one to judge the thing defined, and therefore to act accordingly. Definition by genus and difference, moreover, is of fundamental importance at the argumentation level, because of the topics, or patterns of inference, associated with it.

4.2. Definitions and inferences

As mentioned above, it is possible to define a word in several ways, such as by genus and difference, description, integral parts, and etymology. At a semantic level, as seen above, essential definition is the only type of definition explaining the congruity conditions of a predicate. At an argumentation level, we will now show, definitions are noticeably different, being characterized by different logical assumptions.

The first distinction is between definitions in which the definiens is convertible with the *definiendum*, and definitions in which the relation of

convertibility does not apply. Definitions by etymology and by integral parts belong to the first group, whereas essential and descriptive definitions are characterized by convertibility. In definition by integral parts, we should notice that the *definiens* is not necessarily convertible with the *definiendum*. For instance, if we consider definition by integral parts as following the scheme X is A and B, we can notice that there are cases in which the conversion does not hold. For example, consider the following sentence (*Topics*, 150a 1–5).

> Justice is temperance and courage

As Aristotle noticed, two people, each of whom has one of these qualities, can together be just, without singularly being so. The other scheme of definition from integral whole is 'X is made of A and B'. However, we consider the following argument.

> A house is made of four walls and a roof. The house has been destroyed. Therefore, the walls and the roof have been destroyed

It should be observed in this case that the predicate attributed to the *definiendum* does not necessarily apply to the definition. This type of fallacious reasoning can be labelled as fallacy of division (see Engel 1990, p. 103 for further examples), namely improperly implicating the properties of the parts from the properties of the whole. The definition by integral whole is not convertible with the *definiendum* because it is not subject to the same predications.

Definition by etymology turns on the interpretation of a name, namely, and on linguistic strategy to manifest a meaning. This kind of definition is, however, not convertible with the species defined. What is defined is not the concept, but the manifestation of the concept. An argumentation from etymological definition can cause fallacies, such as the following fallacious inference (Walton 1996, p. 167).

> The word "truth" is derived from the verb "throw", to believe. Therefore, there is no eternal or immutable truth.

In definite descriptions by absolute property and definitions by genus and difference, the *definiens* is convertible with the *definiendum*. We can summarize the inferential patterns which characterize *horismos* and description as follows (Petri Hispani *Summulae Logicales*, 1990, pp. 52–54):

- *Loci a definito / a definitione*

1. Thing defined/definition as subject of predication (Positive)	**2. Thing defined/definition as subject of predication (Negative)**
Maxima: Whatever is predicated of the thing defined is predicated of the definition as well, and vice versa.	Maxima: Whatever is removed from the thing defined is removed from the definition as well, nd vice versa.
Example: A company exclusively controlling the market is contemptible. Therfore a monopoly is contemptible.	*Example*: A company exclusively controlling the market is not helping the economy. Therfore a monopoly is not helping the economy.

1. Definition as predicate (Positive)	**2. Definition as predicate (Negative)**
Maxima: Whatever the thing defined is predicated of, the definition is predicated of as well, and vice versa.	Maxima: From whatever the thing defined is removed, the definition is removed as well, and vice versa.
Example: Bob embezzled his company's funds. Therefore Bob stole the funds entrusted to his own care.	*Example*: Bob did not embezzled his company's funds. Therefore Bob did not steal the funds entrusted to his own care.

In an essential definition, unlikely in the definitive description, the proximate genus must be specified, involving for this reason the inferential patterns described in the *Topics*. The predication must follow the following principal topics (*Summulae Logicales*, p. 56; *Topics*, IV, 120b 12–123a 27):

Maxims	**Examples**
Anything predicated of the species is predicated of the genus as well	Embezzlement can destroy the economy of a country. Therefore theft can destroy the economy of a country.
Whenever genus is removed, species is removed as well	Bob never stole anything. Therefore he never embezzled his company's funds.
The species can be predicated of the definition of the genus, not vice versa.	Embezzlement is theft. Therefore embezzlement is the crime he crime of taking someone else's property without consent.
The genus is predicated of what the species is predicated of.	Bob embezzled his company's funds. Therefore he committed a crime.
It is impossible for something to be predicated of the genus if it is not predicated of one of its species.	Bob never embezzled, robbed, skimmed, and rustled. Therefore you cannot call him a thief.
What is placed in the genus cannot be predicated of the definition of anything contrary to the genus.	Embezzlement is not cunning. In fact embezzlement is a crime, and cunning is not a crime.

Essential definition, as shown in the subsections above, is characterized by semantic and logical properties which allow one to situate the concept defined within a conceptual system. This system, being grounded on necessary semantic features, can be common to different types of ontological classifications. In such a fashion, in a clarification dialogue essential definition can play a fundamental role, constituting the more basic classification system common to different types of conceptual representation. Moreover, topics from genus and definition characterize essential definition by means of necessary rules of inference.

5. Conclusions

The conceptual system put forward in this paper showed how our pragmatically reconfigured version of the notion of essential definition can be used to situate the concept of definition within the system. Our conceptual system presented a level of common knowledge coinciding with the linguistic code used by the interlocutors, and distinguished from other types of implicit commitments belonging to the sharing of the same dialogical rules, inference rules, endoxa, and habits and customs of a society. The organization of such a conceptual system is highly useful for current computing on the semantic web, because of its capability for allowing interlocutors to understand each other and avoid harmful ambiguity. Ontologies have tackled the relation between concepts using a semantic criterion grounded on the possibilities of predication and a more logical one based upon the notion of classification. The field of linguistics offers possible theoretical developments of the principles used to organize concepts, such as a hierarchical description of predicates by means of fundamental features of meaning and their presuppositions. Modern studies on semantics lead towards a tentative of grounding descriptions of concepts on linguistic structure. The paper has shown how this direction can be pushed further by looking at suggestions offered by the Aristotelian theory of definition. We interpret definition by genus and difference in dialectical, and not metaphysical, terms, and show how the underlying principles are the semantic properties of predicates and their logical relations. By this means, definition by genus and difference is shown to be an extremely useful method for situating a concept within a semantic system. Comparison between what we now call the pragmatic version of the notion essential definition with other types of definition has demonstrated the superiority of the former both at the level of foundations and at the level of determining which logical inferences can properly be drawn from a definition.

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STEPHEN TOULMIN'S MODEL OF ARGUMENTATION

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TOULMIN'S MODEL OF ARGUMENT AND THE "LOGIC" OF SCIENTIFIC DISCOVERY[1]

Abstract: The paper discusses Toulmin's substantial (jurisprudential) model of argument, as set out in *The Uses of Argument* (1958), in juxtaposition with his considerations concerning scientific discovery and scientific arguments, as presented in *The Philosophy of Science* (1953). The author finds Toulmin's search for understanding the nature of science to be a forerunner of his later conception of argument. In addition, he claims that the latter displays much more accurately the "logic" of both scientific discovery and the arguments in science than the patterns of formal (both inductive and deductive) logic. For actually, in Toulmin's view, no logic in the traditional, formal sense can be ascribed to discovery and scientific arguments – despite all the mathematical techniques they employ. Thus neither the neo-positivistic account nor even the Popperian one can do justice to their specific character. Although the Toulminian model of argument cannot be treated, in a strict sense, as a methodological instruction, it plays an explicatory role, throwing some light on our understanding of scientific enterprises and their rationality. In fact, the author finds Toulmin's concept of argument to be the core of his overall conception of rationality, and the considerations about science to be one aspect of this conception.

Keywords: Toulmin, argument, substantial argument, discovery, methods of representation, philosophy of science

In this paper I am going to explore the significance of Toulmin's model of argument for the philosophy of science, in particular with respect to our comprehension of discovery and scientific arguments. I will claim that, in Toulmin's view, the substantial, jurisprudential argument better fits our account of the scientific practice of arguing and looking for new methods of representation of physical phenomena than formal logic does. In my presentation I try to show that Toulmin's ideas concerning scientific arguments form one aspect of his whole conception of rationality, which is based on the theory of substantial arguments.

[1] The presentation given in the paper has been developed wider and in greater detail in my book on Toulmin: *Od paradygmatu do kosmopolis. Filozofia Stephena E. Toulmina* (Zarębski 2005); similar discussion on the nature of scientific arguments can be also found in Polish in Zarębski 2003.

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1. Toulmin's model of substantial argument

Toulmin presented his model of argument in *The Uses of Argument* (Toulmin 1958) and later in *An Introduction to Reasoning* (Toulmin, Rieke, Janik 1984). In the former book, he calls it a *substantial* argument (Toulmin 1958, p. 125) as opposed to an analytic one (particularly the traditional syllogism), while in the latter he calls it a *practical* one as opposed to a theoretical one. The difference between the syllogism and the model proposed by Toulmin is that the syllogism has three elements: two premises and conclusion, whereas the Toulminian substantial argument consists of six components: *claim*, *data*, *warrant*, *backing for warrant*, *rebuttal* and *modal qualifier*.[2]

The *claim*, being a counterpart of the logical, syllogistic conclusion, is an asserted thesis that someone tries to justify. The second element is the *data* that are supposed to support the claim advanced; usually they are some sort of factual statements. The third element of the argument is the *warrant*, whose task is to show that the leap from data to "conclusion" is legitimate. The fourth component is the *backing for warrant*, which gives some additional support for a warrant and indicates the ultimate basis that makes the warrant legitimate. The task of the *modal qualifier* – the fifth element of the argument – is to express the strength of the step from the data to the conclusion and has an adverbial form such as "Probably", "Almost certainly," etc. Finally, the sixth and last component is the *rebuttal*, whose task is to point out the circumstances in which the leap from the grounds to the claim is not legitimate. The whole argument takes place between two people, paradigmatically, disagreeing about the assertion advanced; thus, one of them challenges the claim, and the other, who put it forward, tries to justify it. The pattern to follow has been taken from legal practice and this is why Toulmin also calls it *jurisprudential* (Toulmin 1958, pp. 41–43).

Toulmin understands the interrelation between all parts of his argument as follows (cf. Toulmin 1958, pp. 94–107). One person offers a *claim* (C), for example a statement, "Petersen is not a Catholic". His opponent may question this original statement and demand a justification of it; thus he may ask "Why? What have you got to go on?" In that situation, i.e. when the claim has been challenged, sufficient *data* (D) should be given for supporting our claim; some facts or information should be delivered to be appealed to

[2] For a critique of Toulmin's model from logical perspective, see Castañeda 1960.

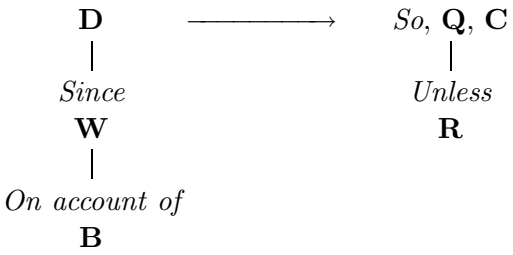
as a ground for the statement concerning Petersen's religion. As a result, the answer may be: "Petersen is a Swede". Then, again, the adversary may continue to question the claim by asking "How do you get there?" In it, what the adversary wants is not any further particular data, but rather demands the claim's defender to show that the mere step from the data to the claim is appropriate and legitimate. To answer such a demand, the defender should put forward a *warrant* (W): a kind of rule, principle or inference-license, which entitles one to draw the conclusion from the data. The warrant usually has a hypothetical form possible to be interpreted as "If D, then C" or "Given data D, one may take it that C" and the like. Correspondingly, in the exemplary argument concerning Petersen, such a warrant would be: "Scarcely any Swedes are Roman Catholics".

But even being provided with the data and the warrant, the opponent may still keep on challenging and ask why, in general, just this warrant ought to be accepted; he may put forth the question: "Why do you think that?" And then, in the defender's turn, what should be given is the explanation why, on what account, the warrant should be regarded as binding. In other words, the proponent has to display a *backing* (B) for the warrant, has to indicate a relevant basis for this warrant. Depending on the kind of claim, it could be, for example: some appropriate statutes and legal provisions; taxonomical classifications of an animal (for a warrant, say, "A whale will be a mammal"); or statistics which record relevant information. What is essential here is that different kinds of warrants often call for different sorts of backings, and various rules of inference require various sorts of backing support. Returning to the example of Petersen, its warrant could be supplemented by a backing such as: "The proportion of Roman Catholic Swedes is less than 2%".

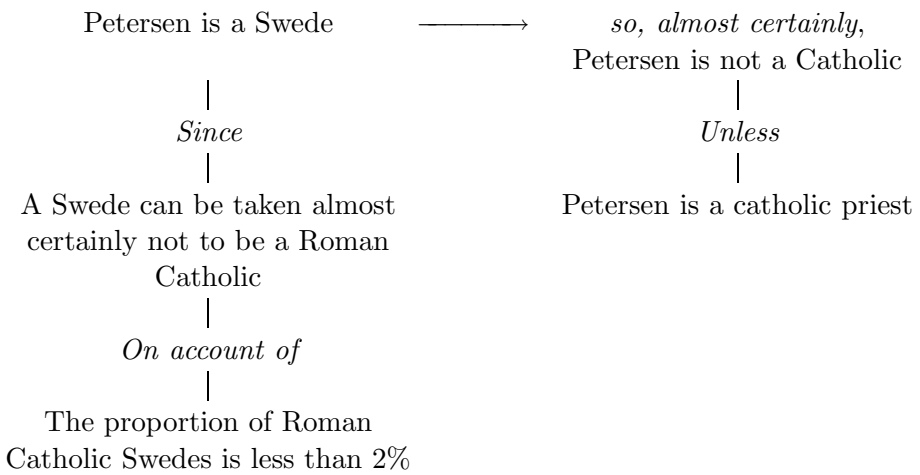
There are two more elements in Toulmin's account. The first is a *modal qualifier* which expresses "some explicit reference to the degree of force that our data confer on our claim in virtue of our warrant. In a word, we may have to put in a *qualifier*" (Toulmin 1958, p. 101). The qualifier (Q), is represented by such modal words as "presumably", "probably", "almost certainly" or "necessarily", and is supposed to reveal the strength of the step from the data to the claim – on account of the particular warrant. In practical discourse, agreed conclusions, even if recognized as valid and reliable, are, by their nature, probable rather than unequivocally certain. Lastly, the sixth element of Toulmin's layout is the *rebuttal* (R), which indicates circumstances under which the general validity of the warrant ought to be set aside. Toulmin explains its role in the following way: "Again, it is often necessary in the law-courts, not just to appeal to a given sta-

tue or common-law doctrine, but to discuss explicitly the extent to which this particular law fits the case under consideration, whether it must inevitably be applied in this particular case, or whether special facts may make the case an exception to the rule or one in which the law can be applied only subject to certain qualification" (Toulmin 1958, p. 101). In the argument with Petersen, the rebuttal would look like: "Unless Petersen is a catholic priest". Both the qualifier and the rebuttal are expected to tell us whether we should accept our claim with a very high degree of certainty or rather tentatively, with some conditions, exceptions or qualifications. The rebuttal tells explicitly what those possible exceptions (some of them) are.

The whole scheme has the structure below (Toulmin 1958, p. 104):



And the exemplary argument would look like the following:



2. Toulmin on scientific discovery

In his earlier book, *The Philosophy of Science* (Toulmin 1967; first published in 1953), Toulmin explored – in the spirit of the later Wittgenstein – the nature of arguments in the sciences. The crucial part of his investigations constitutes the question of the rationality of scientific discovery. Toulmin presents one of the first anti-positivistic accounts of the rationality of science, implying that scientific arguments – along with arguments of many other fields except the pure sciences – are both indescribable and unexplainable in terms of formal logic. Neither deductive methods of inferring nor the variety of inductive ones capture the specific character of scientific enterprises, especially those practices that lead to new discoveries. Science, according to Toulmin, does not – in the proper sense – discover *new* facts or regularities in nature, but rather offers some new ways of seeing and understanding the physical world; its basic, fundamental purpose is not the pursuit of the objective true knowledge in a traditional manner, but rather the foresight and understanding – through a relevant theory – phenomena, many of which we are already familiar with. "Physics – Toulmin says – presents a new way of regarding old phenomena" (Toulmin 1967, p. 16) and goes on to say that discoveries do not simply reveal some new, unknown facts, but rather interpret in a new, different way what we somehow already knew.

The essential and decisive role in such a discovery is played by the "method of representation" (Toulmin 1967, p. 31), as Toulmin calls it. By this phrase he means – on the most basic level – a sort of graphical, pictorial image of a given physical phenomenon as sketched on a board (on a more sophisticated level, this role is performed by mathematical models). He emphasizes the fact that, during the early history of science, the possibility of drawing a diagram of explored phenomena exerted a great influence, because it enabled scientists "to see" the power of proposed solutions: a clear and convincing graphical presentation could significantly contribute to the acceptance of those solutions by the community of scientists. This was also the reason why some of the 17$^{\text{th}}$ century's mathematicians lent more weight to geometry than to algebra, finding the latter to offer only a shortcut way of the matters geometry *displays* in full account (*ibidem*, p. 30).

The branch of science to be regarded as a good exemplification is optics, where a range of basic phenomena is interpreted geometrically: the rays of light are represented as straight lines, and, on that basis, the angles of elevation and reflection are examined, the length of rays worked out, etc. Ano-

ther example can be found in the atomistic theory of matter, where many physical and chemical phenomena are depicted in terms of hits, pushes, connections and disconnections of particles. In accordance with Toulmin's intuitions, Adam Grobler glossed the merits of ancient atomism as follows: "The significance of that vision [i.e. atomism, T. Z.] is difficult to be overrated. Apparently, between the naïve images of hooks or fastenings and the notions of contemporary science opens a gulf. Yet are not, say, the notions of chemical bonds or virtual molecules equally funny? Scientists do not even pretend to camouflage the humor of their language when they introduce with deliberation such terms as 'colors' or 'smells of quarks'" (Grobler 2001, p. 11). Although in this passage Grobler is talking about the extension of the sense of the ancient concept of being, and does not refer to Toulmin, his remark also points out that an inventive method of picturing reality (as it is in the case of atomism) may make a great contribution to the development of a scientific concept and to more fertile theories.

The method of representation is crucial in physics and chemistry since it also provides the whole range of methods and techniques for drawing conclusions; e.g. having accepted a geometrical way of interpreting a given phenomenon, we can employ most laws established by geometry (say, Thales' Law, that of Pythagoras, the laws of trigonometry, etc.) as well as the relevant computational techniques. Obviously, it would be a cliché to say that not every scientific field may rely on relatively simple geometrical ways of representing, especially in dealing with advanced and complex problems. In fact, the majority of questions in the sciences require much more sophisticated formulae and abstract mathematical operations. However, according to Toulmin, even very abstract mathematical models play a role similar to the pictorial methods of representation: like geometrical diagrams, they are also used to interpret old phenomena in a new way, and then to predict future ones; as such, they are a counterpart of geometrical images (Toulmin 1967, p. 32). Newton's Laws of Motion in classical dynamics might be a representative example of an algebraic counterpart of geometrical representations.

Thus, when a scientist begins his investigation of nature, he does not approach it as a neutral, unmediated observer, but he is equipped with some intuitions concerning the ways of representing of the examined phenomena; and tries to employ these representational methods – depending on their explanatory power – as a sort of interpretive key. When a physicist – Toulmin says – starts to claim that "heat is a form of motion" or that "light travels in straight lines" or that "X-rays and light-waves are varieties of electro-magnetic radiation" (Toulmin 1967, p. 16), he does not state the pure facts and

does not discover anything to be in fact ascribed to reality. His discovery is mediated through a given method of representation and thereby takes for granted the adequacy of such methods of drawing inferences in his approach to a particular problem. Toulmin declares explicitly that: "The heart of all major discoveries in the physical sciences is the discovery of novel methods of representation, and so of fresh techniques by which inferences can be drawn – and drawn in ways which fit phenomena under investigation" (Toulmin 1967, p. 31).

If, then, a scientist sets out the Principle of the Rectilinear Propagation of Light, he, strictly speaking, does not say anything about the nature of light, but simply submits a report about his earlier assumptions: that a light ray can by interpreted as travelling in straight lines, and that what happens with it can be described in a geometrical way. Given these assumptions, he introduces a new way of perceiving the light and confers a new sense to this notion, putting it in a new context. It might be said that his considerations constitute tentatively a fragment of a new language game in science: he introduces some novel expressions whose meaning should be clarified from a new perspective, or, as Wittgenstein would say, whose "Grammar has yet to be explained to us"[3] (Wittgenstein 1998, p. 10). On this basis, many other problems for further investigation arise as resulting from those suppositions. For changing the old, ordinary, talking about, say, "light" (like in the expressions "Turn off the light", "There is much light in the room" etc.), and shifting to geometrical understanding of it, we have to – following the claim that "light travels in straight lines" – answer such questions as "Where from?", "Where to?", "How fast?" etc., which are not intelligible within the ordinary, non-geometrical account (Toulmin 1967, pp. 19–20). In the above view, what gives rise both to the problems of science and to the suggested solutions to them is again the *quasi*-diagrammatical code of reading off the phenomena in question.[4]

[3] Although in *The Philosophy of Science* Toulmin does not speak explicitly about "language games" and "grammar", but only about "*language-shift*" (p. 13, 152) in moving from ordinary usage to science, the reference to these Wittgenstein's terms seems to be quite obvious; all the more so because Toulmin repeatedly points out Wittgenstein, his teacher in 1940s, as a figure having the most important impact on his philosophical development.

[4] Other historical examples, concerning, for example, the changing of concepts of movements in Newton are included in another Toulmin's book on science, *Foresight and Understanding* (Toulmin 1961).

3. The "logic" of scientific arguments

When we ask about the nature of scientific arguments, about how – on what basis – the physicist draws inferences, it will turn out that the key role in it is played not by any form of traditional logic, but, again, by the accepted methods of representation. The most basic, but yet representative, examples can be provided, according to Toulmin, by the field of optics. Accordingly, he takes the Principle of the Rectilinear Propagation of Light as an example that "(...) for all its appearance of obviousness, displays many of the features characteristic of discoveries in the exact sciences. Its very commonsensicality is indeed a merit, reminding us how the sciences grow out of our everyday experience of the world" (Toulmin 1967, p. 17). It is worth emphasizing here that this principle is rather obsolete and does not agree with the later, more sophisticated and exact theories of light: corpuscular and wave theories. Yet, for the sake of its simplicity and fair computational exactness, it is still applied in simple, common optical problems. It is also taught in the introductory courses of physics.

Then, let us assume – as Toulmin does – that we deal with the following, simple situation:[5] The sun is shining on a wall that is 3 meters high, so that the angle of elevation is 30°. Now if, given the above data, we want to ask how deep the shadow cast by the wall is, the answer will be: $3\sqrt{3}$ meters. How should we explain why this is so? When we asked the physicist about how we do know that the depth of the shadow is just $3\sqrt{3}$ meters, his response would probably be of such a sort: "Light travels in straight lines, so the depth of the shadow cast by a wall on which the sun is directly shinning depends solely on the height of the wall and the angle of elevation of the sun. If the wall is 3 meters high and the angle of elevation of the sun is 30°, the shadow must be $3\sqrt{3}$ meters. In the case described, it just follows from the Principle of the Rectilinear Propagation of Light that the depth of the shadow must be what it is" (Toulmin 1967, p. 22). Thus, the whole inference here draws on the principle that light propagates in straight lines, which provides the relevant formula that enables us to work out the result.

On account of that, Toulmin raises the question: under what known logical scheme does this sort of argument fall? What type of logic may be ascribed to it? Obviously, what happens here cannot be *induction*. The fact

[5] In the following example, I use the metrical system, not an English one, which Toulmin used to employ in his original version.

that the conclusion seems to flow from the premises with logical necessity would rather hint of *deduction* from some general claim to a particular instance. The candidate for a general claim would be the principle that "All light travels in straight lines" and the particular instance would be the sentence that "The shadow's depth is $3\sqrt{3}$ meters". However – Toulmin goes on – it is not the case here, because of at least two reasons. First, in deduction, for a conclusion to flow with logical necessity (what allegedly happens in the above case), the general principle in the major premise must cover unconditionally all cases of light's propagation; in other words, it must be true. But, in this respect the Principle of the Rectilinear Propagation of Light is not absolutely true: it does not apply, for example, to the cases of diffraction, refraction or scattering. So, since the major premise is not true, then the conclusion drawn from it is not necessary, but only probable. As such, our argument cannot be counted as deductive (Toulmin 1967, p. 23).

Second, if the inference in question were to be a deductive one, it would have to be written (i.e. have the potential to be written) in the form of a relevant syllogism. But, actually, it is not possible; for from the principle that "Light travels in straight lines" it does not follow that "The shadow's depth is $3\sqrt{3}$ meters". Strictly speaking, the only logically correct syllogism to be formed on the account of this principle would look as follows:

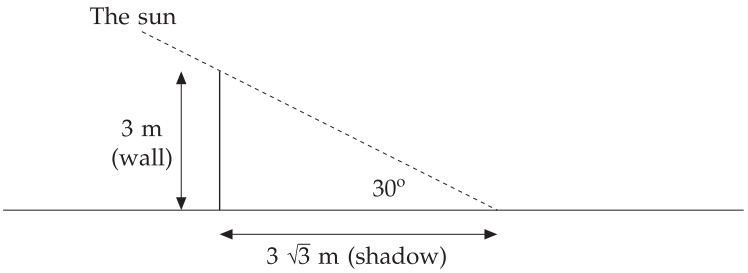
All light travels in straight lines (MaP);
What we have here is light (SiM);
Then, what we have here travels in straight lines (SiP).[6]

If, from the principle in the major premise ("All the light travels in straight lines"), it were to follow logically that "The shadow's depth is $3\sqrt{3}$ meters", its major term in this principle (P) would have to concern the shadows (*all* shadows) of the $3\sqrt{3}$ meters' depth; for only this element occurs in our argument under investigation as an major term (P) in the conclusion. But this is not the case. Hence, the conclusion in our argument does not follow deductively from the Principle of the Rectilinear Propagation of Light and the whole argument does not rely on logical deduction (cf. Toulmin 1967, p. 23).

Toulmin's own claim is that the case described above is "*a novel method of drawing physical inferences* – one which the writers of books on logic have not recognized for what it is" (Toulmin 1967, p. 23). And the

[6] It is an example of the syllogistic mode called *Darii*.

core of it is, of course, the method of representation. The author of *The Philosophy of Science* is convinced that in order to give a more precise exposition of the argument, the physicist would probably draw a diagram like the one below, where the horizontal line represents the ground and the vertical one – the wall, and the slanted, dotted line – symbolizes the sun-ray (*ibidem*).

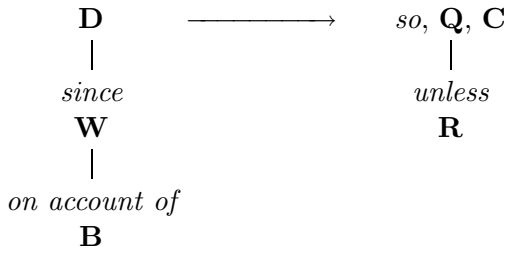


Thus the physicist does not deduce his conclusion in a logical sense *stricto sensu*, but, as a result, infers on the basis of his drawn diagram. The drawing, or the method of representation, plays a central role in his explanation, since, due to this account of the light, he possesses the inferring-techniques that enable him to work out the shadow's depth. The final conclusion does not follow with absolute necessity, but only – so to say – with relative necessity, i.e. one limited to a given method of representation.

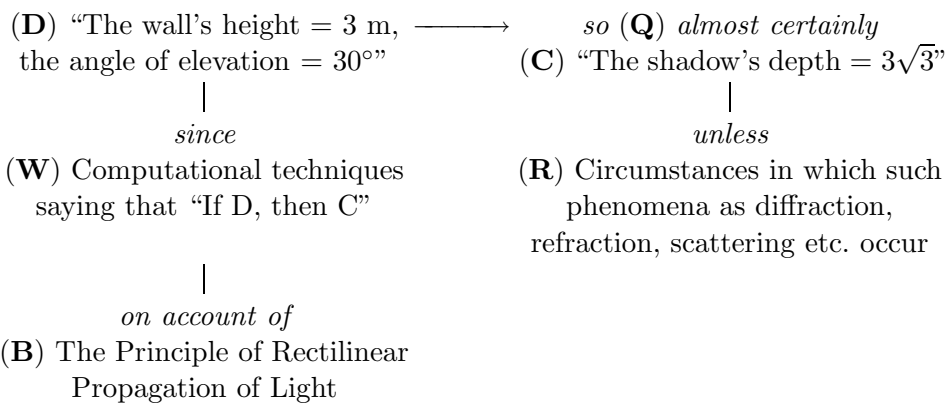
The scope of application of a given way of representing, to repeat, is not universal. On that account, the acceptance of the Principle of the Rectilinear Propagation of Light should be supplemented with at least several provisions, such as: "unless the phenomenon under investigation occurs in an optically homogenous environment (otherwise the light would be succumbed to, say refraction or diffraction)", "unless there is no some opaque obstacles in the way of the light-ray, such as prisms", "unless the light does not pass through very narrow slit (in which case the light would be scattered)" etc. Any complete list of such restrictions in fact cannot be given. The limits of application do not follow directly from the mere method of representation, but they are fixed through experiments and further examination. Yet, we may conclude, in the scientific arguments – at least of the sort described above – a separate place should be designated for such cases. Taking for granted the universality of any such principle would be premature and thus irrational.

4. Toulmin's model as applied to scientific arguments

Since neither inductive nor deductive logic[7] can be ascribed to the arguments in science, it is reasonable to ask whether Toulmin's model of jurisprudential, substantial argument can fit the example analyzed above. In fact, the scheme set out by Toulmin in *The Uses of Argument* (1958) seems to match his earlier considerations from *The Philosophy of Science* (1953). The structural elements of a substantial argument look as following:



The argument from optics, in which the task was to work out the depth of the shadow cast by the wall, when arranged to fit the above scheme, would take the following ("jurisprudential") form:



[7] Although Toulmin does not mention other sorts of formal logic, he implies that none of the formal logical constructions could do justice to the practice of scientific inferring, because there would always be a sort of substantial gap between any formal procedure and its practical application in a given case.

Thus, we may conclude – in agreement with Toulmin's considerations – that the model of substantial argument better corresponds to the real process and structure of scientific arguments than the patterns offered by formal logic. *Backing* **B** points out explicitly the ultimate basis (i.e. the method of representation) on which a given inferring is built; *warrant* **W** expresses a practical rule (inference-technique) allowing to skip from the *data* **D** to the particular *conclusion* **C**; *rebuttal* **R** leaves a place for possible exceptions from the practical, general rule embedded in the warrant, and the *modal qualifier* **Q** shows the force of the conclusion to be drawn, suggesting that it is legitimate on account of the method of representation (explicitly expressed in the backing for the warrant). Indeed, Toulmin does not analyze other examples of physical arguments in detail, but his considerations concerning optics and the nature of scientific discovery permit him to acknowledge that he finds his model more relevant and instructive.

Here, it is worth drawing attention to the problem of induction in science. In Toulmin's view, induction from observational, empirical data to general claims concerning observed phenomena is not of much use in explanatory sciences. It is successfully employed by researchers in "natural history", when they examine and describe each kind of, say, butterfly, mouse, raven etc., in order to make their generalizations as certain as possible. In physics, the situation is quite the opposite: we do not simply make generalizations; correspondingly, any particular (i.e. not general) conclusion is not drawn as a result of deductive inference from a general sentence to a particular claim. This would be like inferring about things we already know: having accepted inductively that "All As are Bs", after examining all As and all Bs, it goes automatically that also "This particular A is B". In physics, Toulmin says, it is not the case; here – when it comes to particular conclusions, as in our earlier optical example – we want to get know something new: if we measured the height of the wall and we have the angle of elevation of the sun, we still need to work out the shadows' depth. What enable us to know it are (allowing for some restrictions) only the computational techniques connected with geometrical optics (cf. Toulmin 1967, pp. 45–48). "Natural historians, then – Toulmin says – look for regularities of given forms; but physicists seek the form of given regularities" (Toulmin 1967, p. 48). And this form of regularities is captured in a given method of representation.

In that case, we may say, the crucial problem that arises concerns how a physicist comes to a given method of representation. And the answer constitutes the crux of Toulmin's discussion. He finds that no formal rules

could be given for it, neither in a neo-positivistic manner nor – we may also add – in a Popperian[8] sense of the logic of scientific discovery. Toulmin says – quoting Einstein – that they are products of human imagination, but immediately puts stress on the fact that this imagination cannot be untutored or accidental. In the relevant passage he writes:

> Perhaps, too, the recognition of fresh and profitable ways of regarding phenomena is, in part at least, a task for the imagination, so that Einstein can say of them, as he says of the axiomatic basis of theoretical physics, that they 'cannot be abstracted from experience but must be freely invented... Experience may suggest the appropriate [models and] mathematical concepts, but they most certainly cannot be deduced from it'. But we must not be tempted to go too far. (...) there are certain kinds of imagination which only a man with a particular training can exercise (Toulmin 1967, pp. 39–40).

Yet, as we see, no formal rules can be demanded for discovering new methods of representation and new profitable theories.[9]

5. The significance of Toulmin's model for understanding scientific arguments

Toulmin's considerations concerning scientific discoveries and arguments plainly cannot be treated – in a strict sense – as methodological hints. Being treated so, they would contain serious shortcomings and ambiguities. To mention some possible objections: first, his critique of (deductive) logic focuses mainly on traditional syllogistics. And thus, despite its being sound, it falls short; it does not refer to other nontraditional logics and does not discuss their, at least partial, usefulness in scientific reasoning. Perhaps, it would be better if he accepted even limited the applicability of some formal methods and then considered how far they reach, in what contexts they are binding, etc. Second, with respect to jurisprudential arguments, it seems that the mere concept of legal discourse is not very clear in Toulmin; for

[8] The main difference between Popper's and Toulmin's view is that, according to Popper, we can notice a sort of progress in the development of science: one leading from problem situations to better and better theories; whereas in Toulmin this development proceeds in a *quasi*-Darwinian manner, which means that science develops both institutional and theoretical mechanisms both of producing new innovations and of selecting them. The direction of evolution depends on both of them (Cf. Toulmin 1972).

[9] Toulmin's elaborate presentation of evolutions of concepts and factors that are decisive of in the acceptance of theories can be found in *Human Understanding* (Toulmin 1972).

example, he does not clarify unambiguously whether he has in mind the Anglo-Saxon system or the continental one.[10] Furthermore, it is difficult – if at all possible – to find close analogies between methodological procedures of science and particular legal procedures. Third, he does not refer to the achievements of the general methodology of science that try to clarify and organize the practice of science. However, one cannot deny they are, in many ways, important and useful.

Instead, on the contrary, Toulmin's ideas about scientific discoveries have some *explicatory* value: they contribute to the way we understand science, its discoveries and arguments. Consequently, one can defend Toulmin's considerations from the sorts of objections brought up above. Starting from the last (third) objection, it has to be emphasized that Toulmin is, first of all, a philosopher, not a methodologist. And as a philosopher, he points out some limitations of methodology, particularly of its formal methods; eventually, he comes to the conviction that scientific practice cannot be properly understood solely in terms of formal methods. Such methodology along with inferring-techniques follows only from the accepted model of the phenomena under investigation, and as long as we remain within this model, our techniques are legitimate. But there are at least two crucial moments in which we, as scientists, go beyond any methodology and any kind of formal logic. One is the discovery of a given, profitable method of representation (given model); coming to such a discovery is in no way a question of methodological instructions or formal algorithms, but rather – as Toulmin says – a question of free, though professionally trained, "imagination" that is able to reach beyond the present practice. Another moment concerns the scope of application of a given model. Determination where a given method of representation is no longer adequate also goes beyond the formal procedures. The mere computational techniques may be used impeccably and the final results worked out correctly, but, nevertheless, a given model does not have to find application in a given case and thus the whole reasoning may be erroneous. Sometimes the scientists do not have to be fully aware of the moments in which their practice do not comply with formal methods – being like one Molière hero who does not realize that he actually speaks in prose. However, Toulmin, as a philosopher, places himself in a sense "outside" the practice of science and thus, from a distance, wants to see more than practitioners themselves sometimes could see. In doing this, he obeys

[10] Here, it should be said that although none particular system plays a distinctive role in Toulmin's model of argument, yet in other contexts, also when it comes to science, he appreciates as a pattern to follow the English common-law tradition.

Einstein's suggestion: "If you want to find out anything from the theoretical physicists about the methods they use, I advise you to stick closely to one principle: do not listen to their words, fix your attention on their deeds" (Toulmin 1967, p. 15).

Secondly, although Toulmin's jurisprudential analogy ascribed here to arguments in science is not very strict, we may still ask how far it reaches and what its crucial implications are. The most important aspects of this analogy are the following: first, coming to particular findings in science proceeds through the exchange of reasons and the mere findings are largely the results of consensus[11] acquired within a community of scientists,[12] but they do not come down to the mere principles of logic. Second, like in law there exist a given principle, regulations and rules of inferring; in science, correspondingly, we deal with laws, principles and inferring-techniques. And like in law judicature is not a question of *quasi*-mechanic, automatic application of legal rules, but requires a thorough examination of whether a particular regulation may be applied in a specific case; in science, similarly, the argumentative practice does not rely only on the employing of inferring-techniques, but requires examination of adequacy of these techniques with reference to the specific character of a given phenomenon. Third, scientific laws – like legal regulations – are not *ex definitione* universal, but in some circumstances or contexts they may be suspended or changed (which is not to say that we know in advance that every principle in science is not universal, but only that we do not know this in advance; and thus we should not take its universality for granted). Finally, as the fourth and last remark, we can develop a more general jurisprudential analogy. For in some cases the situation of scientists resembles the situation of the judge in the Supreme Court and, correspondingly, the decisions of both are in some respects similar (cf. Toulmin 1992, pp. 131–133). Namely, there are moments when they both deal with cases that are disputable, more complex or quite new, and that cannot be successfully explained by previous rules and methods. Rulings made by such a judge do not consist in simply using current or former procedures, but rather in resorting to *informal* modes of reasoning, weighting reasons and the whole significance of a case considered. This is why they may be called "substantial" in Toulmin's sense. Sometimes these

[11] However, it is not to say that this consensus has to be univocal and accepted by all parts of the scientific discourse. The legal analogy implies also the presence of a "judge" (or an "authority", or "board of specialists"), who settles a dispute, irrespective of whether the "defeated" part agrees with his verdict or not. But it does not, in turn, mean that the decision made by a "judge" is arbitrary and irrational.

[12] For further discussion, see 'Rationality and Scientific Discovery' (Toulmin 1974).

sorts of rulings may ultimately lead to the change of particular regulations, and also, in some special circumstances, to the change of fundamental purposes and tasks of the legal system. Similar things happen in science, when a scientist faces a phenomenon, or a problem, which he cannot explain in terms of available rules and laws. Then, his arguments simply have to go beyond the current established system. In some cases, it leads to the change of particular procedures or claims. Furthermore, in some specific situations – which Toulmin calls the "the moments of strategic uncertainty" (Toulmin 1992, p. 132) – it may contribute to revision and redefinition of the whole old paradigm, and then to the choice of a new scientific strategy (and a new paradigm).

Thirdly, when it comes to Toulmin's approach to formal logic, it seems that he does not criticize logic as such, but rather as a proper and universal pattern of rationality. On this basis, he also challenges its usefulness in understanding the physicist's work, particularly in making discoveries. For, as a matter of fact, each field of science develops its own methods and – as Toulmin calls it – "working logic", independent of allegedly universal "idealized logic" (Toulmin 1958, p. 146 et passim). This, in turn, is closely connected with the methods of representation accepted in that field. Because the methods of representation are not *ex definitione* universal, it is reasonable to admit that in the future a dimension can be found in which these methods have no application (in other words, it is reasonable to *qualify* our conclusions in our arguments and to leave some place for a *rebuttal*). And in this sense – and in others – we may say that Toulmin's jurisprudential model of argument better corresponds to scientific practice than do formal logical inference schemes.

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ARGUMENTATION THEORY AND THE CONCEPTION OF EPISTEMIC JUSTIFICATION[1]

Abstract: I characterize the deductivist ideal of justification and, following to a great extent Toulmin's work *The Uses of Argument*, I try to explain why this ideal is erroneous. Then I offer an alternative model of justification capable of making our claims to knowledge about substantial matters sound and reasonable. This model of justification will be based on a conception of justification as the result of good argumentation, and on a model of argumentation which is a pragmatic linguistic reconstruction of Toulmin's model of argument.

Keywords: argument, argumentation, argumentation theory, deductivism, inductive arguments, justification, Toulmin's model of argument, warrant.

1. Introduction

S. Toulmin's *The Uses of Argument* (1958) was the origin of a new perspective for the evaluation of argumentation which tried to counterbalance the hegemony of Formal Logic and of the deductivist ideal of justification associated with it. In this paper, I shall follow Toulmin's work in order to show how Argumentation Theory may solve some problems created by deductivism. In sections 2 and 3, I shall characterize this ideal of justification and explain its shortcomings respecting the possibility of showing that many everyday arguments are good. Then, in section 4, I shall propose a model of argumentation based on a pragmatic linguistic reconstruction of Toulmin's model of argument. This model will provide an alternative characterization of one of its key elements – i.e. the *warrant* of an argument – which aims at avoiding some of the critical remarks concerning Toulmin's proposal, and at better characterizing some distinctions which are crucial for showing that deductiveness, as traditionally understood, is not a necessary condition for justification (sections 5 and 6). Finally, in section 7, I shall offer a conception

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of justification understood as the result of good argumentation. According to this conception, deductiveness will neither be a sufficient condition for justification. The latter contention involves a small step further I would like to take beyond Toulmin's approach: I am going to argue that it is not enough to focus on arguments in order to explain what epistemic justification is. Rather, we have to focus on argumentation, as an activity which is constrained not only semantically, but also pragmatically.

2. The deductivist ideal of justification

The skeptical challenge, which allowed Descartes to initiate the epistemological turn of Modern Philosophy, stated that since, for all that we know, any of our beliefs might be false, we cannot say that we really know something. Certainly, we frequently experience that our minds are somehow "disconnected" from the world; particularly, we have learnt that there is no necessary connection between what we believe and how the world actually is. The way in which we acquire beliefs does not seem to warrant their correctness. We acquire beliefs either by a direct examination, i.e. by, so to speak, contact with the world, or as a result of our processes of reasoning. Regarding the latter, it seems that there are at least two possible sources of failure: either the inadequacy of the basis we employ in order to get these beliefs; or a failure of the means which serve us to acquire them. As a way to try to avoid the latter source of failure, modern epistemologists began to promote a deductivist ideal of justification according to which the only way to make our processes of reasoning reliable is to ensure that they provide us with new beliefs which are the necessary consequences of our initial beliefs.

In *The Rationality of Induction* (1986), David Stove argued that it is the assumption of this deductivist ideal which made Hume come to the conclusion that most of the arguments we employ in everyday reasoning and arguing do not really justify their conclusions. According to Hume, inductive arguments are "founded on the presumption of a resemblance, betwixt those objects, of which we have had experience, and those, of which we have had none" (Hume 1739, p. 90). Thus, in order to conclude that "every raven is black" from a sentence like "every observed raven is black" we would have to presuppose something very close to the idea that nature is uniform – in this case with respect to the color of ravens: i.e. if each observed raven is black, then each raven is black. And this would render the corresponding argument rather circular.

Generalized beliefs are not the only sort of beliefs that may be problematic according to the deductivist ideal of justification. Beliefs supported by arguments like "it's raining, therefore you should take your umbrella", or "it's twenty past twelve, therefore we are late", according to this standard, would also lack justification. Because, for all that we know, all the premises of these arguments may be true while their conclusions are false, unless we assume that in each of these arguments there is an implicit conditional or universal premise, which conveniently links the premise with the conclusion – in order to turn the original argument into a deductively valid one. Certainly, in adding these alleged implicit premises, the premises of the new argument cannot be both true if their conclusion is false. But if we add this conditional or universal premise, we render the argument generated this way rather circular, and circular arguments do not justify their conclusions. Therefore, these arguments do not really justify their conclusions, as Hume concluded.

But, where is the circularity in "every observed raven is black, therefore every raven is black"; in "it's raining, therefore you should take your umbrella"; or in "it's twenty past twelve, therefore we are late?" At its best, we could assume that their premises do not entail their conclusions since it is possible that they are true while the conclusions are false. But, why should we think of these arguments as circular?

Actually, circularity is not a problem of such arguments as stated, but rather a result of the deductivist attempt at showing that their conclusions are "truly" justified. As Robert Brandom has incisively reminded us, Sellars – among the others – had already denounced "the received dogma... that the inference which finds its expression in 'It is raining, therefore the streets will be wet' is an enthymeme" (Brandom 2000, p. 53). Certainly, according to the deductivist model endorsed by Hume, most of our everyday arguments would be enthymemes, i.e. arguments lacking certain premises which, when added, would turn the original arguments into deductively valid, for example, conditionals turning original arguments into instances of *modus ponens*. But, why should we think that these arguments are incomplete? Why should we add the described premises to them? In order to make them more convincing, for example? The truth is that we often employ this type of arguments to persuade each other. In fact, those allegedly "complete" arguments – i.e. arguments supported by premises which turn them into deductively valid – are seldom used in everyday conversations. But why arguments should be deductively valid? The answer is: deductively valid arguments have a wonderful virtue: if their premises are true, they guarantee truth of their conclusion, no matter how the world happens to be. Therefore,

to require deductive validity does not mean to require only that the conclusion is true if the premises are true, but to demand a guarantee that it will always be so. This is the deductivist ideal of justification; an ideal which, on pain of circularity, cannot be reached by most everyday arguments.

3. Toulmin's criticism of deductivism

One of the most insightful critics of deductivism was S. E. Toulmin, whose ideas on this issue gave the origins of the Argumentation Theory, as we know it nowadays.[2] In *The Uses of Argument* (1958), Toulmin argued that the reason why a great majority of our arguments cannot reach what we call the deductivist ideal of justification is that they involve "a logical type-jump", i.e. they support conclusions of a certain logical type by means of reasons of another logical type. In Toulmin's words:

> We make assertions about the future, and back them by reference to data about the present and past; we make assertions about the remote past, and back them by data about the present and recent past; we make general assertions about nature, and back them by the results of particular observations and experiments, we claim to know what other people are thinking and feeling, and justify these claims by citing the things they have written, said or done; and we put forward confident ethical claims, and back them by statements about our situation, about foreseeable consequences, and about the feelings and scruples of the other people concerned (1958, p. 219).

Toulmin's goal in *The Uses of Argument* was to show that these arguments are substantial, in the sense that their validity depends on the sort of propositions which are true about the world, not on formal relations between their premises and conclusions. Actually, as we will see, the best ally for deductivism would be the dominant conception of Logic, according to which the normativity of inference is a formal matter.[3]

For the deductivist, as we have seen, most of everyday arguments are problematic because their premises do not "entail" their conclusions, unless

[2] Toulmin does not use the expression "the deductivist ideal of justification", but his criticism of the analytic standard for argument evaluation is, to a great extent, as it will be shown later, another way of dealing with this problem.

[3] In Bermejo-Luque (2008a) I have followed this Toulminian insight. I have argued there, that if we want to preserve a fully normative character of Logic respecting the acts in which inferences supervene, i.e. the acts of reasoning and arguing, we should not think of this discipline as a set of formal systems for characterizing the concept of "argument validity", but as a set of models describing the concept of "inference". On this account, Toulmin's model would be a particular proposal.

we interpret them as circular. In the light of this fact, a certain form of skepticism made its way, and concluded that we cannot provide a "real" justification for many of the beliefs we would like to preserve the most – like "those are my relatives", "the Earth moves around the Sun", "muffins aren't poisonous", etc. In Toulmin's view, the history of epistemology would be a history of attempts to solve skeptical problems created by the traditional deductivist conception of 'justification'. Particularly, he portrays three kinds of attempts at redeeming substantial arguments: transcendentalism, phenomenalism and skepticism/pragmatism.

Certainly, a straightforward strategy to avoid this type of skepticism was to assume that non-deductive arguments are deductive arguments with certain suppressed premises that, if incorporated, would turn these arguments into deductively valid ones. At least in certain fields, scientific generalizations would seem to be the natural candidates to play this role. They would allow scientific theories to preserve and warrant our knowledge in those fields. But the problem with this strategy is that these generalizations are not in turn satisfactory, according to the deductivist's standards: all the information which a scientist can provide would reproduce the logical gulf between her observations of facts and her generalizations. This is, according to Toulmin, the irredeemable nature of substantial arguments.

The transcendentalist would try a different strategy: to search for a direct grasp of the information which could bridge the logical gulf, like, for example: the faculty of "knowing other minds", of "reading the past", of "grasping the future", etc. By means of those extra-faculties we would get general truths that could transform our substantial arguments into deductively valid ones. Yet, also this strategy cannot satisfy a skeptic: these new, directly grasped beliefs also lack justification.

For her part, the phenomenalist would try to reject that there exists a logical gulf between our beliefs and the reasons that we have for holding them: the idea would be that the conclusions of our arguments are not as different from their supporting information as they seem to be. Allegedly, the type-jump involved would be only apparent. According to the phenomenalist, conclusions of substantial arguments would be of the same logical type as the reasons by means of which we support them. Such is, for example, the behaviorist interpretation of Wittgenstein remarks on our knowledge on other's minds: in this account, other's mental states are supposed to be ontologically indistinguishable from behavior by means of which we are able to attribute mental states. It is also the underlying view of naturalistic ethical theories, which define values in terms of consequences, feelings or interests. However, this reductionist proposal becomes much more pro-

blematic in the case of claims about future or past events which are supposed to be supported by the reference to present events. In these cases, the phenomenalist would have only two options: either to assume that claims about future or past events only refer to present events, or to consider her data as implicitly stating the very events to be predicted. In the first case, she would be refusing predictions altogether; in the second case, she would reintroduce in the premises the same kind of type-jump she aimed to avoid.

Finally, the pragmatic skeptic would claim that the gulf is unbridgeable, and consequently, that our claims to knowledge are always defective. According to this view, in principle, we should renounce the attempt at justifying most of our substantial beliefs. At least, straightforwardly: there would be still a way to reconcile our philosophical results and our common-sense views, namely, as a sort of pragmatist armistice. As Toulmin characterizes it, pragmatism, under the assumption of the deductivist ideal of justification, would offer an indirect justification for our beliefs: that they are sufficiently good for practical purposes, and that is all they can be. This tendency is, according to Toulmin, revealed in the history of epistemology:

> The transcendentalist Locke is answered by the phenomenalist Berkeley, only for the conclusions of both to be swept aside by the skeptic Hume. For all three, the logical gulf between 'impressions' or 'ideas' and material objects is the source of difficulty. (...) In moral philosophy, again, G. E. Moore rescues ethical conclusions, which are based at first sight on entirely non-ethical data, by treating them as underwritten by intuitions of 'non-natural' ethical qualities; I. A. Richards and C. L. Stevenson offer a phenomenalist reply, analyzing ethical statements in terms of non-ethical ideas alone, so that the gulf between feelings and values is disregarded; while A. J. Ayer, in turn, plays Hume to Stevenson's Berkeley and Moore's Locke, and so avoids or evades the problem which had been facing his predecessors (1958, p. 233).

All these responses would share a common mistake: the deductivist ideal of justification. Following Toulmin's remarks, I would like to explain now why this ideal is mistaken and propose an alternative model of justification capable of making sense of our claims to knowledge of substantial matters.

4. A model of argumentation

The model of justification that I would like to offer is based on a conception of justification as the proper outcome of a good argumentation, and

on a model of argumentation that is a pragmatic linguistic account of Toulmin's model of argument. According to our model, an *argument* would be a representation of the semantic properties of an *act of inferring* – i.e. an act of putting forward a claim or belief as a reason for another claim or belief. An act of inferring would be either a *reasoning process* or an *act of arguing*,[4] and an act of arguing – a communicative act, an object which has not only semantic, but also pragmatic properties – would be the smallest speech act which would allow us to justify a given a claim.

Acts of arguing emerge, normally, as attempts at answering the challenge to our claims. Thus, the *claim* that we attempt to make, and the *reasons* we adduce to support this claim, are two main elements which we can distinguish in any act of arguing. In principle, claims and reasons are assertions, but they become the second order speech acts of adducing and concluding when they are a part of a complex speech act of arguing.

On the other hand, the means by which two assertions become reasons and conclusions of an act of arguing would correspond, following Toulmin's terminology, to the *warrant* of this act. In our account, in order to be able to determine that an assertion that p has been put forward as a reason for an assertion that q, we have to attribute to the speaker an implicit conditional assertion whose antecedent is the reason of her act of arguing and which consequent is its conclusion. This implicit assertion would be common to even the simplest forms of argumentation, as it constitutes the inferential link that lies behind each act of arguing. Moreover, it would also be common to every act of reasoning: after all, it is because we can attribute the corresponding conditional belief to a given subject, that we can take her coming to believe that q after she came to believe that p as a process of reasoning, and not as a mere association of ideas or something alike. In Bermejo-Luque (2006a) I named this conditional belief, which makes an input–output mental process a reasoning one, a "motivation" to infer.

The concept of warrant is the key element of Toulmin's model of argument and, in general, of his views on logic and epistemology. He defines warrants as rules, principles, inference-licenses or any "general, hypothetical statements, which can act as bridges, and authorize the sort of step to

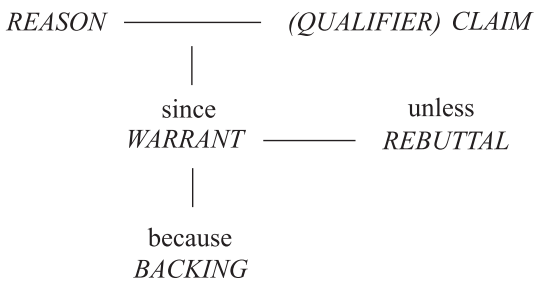
[4] In Bermejo-Luque (2006a) I have tried to show that argumentation can be seen either as a justificatory or as a persuasive tool. I have also explained that the sort of invitation to infer – i.e. the reasoning process, that a piece of argumentation prompts on its addressee – is parallel to the justificatory structure of an act of arguing, i.e. a speech act in which a given assertion becomes a reason for a given claim. In that paper I have argued that, even though argumentation can be seen both as a justificatory and as a persuasive tool, its justificatory power is a matter of semantic and pragmatic conditions of acts of arguing.

which our particular argument commits us" (1958, p. 98). He says that the warrant of an argument can be always made explicit as the corresponding conditional whose antecedent is the reason and whose consequent is the claim of the argument. However, stressing its rule-like nature, he also says that the most "candid" way of expressing a warrant is: "'Data such as D entitle one to draw conclusions, or make claims, such as C' or alternatively 'Given data D, one may take it that C'" (1958, p. 98).

For Toulmin it is very important to distinguish warrants from other elements of his model. Particularly, he stresses the differences between the warrant and the *backing* of an argument.[5] Backings are defined as "other assurances" which stand "behind our warrants" (1958, p. 103) in order to show their legitimacy. They are categorical statements of fact that would eventually justify the legitimacy of the warrant, and they correspond to the answer to challenging acceptability of our warrants. Although Toulmin does not state it explicitly, we can think of backings as reasons supporting warrants. And contrary to warrants and reasons, backings would not be constitutive for acts of arguing: after all, warrants can be conceded without further challenge.

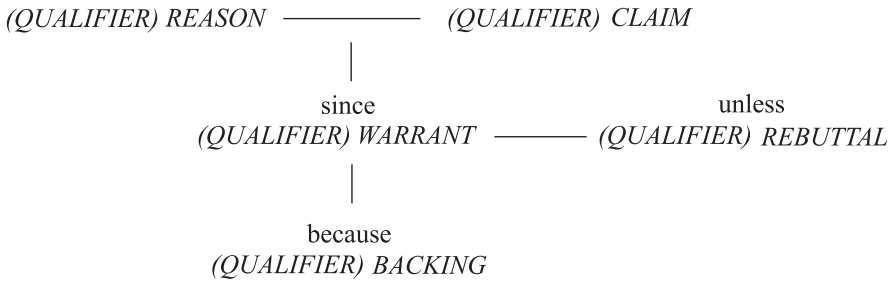
On the other hand, *rebuttals* would be "circumstances in which the general authority of the warrant would have to be set aside" (1958, p. 101). They are assertions that may appear in acts of arguing, but they are not constitutive for them either.

Finally, Toulmin defines *modal qualifiers* as "an explicit reference to the degree of force which our data confer on our claim in virtue of our warrant" (1958, p. 101). Thus, Toulmin's model can be outlined as follows:



[5] The distinction is crucial for his criticism of the concept of "major premise". For example it allows him to explain away that the old problem of whether universal propositions should be interpreted as involving existential implications or not is a consequence of passing over the distinction between warrants and backings.

Our model of argumentation would add to Toulmin's model of argument only a pragmatic linguistic perspective according to which these elements are not propositions, but full-fledged speech acts constituting a second order speech act complex – i.e. the act of arguing. On this account, a modal qualifier would be an explicit reference to the degree of force with which a given proposition is stated. Consequently, whether or not this force is made explicit, every claim would be modally qualified, and hence, modal qualifiers would be constitutive for acts of arguing, as they would necessarily qualify all of its elements. This model can be outlined this way:



In Bermejo-Luque (2009) I define the second order speech act complex of arguing, characterized in this way, as an attempt to show that the target claim is correct.

5. A conception of warrant

Toulmin insists that warrants should not be counted as "premises". For him, the term "premise" is ambiguous, as it may refer, indistinctively, to reasons, backings or warrants. In his account, implicitness and rule-likeness are key features which distinguish warrants from reasons or backings. However, most interpreters have stressed the latter while ignoring the first – partly misguided by Toulmin's own examples.[6] Actually, in my view, this mistake would be a main theme of one of the most important critiques of Toulmin's ideas: according to Manicas (1966) and Castañeda (1960), Toul-

[6] Toulmin says, for example, that we can express an argument "in the form 'Datum; warrant; so conclusion'" (1958, p. 123). Certainly, that would seem to sustain the idea that warrants can be explicit. But this is not necessarily the case: nothing prevents Toulmin from saying that this reconstruction constitutes a new argument having another warrant that is, again, implicit for it.

min's characterization of *backings* and *warrants* is not based on different logical functions within arguments, but rather on different grammatical characterizations – backings as categorical statements of fact, and warrants as conditional, hypothetical statements. Contrary to Toulmin, Castañeda argued that there is no good reason for distinguishing warrants and backings from major premises. After all, both ways of phrasing an argument – that is, "Reason, Warrant, so Claim", and "Reason, Backing, so Claim" – result in analytic arguments, and these are arguments which do not seem to need to be completed or rephrased in any way in order to show the sources of their validity.

A simple answer to this criticism would be to insist on the necessary implicitness of warrants, contrary to reasons and backings. However, Toulmin's approach is not clear about this. As I see it, for him the main difficulty to insist on this feature of warrants is that his model focuses on arguments as objects with merely semantic properties, rather than on argumentation as a communicative activity which is both semantically and pragmatically constrained. Contrastingly, in our proposed model, all the elements are communicative elements of the speech act of arguing. In our account, provided that we can attribute to this subject an implicit inference-claim – i.e. the warrant of her or his act of arguing – whatever a subject explicitly claims in support of a target claim, is a reason for it. It is the attribution of this implicit claim which entitles us to say that her act of putting forward a given claim counts as a speech act of adducing, i.e. as an act of putting forward a reason for another claim. Consequently, in our model, warrants cannot be confused with reasons because they are necessarily implicit in acts of arguing: they constitute the inferential step that lies behind any act of arguing.

Certainly, we can make warrants in arguments explicit – as long as the argument is just a representation of the semantic properties of an act of arguing. In fact, when we portray a given act of arguing according to Toulmin's model, we make its warrant explicit. However we cannot deal with this warrant as if it were a reason, as Manicas and Castañeda would claim. Neither can we deal with a backing as a reason for the target claim, instead of dealing with it as a reason for the warrant.

Indeed, there are very good reasons to think that warrants correspond to the elements of an act of arguing which are, and have to remain, implicit in it. Following a well known argument of Lewis Carroll (1895), Wayne Grennan (1997) showed that warrants – or 'inference claims' as he calls them – are necessarily implicit because they cannot be incorporated into arguments without changing their original meanings:

> [C]onsider an argument utterance symbolized as "A, so B". By definition, the inference claim is "if A then B". Now suppose we add "if A then B" to the original argument, in an attempt to make the inference claim explicit. The argument form is now "A, if A then B; so B". But the inference claim for the revised argument is "if A, and if A then B, then B". If we now add this, we change the stated argument again, generating a new inference claim. Thus, an infinite regress begins when we try to make it explicit in the argument. (Grennan, 1997, p. 69)

That would explain why Manicas and Castañeda's criticism is misleading: contrary to any kind of implicit premise, warrants cannot be incorporated into arguments as premises if we want to preserve the original inferential structure of the act of arguing which we want to represent. Certainly, we can incorporate a bare content of the warrant as a premise. But then we are no longer representing the original act of arguing – whose warrant is "if R, then C" – but a different act of arguing – whose warrant is "if R and W, then C". As we are going to see, this new warrant is not claimed to be a substantial relation between R and C, but an analytical, formal relation between R, W and C.

6. "Crucial distinctions"

Toulmin's model, and especially his concept of warrant, expressed his account of "substantial" argument. This account will be the core of our criticism of the deductivist ideal of justification. Like Toulmin, I aim to show that the validity of an argument is inextricably linked to the forcefulness of the reasons which we have for its conclusion, and that this is by no means an *a priori*, analytical or formal matter, but a matter of the substantial correctness of the warrant which is meant to justify the step from reason to conclusion. To that end, I am going to offer an account of Toulmin's distinctions between necessary, analytical and formal arguments in order to show that the term "deductive" has been used to designate very different properties that arguments may have (1958, p. 9).[7]

Toulmin distinguishes between *necessary* and *probable arguments* by considering the type of entitlement which a warrant provides for drawing

[7] For his part, Toulmin is willing to use the term "deductive" as a synonym of warrant-using argumentation, that is, an argumentation "applying established warrants to fresh data to derive new conclusions" (1958, p. 121).

the conclusion. When a warrant entitles us to draw the conclusion "unequivocally", the argument is necessary, i.e. it is an argument whose conclusion is to be claimed "necessarily". But when "the warrant only entitles us to draw our conclusion tentatively (qualifying it with a 'probably'), subject to possible exceptions ('presumably'), or conditionally ('provided that...')" (1958, p. 148), the argument is only probable. According to this remark, what determines which arguments are necessary and which are probable is not the "logical form" of an argument but the nature of the state of affairs it concerns. Reasonings with conclusions drawn necessarily because of the fact that their warrants are necessary physically, morally, practically, mathematically, etc., will be as conclusive as those drawn from those warrants which are formally necessary. That is, the necessity of arguments would be a matter of their warrants being necessary truths.

On this account, our willingness to say that an argument is necessary would depend on our willingness to recognize not only formal or conceptual necessities, but also physical, moral, practical, mathematical, etc. Actually, in criticizing Formal Logic as a paradigm for the evaluation of arguments, Toulmin criticized the assumption that, in order to draw conclusions sanctioned with a label 'necessarily', rules of inference have to be exclusively formal – that is, they have to be the rules that sanction the meaning of the logical terms involved. As he points out, a warrant like "if Harry was born in Bermuda, then he is a British subject" is as much legitimate an inference rule, as it is *modus ponens*. And many warrants, not only formal ones, would equally entitle us to drawn conclusions 'necessarily': for example, those stating conceptual truths like "if it is red, then it has a color"; or moral truths like "if, by doing that, you unnecessarily hurt someone, then you should not do it"; or – if your metaphysical convictions, like Toulmin's ones, do not preclude them – warrants stating physical necessities like "if the experiment is supposed to reduce entropy in a close system, then it is erroneous" or even, "if it is a hundred tons, then you won't lift it single-handed" (1958, p. 27); or legal necessities like "if she is the defendant's wife, then you cannot oblige her to testify"; etc.

Toulmin's second distinction is that between *formally* and *non-formally valid arguments*. Toulmin says that a formally valid argument is an argument "set out in such a way that its conclusion can be obtained by appropriate shuffling of the terms in the data and warrant" (1958, p. 148). However, this definition has the following consequence: an invalid argument like "No horse is a human; No human is four-legged; therefore no horse is four-legged" would be formally valid, because we can arrive at its conclusion by shuffling the parts of the premises and rearranging them in a new

pattern.[8] So, I would rather define a formally valid argument as an argument whose warrant is formally true, or in other words, an argument whose warrant is a claim that it is true for "formal" reasons – that is to say, it is true because of the meaning of the logical terms involved.[9] Thus, whereas the argument "Socrates is human, therefore, he is mortal" is a non-formally valid argument (its warrant is the "biological" truth "if Socrates is human, then he is mortal"), the argument "Socrates is human, and every human is mortal, therefore, Socrates is mortal" is a formally valid argument (its warrant is the formally true claim "if Socrates is human and every human is mortal, then Socrates is mortal"). Formal systems of inductive logic would also try to determine this type of "formal validity" for probable arguments. But in Toulmin's view, they distort the real meaning of qualifiers like "probable" (1958, pp. 153, 160).

Next, Toulmin distinguishes between *analytic* and *substantial arguments*. For him, an argument is analytic if and only if "checking the backing of the warrant involves *ipso facto* checking the truth or falsity of the conclusion" (1958, pp. 133, 140). Toulmin says that this is "the key distinction" of his project (1958, p. 234). And, not surprisingly, it is the one which was subjected to the strongest criticisms. But I think we can avoid objections by saying that an analytic argument is an argument whose warrant is an analytic truth. As long as there are necessary truths which are not analytic, this definition would share with Toulmin's definition the idea that not all necessary arguments are analytic: "in other fields also a time comes when we have produced in support of our conclusions data and warrants full and strong enough, in the context, for further investigation to be unnecessary – so in this sense non-analytic arguments also can be conclusive" (1958, p. 234). Yet, my proposal differs from Toulmin's in an important aspect, because according to Toulmin, "where an analytic argument leads to a tentative conclusion, we cannot strictly say any longer that the conclusion follows 'necessarily' – only, that it follows analytically" (1958, p. 141). That is, on Toulmin's definition, not all analytic arguments would be necessary. In contrast, according to our proposed definition, as long as all analytic truths are

[8] I owe this observation to one of the referees of Bermejo-Luque (2008a), where part of this section appears. I have there also observed that Toulmin could have answered that the consequence of that argument cannot really "be obtained by any *appropriate* shuffling of the terms in the data and warrant". But in that case, he should give further explanations of what "appropriate shuffling" is, and it is doubtful that he might do it without adopting certain formal criteria of argument validity.

[9] Following Brandom's criticism of the concept of "logical term", in Bermejo-Luque (2008a) I have also questioned the idea of "formal truth".

necessary, all analytic arguments are necessary as well.[10] This is how we can respond to one of the criticisms that Castañeda (1960), among the others, made to Toulmin's proposal.

Finally, we should also introduce a distinction between valid and invalid arguments. However, at this point we have to take into account that in *The Uses of Argument* Toulmin does not address directly the question of the evaluation of arguments; he just offers some guidelines that can be derived from his ideas concerning probability and from his model of argument. For their part, many interpreters focused on his conception of the *field* of an argument and the idea that each field provides different standards for evaluating arguments. I argued against this approach in Bermejo-Luque (2006b). Following our proposed conception of arguments and the above model of argumentation, I would rather offer the following definition of the validity of argument: an argument is valid if its warrant is semantically correct.

As I mentioned above, I think of the warrant of an act of arguing as an implicit conditional claim. This claim is an associated conditional whose antecedent is the reason of an act of arguing, and whose consequent is its target claim. In Bermejo-Luque (2006b), I proposed a semantic account of this conditional as a material conditional. As D. Hitchcock (2007) indicated, such a view is open to apparent paradoxes: on this account, an argument like "this is my hand, therefore the Moon is not made of cheese" would seem to be valid, because its warrant, "if this is my hand, then moon is not made of cheese", understood as a material conditional, is true. I defended myself against this criticism in Bermejo-Luque (2007), where I appealed to Grice's distinction between the semantics and pragmatics of conditionals. In my view, such a warrant is erroneous not because of its semantic properties, but because of its pragmatic properties. As H. P. Grice argued in "Indicative Conditionals" (1989), the reason why – under general circumstances – we should not put forward a material conditional when we try to say that its antecedent is false is that merely putting forward the negation of the antecedent expresses the same meaning in a simpler manner. The case is similar when we try to say that its consequent is true. Thus, if we just mean that the premise is false or that the conclusion is true, putting forward the warrant implicitly – i.e. an indicative conditional – would amount to

[10] If we assume the Quinean thesis that the only type of analytic propositions are the logical ones, we may come to believe that the only possible type of analytic arguments are the formal ones, as defined above – more precisely, formal, first-order classical arguments, in Quine's view. But this is neither Toulmin's view, nor mine. I think we can distinguish between formally valid and analytic arguments by considering "formal" truths as a sub-set of "analytic" truths: an argument like "this is red, therefore it has a colour" would be analytic but not formally valid.

a violation of the Maxim of Quantity. And this is something we would not be allowed to do, according to our model. For in it a warrant is first of all a certain (implicit) assertion; thus, as any other statement, it has not only semantic but also pragmatic conditions of correctness.

On this account, warrants are meant to authorize an inference from reasons to conclusions, and in being semantically correct, they actually do so. Because they are assertions – i.e. contents put forward with a certain degree of assertive force – they may be qualified by as many types of qualifiers as any other statement. Actually, it would be the qualifier that corresponds to the warrant of our argument, what would entitle us to draw our conclusions "necessarily", "probably", "tentatively", "possibly", etc. This way, a *valid argument* – understood as a semantic notion – would be an argument whose warrant is semantically correct. That is to say: the qualifier that actually corresponds to this conditional assertion is the one that has been used for drawing the conclusion in the act of arguing. Alternatively, we may also preserve the traditional connotation of the concept of validity, according to which an argument is valid if, and only if, its conclusion "follows" from its premises. In this case we would have to say that an act of arguing is valid if, and only if, its warrant is semantically and pragmatically correct. But we will have to keep in mind that this type of validity is no longer a merely semantic notion, and therefore that it is not a property of arguments, but of argumentation.[11]

In any case, arguments like "Every observed raven is black, and if every observed raven is black, then every raven is black; therefore (necessarily) every raven is black" or "every observed raven is black; therefore (likely) every raven is black" would both be valid, whereas arguments like "Every observed raven is black, and if every observed raven is black, then every raven is black; therefore (likely) every raven is black" or "every observed raven is black; therefore (necessarily) every raven is black" would both be invalid.

7. Conclusions

Following Austin's analysis, Toulmin contends that claims to knowledge have the effect of making the speaker answerable to the reliability of her

[11] This is the conception of validity which I defended in Bermejo-Luque (2007), following Hitchcock's intuition, claiming that the expression "So" stands for the concept of validity which we use in arguing.

assertions. He says that when we ask 'how do you know that *p*?' we are, in principle, raising a logical question, namely, a question about the reasons which support *p*. For sure, we can also ask for an explanation of the process by means of which a given subject came to believe that *p*. But such a question would not imply to acknowledge that *p* is true. Rather, it would be just a question about a subject's biography. As Toulmin points out, both questions can be appropriate, depending on the context; and in certain contexts, a report of the way the subject came to believe something may also count as an elicitation of the reasons which support the belief.

However, in most cases claims to knowledge work as modal qualifications of our assertions. When I say "I know that *p*", I am not only saying something about my beliefs, but I am also committing myself to the idea that *p* is true. When my claim is challenged, I am normally asked to produce grounds to establish that *p* is true – rather than being merely asked to explain how I came to believe that *p*. As far as claiming to know that *p* involves claiming that *p* is true, epistemology would be concerned with conditions for claiming that *p* is true. In this way, as it should be obvious by now, the conception of justification endorsed by Toulmin is not that of the additional condition that only true beliefs must fulfill in order to become "proper" knowledge. Rather, he would be thinking of justification as a normative outcome of argumentation, i.e. as a sort of property that good arguments confer to their target claims. This is why, in Toulmin's view, epistemology would be concerned with the appraisal of arguments: its business is to determine the rationality of our claims to knowledge. The set of criteria that we need in order to determine the value of our arguments would paradigmatically determine, among other things, the cogency of our claims to knowledge. In Toulmin's words, "the logical criticism of claims to knowledge is a special case of practical argument-criticism – namely, its most stringent form" (1958, p. 218).

The conception of justification here proposed is slightly different from that proposed by Toulmin. If we think of 'justification' as the output of good argumentation, it makes all the difference which conception of argumentation do we endorse. For us, argumentation is, first of all, a communicative activity, an attempt at showing a target claim to be semantically correct. By arguing, we put forward a claim – i.e. we present certain content with a certain degree of assertive force – and by arguing well, we justify that claim. On this account, justifying is in turn a certain sort of successful communicative activity, and therefore it has not only semantic but also pragmatic conditions of correctness. For an act of arguing to be a good one – i.e. an act of justifying, an object with semantic and pragmatic properties

– it has to fulfill both semantic and pragmatic conditions of correctness. In particular, all its elements have to be semantically and pragmatically correct: the warrant – so that the argumentation is valid, the reasons and the argumentative speech act, as a whole. In Bermejo-Luque (2008b) I dealt with these pragmatic conditions by adopting Grice's Cooperative Principle and its maxims as regulative for argumentation. On this account, certain argumentative fallacies would be violations of these maxims as pragmatic conditions for showing a target claim to be correct. Thus, for a piece of argumentation to be good, it will not be sufficient that it is deductively valid, as most argumentation theorists are willing to claim nowadays.[12]

In the light of this proposal, we can determine now what was wrong in the deductivist ideal of justification, namely its assumption that the only kind of valid arguments are those whose warrants are necessary, a priori, analytic truths. This could explain why, in the view of authors like Hume, for an argument like "every observed raven is black, therefore every raven is black" to be a good one, we had to presuppose something like "if every observed raven is black, then every raven is black": if we add such a premise to the original argument, the new argument is a formally valid argument, its warrant being the formal truth "if every observed raven is black and, if every observed raven is black, then every raven is black, then every raven is black". Certainly this conditional is true not because of the things that are true of the world, but because of the meanings of the logical terms involved – i.e. it is a particular case of necessary and analytic argument.

In contrast, in our account, requiring this type of validity would be misleading: the only semantic property that is needed for an act of arguing to justify its conclusion is that its reasons and warrant are semantically correct. We do not need the warrant being a necessary truth, be it formal or not. This is the way we put ourselves in a condition which allow us to avoid the problem of circularity Hume worried about: in order to infer that every raven is black because every observed raven is black we do not presuppose that if every observed raven is black, then every raven is black. What we do is to implicitly say so: that is precisely the meaning of our implicit inference-claim, i.e. the warrant of our act of arguing. And if we are right, if this conditional is true, by inferring in this way we are in a condition to justify our claim that every raven is black. For sure, we may also need to determine whether this conditional is true. But this is not something we need "in order

[12] See, for example, T. Govier (1995).

to justify" that every raven is black by adducing that every observed raven is black. We need it in order to determine whether this act of arguing is a good one, i.e. whether it indeed justifies its conclusion. But determining justification is not the same as justifying: a claim may be justified whether or not we can determine that it is. And, at any rate, we may try to determine whether a given warrant is true by further considering the reasons that we have for thinking that it is, i.e the reasons that eventually would justify it.

Once we abandon deductivism, what determines justification is not the inevitability of a conclusion, given premises, but the nature of the case at stake. For sure, an argument having a necessary truth as a warrant will guarantee not only that its conclusion is true, but also that it necessarily has to be true, if the reason is true. Formal truths, if we think of them as necessary, are capable of playing this role. But turning substantial arguments into formally valid ones by adding their warrants as premises is just a trespass of the question of the goodness of the argument upon the question of the truth of its premises. And as I argued above, this is not only a useless strategy, but it is also illegitimate, as it perverts interpretation of the original act of arguing. Moreover, it may preclude us from appreciating the source of its eventual validity. And the worse is that it poses a standard of justification that cannot be reached by many good arguments, on pain of circularity.

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ETHICAL AND LEGAL ARGUMENTATION

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THE ANALYSIS AND EVALUATION OF LEGAL ARGUMENTATION: APPROACHES FROM LEGAL THEORY AND ARGUMENTATION THEORY

Abstract: In the past thirty years legal argumentation has become an important interdisciplinary field of interest. The study of legal argumentation draws its data, assumptions and methods from disciplines such as legal theory, legal philosophy, logic, argumentation theory, rhetoric, linguistics, literary theory, philosophy, sociology, and artificial intelligence. Researchers with different backgrounds and from various traditions are attempting to explain structural features of legal decision-making and justification from different points of view. The authors describe how argumentation theorists, philosophers, legal theorists, and legal philosophers deal with these problems from different points of view. The authors distinguish three traditions in the study of legal argumentation: the logical, the rhetorical and the dialogical approach. Ideas about the analysis and evaluation of legal argumentation, developed by influential authors in the field, are examined. The contribution is concluded with a more extensive discussion of the pragma-dialectical approach to legal argumentation that integrates rhetorical and dialectical aspects of legal argumentation.

Keywords: legal argumentation, rationality, rational reconstruction, rational discussion, discussion rules, logical analysis of legal argumentation, rhetorical analysis of legal argumentation, dialectical analysis of legal argumentation

1. Introduction: argumentation and legal justification

In the past thirty years legal argumentation has become an important interdisciplinary field of interest. The study of legal argumentation draws its data, assumptions and methods from disciplines such as legal theory, legal philosophy, logic, argumentation theory, rhetoric, linguistics, literary theory, philosophy, sociology, and artificial intelligence. Researchers with different backgrounds and from various traditions are attempting to explain structural features of legal decision-making and justification from different points of view.

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One of the main incentives for the growing interest in legal argumentation has to do with changing views on the tasks of the judge. In the 20th century, ideas about the tasks of the legislator and the judge have changed. Because the legislator cannot foresee all possible cases and new developments in society, he must, of necessity, restrict himself to a general formulation of rules. As a result of this legal rules have an *open texture character*: in a given case rules can be indeterminate. Therefore, as Hart puts it in *The Concept of Law*, the nerve of legal reasoning is not subsumption and the drawing of a syllogistic conclusion, but the reasoned solution of interpretation problems in applying legal rules.

Although it is commonly accepted that legal decisions must be justified in a rational way, there are hardly explicit legal specifications as to what the justification should consist of. One of the important problems in the study of legal argumentation is which standards of legal soundness the argumentation should meet. Is it enough that the judge mentions the facts of the case and the legal rules, or does he also have to explain why the legal rules are applicable to the concrete case? How can the interpretation of a legal rule be justified acceptably? What, in the context of legal justification, is the relation between legal rules, legal principles and general moral norms and values? Are there any special norms for a judge's decision, when compared with the justification of other legal positions? Which types of complex argumentation in legal decisions can be distinguished? How exhaustive should argumentation in legal decisions be? Is it for example necessary for a judge to refute counterarguments in the decision?

A second important problem in the study of legal argumentation is the question how to analyse *real life* argumentation in legal decisions in order to evaluate it adequately. When a judge resolves for instance an interpretation problem in deciding a legal case, he can choose different types of *interpretative arguments* to justify his decision. Ideally, these arguments are recognizable in the justification of the legal decision. But in practice these reasons are not always presented explicit, clear and well ordered. Sometimes, the judge does not give an account of all considerations underlying the decision which would be necessary for a complete justification (for example, because he considers it obvious), at other times he adduces arguments *obiter dicta* that are superfluous to the justification of his decision. The critical reader who wants to evaluate these reasons must therefore solve a number of reconstruction problems. First, he must *identify* the argumentation as such. This means that he must establish which parts of the decision constitute the argumentation and what function this argumentation fulfils. Second, he must *interpret* the argumentation, which means that he must determine

which proposition in the text is defended as standpoint and which propositions are brought forward as explicit arguments in defense of the standpoint and which implicit arguments are presupposed. Third, he must *analyze* the argumentation, which means that he must examine what bearing the arguments have on each other and on the standpoint. The next problem for the critical reader is to find out which criteria are to be used to evaluate the argumentation that is given as a justification of the decision. What are the general circumstances in which legal arguments are used and when is are they applied correctly?

This contribution describes how argumentation theorists, philosophers, legal theorists, and legal philosophers deal with these problems from different points of view. Ideas about the analysis and evaluation of legal argumentation, developed by influential authors in the field, will be examined. In section 2 we give a concise overview of the central questions and methodological choices in the study of legal argumentation. We proceed in section 3 with a discussion of three traditions in the study of legal argumentation: the logical, the rhetorical and the dialogical approach. In section 4 we complete our discussion with an extended description of the pragma-dialectical approach to legal argumentation. In this approach rhetorical and dialectical aspects are integrated in a systematic theory for the analysis and evaluation of legal argumentation from the perspective of a rational critical discussion.

2. Central questions and methodological choices

The general objective of legal argumentation theory is to establish how arguments can be analyzed and evaluated adequately. In legal argumentation theory, criteria are developed for determining when the argumentation put forward as a justification is acceptable according general and legal standards of acceptability. The theoretical focus is both on *ideal norms* for acceptable arguments and criteria of acceptability which apply in legal practice. So the study of legal argumentation has a *normative* and a *descriptive* dimension. This means that on the one hand a philosophical ideal of reasonableness must be developed and starting from this ideal, a theoretical model for acceptable argumentation. On the other hand, argumentative reality must be investigated empirically, so that it becomes clear how argumentative discourse is in fact conducted and which standards of acceptability are applied in legal practice. This makes it necessary to link the normative and the descriptive dimensions by developing instruments that make it possi-

ble to analyze argumentative practice from the perspective of the projected ideal of reasonable argumentative discourse (Van Eemeren and Grootendorst 2004, MacCormick and Summers 1991, p. 19). The reconstruction of legal argumentation is descriptive in the sense that it gives a reconstruction that starts from arguments expressed in legal decisions and it is normative in the sense that the reconstruction is related to a model of acceptable justification.[1]

Given this relation between normative and descriptive dimensions of research in legal argumentation one can distinguish different research components. The *philosophical* component attends to the normative foundation of a theory of legal argumentation. In this component, questions are raised regarding the criteria of rationality for legal argumentation, and regarding the differences between legal norms of rationality and other (moral) norms of rationality. An important question raised in the philosophical component is which general (moral) and which specific legal criteria of rationality should be used in evaluating legal argument. In the *theoretical* component, models for legal argumentation are developed, in which the structure of legal argument and norms and rules for argument-acceptability are formulated. The *reconstruction* component shows how to reconstruct legal argument in an analytical model. The object of such a reconstruction is to get a clear view of the stages of the argumentation process, the explicit and implicit arguments, and of the structure of the argument. In their turn, rational reconstruction forms a basis for the evaluation of arguments. Depending on the type of approach and on the criteria of rationality presupposed in the approach, a specific kind of reconstruction is carried out. The *empirical component* investigates the construction and evaluation of arguments in actual legal practice. It establishes in which respects legal practice fits in or conflicts with theoretical models and examines how possible discrepancies might be explained. Finally the *practical component* considers how various results forwarded by the philosophical, theoretical, analytical, and the empirical components might be used in legal practice. Practical applications

[1] Cf. MacCormick (1978, p. 12) who states (...) 'that reasoning in the sense at least of public argumentations is itself an activity conducted within more or less vague or clear, implicit or explicit, normative canons. We distinguish between good and bad, more sound and less sound, relevant and irrelevant, acceptable or unacceptable arguments in relation to philosophical, economic, sociological, or, above all, legal disputation over given foci of dispute. That is possible only given some criteria (as often as not both vague and inexplicit criteria) of goodness or badness, more or less soundness, relevance, acceptability and so forth. (...) Any study of legal reasoning is therefore an attempt to explicate and explain the criteria as to what constitutes a good or a bad, an acceptable or an unacceptable type of argument in law.'

are methods for improving skills in analyzing, evaluating and writing legal argumentation.

Until 1970, legal argumentation was studied mainly in the context of legal theory (jurisprudence) and legal philosophy. Problems affecting legal argument were considered as part of general legal problems, such as legal decision-making and statutory interpretation. Legal argumentation was treated as part of legal methodology, rather than a theory of legal argument in its own right.[2]

In the 1970s, an interest in legal argumentation began to grow among lawyers and argumentation theorists. The question of the rationality of justifications of legal decisions has become one of the central themes of the evolving legal argumentation theory. A number of surveys of legal argument were published in the 1970s. The first of these were concerned with logical approaches. Horovitz (1972) gives an overview of research in the field of legal formal and informal logic. Kalinowski (1972) discusses various approaches in legal logic. In later publications, attention shifts to legal argumentation theory itself. Struck (1977) examines various models of argument. Alexy (1978) and MacCormick (1978) were the first to develop theories of legal reasoning and legal argument. Alexy's theory is based on ideas from analytic moral philosophy, language philosophy, legal hermeneutics and argumentation theory. MacCormick's theory is based on ideas from analytical legal philosophy.

Research on legal argumentation over the past 30 years discloses a rich variety of topics, approaches, ideas and principles. Scholars study legal argument in various contexts such as legal theory (jurisprudence), the legislative process, the legal process, and the process of legal decision-making by judges. Various methodological approaches can be distinguished in these writings. Some authors opt for a normative approach which emphasizes how a judge can justify his or her decision in a rational way, or how a legal discussion can be conducted reasonably. Others prefer a descriptive approach to real-life processes of argument, such as investigating argumentative techniques which are effective in convincing a certain legal audience.

There are also various 'topics' which can form the object of study. Some authors concentrate on the philosophical and methodological aspects; some develop theoretical models and try to establish the norms for rational justification; some concentrate on the description of legal practice; and others

[2] See, for instance, Gottlieb (1968), Levi (1949) and Wasserstrom (1961) in the United States, Jensen (1957) in Natal, and Stone (1947) in Australia.

specify methods for developing practical skills in analyzing, evaluating and writing legal texts.

3. Approaches in research of legal argumentation

In the past 30 years three more or less consistent approaches to legal argumentation can be distinguished: the *logical*, the *rhetorical* and the *dialogical* approach.[3]

3.1. The logical approach

The approach with the longest tradition in the study of legal argumentation is the logical approach. In a logical approach the role of formal validity is emphasized as a criterion of rationality for legal argumentation, and logical languages are used for reconstructing legal arguments.

From a logical perspective, it is a necessary condition of the acceptability of a legal justification that the argument underlying the justification be reconstructable as a logically valid argument (another condition is that the reasons brought forward as a justification are acceptable according to legal standards). Only if an argument is logically valid, does the decision (the conclusion) follow from the legal rule and the facts (the premises).

The requirement of logical validity as a standard of soundness of legal argumentation is, in the view of some authors, related to the requirement that a legal decision should be based on a general rule. This requirement is also called the 'principle of generalizability' or the 'principle of universalizability'. When someone claims that a legal decision is based on a general rule, he or she claims that the same solution should be chosen in similar cases.

Different authors taking the logical approach have different opinions as to whether an analysis of legal arguments requires a deontic logic. Following Klug (1951), some authors argue that normative concepts such as 'obliged' and 'prohibited' can be defined by means of normative predicates, and without the need to postulate a special class of operators, such as 'it is obliging that' and 'it is permissible that', and accordingly, that legal arguments can be reconstructed adequately in terms of a predicate logic.[4]

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[3] For a more extensive overview of these approaches see Feteris (1999). For a recent overview of approaches of the analysis of legal argumentation see the special issue of *Informal Logic* on 'Models for the analysis of legal argumentation', Vol. 28, No. 1 (2008).

[4] See, for instance, Tammelo et al. (1981), MacCormick (1992, pp. 195–199), Rödig (1971), Yoshino (1981).

Others are of the opinion that a deontic logic, in which normative concepts are analyzed as separate logical constants, is more suitable for analyzing legal arguments.[5] A deontic logic forms a further elaboration of propositional logic and predicate logic, and thus can be used not only for the same types of arguments, but also for other types that these more elementary systems are not capable of formulating.[6] Recently, various authors working in the field of artificial intelligence and law offer a different kind of elaboration of standard logic for the analysis of legal reasoning. Hage et al. give a logic for reasoning with legal rules; in such a *reason based logic*, arguments for and against a legal standpoint can be weighed with greater sure-footedness than is possible in standard logic.[7] In another development, Prakken develops a logical system for a dialogical analysis of legal argument. Because existing logical systems reconstruct only monologues, Prakken develops logical systems in which it is possible to compare arguments for and against conflicting conclusions put forward in the context of a dialogue.[8]

3.2. The rhetorical approach

As a reaction to the logical approach and the emphasis it places on formal aspects of legal argumentation, the rhetorical approach emphasizes the content of arguments and the context-dependent aspects of acceptability. In this approach, the acceptability of argumentation is dependent on the effectiveness of the argumentation for the audience to which it is addressed. The audience might consist of individuals, such as a magistrate in Traffic Court, or collections of persons, such as the jury in a criminal trial, the lawyers which form the audience of a legal journal, or the American legal community as a whole.

Prominent representatives of the rhetorical approach are Perelman's 'new rhetoric', Toulmin's argumentation model, and Viehweg's topical approach. All three authors have written especially about legal argument, and their ideas have been further developed by others.

In *Logique Juridique. Nouvelle Rhétorique* (1976) Perelman describes the starting points and argumentative techniques used in law to convince an audience of the acceptability of a legal decision. He describes how judges

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[5] See, for instance, Alexy (1980b, pp. 198–199), Kalinowski (1972), Koch (1980), Soeteman (1989), Weinberger (1970).

[6] For a more extensive treatment of the arguments for and against a deontic logic with respect to legal argumentation see, for instance, Rödig (1971), Soeteman (1989).

[7] See Hage et al. (1992, 1994).

[8] See Prakken (1993, 2008).

use certain generally accepted starting points in justifying their decisions. Examples of such starting points are legal principles such as those of fairness, equity, good faith, freedom, etcetera. Argumentation schemes, such as analogy and *e contrario*, enable a judge to win the assent of others.

In *The Uses of Argument* (1958) Toulmin employs examples drawn from the legal process to establish that argument-adequacy is not determined by formal logical validity. He shows that argument is field-dependent. An argument consists of a claim defended by means of data, a warrant and a backing. The acceptability of the content of the argument, however, depends on its subject matter and on the audience to which it is addressed. In *An Introduction to Reasoning* (1984) Toulmin together with Rieke and Janik gives a further elaboration of this model for the analysis of arguments in various contexts. In a chapter on legal argumentation, they adapt the procedure specifically to the analysis of legal argument.[9]

In a *topical* approach to legal argument, Aristotle's Topics is the starting point of theories for finding relevant arguments. In a legal context, arguments must be found which are based on general viewpoints (*topoi*) which can convince a legal audience. Examples of such legal *topoi* are general legal principles, such as those of fairness, of equity, etc. A prominent representative of a topical approach is the German legal theorist Viehweg (1954).[10] Using *topoi*, arguments can be found and formulated which can be used for justifying a legal decision.[11]

3.3. The dialogical approach

In the dialogical approach legal argumentation is considered from the perspective of a discussion procedure in which a legal position is defended according to certain rules for rational discussion. In this approach the rationality of the argument depends on whether the procedure meets certain formal and material standards of acceptability. Prominent representatives of a dialogical approach in legal theory are Aarnio, Alexy, MacCormick and Peczenik.[12] As with Habermas, they take legal argumentation to be a form of

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[9] Recently: D.L. Hitchcock & B. Verheij, eds., (2006), *Arguing on the Toulmin Model. New Essays in Argument Analysis and Evaluation*, Argumentation Library, Vol. 10. Springer, Dordrecht.

[10] For a critique with respect to Viehweg's theory, see Alexy (1989, pp. 20–24).

[11] Other authors working in a topical-rhetorical tradition which is based on Viehweg's ideas are Ballweg (1982), Esser (1979), Horn (1967), Schreckenberger (1978), and Struck (1977).

[12] For a description of a combination of the insights of these authors, see Aarnio, Alexy, and Peczenik (1981), in which they give an outline of a theory of legal argumentation and legal discussions.

rational communication for reaching rational consensus by means of discussion. Prominent representatives of a dialogical approach in argumentation theory are van Eemeren and Grootendorst, Feteris, Jansen, Kloosterhuis and Plug. The authors that work in a pragma-dialectical tradition consider legal argumentation as part of a rational critical discsussion.

In this section we will discuss the way in which legal theorists such as Aarnio, Alexy and MacCormick have answered the central questions in these theories of legal argumentation. Central questions in these theories are: how must a rational reconstruction of legal argumentation be performed; how must legal interpretations be justified; which procedural norms of rationality must be applied in legal discussions; and which specific legal and material standards of soundness must be applied? In the following section, 4, we will go deeper into the way in which legal argumentation is analyzed and evaluated in the pragma-dialectical theory of legal argumentation.

With respect to the analysis and evaluation of arguments, the legal theorists Aarnio, Alexy, MacCormcik and Peczenik draw a distinction between *formal*, *material*, and *procedural* aspects of justification. As they concern the *product* of an argument two levels distinguished, in sets of formal and material aspects, in the reconstruction of the justification of legal decisions. On the level of the *internal justification*, the *formal* aspects are deployed: the argument should be reconstructed as a logically valid argument consisting of the legal rule and the facts as premises, and the decision as conclusion. On the level of the *external justification*, the *material* aspects are central: can the facts and the legal rule or norm used in the internal justification be considered acceptable?

In a dialogical approach, discussions are also required to accord with certain *procedural* criteria of rationality. For a legal decision to be acceptable, it is important that the participants observe certain rules. The basic principles of such systems (e.g. that of Alexy) are the principles of consistency, efficiency, testability, coherence, generalizability, and sincerity. Aarnio (1987) and Peczenik (1983, 1989) depart from these rules and make several additions.

In the *analysis* of legal argumentation, Aarnio, Alexy, MacCormick and Peczenik distinguish between the reconstruction of clear cases and hard cases. In clear cases, in which there is no difference of opinion about the facts, a single argument can be used to defend the decision. MacCormick calls this single argument for easy cases a *deductive justification*, and Aarnio calls it an *internal justification*.

In hard cases, in which the facts or rule are disputed, a further justification by means of a chain of arguments is required. MacCormick calls

such a chain of arguments in which the interpretation of the legal rule is defended a *second-order justification*. Alexy calls the whole chain of arguments the *internal justification*, and uses the term *external justification* for the argument defending the content of the premises. According to Alexy, the internal justification is concerned with the formal reconstruction of the premises of the complete justification.

How many subordinate arguments are required for a successful justification depends on the number of steps required to reach a point in the discussion at which there is no longer a difference of opinion. In Alexy's opinion, the number of single arguments required is that needed to reach a point where there is agreement as to whether the legal rule can be applied to the concrete case. In Aarnio's opinion, the number that is needed to take away the addressee's doubt. In MacCormick's opinion, a consequentialist argument must always be combined with an argument of coherence and consistency. In Peczenik's opinion, in a reconstruction of a legal justification all transformations that are carried out must be made explicit. The justification consists of a combination of various forms of justification in which the various transformations are clarified.

To make the chain of subordinate arguments complete, at various places in the reconstruction *missing premises* must be supplemented. Most authors do not specify how these premises must be made explicit. Alexy only says that the legal decision must follow logically from at least one universal norm together with other premises, but he does not specify how the hidden assumption must be made explicit. From the description of Alexy and MacCormick it can be deduced that if the universal rule is missing, this rule must be made explicit. In Aarnio's opinion, in the externa justification those elements required to make complete the syllogisms in which the premises of the internal justification are defended, must be reconstructed. A complete syllogism must be reconstructed for each step in the chain of arguments. According to Aarnio, all implicit elements of incomplete syllogisms must be made explicit. Often, only the conclusion is mentioned, and both premises must be added. In Peczenik's opinion, implicit elements must be supplemented on the various levels of a legal justification.

With regard to the evaluation of the argumentation, Aarnio, Alexy, MacCormick and Peczenik make a distinction between the formal, material and procedural aspects of justification. With respect to the formal aspects, the authors think that argumentation must be reconstructed as a chain of logically valid arguments. Most authors relate the requirement of logical validity to the moral requirement of universalizability: similar cases must

be treated in a similar way. The legitimacy of a legal decision is dependent on the question whether the decision is based on a universal rule which also applies to similar cases.

The authors differ with respect to the question of which logical system is most suitable for reconstructing legal argumentation. Alexy and MacCormick are of the opinion that legal arguments in which normative claims are defended can best be reconstructed by using a predicate logic with deontic operators. Following Wróblewski, Aarnio uses syllogistic logic for analyzing legal arguments.

For the evaluation of the material aspects of legal argumentation, the authors propose several kinds of procedures. First, there are those for checking whether a premise is considered to belong to commonly shared legal starting points. To decide whether an argument is acceptable according to legal standards, the first check is whether the argument is a valid rule of law. The rules of valid law are considered to be a specific form of shared legal starting points.

To check whether an argument is a rule of valid law, and thus a shared starting point, a testing procedure must be carried out which establishes whether a certain rule can be derived from an accepted legal source. Legal sources such as statutes, legal decisions, legal dogmatics and legislative preparatory material are considered to be specific kinds of sources which may be used for the evaluation of legal argumentation. Following Hart, MacCormick argues that rules of valid law must be identified on the basis of a 'rule of recognition' by means of which it can be established whether a legal source is a valid source of law. According to Peczenik, rules of valid law must be identified by means of a source transformation which establishes whether a legal source is a valid source of law.

A premise cannot always directly be derived from a source of law: often an interpretation is required. Various interpretation methods are applied to decide whether a certain interpretation is legally acceptable. Legal interpretation methods are the semantic, historic, systematic, and teleological interpretation method by means of which a precise interpretation can be given of a legal rule. Other methods are arguments from analogy, the argumentum a contrario, and the argumentum a fortiori.

Alexy takes the interpretation methods to be argumentation schemes which may be used for the justification of a certain interpretation. However, he does not specify how an argument in a concrete case should be reconstructed as a certain argumentation scheme. Also, he does not specify when an argument which is reconstructed according to a particular argumentation scheme is acceptable or not. In practice, it can be hard to decide what kind

of argumentation scheme a certain argument must be reconstructed as, and which critical questions are relevant to the evaluation.

With respect to the evaluation of the procedural aspects of the argumentation, it must be determined whether the discussion has been conducted in a rational way. According to Aarnio, Alexy and Peczenik, it must be established whether the discussion has been conducted according to a system of rules for rational discussion. The basis principles of such a rule system are the principles of consistency, efficiency, testability, coherence, generalizability, and sincerity. These principles are formulated by Alexy and developed into a system of rules for general practical discussions, which is, in turn, elaborated for legal discussions.

The procedural rules also contain the rules for the formal and material evaluation of the justification. Rules which are specific for the discussion procedure are the rules which guarantee the right to participate in discussions, the sincerity rules, the rules concerning the burden of proof, the rules concerning the relevance of the contributions, and the rules for a common use of language. Alexy is of the opinion that not all rules apply the same way in all types of legal discussion. For example, in a legal process the discussion rules differ from the rules for a discussion between legal scholars.

Aarnio, MacCormick and Peczenik distinguish a separate component in the evaluation in which it is determined whether the result of the justification process (in Aarnio's and MacCormick's terms the interpretation, in Peczenik's temrs the legal decision) is in accordance with the norms and values of a certain legal community. In Aarnio's theory, an interpretation must be coherent with the norms and values which are shared within a certain legal community, a specific audience. In MacCormick's view, the interpretation must be coherent with certain legal principles, and must be consistent with relevant legal rules and precedents. In Peczenik's theory, the interpretation must be in accordance with all legal sources, interpretation norms, conflict norms and the *Grundnorm*.

Alexy does not distinguish a separate evaluation component for the result of t he discussion. In his opinion, the rationality of the result depends on the question whether the discussion has been conducted in accordance with the rules for rational discussions. Because the discussion rules already contain the requirement that the argumentation must be acceptable according to common starting points, it ensures that the final result is coherent with the starting points and values which are shared within the legal community.

4. The pragma-dialectical theory of legal argumentation in the context of a critical discussion

In a pragma-dialectical perspective, legal argumentation is considered part of a rational critical discussion aimed at the resolution of a dispute. The aim of this approach is to develop a model for the analysis and evaluation of legal argumentation as a specific, institutionalized form of argumentation. The pragma-dialectical approach to legal argumentation is based on the ideas of van Eemeren and Grootendorst developed in their pragma-dialectical theory of argumentation in various book and articles, among which *Argumentation, communication, and fallacies* (1992) and *A systematic theory of argumentation. The pragma-dialectical approach* (2004).

Starting from the general theory, various authors such as Feteris, Jansen, Kloosterhuis and Plug have applied the theory to the context of legal argumentation. Feteris (1990, 1999) has analyzed the legal process as a specific implementation of a critical discussion and has described how the different stages of a critical discussion are represented in a legal discussion in a legal process. Feteris, Jansen, Kloosterhuis and Plug have further developed models for the rational reconstruction of various forms of complex argumentation that are based on methods of legal interpretation and on the application of specific legal argument forms such as analogy argumentation, a contrario argumentation, teleological-evaluative argumentation and argumentation from unacceptable consequences, and arguments based on obiter dicta.

4.1. The general theory of argumentation as part of a critical discussion

The pragma-dialectical theory of argumentation is based on an approach that combines a pragmatic and a dialectical perspective on argumentation. The pragmatic perspective regards argumentation as a goal-oriented form of language and analyses the discussion-moves in a critical discussion as speech acts which have a certain function in the resolution of the dispute. The dialectical perspective implies that argumentation is considered to be part of a critical exchange of discussion moves aimed at subjecting the point of view under discussion to a critical test. A resolution in a critical discussion of this nature means that a decision is reached as to whether the protagonist has defended successfully his point of view on the basis of shared rules and starting points against the critical reactions of the antagonist, or whether the antagonist has attacked it successfully.

The core of the pragma-dialectical theory consists of an ideal model for critical discussions and a code of conduct for rational discussants. The ideal model specifies the stages which must be passed through to facilitate the resolution of a dispute, and the various speech acts which contribute to the process.

The code of conduct for rational discussants specifies rules for the resolution of disputes in accordance with the ideal model. These rules acknowledge the right to put forward and cast doubt on a standpoint, the right and the obligation to defend a standpoint by means of argumentation, the right to maintain a standpoint which is successfully defended in accordance with shared starting points and evaluation methods, and the obligation to accept a standpoint which is defended in this way.

The model for critical discussion provides a theoretical instrument for the analysis and evaluation of argumentative discourse that specifies the elements which play a role in the resolution of a difference of opinion. The model forms a heuristic tool in finding the elements which serve a function in the resolution process and thus identifies the elements relevant for the resolution of a dispute. The model also forms a critical tool for determining whether the discussion has been conducive to the resolution of the dispute and for identifying the factors in the discussion process which offer a positive and a negative contribution. Thanks to these characteristics, the pragma-dialectical theory provides a suitable theoretical instrument for the analysis and evaluation of argumentation.

To establish whether the argumentation put forward in defence of a standpoint is sound, an analysis must first be made of the elements which are important to the evaluation of the argumentation. In the evaluation based on this analysis, an answer must be found to the question whether the arguments can withstand rational critique. In an analytical overview (that can be compared to a rational reconstruction) an analysis of the argumentation is made in which the elements which are relevant for a rational evaluation are represented.

In the analysis and evaluation of argumentative discourse the following points that are crucial for the resolution of the difference of opinion need to be addressed:

(1) the standpoints at issue in the difference of opinion and the positions adopted by the parties
(2) the arguments adduced by the parties
(3) the argumentation structure of the arguments
(4) the argumentation schemes used in the argumentation
(5) observation of the rules for critical discussion

In the analysis it is established what the points at issue in the discourse are and which positions are adopted with respect to these issues; which arguments are adduced explicitly, implicitly or indirectly; which relations exist between the arguments advanced in favour of a standpoint; which argumentation schemes (symptomatic argumentation, analogical argumentation, causal argumentation) are underlying the argumentation.

In the evaluation of the content of the argumentation it is established whether the different parts of the argumentation are successfully defended against the relevant points of critique. It is first established whether the argumentation schemes have been correctly chosen and applied. For each argumentation scheme, there is a set of critical questions which must be answered satisfactorily for the argumentation to be acceptable. In the evaluation of the procedure of the discussion it is established to what extent all rules for critical discussion have been observed. This amounts to checking whether one or more participants have committed a fallacy, which is considered as a violation of a discussion rule, and to what extent the resolution of the dispute has been hindered by this violation.

In order to establish how people in actual argumentative practice try to persuade others of the acceptability of their standpoint, a dialectical analysis of the discourse must be combined with a rhetorical analysis. Arguers not only try to achieve the dialectical goal of resolving a difference of opinion in a reasonable way, they also try to achieve the rhetorical goal of winning adherence from the intended audience. The way in which arguers try to reconcile these goals Van Eemeren and Houtlosser (2002) consider as strategic manoeuvring which implies that arguers try to adept the choice from the topical potential of argumentation schemes and starting points that are acceptable from a dialectical perspective to their rhetorical ends of convincing the audience.

The technique of strategic manoeuvring as described by van Eemeren and Houtlosser amounts to an attempt to reconcile the dialectical goal of defending a standpoint in light of the relevant forms of critique on the basis of argumentation schemes and starting points that belong to the common commitments, with the rhetorical goal of winning the adherence from the audience. As long as the choice made to win the adherence of the audience is in keeping with the dialectical requirements the strategic manoeuvring can be considered as a constructive contribution to a critical discussion. However, if the arguer chooses to let the rhetorical aims of gaining the adherence by the audience have preference over the dialectical aims, the strategic manoeuvring derails and constitutes a violation of the rules of critical discussion.

4.2. Legal argumentation as part of a critical discussion

In the legal part of the pragma-dialectical theory, the aim is to develop an application of the pragma-dialectical theory for the analysis and evaluation of argumentation in a legal context. In a pragma-dialectical approach, legal argumentation is considered as a specific institutionalized form of argumentation, and legal discussions are considered as specific, institutionalized forms of argumentative discussion. In this conception, legal argumentation is considered as part of a critical discussion aimed at the resolution of a dispute. The behavior of the parties and the judge is viewed as an attempt to resolve a difference of opinion. In a legal process (for example a civil process and a criminal process) between two parties and a judge the argumentation is part of an explicit or implicit discussion. The parties react to or anticipate certain forms of critical doubt. A characteristic specific to a legal process is that in addition to the discussion between the parties, there is an (implicit) discussion between the parties and the judge, which is aimed at checking whether the protagonist's claim can be defended against the critical reactions that the judge puts forward in his official capacity as an institutional antagonist. The judge must check whether the claim is acceptable in the light of the critical reactions of the other party ànd whether it is acceptable in the light of certain legal starting points and evaluation rules which must be taken into account when evaluating arguments in a legal process. These institutional critical questions which the judge must apply in the evaluation, can be considered as institutional forms of doubt put forward by the judge in his official capacity. In the defense of their standpoints, the parties anticipate these possible critical questions of the party and the judge.

When the decision is presented by the judge, it is submitted to a critical test by the audience to whom it is addressed. This multiple audience consists of the parties, higher judges, other lawyers, and the legal community as a whole. Therefore, the judge must present arguments in support of his decision in order to justify it. He must specify the facts, the legal rule(s) and further considerations (such as interpretation methods, priority rules, legal principles, etc.) underlying his decision. From a pragma-dialectical perspective, the justification forms part of the discussion between the judge and possible antagonists (the party who may want to appeal the decision and the judge in appeal). In his justification the judge anticipates various forms of critical reactions which may be put forward by these antagonists.

The resolution process in a legal process can be regarded as a critical discussion in which the five stages which have to be passed through in a pragma-dialectical critical discussion, are represented. The first stage of a legal process in which the parties advance their points of view can be

considered as the confrontation stage. Here the judge remains passive. The second stage, the opening stage, in which the participants reach agreement on shared starting points and discussion rules, is largely implicit in a legal process. This stage is represented by the institutionalized system of discussion rules that are laid down in codes of procedure and starting points that consist of material legal rules, legal principles, propositions of legal dogmatics, etc. In the third stage, the argumentation stage, the parties defend their standpoints in accordance with the rules of procedure and provide proof if asked to do so. In this stage the judge (or jury) evaluates the quality of the argumentation and the proof. In the final stage of the process, the concluding stage, the judge has to decide whether the claim has been successfully defended against the critical counter arguments. If the facts can be considered as proven and if the judge decides that there is a legal rule which connects them to the claim, he will grant the claim. If the facts cannot be considered as established according to legal standards of proof, or if there is not a legal rule applicable, the judge will reject the claim.

In a legal process, the way in which the stages of a pragma-dialectical critical discussion are represented and the way in which the discussion is conducted can be regarded as a process of dispute resolution by means of critically testing a standpoint in the light of certain forms of critical doubt. However, there are some crucial differences which require attention. In a critical discussion the parties jointly ensure that the discussion rules are being observed and they jointly decide on the result of the evaluation and the outcome of the discussion. In a legal process, for reasons of impartiality, it is the task of the judge to ensure that the rules of procedure are observed. It is also the task of the judge to evaluate the argumentation and to render a decision on the final outcome. So, in a legal process the judge does alone what the parties to a critical discussion do jointly. Because of specific legal goals, such as legal certainty, legal security and equity, there are some procedures in law which differ in certain respects from the rules and procedures of a critical discussion. These rules and procedures must guarantee that the conflict can be resolved by a neutral third party within a certain time limit.

4.3. The analysis and evaluation of legal argumentation in the context of a critical discussion

The first step in the analysis of the argumentation involves establishing the nature and content of the difference of opinion and the standpoints adopted by the participants. Compared with a dispute in the standard form of a critical discussion, the difference of opinion in a legal process is more complex because it always consists of various disputes: one between the

participants and one between the party who initiates the proceedings and the judge. From a pragma-dialectical perspective, the participants adopt various positions with respect to the claim put forward by the party who initiates the proceedings. The judge is obliged to adopt a neutral standpoint with respect to the statements of the parties and thus, in pragma-dialectical terms, adopts a neutral standpoint.

The second step in the analysis must determine the arguments put forward in reaction to various forms of critical doubt and the relations between these arguments. In a legal context, the argumentation put forward as a justification of a legal decision may consist of different levels, depending on the forms of critique the judge must react to.

On the first level, the justification implies that the decision (1) is defended by showing that the facts (1.1) can be considered as a concrete implementation of the conditions which are required for applying the legal rule (1.1′). The argument can be schematically presented as follows:

1
legal decision
↑
1.1 & 1.1′
facts legal rule

In clear cases, such a single argumentation may suffice as a justification of the decision. Often, the argumentation is more complex because one of the elements of the main argumentation of the first level must be supported by further argumentation. The supporting may consist of proof for the facts (1.1) or a justification of the applicability of the legal rule (1.1′). In pragma-dialectical terms, a second-order justification supporting the classification of the facts or the interpretation of a legal rule can be considered as complex subordinate argumentation.

To justify the interpretation of a legal rule, the complex subordinate argumentation in support of the decision can be reconstructed as follows:

1
final decision
↑
1.1 & 1.1
qualification interpretation decision
of the facts
↑
1.1′1
argumentation using an interpretation method

In the second-order justification the interpretation decision about the legal rule (1.1) is justified by second-order argumentation consisting of a justification in which the judge uses one or more interpretation methods. This argumentation may be more or less complex, depending on the choices a judge makes and on the argumentative steps that are required to make the justification complete. The judge may, for example choose to weigh certain interpretations on the basis of the consequences of the different solutions, which implies that the argumentation must be reconstructed as complex argumentation consisting of different horizontally linked lines of argumentation: the two interpretations, the weighing rule, as well as subordinate argumentation supporting the different lines of argument (see Feteris 2008b for a discussion of this complex form of argumentation).

For different forms of argumentation used in the second-order argumentation authors have described which argumentative steps are required for a sufficient justification. Feteris (2005, 2008a) develops a model for the rational reconstruction of teleological argumentation, teleological-evaluative argumentation and consequentialist argumentation and describes the interaction between the various elements of the justification, Jansen (2003a, 2003b, 2005) develops a model for different forms of a contrario argumentation and reductio ad absurdum, Kloosterhuis (2005, 2006) develops a model for different forms of analogy argumentation and reductio ad absurdum, and Plug (1994, 2000a, 200b, 20005) develops a model for various forms of complex argumentation, among which argumentation on the basis of obiter dicta.

The last step concerns the evaluation of the argumentation. Regarding the evaluation of the content of the argumentation, in pragma-dialectical terms it is established whether the argumentation schemes used in the argumentation have been correctly chosen and applied. For various implementations of the basic forms of argumentation schemes (symptomatic, analogy and causal argumentation) in a legal context such as analogy argumentation, teleological argumentation, consequentialist argumentation, etc. which are used for justifying the interpretation of a legal rule it must be established whether this form of argumentation is correctly chosen (for example in Dutch criminal law analogical interpretation of statutory rules is not allowed) and whether the form of argumentation is applied correctly (for example whether an analogy relates to relevant similarities). Feteris, Jansen, and Kloosterhuis have developed criteria for the evaluation of different forms of legal argumentation such as analogy argumentation, teleological argumentation, consequentialist argumentation.

4.4. Strategic manoeuvring in legal argumentation

In the presentation of the justification of their decision, judges often try to present their decision as an self-evident result of the application of the law to the facts of the case. However, this application is often less self-evident than it is presented. In their justification judges often make use of what is in pragma-dialectical terms called strategic manoeuvring by trying to reconcile dialectical and rhetorical goals. The way in which judges present their justification can be analyzed and evaluated from the perspective of the strategic manoeuvring in a critical discussion. The advantage of such an analysis is that it can be clarified how judges make an expedient choice from the options that constitute the starting points of a legal discussion in a particular context, how they to exploit certain presentational devices, and to what extent their justification can still be considered a constructive contribution to a rational discussion or whether the contribution 'derails' and must be considered as a fallacy.

Feteris (2008c) describes for the legal context how such strategic manoeuvring can be analyzed and evaluated. A form of strategic manoeuvring often used in a legal context consist of the weighing of a literal interpretation of a legal rule with an interpretation that is based on teleological-evaluative considerations. From the perspective of legal certainty it is important that the judge applies the law as it is formulated by the legislator. This implies that, when he wants to depart from the literal application of a legal rule, it is important that the judge shows that his interpretation is still in line with the intention of the legislator. For different forms of legal justification Feteris and Kloosterhuis explain what it implies that judges try to reconcile dialectical and rhetorical goals and which techniques of strategic manoeuvring are used in the choice of argumentation schemes, starting points and presentational devices. They show when judges remain within the limits of a rational discussion and when the attempt to manoeuvre strategically constitute a move that cannot be considered as a constructive contribution to a resolution of the dispute and must, for that reason, be considered as a fallacious move.

5. Conclusion

In this contribution we have discussed the central questions and approaches in the study of legal argumentation. We have described the contributions by scholars working within different disciplines and we have discussed their ideas with respect to the analysis and evaluation of legal argumen-

tation. We have concluded the discussion with a description of the analysis and evaluation of legal argumentation from a pragma-dialectical perspective. We have shown how rhetorical and dialectical aspects are integrated in a systematic theory for the analysis and evaluation of legal argumentation from the perspective of a rational critical discussion.

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BIOMEDICAL INVESTIGATIONS IN THE CONTEXT OF INTERDISCIPLINARY STRATEGIES: MORAL AND LEGAL ARGUMENTS

Abstract: The aims of this paper are: to show the dynamics of moral and legal arguments in the modern bioethics, to analyse retrospectively the main phases of the development of bioethics as a science, to find the developmental mechanisms of organizational and educational strategies of bioethical thinking and of the National Bioethical Committee in the Republic of Belarus. The paper also focuses also on particular aspects of cooperation between Ethics Committees (ECs) and patients in biomedical research.

Keywords: bioethics, legal arguments, evaluation of science, Chernobyl tragedy, cooperation between EC and patients.

1. Introduction

The introduction of new medical technologies (methods of artificial impregnation, surrogate motherhood, prenatal diagnostics) into practice, the actualization of problems of transplantation, euthanasia, biomedical experiments involving human beings and animals, the necessity of moral, ethic and legal regulation of collisions arising in the process of biomedical investigations served as specific social demands for the formation of bioethics as an interdisciplinary area of scientific research.

The interdisciplinary strategies represent the organization method of research activities provided for the interaction in studying one and the same class of objects and systems by the representatives of different scientific disciplines.

Moreover, the modern scientific knowledge forms the transdisciplinary strategies thus ensuring an innovation system of the scientific knowledge organization. The system isn't limited with the interdisciplinary ties only, but it comes to the necessity of involving the social values and standards in the humanitarian examination of the modern scientific projects and their correlation both with the interscientifical ideals, standards and values and with the social and humanistic priorities and requirements.

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The evaluation of science and technique becomes a variety of social and organizational development of the system and a dialogue of science, technique, policy, ethics and civil society. It becomes impossible to supervise the rapidly rising changes in the ambient environment caused by the unregulated scientific, technical and industrial development.

A new understanding of scientific rationality appears that goes beyond the scope of disciplinary rationality and includes the political, social, humanitarian, philosophical aspects and the system of values as well as the ethical attitude to science and technique since the power and knowledge causes a specific responsibility – the responsibility of a competent and ruling person. Being a specific social institution, the modern science generates the standards of moral regulation and proves not a humanistic vector of its modern development only, but orientates other phenomena also on high ideals of cooperation, co-creativity, intransigence, synthesis of truth and morality, dialogue of natural, technical and humanitarian knowledge. A specific role here plays such an interdisciplinary science as bioethics (Yaskievich 2008).

2. Bioethics as an interdisciplinary science: its brief history, status and role

Bioethics as an interdisciplinary scientific trend becomes outlined in the context of common stylistics typical for the post-nonclassical science of the last third of the XX century as a whole when it becomes enriched with such unusual for classical science ideals and arguments as well-being of a man and mankind, good and morals, duty and responsibility for the results achieved in the process of scientific investigation of human objects.

The thirty years period of existence of this interdisciplinary trend combining biological knowledge and human values and representing a "systematic investigation of human's behavior in the field of sciences of life and health care so far as the behavior is considered in the context of moral values and principles" (*Encyclopedia of Bioethics* 1995, p. 102) was connected with the dynamics of bioethical problems ranging from the empirical arguments and descriptions of doctor's moral to the philosophical introspection of morals in the area of biomedical study. Starting from the second half of the 80-th, quite a powerful layer of philosophical knowledge transforming the conceptual foundations of a traditional model of the Western type of bioethics was formed alongside with the development of biomedical technologies. The problems of personal rights and liberties typical for bioethics were actualized in a new way; a wider understanding of the term

"freedom" was formed including the recognition of personal autonomy. In the framework of contemporary interpretation of personal autonomy it is regarded as the basic ethic value manifested as a patient's free choice of either medically possible or medically human. More profound ethics of dialogue combined with the principle of informed consent replaces the ethics of paternalism that dominated in traditional model of bioethics. Instead of priority absolutization of both the doctor or biologist (experimenter) and the patient (or probationer), the modern model of bioethics prefers the argument structures aimed at coordination in grounding the rights and duties of the sides, the active attraction of patients to make decisions in choosing the treatment methods especially in case of risk for the person's life.

As far as our knowledge of living matter becomes more extensive, the main philosophical accent in considering the category of freedom is shifted from the *consumer's freedom* ("freedom from") to the *creative freedom* ("freedom for"). At the same time, the "freedom from" is interpreted as the present-day person ability to overcome natural forms of dependency on the outer world and to satisfy his growing demands (prolongation of active life period including even life maintenance at a vegetable state, treating the illnesses that were incurable before, freedom in changing the appearance and/or gender, personal choice to have or not to have children even without a man, etc.). The modern level of biochemical investigation makes it possible for a person to achieve certain level of argumentation ("freedom from"), but getting separated from the nature and towering above the world the person sometimes becomes more and more dependant on the modern technique and only the natural unity of a person and the Space, self creation and moral self improvement makes a person closer to creative freedom of argumentation ("freedom for himself"). The value status of freedom in the development process of our knowledge of the alive nature, in performing biomedical investigations dealing with the unique isolated objects (human genome, social and natural systems) supposes the necessity of self-restriction from the side of researchers and the formation of argumentational concept of collective responsibility for the scientific study results as well as for the mankind unity. The concept of responsibility turns from an individual argumentation into a rank of collective responsibility argumentation for prejudice caused to people and nature.

Within the frames of bioethical argumentative discourse where morals appears traditionally in its highest sense due to its affect on inter-personal relations (doctor – patient, investigator – probationer) at boundary situations (on the verge of life and death, health and illness), the categories of justice, duty and humanism are philosophically revised. It becomes clear,

that a humanistic paradigm in bioethics can be implemented not only in case of observance of moral arguments and principles but in case of strict adherence to legal arguments and standards too. The concept of justice supposes the presence of social component and corresponding equal access to common wealth and availability of pharmacological means required for health maintenance.

The traditional bioethical arguments and categories of duty and welfare that were expressed in the Hippocrates' formula "don't make harm" (i.e. use only the medicines that make no harm to patient) were extended in the modern bioethics by transforming the above formula into "not only make no harm, but make good" although the interpretation of good deed concept is not monosemantic especially in discussing the problems of life maintenance at a vegetable level, cloning of living creatures and even a human being, etc.

The above paradigm appears in the Western model of bioethics as an institutionally organized social technology with the system of standard liberal values providing the observance of personal rights and freedoms in the biomedical area. The protection of civil rights against the negative consequences of modern biomedical technique usage (the main target of bioethics) is implemented by using ethical and legal arguments, developed ethical codes, laws and by increasing the area of responsibility of doctors and biologists as well as by extending their social duties fixed not only at personal but at legal level too. The ethical control mechanisms of doctors and scientists activities are added with the developed system of legal supervision, foundation of special bioethical committees, and formation of bioethical education (Sheets, ed., 1986).

The post soviet area including the Republic of Belarus is characteristic for its own ("domestic") model of bioethics which considers bioethics as an interdisciplinary and biologically oriented area of modern knowledge analyzing the moral problems of human being existence and his attitude to life and to certain living organisms. The development of mainly moral arguments and principles regulating practical activities of people in the study of nature and human being, the moral criteria of social activity aimed at the environment transformation, the evaluation of role and place of a person within the frames of biological reality, theoretical grounds of co-evolution concept of nature and society, the category status of life and death – such is the range of the domestic model of bioethics based on the extended interpretation of its problem area and subject. It is evident that at present we can't develop bioethics in the way accepted in the West with its developed system of legal regulation due to the insufficient propagation of scientific knowledge both among the medical professionals and the population, poor

juridical education of people and insufficient availability of equipment for biomedical study.

The priority trend of bioethics is the development of ethical and legal arguments and the analysis of ethical standards of health care taking into consideration the social essence and the main principles of organization and functioning of a human being as a bioethical system. The human being health steps forward as the leading indicator of a complex co-evolutional development of the nature-human being systems. Here we can speak of the coincidence of goals of bioethics and ecological ethics in the context of ensuring ecological safety and health of population under the conditions of environment contamination and changed balance of "human being-Nature" system.

3. Bioethics in the light of Chernobyl tragedy

The status of bioethical arguments and criteria in the Republic of Belarus at present has a special significance due to the crisis state of balance in the system of "human being-Nature". The results of biomedical investigations show the direct and implicit threat to population health and to gene pool safety owing to complex radioactive and chemical pollution of Belarusian territory. The Chernobyl catastrophe (April, 1986) played especially negative role in this process as the greatest man-caused tragedy in the history of mankind. Namely this catastrophe caused especially great damage to the Republic of Belarus and showed that such catastrophes ignored boundaries and that the world was in the greatest ecological integrity thus reminding the topicality of V. Vernadsky's idea of the integrity both in planetary and Universe aspects.

The biomedical and the ecological health control of population residing within the contaminated areas of Belarus shows the threatening dynamics of illnesses growth among the adults and children in particular. It also indicates that the areas are contaminated not only with radionuclides, but with chemical substances too. As a whole, all this brings a long-term post-catastrophe emotional and psychological stress, feeling of mutual anxiety that arouses and lasts for a long time among the population of not only contaminated territories, but also of the whole country. Only 18 per cent of children grown up during the last years are completely normal from the medical point of view. The most spread illnesses are: cancer (thyroid cancer), respiratory diseases, stomach-and-bowel diseases, and cardiovascular diseases. Unfortunately, clinical practice shows that thyroid cancer in case of children is more aggressive than in case of adults and that children with ablation of gland

are slow in most cases in their intellectual and physical growth compared to other children of their age. At the same time, the growth of cases of such diseases as flue and cataract takes place in kindergartens and health index of pre-school children comes down.

A lack of medical and sport equipment for health recovery aggravates the problem of ill people treatment. The complex prophylactic and sanitary measures in children pre-school and polyclinic institutions, biomedical intervention for studying persons residing within the environmentally unfavorable areas must be the supreme line in this situation. It should be noted that the intervention is to be carried out with the agreement of informed adult or with permission of parents (tutors) in case of children under sixteen. The realization of supposed biomedical scientific study with the intervention into psychophysical state of people (blood sampling, echography, etc.) must have the scientific and practical validity and the assessment of potential risk and benefit. The studied persons must be guaranteed with confidentiality of the information obtained. The modern interdisciplinary environmental investigations should attract specialists of different sciences – biology, medicine, ecology, sociology, demography, ethics and philosophy. Bioethics from this point of view can significantly contribute to the evaluation of environment, dynamics and prophylaxis of population health. The continuous biomedical and ecological control for the health of population residing within the contaminated territory of Belarus and the resettlement of people into the "clean" areas gives the positive results undoubtedly.

4. The legal and educational basis of biomedical investigations: international and Belarusian experience

Like in the area of both the health care and the formation of local and national ethical committees, the Republic of Belarus follows the international legal and ethical standards first of all. They are: *Nuremberg Lawbook*, 1947; *Helsinki Accord on Human Rights* (with add-ins), 1964; ICH GCP, 1966; *Recommendations on Ethics to Committees Controlling Bioethical Researches*, WHO, 2000 and such UNESCO documents as *Declaration of Tolerance Principles*, 1995; *Universal Declaration on Human Genome and Human Rights*, 1997; *Universal Declaration on Bioethics and Human Rights*, 2005; UNESCO Instruction 1 on the *Formation of Bioethical Committees*, 2005; UNESCO Instruction 2 *Activities of Bioethical Committees: Rules, Procedures and Political Principles*, 2005.

The Republic has *National Strategy of a Steady Development* and *The Concept of Health Care Development in the Republic of Belarus*, 1995. They

form the basis for the approval of legal acts and national programs defining the specific actions and the sources for the ethical and legal control of biomedical researches. The main principles of bioethics recommended by WHO are fixed in the laws of the Republic of Belarus *On Health Care* (1999 with the further add-ins); *On Safety of Gene and Engineering Activities*, 2005; *On Transplantation of Human Organs and Tissues* and in a number of orders and instructions of the Ministry of Health Care.

Alongside with the formation of legal status of bioethics, its social and ethical arguments and grounds are developed with the use of Christian morality too. The Moscow Eparchy already has the acting Public Church Council on Medical Ethics and the same fund is planned to establish in Belarus. Christianity holds a very stiff line on some bioethical problems: cloning of a human being and his (her) organs (heart in particular), euthanasia, artificial conception and abortion which are considered as an encroachment on life of a future individual. Cloning of separate sells and living tissues of organism, gene-therapy, transplantation of separate organs, study and usage of a number of modern molecular and genetic methods of treatment is considered applicable and useful. A woman aborted pregnancy due to the direct threat to her physical and mental health is not excommunicated, but she has to read special personal repentance penitence established by the priest after confession. The Minsk Eparchy of Belarusian Exarchate has accumulated a significant experience in spreading of bioethical ideas by the Orthodox Congregation of Doctors and a house of charity has been built at the parish of All Saints in Minsk. The spiritual medico-psychological assistance to the hopeless case children is rendered at the Belarusian Children's Hospice at the oncological centre. Thus, bioethics as a social and cultural phenomenon of our society determines in many respects the cooperation and mutual enrichment of argumentation of legal and moral senses and sets the guiding line of biomedical practice and acceptance of management decisions. All this provides the required moral climate in scientific community, medical collectives and adequate moral choices for doctors, biologists, biotechnologists, their intervention into the sphere of living matter, social and legal responsibility for the results of scientific and practical activities.

When the mutual influence of ethical and scientific discourse in the science as a whole and in bioethics in particular is very limited for the "domestic" model of bioethics since its core problematic is mainly the development of moral arguments and principles regulating human behavior in sciences of life, human being, animate nature (bios), the formation of legal argumentational status of bioethics is still in progress. And though A. Puancare at the beginning of the XX century said that any juridical in-

terference into the problems of scientific investigation would be mistaken and incongruous, many scientists at the end of XX – beginning of XXI century began to appeal to scientific tribunal for adjusting the arbitrary scientific problems and elaborating the code of laws for scientific investigations. Bioethical knowledge fulfils successfully different functions in the process of its development including ideological, gnoseological, methodological, axiological ones promoting the development of system of arguments, values, goals and ideals concerning the assessment of life state and its development prospects, moral and legal standards of investigations in biomedical study and technique, modern tendencies of functioning of scientific knowledge of living systems, dialogue and mutual enrichment of scientific and humanitarian discourse, interdisciplinary synthesis as well as the improvement of ideological and ethic health of society.

This dynamics is proved to be true by the international scientific conferences (*Ecological Problems of the XX Century* of 1999, 2000, 2001; *Strategy of Steady Development and Prospects of Civilized Dynamics at the Turn of Centuries* of 1999–2003; *Biomedical Ethics: Problems and Prospects* of 2000–2005), the participants of which were scientists, lecturers, doctors, ecologists, clergymen and others. The curriculums of institutes of higher education of our country were added with such courses as *Biomedical Ethics, Ethics of Ecology, Bioethics, Concept of Modern Natural Science.*

The international seminar *National Bioethical Committee of the Republic of Belarus and Activities of Local Ethical Committees* was carried out in Minsk on June 6 to 8, 2006. The National Coordinating Centre on Biosafety has been established in 1998 at the National Academy of Sciences.

The National Belarusian Bioethical Committee was formed on April 2006. The author of this paper is its present vice-chairman. Taking into account a world-wide experience, the formation of Bioethical Committee in the Republic of Belarus was preceded with the basic organizing, scientific and educational activities in the light of national, social, cultural, historical and political traditions. Like the Danish Council on Ethics and the Czech Ethical Committee, the Belarusian National Bioethical Committee was formed at the Ministry of Health with the help of Belarusian National Committee on UNESCO affairs.

In general, Bioethical Committee is at present the most important structure for observing various legal acts accepted by UNESCO – the leading international organization in the area of bioethics. The National Belarusian Bioethical Committee is destined to provide all possible assistance for strengthening the confidence, consolidation and partner relationships between the doctors (and other medical workers) and the patients reaching

the consent by means of objective and principal discussion of situations being complex in moral and legal aspects. The Ethical Committees (ECs) examine all the questions dealing with observing general principles of humanism, morality and biomedical ethics.

5. Ethical and legal parameters of cooperation between the ECs and patients

The state policy in health care, legal, economic and ethical issues regarding biomedical investigations of human subjects, as well as patient rights and responsibilities are defined in the *Law on Healthcare of the Republic of Belarus* (1993). According to Article 31 (*Conducting Clinical and Biomedical Research Involving Human Subjects*), clinical and biomedical studies of human subjects for therapeutic purpose should be carried out in the state healthcare institutions. The studies should be scientifically justifiable and performed under a freely given written consent of a studied subject to participate in the investigation based upon the explanation of all relevant information (research goals, duration, anticipated results and possible consequences for research participant's health). Clinical and biomedical investigation of pregnant women and minors is unacceptable, with the exception of cases when the research is performed for the diagnostics and treatment aims in this particular contingent. The study of children should be necessarily based on the written consent of one of the parents. It is not permitted to carry out clinical and biomedical investigations of neglected children without parents' charge, servicemen, convicted prisoners, persons under arrest, mentally incapable persons (with mental disorders), those incompetent according to law, persons compulsorily hospitalized or receiving compulsory treatment at psychiatric hospital.

The rules of medical ethics and deontology reflecting the basic principles of biomedical activity and patient–doctor relationships are defined in the *Code of Medical Ethics* adopted at the First Congress of Belarusian Physicians (1998) and approved by the Ministry of Health of Belarus (1999). Part III *Physician-Patient Relationships of the Code* states:

— Asset 14. Physician and patient have equal rights to respect for human dignity and can protect those in accordance with the current legislation.
— Asset 15. Rude and inhumane attitude, dishonor or preferential attitude in physician's work is absolutely unacceptable.
— Asset 16. Patient-physician relationship should be based on mutual trust and mutual responsibility. Patient is an active participant in the process of treatment.

— Asset 21. All medical interventions should be performed with the patient's consent only for the exception of particular cases when the patient mental status doesn't allow making a reasonable decision due to his severe condition or in other cases defined by law.
— Asset 23. Organs and tissues for diagnostic or treatment purposes can be taken with the patient's written consent only as stated by law or with consents of patient's close relatives or legal representatives as specified in some cases by law. It is prohibited to take patient's organs and tissues for any other purpose.
— Asset 24. The physician should follow the rule of confidentiality with regard to his relationship with the patient and must not disclose patient's confidential information even after patient's death. Physician should also prevent others from disclosing confidential information.

When performing the studies of human subjects, Ethical Committees established at medical-prophylactic institutions and medical universities of Belarus complies to international guidelines defined in *Helsinki Declaration: Ethical Principles for Research Involving Human Subjects* (Helsinki, 1964); *International Ethical Guidelines for Biomedical Research Involving Human Subjects* (Geneva, 1993); *Lisbon Declaration of Human Rights* (Lisbon, 1981), et al.

To control the work of ECs, the Ministry of Health of Belarus developed Methodical Recommendations *"On the Order of Establishing and Performance of Ethics Committees" (2000).* The Recommendations cover the problems of organization and performance of EC in compliance with the WHO Project *Implementation of International Standards into the Practice of Clinical Trials in New Independent States* (Geneva – Moscow, February 1999). They define the formation mechanisms of EC and its authorities. EC must monitor the observance of *Rules of Conducting Clinical Trials of Pharmaceutical Products.* The main goal of EC is to provide protection of safety and health of all studied subjects. In order to reach this goal, EC should:

- inform investigators about all ethical and procedural problems regarding human subjects involved in the research, assist them in solving all problems associated with the research and provide its compliance with the requirements stated in regulations;
- assist researchers in planning their projects for minimizing potential harm for the subjects under study, review all project materials prior to start the research and approve only those of them that meet all requirements for the study subject protection;

- monitor the course of the approved research for providing the real protection of the study subjects.

Rights, safety and health of the study subjects are absolutely essential and should prevail over the interests of science and community. To protect the study subject interests, EC should consider all issues relating to the information presented to the subjects under study, investigator's experience, confidentiality and payment for studying subjects (if stipulated).

All issues connected with the EC composition should be considered in line with the following *basic principles*:

- EC members should be competent and reasonable enough to review ethical aspects of a clinical trial and decide about their adequacy to international ethical principles.
- When making decision, EC should take into account the opinions of the society representatives (i.e. non-medical persons).
- EC members should work on a voluntary basis, with a due respect for human personality and welcome scientific progress in the interests of all mankind.
- The number of EC members should be no less that 5, and not more that 12; they should be no younger that 21, and include both men and women.
- The term of membership should be 5 years with a possible prolongation for another 5 years if the member meets all necessary qualification requirements.
- The chairman is elected by EC members at the EC meeting; EC chairperson should have a higher medical education, possess expertise in ethical issues and knowledge of regulations for performing clinical studies; the vice-chairman and the secretary are also elected at the EC meeting.

When analyzing the risk to benefit ratio, EC should make sure that information submitted by the investigator is sufficient for the valid conclusion about the risk and the benefit for the study subjects; determine the level of the treatment risk for the patient associated with the given study in comparison to that when the patient doesn't participate in such study; to make sure that the risks for subjects in study will be minimized and the potential benefits for the studied subjects will be found.

When analyzing the recruitment procedures of the study subjects, EC should confirm that the choice made was fair and unbiased. If the subjects from the vulnerable groups are involved into the study, their participations should be adequately justified and additional guaranties for protecting their health and rights must be provided.

EC should consider the order and the amount of payments for the study subjects to make sure that there is no undue interest or pressure. EC should also analyze all information regarding the payment for studied subjects (if stipulated). Methods, amounts and order of the payment are described in details in the form of written informed consent.

EC meeting discussing ethical aspects of clinical trial should end up with a decision making. The following *decision versions* are possible:

- approval of the study;
- requirements for making changes or amendments into the submitted documents in order to obtain the approval;
- refusal.

Thus, EC as an independent body functioning within the medical and prophylactic institutions, in health care authorities and medical universities of the Republic of Belarus fulfills its main tasks and functions in the sphere of rights and health protection of the study subjects. Together with other health institutions in Belarus, EC provides the ethical and the legal basis of cooperation with patients.

6. Theoretical and methodological principles of cooperation between EC and patients

ECs perform their functions basing on the following *principles*:

- Biomedical study of human subjects should be performed in line with commonly accepted *scientific principles* and based on the cutting edge scientific data, adequate scientific results of laboratory investigations including the study of animals.
- Goals and objectives of each investigation of human subjects should be clearly defined in the research protocol (RP) submitted to EC for examination.
- Biomedical study of human subjects should be carried out only by the experienced specialists supervised by a competent physician with a sufficient clinical experience. *The responsibility for the subject in study rests always on physician*, and by no means on the subject even if it is the subject's agreement.
- Each clinical trial should be preceded by the thorough evaluation of *a probable risk and potential benefit.*
- Biomedical study of human subject must not be conducted if a possible risk prevails over the expected benefit. A physician should avoid such investigations till he is sure that a possible harm can be predicted. *The*

interests of the subjects in study should prevail over the interests of science and society.

- Measures should be taken for safeguarding the respect of the *study subject personality* and for reducing the adverse effects on his expected benefit physical and mental abilities.
- *When publishing the results of the study, the physician should check them for accuracy.* The papers based on the experiments carried out without the observance of principles of the Declaration must not be accepted for publication.
- Each potential participant of a study should be adequately informed about the research goals, methods, expected results and potential risks or dangers, as well as about the possible discomfort associated with the research. *The study subjects should be duly informed about their rights to refuse participation in the study and to exit it at any moment.* The physician should obtain the written free informed consent of a subject for his participation in the experiment.
- In case of the study subject inability, the informed consent should be obtained *from his legal representatives according to the national legislation.*
- RP should always contain statements related the ethical aspects proving the observance of the Declaration principles.

When performing a purely scientific medical investigation of a human subject, EC should make sure that the physician provides due protection of life and health of the subject under study. Mainly the healthy volunteers should be involved into the study or when the patients are studied, their diseases should have no relation to the investigation. The investigator should suspend the research if he sees that its continuation can be harmful for the studied subject.

The cooperation between EC and patients is based on the ethics of patient–doctor relationship. R. Veatch, an American specialist in medical ethics, mentions 4 types of the relationship models:

1. *The engineering model.* According to this model, health care professionals behave as applied scientists. It means that the scientist should be "unbiased", based on facts only and stay value-neutral. This model turns a physician into a plumber who clears blocked pipe systems and connects them without setting himself on any moral issues.

2. *The sacral model.* Another extreme, when a physician turns into a priest giving more for patient's soul than for his body. The main moral principle representing this tradition is: "make no harm when treating a patient".

3. *The collegial model* suggests that a physician and a patient should be colleagues pursuing a common goal – to treat the disease and to protect the patient's health. A mutual trust is absolutely required for this model.

4. *The contractual model* is based on contract or agreement. It does not mean signing a judicial document. This model of the relationship between the patient and the medical professional attempts to capture the desirable features of the above models. It implies a true sharing and each party has its own role in the process of decision-making. The relations based on a contract or informed consent ultimately allow patients to make final decisions. They give the priority to the person autonomy as well as to his needs and values. When searching for the most optimal type of relations between the medical professionals and the patients (to overcome problems arising in the course of treatment and to give hope and assurance to the patient in a beneficial outcome for his health), the former developed two main models of relationship – *the paternalistic model and the autonomous one.*

Historically, the paternalistic (form lat. 'pater' – the father) model of the patient-physician relationship implies that the physician (due to the constrained patient autonomy) is responsible not only for his actions, but also for the decision, which he made. The extreme forms of paternalism deprived a patient of his rights for choosing a physician or for participating in the decision making on the treatment strategy and methods. The model does not take into account the individual character of the patient, his activity and free will. Therefore, it was necessary to develop a more adequate model based on the *democratic values such as solidarity, compassion and idea of communicational interests* (B. Jennings). A more considerate ethical approach is gradually supplanting the paternalistic model that was standard earlier.

The current model of biomedical ethics implies the prevention of absolutism both on the part of a medical professional and a patient. Instead, it offers cooperation and consensus with regard to the rights and responsibilities of both parties and to the active participation of a patient in decision making in case of risk to his life and health. This model is undoubtedly more adequate to the bioethical problems that must be solved (euthanasia, transplantation, new reproductive technologies, etc.).

This is the reason for implementing (in line with the WHO recommendations) a new *autonomous* model of the patient-physician relationship. This model is based on the principle of patient autonomy and implies that the medic should take into account the patient's opinion and be more precise in making decision. While the paternalistic relation type means that the information given to the patient depends entirely on the physician's free will

and wish, the autonomous model implies that the physician must provide the patient with the adequate information, and the patient has rights to receive information on all existing methods of treating his disease and on risks associated with each method of treatment. It is clear that the right of choice does not entirely belongs to the physician, but is shared with the patient.

The ethical principles of the new approach respect *the autonomy and benefit of a person.* The reasonable decision made in the process of information collection is based on a mutual respect and an active cooperation. The medic should take into account the following moments:

— *patient's competence* that depends on a number of factors ranging from his general cultural level to his psycho-emotional state;
— *patient's awareness* implying his right to know the whole truth about the level of his health and on the methods of treatment;
— *free decision-making* that sometimes is a formal act, i.e. the patient signs a form of informed consent which warns that otherwise they will not obtain an adequate medical care.

Legally, the *model of patient's autonomy* with its rule of *informed consent* is fixed in the "Law on Healthcare in the Republic of Belarus". The Asset 27 of the Law states, in particular, that a patient's free informed consent should be obtained prior to a medical intervention. Every patient has the right to choose a physician (Asset 29). A clinical and biomedical research can be performed only if the written consent of a person to participate in the study is obtained (Asset 31), etc.

The autonomous model substitutes gradually the model of paternalistic relations. It incorporates the principle of informed consent; the observance of patient's rights including the right for truthful information on his health level, methods of treatment, the information on alternative treatment methods and possible risks. A physician should skillfully involve a patient in a dialogue and guide him along the way of decision-making. Thus, the model suggests an equal partnership in the physician-patient dialogue and increases the patient's responsibility in making the decision about the treatment, disease prevention and medical rehabilitation.

The information on the level of health and a medical prognosis allows the patient to actualize his right to make decisions related to his life. The patient may wish to complete some work or to solve certain problems with relatives, friends, illegitimate children (if any) or to disclose some important information to the law-enforcement agencies, etc.

In 1994 WHO formulated three basic components of relations between physicians and patients (everybody's right to health, patient's right to in-

formation, physician's responsibility to answer all patient's questions) and approved officially the principle of providing a patient with the reliable and understandable information prior to start of the treatment. In order to give adequate and reasonable answers, *a physician in his turn should have the access to the objective and controllable information.*

There is no doubt that the model of patient's autonomy is more efficient that the paternalistic model, but it may be successful only if medics observe their professional code, publish documents on patient's rights and create the atmosphere facilitating the therapeutic dialogue.

With all positive features of the autonomous model, we often face situations that force a physician to act without the patient's consent. Firstly, this is a situation when the patient's condition does not allow him to participate in making decision on a medical intervention (a surgical patient in the unconscious state). Here, the paternalistic model is absolutely justifiable and applicable. Secondly, there are situations when the decreased level of psychic and intellectual abilities (e.g. alcohol or drug intoxication or mental disorder) may become the decisive factors in choosing the model of relationship. Such situations cause problems with regard to using the autonomous model.

Perhaps, in case of reduced level of the patient's autonomy it would be reasonable to introduce a border-line model of the *soft paternalism* including a partial limitation of a person's autonomy when it is necessary to prevent a person against his self-damnification (suicidal attempts, drug hallucinations, etc.) and to observe him within a certain period.

The effective mechanisms of cooperation between ECs and patients participating in a biomedical study are provided with the physician (investigator) craft:

- compassion;
- high professionalism;
- courage;
- law compliance;
- adherence to principles;
- ability to mutual understanding;
- dignity;
- strength of will;
- commitment.

The current level of medical investigations should not be reduced to the analytical study of a separate phenomenon only without taking into account its connection to a more complicated dynamic system. The holistic approach implies the understanding of a disease as an inner dynamic system. Its

performance depends on a wide range of factors – from genetic to social ones. It is important to study a human organism within the frames of a treatment process. The patient is not a mere object of diagnostics, but a subject with a complex psychic world and individual responses to diseases or conditions of microsocial environment.

When the physician concentrates his attention only on symptoms of a pathological process, the patient is treated as a carrier of certain symptoms and his individual emotional response may affect the course of the disease and the therapy may be ignored.

7. Ethical problems of genetic testing

One of the most essential aspects of EC activity nowadays relates to ethical problems associated with the genetic studies. "Universal Declaration on Human Genome and Human Rights" was adopted by acclamation at the 29th Session of UNESCO General Assembly on November 11, 1997. An evident strong point of this document is the achieved balance between safeguarding the basic human rights and freedoms and the necessity of providing the opportunities for the study performance. The Declaration was accompanied with the resolution stating that the member States are responsible for taking relevant measures facilitating the implementation of the Declaration principles. The Declaration marked the beginning of a new stage on the way of thinking about the ethics of science and technique.

The last decades of the XX century were marked with the rapid development of one of the most important branches of biological science – molecular genetics that stimulated the development of a new field – genetic engineering. The latter gave start to development of different biotechnologies producing genetically modified organisms (GMO) and genetically modified products (GMP). There are opportunities for genetic therapy of some human diseases, embryo and somatic cells, creating identical genetic copies of an organism and other relevant directions. These forms of genetic intervention into the nature of an organism require evaluation and discussion of social and economic consequences just now. Decisions resulting from the discussions influence the directions and investigation themes and help to form an adequate society response regarding the necessity and justifiableness of genetic investigation.

It is quite obvious that genetic and biotechnique have a tremendous potential and possibility for effecting human beings and society. However, the prospects are double-natured. Thus, in spite of all scientific and econo-

mic benefits of genetic engineering, it is necessary to evaluate its potential dangers for human beings and humanity in particular, the dangers that may be caused with the further intervention of human intellect into the Nature.

If everything that genetic engineering can do with microorganisms and separate cells can, in principle, be done with a human being too then the prospects of introducing the intentional changes into the hereditary material may be extended from reproduction of a genetically programmed individual or clones to creation of chimeras (a human being combined with an animal). A human being becomes an object for genetic technologies. We should remember also that some scientists believe that their activities mustn't have any limitation: they may do everything they want to do. However, when the reconstruction of an adult person genome is ethically and medically acceptable, the changes introduced into the genome of embryo cells present an entirely different situation.

By the beginning of the XXI century the investigations in the area of genetic engineering become more and more affecting the society interests and ethical problems compose a significant part of activity of specialists in biology and biomedicine. Nowadays a world community and scientists are actively discussing harms and benefits resulted from the achievements of genetic engineering. More and more scientists agree that studies in the area of genetic engineering should go on, but they should be focused on treating diseases but not on improvement of the human being nature. *The Universal Declaration on Human Genome and Human Rights* states: "The aim of the applied use of results obtained during the scientific study of a human genome (particularly in biology, medicine and genetics) should be the relief of human sufferings and improvement of health of both an individual and all people as a whole".

The last decade of the XX century was marked by another significant event – a tremendous progress was achieved in *cloning animals from somatic cells.*

The methods of animal cloning are still far from being perfect. The experiments showed a high mortality rate of fetus and newborns. Many theoretical issues on cloning animals from the somatic cells are still not clear. Nevertheless, the achieved success showed a theoretical capacity for creating *genetic copies of human beings* from an isolated cell taken from any human organ. Many scientists are very enthusiastic about this prospect.

At the same time, Asset 11 of the Declaration states that the practice conflicting with a human dignity (particularly the practice of cloning with the purpose of reproducing individuals) should be prohibited. The Council of Europe also introduced an amendment into the *European Convention on*

Human Rights and Biomedicine that outlines: "To forbid any intervention pursuing the goal of creating a human individual identical to another one – both alive and dead".

Anyway, the task of biomedical ethics is not to forbid or to impose a moratorium on new and old biotechnique, but to facilitate their development and moral use. To forbid, for example, any manipulations with embryo would mean not only the development termination of methods of extracorporal fertilization allowing some women to conceive a child in a natural way; it would also mean the closure of an entire scientific field of embryology that helps to study many severe diseases and look for the ways of treating them. The prohibition of human being and animal cloning and the creation of transgenic animals would mean not the development termination of an entire scientific direction only but that in the future we should purchase the products of scientific achievements of the leading world companies.

The current level of genetics allows us to pose a problem of ethical justification of intervention into biologic processes responsible for the reproduction of human generations. The following problems are essential:

- detection of carriers of hereditary diseases;
- prenatal diagnostics and selective abortions;
- entirely new ways of overcoming the problem of sterility including outer intervention into the reproductive functions of human organism.

In any case, from the moral point of view some studies of fetus should be forbidden. Embryos exposed to any effects must not be implanted into a female organism. Human embryos must not be implanted into an animal organism. An illegal sale and purchase of embryos is also unacceptable.

We should also bear in mind that the studies of embryos may be very beneficial for the society since they facilitate scientific studies in different fields of medicine and biology. It may facilitate the development of new methods of contraception, the solution of sterility problem, the detection of hereditary fetus diseases, the study of mechanisms causing spontaneous abortions and processes of egg cell development, the study of cancer genesis and the search for the development regularities of a human being as a biologic specie.

Thus, *the modern paradigm of bioethics is characteristic for the radical turn from the arguments of empirical description of medical morals to the thorough philosophic argumentation – the revision of grounds of morals in medical studies, concepts of moral values, widening of problem area of bioethics by enriching it with moral, philosophical, legal arguments and components as well as integration of different arguments and kinds of values*: biological (physical existence, health, freedom of pain, etc.), social (equal

opportunities, availability of all medicines and medical services, etc.), ecological (understanding of the Nature self-value, its originality, co-evolution), personal (safety, self-esteem, etc.).

As a whole, the modern argumentative model of bioethics and the development of programs of biomedical investigations in the Republic of Belarus are adapted to the scientific, social, cultural and ideological traditions, to its system of public health care and needs further development.

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COMMENT

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ON THE POWER AND GLORY OF DEDUCTIVISM

This short comment is meant as a couple of glosses on the margin of Dale Jacquette'e extensive and thought-provoking contribution (this issue) "Deductivism in Formal and Informal Logic". My title alludes to Graham Greene's masterpiece "The Power and the Glory" which tells about moral power as displayed by this novel characters in spite of human weaknesses. Here I am to ask some questions regarding the logical power and possible weaknesses of *deductivism* – defined by Professor Jacquette as the view that *any good reasoning conforms to a rule of deductively valid inference.*

I do not address relations between formal and informal logic as treated by deductivism, though this issue is extensively discussed in the paper, since I do not find any questionable items in the Author's exposition. What I am to ask about, it is the very concept of deductive validity. There are among logicians at least two plausible interpretations of this attribute, one much liberal (L), the other much restrictive (R).

(L) An inference is deductively valid iff it complies with a rule that grants the truth of conclusion, provided the premisses are true.

(R) An inference is deductively valid iff it complies with rules of the classical first-order logic.

Between these extremes there is a lot of other conceptions: R can be extended to involve the intuitionistic first-order logic, the second-order classical logic, modal logics of any varieties, a theory of probability, and so on. Two possible additions to R are of special interest, one regarding the *mathematical induction rule*, the other regarding *truth-preserving rules generated by some conditionals.*

As to the former, it clearly falls under L but not under R. Does it constitute a fatal counterexample to deductivism? Obviously NOT, if the term

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"deductively valid" in the thesis of deductivism is to be conceived according to L; and obviously SO, if according to R. That the rule of mathematical induction does not belong to logic was firmly held by such a great mathematician as Henri Poincaré, to the effect that the principle in question is *necessary to the mathematician, and clearly irreducible to logic* (see his *Science and Method*, Dover 1952, p. 149).

As to the latter case, take for example any set-theoretical axiom having the conditional form. E.g. the sum-set axiom for two-element set families can be easily transformed into the following rule of inference:

$\exists_X(X \textit{ is a set}) \wedge \exists_Y(Y \textit{ is a set})$, hence $\exists_S \forall_x (x \in S \Leftrightarrow x \in X \vee x \in Y)$.

We are free either to employ the sum-set principle as an inference rule, or to traditionally accept it as an axiom and obtain the above conclusion from it with the help of ponendo ponens. If one prefers the rule strategy, and, moreover, is ready to regard the set-theoretical epsilon as a logical constant, then there increases, correspondingly, the scope of logically valid inferences.

To make the issue more general, let us notice, that not only the epsilon but also some other terms happen to be problematic as far as their status of logical constants is concerned. It is surely merited by truth-functional connectives, as well as quantifiers conceived as generalized conjunctions or generalized disjuctions. However, as for the identity sign, its belonging to logical constants is sometimes felt as being a bit conventional, and the more modal operators, etc.

Are such hesitations relevant to Jacquette's main problem of deductivism as endangered with the risk of appearing deductively valid rhetorical fallacies, and so the appearing of counterexamples to its point? To try an answer, let me transform the claim of deductivism into a hypothesis being a bit more (to my mind) operationalized, to wit: *The theory of logical validity is a reliable tool to detect any rhetorical fallacy.*

The Author convincingly shows, step by step logically analyzing fallacies most commonly occurring in the literature, that the hypothesis gets fully confirmed within the scope of the cases considered. One may have impression that such a message is obvious a priori and, therefore, not demanding such a thorough work. But the opinion as to obviousness may depend on environmental factors (meaning a scholarly environment), thus remaining to some extent subjective. Anyway, the results obtained help to choose between the options L and R as sketched above. The evidence we have got owing to the Author's research does reveal that logical validity in the restricted sense is sufficient to inquire into rhetorical fallacies to the effect that they notoriously lack logical validity. Hence there is enough power and glory in

the first-order classical logic. If it proves too weak for some new rhetorical fallacies which would demand new means of logical analysis, then one can extend the first-order logic (towards the scope of L) to suitably enrich its repertoire of devices.

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