Reflective Equilibrium and the Principles of Logical Analysis

This book offers a comprehensive account of logic that addresses fundamental issues concerning the nature and foundations of the discipline. The authors claim that these foundations can not only be established without the need for strong metaphysical assumptions, but also without hypostasizing logical forms as specific entities. They present a systematic argument that the primary subject matter of logic is our linguistic interaction rather than our private reasoning and it is thus misleading to see logic as revealing "the laws of thought". In this sense, fundamental logical laws are implicit to our "language games" and are thus more similar to social norms than to the laws of nature. Peregrin and Svoboda also show that logical theories, despite the fact that they rely on rules implicit to our actual linguistic practice, firm up these rules and make them explicit. By carefully scrutinizing the project of logical analysis, the authors demonstrate that logical rules can be best seen as products of the so called reflective equilibrium. They suggest that we can profit from viewing languages as "inferential landscapes" and logicians as "geographers" who map them and try to pave safe routes through them. This book is an essential resource for scholars and researchers engaged with the foundations of logical theories and the philosophy of language.

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Routledge
Taylor & Francis Group
NEW YORK AND LONDON

First published 2017
by Routledge
711 Third Avenue, New York, NY 10017

and by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

Routledge is an imprint of the Taylor & Francis Group, an informa business

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Library of Congress Cataloging-in-Publication Data
[CIP data]

ISBN: 978-1-138-21096-7 (hbk)
ISBN: 978-1-315-45393-4 (ebk)

Typeset in Sabon
by Apex CoVantage, LLC

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Acknowledgements

Some parts of the book have been built on already published material. The chapters addressing the criteria of logical analysis and the reflective equilibrium have incorporated parts of our papers 'Criteria for logical formalization' (*Synthese* 190, 2013, 2897–2924) and 'Logical formalization and the formation of logic(s)' (*Logique et Analyse* 233, 2016, 55–80), while Chapter 9 partly overlaps with our paper 'Logically incorrect arguments' (*Argumentation* 30, 2016, 263–287). Some of the arguments and examples presented here appeared in the Czech book *Od jazyka k logice* (*From language to logic*), which was published by Academia, Praha, 2009. We are grateful to Pavel Arazim, Georg Brun, Matej Drobňák, Ulf Hlobil, Ansten Klev, Radek Ocelák, Vít Punčochář, and Hans Rott for valuable critical comments to previous versions of the book's manuscript. Greg Evans did, in our view, a great job proofreading the book as well as minimizing appearances of Czechisms. We are also grateful to the Institute of Philosophy of the Czech Academy of Sciences which provided excellent conditions for our research during the period when we worked on this book. The preparation of the book was supported by the research grant No. 13-21076S of the Czech Science Foundation.

Introduction

Logic is a well-established and respected scientific discipline. Dozens of international journals are devoted primarily to it and hundreds are open to articles that utilize the methodology of logic to deal with problems in disciplines such as philosophy, linguistics, and computer science, among others. Millions of students attend—compulsorily or voluntarily—logical classes every year. In spite of this, there are still many open questions concerning the foundations of the discipline and there continue to be a number of blind spots in the field's commonly held views. This is not a problem that is specific to logic. Many scientific disciplines, including those that have gained great respect and whose results have proven to be highly valuable, do not have entirely firm and perspicuous foundations—biologists, for example, do not seem to be able to define what *life*, the ultimate subject matter of their studies, is. But this, of course, does not mean that we should not carry out foundational studies and try to elucidate the foundations of a discipline as much as is possible.

Moreover, we want to argue that the foundations of logic are more precarious than those of most other disciplines. The inability of biologists to define life, for example, does not mean that it is unclear how the organisms that biologists of different specializations study are to be identified. In contrast to this, the unclarity of the subject matter of logic cuts much deeper—perhaps the majority of logicians would agree that the fundamental goal of logic is to study (logical) consequence, but there is no general agreement as concerns what kind of relation consequence is. Are, for example, its *relata* (primarily) mental entities? Or are they rather ideal entities residing in some kind of Platonic realm? Or should we identify them as linguistic entities established solely by practices of social intercourse? Terms like "propositions" or "statements" that are used to designate the *relata* can be a quite handy means of disguising problems of this kind.

When we suggest that the foundations of logic are, even in the beginning of the twenty-first century, precarious, we certainly do not want to say that philosophers have not bothered to clarify what the subject matter of logic, or what the nature of a logical law, is. Even a thumbnail survey of the history of philosophical inquiries into the nature of logic would be a

demanding project, while a project aimed at a detailed analysis of the pros and cons of the individual conceptions that can be found in the literature would be truly immense. The project of this book is less ambitious. Our primary concern is neither to scrutinize the pivotal contemporary conceptions of the philosophy of logic nor to enter into polemics with the great philosophical minds of the past. We instead present and examine a picture of logic as viewed from an angle somewhat different from the usual one, taking into account some new ideas—from both philosophy and science—concerning the nature of language and of logic, and thus we try to throw some new light on the foundational topics.

It may nevertheless be interesting to present some intimations concerning the confrontation of our picture with the conceptions of the subject matter and logic's mission that have been influential during the recent period of the discipline's development. In works considered to be the classics of modern logic, we find various ideas that foreshadow several such conceptions. George Boole, for example, maintains that while studying logic he wanted to investigate "the fundamental laws of those operations of the mind by which reasoning is performed" (Boole, 1854, p. 1). Gottlob Frege says that "it falls to logic to discern the laws of truth" and that the task of logic could be represented as an "investigation of the mind", stressing immediately that the mind is not to be taken as the mind of an individual human being (Frege, 1918, p. 289). Ludwig Wittgenstein suggests that "logic is not a theory but a reflexion of the world" (Wittgenstein, 1922, §6.13), and Bertrand Russell claims that "logic is concerned with the real world just as truly as zoology, though with its more abstract and general features" (Russell, 1919, p. 169). These are very different conceptions grounding very different views of logic, the confrontations of which became prominent later.

While it seemed almost self-evident during the pre-modern era that logic must be grounded in the realm of the ideal that precedes the mundane reality of our senses, during the last century the requirement that logic should be continuous with scientific findings about the world (such as those of psychology, linguistics, but also of neurology, or evolution theory), i.e., that logic should be grounded in a broadly naturalistic fashion, became close to imperative.[1] The fact that this naturalistic sentiment came to dominate the scene did not, of course, mean that philosophers' views on the foundations of logic no longer varied from one another. Some philosophers, for example, have followed in the footsteps Russell and tried to elaborate on the view that logic captures an underlying structure of the world (Sider, 2013; Maddy, 2014); others have kept with the more traditional stance that the proper subject matter of logic is thought processes as they occur in individual minds (Hanna, 2006; Pelletier et al., 2008); and still others have situated

1 Some eccentric foundational conceptions of logic, such as the "metaphysical foundations" of Heidegger (1978), notwithstanding.

logic in closer vicinity to the technology of the proper weaving of our webs of belief (Makinson, 2003; Field, 2009). Yet others promote what can be called a linguistic view of logic, i.e., suggesting that we should seek the roots of logic in our linguistic interaction (Quine, 1986; Bencivenga, 1999).[2]

There are, we should notice, quite significant differences in the extent to which the individual conceptions are elaborated. While the logical Platonists can follow up on a long tradition (which, according to the prevailing view, includes such prominent figures as Frege), and in recent literature we can find systematic elaborations of the 'structure of reality' view as well as of the (revived) psychologism, the situation is different in the case of the 'linguistic' conception of the foundations of logic. Not that this stance would be too eccentric: seeing that it is continuous with the ever more popular pragmatist theories of language and related 'use theories of meaning', an increasing number of philosophers should find it attractive and worth elaborating. However, not many of them bother to develop it on a systematic basis—perhaps because the scholars in this camp are often influenced by Wittgensteinian 'quietism'. This book aims at filling the gap. It strives to show, in detail, how such a 'pragmatist' notion of logic can be given a concrete shape.

Thus, the approach to logic that we present and investigate in this book is based on several key assumptions.

First: logic is essentially a matter of rules of languages—primarily of natural languages and secondarily of our artificially created languages. Philosophers have developed logical theories for the purposes of sorting out the rules implicit in our natural linguistic traffic; later, they—in cooperation with mathematicians—developed specific artificial languages which help us analyse and also stabilize (and in some cases even reinforce) the laws implicit to our natural languages. Thus, logical constants are—similarly as their natural language prototypes—*expressions*, elements of such or another language. Therefore, it makes no sense to think of the rules governing them as being independent of languages. It is true that, insofar as we accept that language may influence thought, languages with certain logical constants and logical structures may constitute amazing enhancements of our expressive and reasoning capacities that upgrade our thinking to a wholly new level; this does not mean, however, that they are not essentially linguistic.

Second: logical forms which, as logical textbooks often teach us, reveal the underlying structure of sentences by which we express our thoughts are not actual entities that logicians can encounter. They are not to be found

2 To be sure, the alternative conceptions need not always be mutually exclusive. The processes in individual minds can be seen as guided by some more abstract principles, and languages may similarly be seen as shaped by them or by some neurological or psychological facts. Thus, the discrepancies between them need not be always perceived as substantial since they may be a matter of emphasis or of methodological preferences.

somewhere 'behind' or 'beyond' expressions (perhaps in the minds of speakers or in the third realm?). Logical forms, rather, are products of the logicians' efforts to account for the inferential structure of a language, especially to envisage the roles of individual statements within the structure. Thus, logical forms are not constituents of the subject matter of logic but instead belong to the toolbox of logical theorizing.

Third: it is necessary to pay much more attention than usual to the relationship between the artificial tools of logicians—the logical constants with which logic usually works and the artificial logical languages to which they belong—and the natural means of our argumentation and reasoning. So called *logical analysis*, which leads us from the sentences of a natural language and arguments composed of these sentences to their regimented forms in the artificial languages of logic, is often considered as a kind of art, and the adequacy of such regimentation is often seen as something that is a matter of 'intuition'. In contrast to this, we believe that we should aim at some explicit criteria of such adequacy that would allow us to make the process of regimentation into something more akin to a process that can be evaluated on a rigorous basis.

Fourth: logicians do not explore some level of our thought that is accessible only through an *a priori* analysis. Logicians make explicit some of the constitutive rules implicit to our linguistic practices and develop, often with the weighty help of mathematical methods, artificial *simulacra* of real languages. Though present-day logicians spend most of their lives dealing with the simulacra we should not forget that logic is to be continuous with empirical sciences such as linguistics, psychology, or sociology. True, logic is not itself empirical in the same sense as these disciplines are since it typically restricts its attention to the study of certain very general structures, but, insofar as its languages are meant to help us express full-fledged thoughts and articulate real reasoning, logicians must be prepared to demonstrate that the structures they study are relevant from the viewpoint of our practical, purpose-oriented communication.

Fifth: while this approach to logic is closely allied to inferentialism in the philosophy of language and to theories underlying the so-called proof-theoretic semantics in logic, it is no trivial appendix to such views. Neither of these doctrines by itself provides an explicit answer to the question of how logic relates to language. Indeed, we are convinced that a relatively wide spectrum of approaches to logic is—more or less—compatible with inferentialism; hence, the one presented in this book might be seen as controversial by many adherents of inferentialism and of a proof-theoretic account of logic. We, moreover, believe that foundational questions addressed in this book are important not only for the sake of understanding the foundations of logic and thus for those who are engaged with its philosophical problems, but also from the viewpoint of those who utilize logic as an analytic tool.

Our deliberations in this book unfold then from a reconsideration of some basic questions concerning the nature of logical analysis. We believe

that this concern with the most basic practice of logic is a suitable departure point for an inquiry that is to provide a firmer grasp on the general enterprise of logic. In close connection with this, we turn our attention to conceptual questions that seem easy at first sight but under closer examination turn out to be difficult and controversial. We try to show that if we attempt to analyse the commonplace theses presented by textbooks and handbooks, we will often discover that we face clichés that are rarely disputed and are even more rarely properly scrutinized and understood.

The book starts from scratch. In the beginning, we tentatively establish our core thesis concerning the inseparability of logic and natural language. We first argue that it is misleading to see logic primarily as a theory describing or setting standards of efficient reasoning. Logic on its most fundamental level addresses the sociolinguistic rules which are constitutive of the whole business of reasoning and strives to reconstruct them as explicit and systematically intertwined. Though present-day logicians typically devote most of their attention to the study of abstract structures that seem quite detached from our everyday communication, these studies, if they are not to escape the realm of logic, must aim at deciding which arguments (justifications, proofs) formulated in humanly usable languages are to be accepted as correct or conclusive and which are to be rejected as wrong or dubious. Building logical theories is thus best seen as a purpose-oriented enterprise and logicians should be viewed neither as visionaries having divine insight into 'the realm of the thought' nor as despots imposing laws on the proper use of language for those who want to be considered rational. They can instead be compared to democratic legislators who aspire to set some explicit rules of behaviour but try to establish them so that they cohere with the actual functioning of the society and with a wide social consensus regarding the worth of following them.

In the second chapter, we put forth a rough and ready demarcation of the domain of logical studies. We start from what may seem to be a reiteration of platitudes—e.g., from the delineation of the basic concepts of argument and correct argument. Then we turn our attention to different kinds of arguments and suggest that logically correct arguments are not the only type of correct arguments. (As this is not something that is commonly taken for granted, we spend some time explaining and justifying this). We also discuss the concept of the form of an argument and outline an answer to the question of what makes logically correct arguments special.

In the third chapter, we indicate that the platitudes put forth in the previous chapter may be less platitudinous than they seem. Uncritical adoption of the concept of correct argument, which in effect reduces correctness to truth-preservation, is, we suggest, improper and potentially misleading. The concept of truth-preservation may seem quite straightforward, but it is tricky as it presupposes a certain domain of cases over which the preservation happens. It is easy to overlook that the delimitation of such a domain is an inherently problematic issue. Also, the concept of truth, we argue, is too

complex to be put into the utter foundation of a conceptual edifice. Finally, we point out that we should be careful not to overburden the concept of logical form.

In the next chapter, we devote attention to particular procedures and theoretical means that are employed within logical analyses. We make some important conceptual distinctions like the one between *logical form* and *logical structure*, and between *formal language*, *formalized language*, *hybrid language*, and so on. At the end of the chapter we try to draw a systematic picture of the processes and relations which constitute the bulk of logical analysis and fix the related terminology.

In the fifth chapter, we turn our attention to the formulation of explicit criteria of logical analysis—*viz*. to criteria which allow us to assess whether the assignment of a logical structure or a logical form to a natural language sentence is adequate. Selecting the formula (sentence of an artificial language) which presents a correct logical analysis of a sentence or an argument formulated in natural language is, we suggest, a matter of balancing different criteria, benchmarks, and requirements. We formulate the most important criteria and show that, though some of them are more substantial than others, the emphasis on a specific criterion may also be related to the aims of a particular analytical project.

The sixth chapter is mostly polemical. Its main goal is to subvert the view that semantic criteria of correct formalization are superior to the inferential ones that we favour. We examine, in detail, the principles of logical analysis proposed by authors who think that logical analysis has to be based semantically, i.e., on considerations focusing on truth conditions of the statements/formulas in question. We argue that such an approach can be misleading in at least two ways. The first is that basing the criteria of adequacy on truth conditions does not in fact grant us anything over and above what we already have (in a more transparent form) within considerations that focus on correctness or incorrectness of arguments. The second is that the semantic approach offers us an illusion of going beyond the inferential one in that it proposes certain 'criteria' that are not practically applicable—whereas we believe that pinpointing an adequate formalization of a sentence or an argument is a basically *practical* problem whose success should be evaluable by criteria which are humanly usable.

Chapter 7 completes the picture outlined in the previous chapters. It shows that explicit logical rules emerge, in a bottom-up way, from the spontaneous formation of our language games; that, however, their establishment is essentially bolstered by our conscious reflecting on this process in a top-down manner. This 'dialectic' kind of movement is characteristic of the reasoning that leads towards a *reflective equilibrium*, which amounts to adjusting data in light of conjectured principles while, at the same time, adjusting the principles in light of the data. We show that considerations of this kind can also help us decide which theories are 'real' logical theories and which are to be eliminated from the logical family (or rather not introduced to it).

In the eighth chapter, we discuss some consequences of the construal of logical rules presented in the previous chapter. We further defend the view that logical rules are anchored in living languages, i.e., in the ways in which native speakers actually speak and argue and in the normative attitudes which underlie these practices. These rules are then raised to the status of laws by our reflective activity. Logic, according to us, is therefore neither the straightforward result of an empirical description of an aspect of our communicative practices nor a type of 'metaphysics of thought'; it is a discipline which studies rules put forth by scholars trying to improve on the indefiniteness of the rules governing our linguistic practices. It is clear that natural rules can be streamlined in different ways and so there is a certain space for alternative, though equally legitimate, logics. Thus, for example, both classical and intuitionistic logic can be seen as well-formed logical theories in a state of equilibrium. We need not reject one of them; we just need to decide about their scopes of application.

In Chapter 9 we focus, by way of a digression, on problems connected with the so-called *asymmetry thesis*. While it is clear that logic is quite useful for demonstrating that certain arguments are *correct*, it is much less useful for demonstrating that certain others are *incorrect*. We deal with the question of what it takes (or what it should take) for an argument to be *logically incorrect*—in the sense of being incorrect and being such for logical reasons. We argue that the weak account of logical incorrectness, according to which an argument is logically incorrect iff it is *not* logically correct, is unsatisfactory—many arguments logically incorrect in this sense are in fact impeccable. And though the task of defining a usable concept of strong logical incorrectness is a tricky one, we show that it can be accomplished.

In the penultimate chapter, we take a bird's eye view of the process of logical formalization, viewing it as a matter of mapping the 'inferential landscape' of natural language. This involves a holistic view on matching the implicit inferential structure of the analysed natural language with the explicit inferential structure of the analysing logical language.

The last chapter is devoted to a reconsideration of the project of logical analysis as a whole and to reflections on the tenability of the mapping simile. We again address the question of the primary *relata* of the relation of consequence and of the limitations of the picture of natural language as the inferential landscape. In particular, we consider the question as to whether inferences can exist only among declarative sentences (which traditionally are seen as truth bearers) or whether the domain of logic is wider. We then defend the view that inferential links directly interconnecting sentences of a natural language (and indirectly of artificial languages) exist just as the result of speakers of the language having certain attitudes—namely taking some inferences for correct and others for incorrect. Logical laws as we can encounter them in logical theories are thus nothing but outcomes of the effort of logicians to make our

linguistic means more perspicuous and more reliable whenever these qualities become of crucial importance.

As the above synopsis suggests, we will often argue that logical matters are quite complex and that we should not expect categorical and straightforward answers to intricate, fundamental questions. In spite of that, we believe that the considerations presented in this book clarify a number of conceptual confusions that plague efforts at gaining a deeper insight into the nature of logic. They also suggest how certain fundamental problems of the philosophy of logic (e.g., the traditional problem of whether logic is a descriptive or a normative discipline) should be dealt with.

1 What is Logic about?

Logic has traditionally been presented as a discipline that studies and improves our reasoning. It is commonly presupposed that the rules studied by logic are types of strategic rules that concern the reliability and effectivity of our reasoning—that, one might say, we are gifted with the ability to reason and that logic teaches us how to cultivate this gift, how to reason as truly rational beings. We believe that this picture is misleading. First of all, logic, in our view, does not have much to do with reasoning conceived of as a mental process.[1] Second, the rules that are—in the most fundamental sense—logical do not concern the strategy and tactics of rational reasoning. They are rather rules constitutive of the very enterprise of reasoning. Logical rules—in a raw form—are inherent in any language worth its name and, in fact, can be seen as establishing a kind of 'backbone' of the language.[2]

If we generally accept the naturalistic stance, we cannot help but view the languages that serve as our mother tongues as natural phenomena, as communication systems that evolved from less advanced systems used by our ancestors. The appearance of logical rules was, we suggest, an integral (and in a sense crucial) part of the process of the development of all human languages. Of course, the rules did not appear in the form of explicit prescriptions issued by some 'linguistic legislators'. They were gradually established as specific forms of behavioural patterns acquired by individuals—participants of communication. It was the appearance of these kinds of rules that was one side of the coin, the other being the emergence of argumentation (in the broadest sense of the word). Thus, we want to argue, the common picture according to which humans first started to

1 This, of course, is by no means a new idea. The same view on logic was famously and convincingly defended by Frege at the dawn of modern logic. He stresses that it is not psychological genesis but the best method of proof that is important for his way of classifying judgments (Frege, 1879, p. iii).

2 Of course, when we speak about *languages worth their name* we do not want to deny that there can exist advanced communication systems which are completely alien to us and which therefore might also allow for quite different kinds of 'reasoning'.

reason and only subsequently found ways to 'publicize' their thoughts and reasonings—i.e. how to make them manifest by means of words—is seriously misconceived. If we want to have a more adequate (though still quite simplistic) picture of the relationship between (public) argumentation and (private) reasoning, then we should see the appearance of private reasoning as a by-product of the emergence of public argumentation rather than the other way round.[3] Given this, we can say that presuming that language precedes thought is less misleading than presuming that thought precedes language.

In light of these observations, it seems justified to claim that logic is not to be seen as a theory of proficient reasoning but rather as a theory that, on its most fundamental level, reveals how reasoning becomes possible at all. The business of logic thus essentially consists in making explicit the practices that establish a framework which opens up the possibility of arguing and consequently of reasoning. Using a parallel with chess, we may say that the core logical rules are to reasoning what the rules of chess are to chess. (The problem is that they are almost universally seen as corresponding to the kind of rules that advise us on how to play chess shrewdly—how to avoid weak moves and identify those that lead to success in the game). The inherent, constitutive nature of rudimentary logical rules is, in our view, what distinguishes specifically logical studies from other kinds of studies focused on argumentation and reasoning.

Thus, we suggest that those who take for granted that beliefs are prior to the appearance of logical relations, as well as those who adhere to the view that logic is best seen as a kind of rational belief management, may well be making their way up a blind alley. Viewing logic as a theory dealing with the principles of individual 'thought processing' is not misguided because an individual alone could not reason, but because to do so she must be equipped with entities that can play the role of communicable and articulate beliefs and that these cannot be forged by anything other than certain public linguistic practices. Thus, the answer to the question *What is logic about?* is that it is essentially about the most basic rules constitutive of and common to all communication systems that we are ready to see as full-fledged *languages* and their suitable theoretical reconstructions.[4]

Of course, because the practices within which rules governing languages emerge are—as most natural phenomena tend to be—indefinite and fluid, the process of bringing to light the implicit rules which regulate the use

3 Those who prefer a broad concept of reasoning that allows us to view animals as reasoners might want to attach the adjective 'specifically human' to the term 'reasoning' here.

4 This is not to be taken as a claim to the effect that nothing else besides our human linguistic activities deserves the name communication. If we understand the term broadly, we can imagine communication of alternative kinds (employed, e.g., by different animal species or some hypothetical extra-terrestrial civilizations).

of the specific 'argumentative' vocabulary and articulating them in an explicit form is more a kind of creative enterprise than a straightforward mechanical replicating, especially in that it requires a certain (sometimes sophisticated) streamlining. Thus, the rules which are presented in scholarly books as the rules of logic—we could speak about logical rules in the narrow sense—are in our view not something merely *discovered* or *brought to light* by philosophers or logicians, but rather something that acquired a definite shape only after it was explicitly articulated within a theory. The process of explicit articulation is, of course, far from uncontroversial[5] and it is essential to understand how it proceeds. In this book, we suggest that the essential process of bringing forth the rules of logic is that of *reflective equilibrium*—the rules emerge from a back-and-forth manoeuvring between the facts regarding our linguistic normative attitudes and tentative formulations of principles.

From what has been said, it follows that logic is primarily connected with our linguistic traffic—i.e. with a 'public business'—and only secondarily with the 'private business' which is subsumed under the general heading 'thinking'. This holds both for the 'pulp logic' inherent in natural languages and for the logical theories that have been developed over the centuries and that have so abundantly multiplied over the past fifty years. We are convinced that even the highly abstract theories subsumed under the term "mathematical logic" deserve the attribute "logical" only to the extent to which they are rooted in (and relevant for) the practices of our argumentation, i.e. certain 'games' we play with words. Yet, when we examine what logicians actually *do*, we often see analyses of abstract structures that would seem to have nothing to do with our matter-of-fact linguistic interaction. Our conviction is that such analyses belong to logic only to the extent to which logic, similarly as other sciences, has undergone the kind of 'mathematization' that allows for the picking up of the structural features of its subject matter and subjecting them to a purely mathematical scrutiny. In such a case, however, the study of the structures is only auxiliary to the basic enterprise and does not exhaust it. Hence, if studying such structures is nowadays an important part of logic (and we do not doubt that it is, and that it should be), then it should be supplemented by another part which tells us how the results of the mathematical studies help us understand (and possibly refine) our genuine language and our real argumentation.

In other words, though logic can contain a lot of mathematics, it should start and end with down-to-earth matters relating to what we humans really do and how we pursue our ends. We thus propose a view that is in

5 This, of course, opens a space for competition between different theoretical reconstructions of the implicit rules, viz. among alternative logical systems.

opposition to those who see logic as a discipline that studies forms of thought (conceived as prior to any linguistic encoding), or who see it as a discipline which studies the most general laws of truth or uncovers deep metaphysical foundations of reasoning. Logic, in our view, is first and foremost a matter of rules in the use of certain expressions, primarily expressions of our natural languages and, secondarily, of expressions of artificial languages (the latter arising from our effort to make the former more orderly, more transparent and less ambiguous). This has some very important consequences. First and foremost, the rules of logic cannot be *a priori* in the sense of being an inborn part of our natural cognitive gear[6]—expressions we have come to employ are rooted in the empirical world, as must therefore also be any rules that have come to govern them. The only way to pinpoint the ways of using expressions such as "and", "not", "all", or "possibly", which speakers of English hold to be correct, is by empirical investigation. (Of course, being competent speakers we know, to a certain extent, these ways, and this knowledge is often enough to build on; however, in cases when this knowledge is not enough—in cases, for instance, when controversies arise—the ultimate way to resolve them would be to poll the community of English speakers).

The situation is different with signs like $\wedge$, $\neg$, $\forall$ or $\Diamond$, which constitute the languages of logics. In their case, we are normally given the relevant definitions; hence, there is no need to poll anybody. However, here the trouble is that they are interesting for us, qua logicians, only insofar as they are able to help us with our reasoning, i.e. if they help us to articulate our arguments more precisely or more transparently and, especially, to reach a definite agreement as concerns which arguments are correct and which are not. And this presupposes that the artificial signs of the logical languages can be seen as a useful means of regimenting their natural counterparts—that, for example, $\wedge$ is a reasonable proxy for "and", that $\neg$ can regiment "not" or "it is not the case that", that $\forall$ can be a useful means for the regimentation of statements containing "all", "every", etc., and that $\Diamond$ can be used to regiment the word "possibly". Whether expressions equipped with a conventional meaning (fixed by certain definitions) can successfully play these roles is, clearly and inevitably, an empirical matter.

Does this mean, then, that logic is empirical? Certainly not in the sense that its laws would be just empirical generalizations—the laws of logic do not capture the regularities of our use of signs of natural language, they capture the *rules* inherent in such usage. This, to be sure, presupposes that our natural language is an essentially rule-governed enterprise, which we are convinced is the case. We believe that speaking a natural language is not

6 They, of course, can be seen as a priori if we identify it with the analytic, thus reaching a relativized and also 'linguified' notion of the *a priori*, as the logical empiricists and some of their followers in effect did (see, e.g. Parrini, 2009).

only a matter of producing utterances but also of assuming certain normative attitudes to others' utterances (as well as to one's own), thus taking part in the 'conspiracy' that sustains (implicit) rules governing the usage of the signs and that is constitutive of their meanings.

But are the implicit rules constitutive of natural languages articulate and unequivocal enough to yield us the rules of logic, which we tend to see as the paradigm of exactness, clarity and explicitness? Is every argument formed by means of "and", "all" or "possibly" clearly correct or incorrect? Surely not. In the case of very simple arguments, we can expect that agreement among English speakers as concerns their conclusiveness will be quite significant but that even in such cases there may arise controversies. Given this, we might want to strive for some explicit rules that would do away with any indeterminacies. However, though something like this can perhaps be achieved to a limited extent in some limited areas, in general such efforts are doomed to failure. Natural languages are wild beasts which cannot be easily tamed. Hence, the task of logicians cannot be to improve natural language. This is not to say that their warnings against the haphazard use of certain expressions or phrases, or their pointing to common fallacies that affect communication in natural languages, are not to be taken seriously. Also, if a discussion concerning the correctness or incorrectness of a certain argument arises their opinion should be taken very seriously as they are specialists in the area of argumentation. In some cases, they can be recognized as the authorities who decide which arguments are correct or incorrect.However, the authority presupposes that they act 'in the interest of the speakers', that they, that is, respect the meanings their words really have. A natural language is, by its nature, a public enterprise and those who want to regulate it in some way must proceed by 'democratic' means if they are to find enough supporters who will be ready to endorse the regulation.

The situation is, of course, different in cases when somebody designs his own language. When Ludwik Zamenhof created Esperanto, he was, without any doubt, the decisive authority on any issue regarding the language, including the correctness of inferences.[7] What he could not decide was whether his invention would be recognized as a useful language; instead, he could only make this more probable by making his artificial language easy to learn and use and, at the same time, suitable for all kinds of common communication. The situation of logicians is to some extent similar. They also invent artificial languages. Unlike Zamenhof, however, they do not aspire to provide an alternative means of oral or written communication, rather they want to offer 'languages' that would be usable as prisms

7 Of course, as soon as he made the rules that established the language publicly available someone could prove him wrong on some concrete issue.

through which we can look at natural languages so as to be able to better identify arguments that are correct (in particular, that have a valid form).[8] The two projects are, however, similar in the sense that not every artificial language has a chance of being recognized as a useful tool for assessing the correctness of arguments. Learnability, simplicity and perspicuity are in both cases the principal virtues, and we also need a certain kind of complexity. Unsurprisingly, these demands sometimes pull in different directions and so they often have to be balanced. How this balancing proceeds is one of the central topics of this book.

Thus, the artificial languages of logic are to bring to light certain features of natural languages (their logical constants typically mimic expressions which we already understand), but they embody them in a much more orderly fashion than is to be found in the natural languages. The status of logical laws that are 'captured' by such languages is therefore, we believe, peculiar. They are firmly grounded within the normative practices constitutive of our natural language, but they are also partly forged within the workshops of logicians. The reason why the laws can have an authority over our argumentation and reasoning is that they encompass the native rules constitutive of meanings of the words of natural language which typically constitute the skeleton of common arguments.

What, then, *are* the rules of logic? The fact that there are quite diverse answers to this question (rules of some actual languages, rules governing our thought, rules reflecting the limits of reality, . . .) leading to very different construals of what logic is and what its subject matter is,[9] is nowadays largely camouflaged by the fact that the majority of logicians can agree upon a common agenda—the study of certain abstract structures. Thus, for example, almost all logicians would agree that logic should deal with *modus ponens* as a rule governing transitions between some 'statements', 'propositions' or 'beliefs', especially concerning 'implication'. Practically all of them would use a rule identifiable as *modus ponens* to build various artificial languages, prototypically the language of propositional or predicate logic (but possibly also more complicated languages). However, as we have already pointed out, there is no real agreement on the exact nature of the 'statements', 'propositions' or 'beliefs' that are the ultimate subject matter of logic and for which the sentences or formulas of the artificial languages were introduced as mere proxies. And, moreover, many logicians do not seem to think such agreement is truly needed—they appear to take for granted that the core of logic consists of the study of abstract structures as such.

8 In Chapter 9, we will see that identifying correct arguments is not the same task as identifying those that are incorrect.

9 See Hofweber (2014).

Though we believe that this 'abstractization' of logic is in many respects useful (especially because it closely interconnects logic with mathematics and has brought the problems of logic into a shape in which they are accessible to the vast reservoir of mathematical methods), sooner or later a genuine logician cannot evade the question of what the structures studied by logic are structures of. The problem is that abstract structures are a dime a dozen, and if logic is not to collapse into something like a universal algebra, studying *all* conceivable kinds of structures, there should be a way of picking out those structures that deserve to be considered *logical*. And the way seems open: if logic is to live up to its perennial task of helping us to assess argumentation and reasoning, then clearly the *logical* structures should be marked by their relevance for the study of these phenomena.

The idea that the most basic role of logic is to help us distinguish between correct and incorrect arguments is the point of departure that we share with most philosophers and logicians.[10] Such distinguishing, to be sure, is a very wide-ranging task that can be interpreted in various ways and can be dealt with in very different manners; but sticking to it, in our view, prevents logic from fleeing into an utterly abstract realm disconnected from what we humans really do and what matters to us. In some senses, logic is a matter of the *structural* aspects of our human dealing and thinking and is thus legitimately engaged with studying structures; the legitimacy of this, however, only goes so far as this is instrumental to the sorting out of arguments or enhancing our capability to formulate them clearly.

This means that, though logic can be seen as the most general and most abstract component of theories of argumentation and reasoning, it should not fail to be continuous with the studies of the more mundane aspects of these practices. We find this imperative: in so far as logic is seen as dealing with ideal entities severed from real reasoning and communication, it can yield theories that may be useful only by accident. And we insist that it is not enough to assume that there is *some* connection of the ideal entities and the real practices—we must clearly show what this connection consists in, i.e. how the results of logic, as a theoretical discipline, can help us accomplish the ultimate task of logic: getting a grasp on real arguments and classifying them as correct or incorrect.

10 As Copi et al. (2014, p. 2) put it: "When we reason about any matter, we produce arguments to support our conclusions. Our arguments include reasons that we think justify our beliefs. However, not all reasons are good reasons. Therefore we may always ask, when we confront an argument: Does the conclusion reached follow from the premises assumed? To answer this question there are objective criteria; in the study of logic we seek to discover and apply those criteria."

Thus, studying the rules of logic, we believe, should be based on the identification of the rules that (as a matter of fact) govern our natural languages, especially the most general of them. And there is, in our view, no other source of the neat rules studied by logic than these somewhat scrappy rules implicit in our linguistic practices. It is we who abstract the neat rules out of the scrappy ones in a process of *reflective equilibrium*, which we will discuss in detail in this book.

It follows that the rules of logic, such as *modus ponens*, are neither a gift of god nor a kind of (pseudo)natural law governing our thought, they are—purified versions of—the rules that have come to govern our languages during the process of their evolution. These rules are distinctive in that they interlock in a uniquely fruitful way which opens space for a 'propositional organization' of our talk and thought.[11] It is certainly no coincidence that all of the known natural languages incorporate a structure of this kind[12]—it seems to be a kind of an 'attractor' of evolution of our species. In this sense, logic addresses rules that are constitutive to our reasoning and to our distinctively human thinking.

11 An essential component of our human way of thinking is what we call reasoning and what is typically seen as a process consisting in moving from propositions to propositions.

12 It does not seem to be too daring a generalization to assume that every natural language contains something like conjunction, disjunction, negation, quantification . . . (though in different languages they can acquire more or less different surface forms – see, e.g., Bach et al., 1995, for the case of quantification).