Logic and **L**ogical **P**hilosophy
Volume 31 (2022), 183–207
DOI: 10.12775/LLP.2022.004

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Logica Dominans vs. Logica Serviens

Abstract. Logic is usually presented as a tool of rational inquiry; however, many logicians in fact treat logic so that it does not serve us, but rather governs us — as rational beings we are subordinated to the logical laws we aspire to disclose. We denote the view that logic primarily serves us as *logica serviens*, while denoting the thesis that it primarily governs our reasoning as *logica dominans.* We argue that treating logic as *logica dominans* is misguided, for it leads to the idea of a "genuine" logic within a "genuine" language. Instead of this, we offer a naturalistic picture, according to which the only languages that exist are the natural languages and the artificial languages logicians have built. There is, we argue, no language beyond these, especially none that would be a wholesome vehicle of reasoning like the natural languages and yet be transparently rigorous like the artificial ones. Logic is a matter of using the artificial languages as idealized models of the natural ones, whereby we pinpoint the laws of logic by means of zooming in on a reflective equilibrium.

Keywords: logic; logica dominans; logica serviens; the nature of logical laws; logical knowledge

1. Two views of logic

Logic, we all know, is a traditional field of study. Perhaps not as ancient as mathematics or astronomy but it still belongs to the long-established enterprises of human theoretical thought. But logic is not always seen as a purely theoretical enterprise. This is witnessed by the medieval distinction — once important but nowadays somewhat out of fashion — between *logica docens*, logical theory that is taught and learned, and *logica utens,* the practical logical know-how of all those who use language

Special Issue: Logics and their interpretations. I. Guest Editors: H. Antunes and D. Szmuc

Published online February 4, 2022

and think [see, e.g., Klima, 2008]. We are convinced that this is a useful distinction (and we think that scholars interested in the philosophy of logic should appreciate its significance). However, in this paper we want to draw attention to another distinction concerning logic, a distinction that is, in our view, especially pertinent today. To commemorate the medieval distinction, we will use similar Latin terms for the one we put forward.

Our initial question is: What is logic good for? This appears to be a natural question. And already Aristotle's writings suggest a rather straightforward answer: logic is primarily a kind of *tool*, a tool of rational inquiry and convincing demonstration, as well as a tool which helps to recognize fallacious patterns of reasoning.[1] This seems to be a reasonable answer, and we conjecture that not many current logicians would disagree. However, is this answer really so generally accepted? And is it correct? We think it is correct, but we also think that many contemporary logicians, though perhaps paying lip service to it, in fact treat logic quite differently. Their approach to logic is such that it does not ultimately serve us as a tool, but rather dominates us; we are subordinated to its laws,[2] the laws restrain our rational thinking in a similar way in which laws of nature restrain our behaviour. So should we see logic as our servant, or rather as our master?

Let us call the view that logic primarily serves us as *logica serviens*, while denoting the thesis that it primarily governs our reasoning as *logica dominans*. If we accept the latter view, then logical inquiries do not primarily aim at producing or upgrading tools which are to serve our objectives (similarly as a saw or an electric drill serve to make carpentry more efficient), logic rather aims at revealing the laws valid in a specific domain of reality.[3]

[1] Cf., e.g., the first book of *Topics* [Aristotle, 1984, p. 167]: "Our treatise proposes to find a line of inquiry whereby we shall be able to reason from reputable opinions about any subject presented to us, and also shall ourselves, when putting forward an argument, avoid saying anything contrary to it."

[2] Frege [1893, p. xv] says: "logical laws [...] are the most general laws, prescribing how to think wherever there is thinking at all".

[3] It is clear that even the production of tools, such as saws, must respect (and perhaps take advantage of) the laws of nature. Similarly, insofar as there were some laws of logic on the level with the laws of nature, the building of logical tools would have to respect them. But even so, there is a substantial difference between capturing the laws and articulating rules for constructing artefacts. The former are inescapable

From the outset of modern logic in the nineteenth century, we encounter logicians subscribing to both positions; though we must keep in mind that explicit declarations are one thing, while a stance implicit to what one is doing is another. (And we must also keep in mind that some logicians, throughout their career, make claims which indicate that they fluctuate between the two not really compatible views.[4])

Frege [1879, p. 6], in the well-known passage from his *Begriffsschrift*, compares his artificial language to a tool, such as a microscope:

> I believe that I can best make the relation of my ideography to ordinary language clear if I compare it to that which the microscope has to the eye. Because of the range of its possible uses and the versatility with which it can adapt to the most diverse circumstances, the eye is far superior to the microscope. Considered as an optical instrument, to be sure, it exhibits many imperfections, which ordinarily remain unnoticed only on account of its intimate connection with our mental life. But, as soon as scientific goals demand great sharpness of resolution, the eye proves to be insufficient. The microscope, on the other hand, is perfectly suited to precisely such goals, but that is just why it is useless for all others.

Here Frege explicitly endorses the *logica serviens* position. Peirce [1882, p. 378] characterizes logic in a different way, yet to a very similar effect:

> "*Dyalectica*," says the logical text-book of the middle ages, *"est ars artium et scientia scientiarum, ad omnium aliarum scientiarum methodorum principia viam habens,"* and although the logic of our day must naturally be utterly different from that of the Plantagenet epoch, yet this general conception that it is the art of devising methods of research — the method of methods — is the true and worthy idea of the science.

According to such views, logic is not — or is not primarily — a theory, it is something to help us build theories and engage in other sorts of rational activities.

But there are thinkers who characterize the mission of logic very differently. Boole [1854, p. 2], unlike Frege or Peirce, sees his calculus of logic not as a tool, but as a theoretical means of capturing the laws of thought:

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and valid independently of us and our needs and goals; the latter result from our needs and our invention and can be avoided (if we decide to ignore the needs).

[4] Thus, while Frege presents himself in the quote to follow as the partisan of the *logica serviens* position, the quote in footnote 3, from the later period of his career, shows him rather as an exponent of the *logica dominans* view.

> [The treatise *The Laws of Thought*] is designed, in the first place, to investigate the fundamental laws of those operations of the mind by which reasoning is performed. It is unnecessary to enter here into any argument to prove that the operations of the mind are in a certain real sense subject to laws, and that a science of the mind is therefore possible.

He accentuates the parallel between logic and natural sciences, and especially the fact that objects of their study are both law-governed in the same sense — thus subscribing to the *logica dominans* position. Russell [1919, p. 169], concurs:

> Logic, I should maintain, must no more admit a unicorn than zoology can; for logic is concerned with the real world just as truly as zoology, though with its more abstract and general features.

In the following pages we want to address these conflicting pictures of the nature of logic and present arguments in favour of the first one — the *logica serviens* view. The plan of the paper is as follows. In the next section we consider the relationship between logic and reasoning (as logic is standardly considered to be the theory of reasoning); and we state that the relationship can be construed in two ways corresponding to the *logica serviens* and *logica dominans* paradigms, respectively. In §3 we consider reasons why philosophers and logicians embrace the *logica dominans* paradigm; while in §4 we point out that this paradigm is not always embraced consciously and explicitly and we argue that its acceptance follows from presupposing a "genuine" language, which is needed by anybody who wants to have a "genuine" logic. In §5 we point out that discussions taking for granted that there is such a *genuine logic* (or, for that matter, a collection of *genuine logics*) are misconceived. In §6 we go on comparing the two paradigms and arguing that we should embrace the *logica serviens* one. In §7 we then consider how the laws of logic look from the viewpoints of the two paradigms.

2. Logic and reasoning

To be able to adjudicate whether logic intrinsically serves us or rather dominates us, it is important to make clear what exactly is in question. And for this we must specify what can be meant by the term "logic". The use of the term in the contemporary philosophy of logic lies ambiguously

between denoting a certain discipline, denoting specific theories (or constructed calculi with their fixed "laws") within the discipline (logics) or, less commonly, denoting that which the theories are meant to capture — the relevant subject matter, some *pre-theoretical logic* (*logica utens*?).

The bulk of philosophers agree that logic is a discipline that originated with Aristotle, who also formulated the first respectable logical theory — syllogistic. After centuries of gradual development the discipline accelerated in the nineteenth century with the establishment of modern symbolic logic. Its enormous boom during the last century resulted in the present state of things. Logic in the 21st century abounds with different theories — with different logics (in the second sense of the term). It is clear that as theories are human constructions, logic as a theory can always be seen as a tool, if only a tool of our potential (fallible) understanding. This is hardly overly controversial. The debate, however, becomes much more interesting if it is posed as concerning the subject matter of logical theories.

Logic is usually presented — in logical textbooks and elsewhere — as a theory of *reasoning*. But what, precisely, is understood as reasoning is typically not further clarified. Different specifications of the concept of reasoning, however, can lead to different conceptions of logic. We can, for example, understand reasoning as a specific process that occurs in human (and perhaps also animal?) brains. The relevant processes can be studied by neurophysiology or psychology but reasoning in this sense obviously cannot be studied by the methods of logic.[5] Another option is to identify reasoning as a mundane practical activity in which we are engaged when we argue or reason (orally or in writing), just as we are engaged in, say, cooking or carpentry. Then it comes to us naturally to see logical theory as anatomizing this mundane activity from a specific viewpoint and as helping us to advance it so that our communication in certain areas becomes more accurate, effective and compelling. Unsurprisingly, this requires a lot of abstracting and schematizing which is, nevertheless guided by the practical purpose.

However, we can also conceive reasoning as something less earthly — as something which underlies any mundane activity such as human argumentation. Reasoning in this sense can be seen as following the proper

[5] Frege [1879, p. 5] made a crucial point about this: logic does not concern how we reach a conclusion in our minds/brains, but how a proof of the conclusion is to be carried out.

way in the complex network of inferential links between thoughts or propositions in some "third realm", where they reside independently of our antics. If we adopt this perspective then real argumentation — a specific sort of human interaction — appears to be just a more or less successful navigation through these pre-given routes. We can then aspire to study the principles, which determine the success of the navigation, in a way which may be seen as parallel to the way in which we reveal and study natural laws (and eventually exploit the knowledge to our benefit).

The core of the issue becomes clearer when we consider logical laws as the most crucial items logic is supposed to grasp. This does not seem to be a very controversial assumption; but it is exactly here where the distinction between *logica serviens* and *logica dominans* comes into the open. One possibility, the *logica dominans* possibility, is that logical laws are very much like natural laws: they govern the domain of reasoning with unshakeable authority, which we cannot tamper with, but which we can only respect.[6] Another possibility, corresponding to the *logica serviens* notion, is that the so called laws of logic are akin to "rules of carpentry": they are rules instructing us what we should do to achieve desired aims related to our communicative interactions, like removing ambiguities which obscure them and minimizing the space for disagreement as to what follows from what.

If we subscribe to the *logica dominans* paradigm then it is natural to see the laws of logic as something that we simply try to discover in a similar way that we try to disclose the laws of nature. The project of logic is then plausibly seen as an attempt to ensure that our fallible reasoning manifested in oral debates or in writings will at least sometimes — ideally any time when clarity and reliability are important — follow the correct route through the inferential network of propositions, which can be called Reasoning (with the capital "R"). The subject matter of logical research, according to this picture, are the laws of "pure" Reasoning independent of any mortal reasoner and any parochially human language.

One might wonder whether the *logica dominans* view is really incompatible with the *logica serviens* view – whether we really face a dilemma.

[6] For example Sher [2020, p. 349] says: "Just as the normativity of physics is due to truths about physical laws, the normativity of logic is due to truths about formal laws. And it is a special feature of formal laws — their especially strong degree of invariance (to be explained below) — that is responsible for the special normative force of logic, that is, for the fact that its normativity is in a certain significant sense greater than that of physics and biology and most other disciplines."

The simple answer would be that the views are incompatible because of the use of the word "primarily" in their characterizations. (*Logica serviens* is the view that logic *primarily* serves us, while *logica dominans* is that it *primarily* governs our reasoning.) The more elaborate version of the answer is that certainly there is a substantial difference between laws that hold independently of us and rules we put together to make up a game or an institution including the institution of natural language.

Consider a game like basketball. Though it is clear that the game may not be able to exist in its actual form if the physical laws were substantially different from the current ones, it would be quite strange to claim that its rules are partly determined by natural laws and partly by the rules sanctioned by FIBA. The game is a fully human invention — natural laws are not among the rules determining it, they are just part of the background. (The fact that a theory of the laws, like any theory, can be seen as a tool is obviously irrelevant.)

If we do not want to accept the assumption about the independence of reasoning of the existence of reasoning creatures, there is an alternative way to embrace the thesis *logica dominans.* We can see logical laws as principles that foster the proper working of the cognition of our kind of animals — *Homo sapiens sapiens.* Just as if we want our stomachs to work properly, we must observe certain principles of alimentation, we have to observe the principles of logic if we want our cognition to work properly. The laws of logic in such a case do not describe an ideal process of Reasoning, but reveal the proper working of the mind of human reasoners — a specific kind of animal that has evolved on our planet.[7]

3. Motivations

Let us consider the reasons why philosophers tend to embrace the *logica dominans* paradigm in greater detail. One of the crucial ones, in our view, is what Dewey aptly calls *the quest for certainty* — the widespread tendency to view theoretical projects that don't yield definite knowledge as flimsy. It is not surprising that for many researchers the idea that true theoretical knowledge must be ultimately firm and hence concern a realm of ultimate reality is attractive. Those who are intrigued by such

[7] A version of this view is defended by Hanna [2006], as discussed later.

an epistemic perspective are likely to demand that logic should deliver permanent and necessary principles which guarantee that our knowledge is properly organized.[8] And they naturally presume that principles governing organization of such knowledge — including the principles of correct inference — must be certain and not merely a matter of convention.

Some of the philosophers think that the laws of logic are akin to natural laws because they *are* a sort of natural laws, or because they are *derived from* natural laws. Thus Sider [2018, pp. 115–116], for example, directly subscribes to Russell's view quoted above:

> Against logical conventionalism, I uphold Russell's [1919, p. 169] diametrically opposed position: "logic is concerned with the real world just as truly as zoology, though with its more abstract and general features". Evaluating logical expressions for joint-carving is therefore not different in kind from evaluating any other expressions for joint-carving.

Or consider Sher [2016, p. 269]:

> [T]he reality of certain laws or regularities in the world has the power to establish at least some paradigmatic claims of logical consequence, ones that accord with logic's designated role in our system of knowledge. [...] logic is grounded in reality at least in the negative sense of being constrained by reality and [...] it is also grounded in reality in the positive sense that certain laws governing reality sanction, or give rise to, logical consequences.

There is a specific, very popular version of this view, a view that the world determines logic via language, namely via making some of its sentences true while making others false. This making true or false has, so the story goes, nothing to do with logic, but once it is accomplished, the task of logic is to construct a relation of inference, which is to copy, as closely as possible, the relation of truth-preservation. The story is based on the assumption that truth has nothing to do with actual reasoning and its theories, and hence sentences (or propositions) have their truth conditions independently of how these sentences (propositions) get interconnected by our practices of talking and reasoning. (This is an assumption we reject for we see truth as inseparable from justification, but there is no room to argue for this in the current paper.)

[8] Dewey [1929] is critical about the quest — he suggests that it involves an attempt to separate theory from practice, or, in other words, knowledge from action. According to Dewey, however, knowing cannot be separated from doing. We concur and add that his insight applies also in the area of logic.

Another reason to endorse the *logica dominans* paradigm is the conviction that the laws of logic are laws governing our thought. A recent example of a view belonging to this broad category is outlined in Hanna [2006]. Hanna tries to crossbreed Kant with Chomsky and sees the source of logic in human "logic faculty":

> [*L*]*ogic is cognitively constructed by rational animals*, in the sense that all and only rational animals — including, of course, all rational humans — possess a cognitive faculty that is innately set up for representing logic, because it contains a single universal "protologic," distinct in structure from all classical and nonclassical logical systems, that is used for the construction of all logical systems. [Hanna, 2006, p. xiii]

Unsurprisingly, more common than Hanna's biologically grounded version of the *logica dominans* view is other, more traditional, picture. It does not conceive thought as a product of cognitive faculties of minds of us earthlings, but considers its ideal archetype – "pure thought". (This term can be found in writings of some fathers of modern logic, like Frege or Dedekind, but without a clear explanation.)

Some of the exponents of the *logica dominans* paradigm see logic, in effect, as a pure "formal metaphysics" capturing certain specific facts. A survey of views subsumed under the heading "logical realism" is presented by Tahko [2021] (who manages to deal with the nature of logic wholly without using the words "reasoning" or "inference"). However, even the "logical realists" tend to justify their "metaphysical" goals by reference to practical epistemic achievements – like the foundations of reasoning and inference. Thus, Sher [2020, p. 343] associates logic with "a powerful method of expanding our knowledge through inference", while Maddy [2014, p. 93] ponders the question "what makes our logical inference reliable?".

A specific position that attempts to combine a version of logical realism with a radical pragmatism is outlined by Priest [2014]. Priest introduces the term *logica ens* which amounts to "what is actually valid: what really follows from what" (p. 212). Alternatively he characterizes *logica ens* as "the facts of what follows from what — or better, to avoid any problems with talk of facts: the truths of the form 'that so and so follows from that such and such' " (p. 220). This sounds as an exposition of the *logica dominans* view. But Priest also suggests that logic is importantly different from natural sciences — "realism about the physical world is simply common sense. But logic is not a natural science. It

is a social science, and concerns human practices and cognition. When a theory changes in the social sciences, the object of the science may change as well. One has to look only at economics to see this" (p. 220). Thus one wonders: Are logical laws (or some of them?) on the same level as the law of supply and demand? ("When free-market economics became dominant in the capitalist world in the 1980s, so did the way that the then deregulated economy functioned. So, in the social sciences one is not automatically entitled to the view that a change of theory does not entail a change of object", p. 220.) But economic laws surely do not hold generally — people can design economic environments with their special "laws" (as, e.g., communist regimes tend to do). Insofar as Priest wants to admit something like this, his position starts to look as indistinguishable from the *logica serviens* view. Priest's concept of *logica ens* thus may appear to reconcile some aspects of the *logica dominans* and the *logica serviens* positions — especially the objectivity of logical relations with their social relativity. We, however, suspect that this reconciliation is not a promising project — any attempt to put it on a completely firm foundation will eventually push it either to the side of *logica dominans*, or to that of the *logica serviens*. (Unfortunately, to our knowledge, Priest has not elaborated his notion of *logica ens* to such an extent that it would be possible to assess its viability.)

In contrast to versions of logical realism, the deepest conviction of those who see logic as *logica serviens* is that logic as a discipline offers *tools* — logics as specific theories. This does not mean that logical systems do not have specific structures, that the structures are not very complex, or that the structures cannot be the subject of mathematical or whatever studies. It just means that the rules constitutive of these structures differ from natural laws and the laws of the realm of mathematical structures in that they are formed as means of systematic maintenance and augmentation of our parochially human utensils — natural (and later also artificial) languages. They would not be here if there were not for us humans and our peculiar interests. The rules concern useful artefacts; they are rules more like those which establish what kinds of structure such gadgets as a combustion engine or a flush toilet are to have if they are to serve us well, than like principles governing the radioactive decay of chemical elements or computational complexity of various algorithms for certain mathematical operations.[9]

[9] The relationship between logic and mathematics is complicated. However, here

4. "Genuine" consequence?

Aside from the scholars who subscribe to a version of the *logica dominans* position explicitly, there are those who would not do so, who, however, adopt a framework that necessitates the notion of genuine reasoning (Reasoning). They seem to assume that our reasoning can't qualify as fully respectable unless it can be said to properly embody a canon of such Reasoning, which is not contaminated by the accidentality of our everyday talk and thought. This is indicated by their embracing of the notion of "genuine" reasoning, *viz.* reasoning that is, on the one hand, as full-fledged as reasoning displayed in arguments articulated in English or another natural language, while, on the other hand, being on the same level of precision as proofs articulated in artificial languages of logic or mathematics. The critical point of such vision of reasoning is that this kind of reasoning requires a medium, which can be nothing other than a "genuine" language, a language that transcends any human product and is thus absolute in the sense of *logica dominans*. It might be that someone will find convincing arguments that we can benefit from positing such a language for some theoretical or didactic purposes, but we, as naturalists, are quite suspicious of any theories which hinge on the necessity, reality or even possibility of such a language. Still, it is not difficult to see that even philosophers from which we would not expect that tend to talk as if they find the idea of Reasoning plausible, or even natural.

The question whether some forms of reasoning are valid as such (without adjectives like "classically" or "in S4") has been repeatedly addressed in topical discussions on philosophy of logic. Consider:

> For instance, someone who thinks that "disjunctive syllogism" (the inference from $A \vee B$ and $\neg A$ to B) is not a valid form of inference will, if she accepts a bare minimum of mathematics, agree that the inference is *classically* valid, and will say that that just shows that classical validity outruns genuine *validity*. Those who accept disjunctive syllogism don't

we put stress on the fact that while (pure) mathematics deals with structures that are abstract in the sense that they need not be in any way connected to the real world, logic deals with a specific phenomenon present in the real world, *viz.* human argumentation and reasoning. Thus, it is not enough to call a relation subjected to a mathematical study *consequence* to make the study of its properties into doing logic — it must be shown that the relation approximates a relation displayed by our actual "games of giving and asking for reasons". For an account of mathematics which makes it more continuous with logic, in that it renders both the enterprises as conventional, see Warren [2020].

> just believe it *classically* valid, which is beyond serious contention; they believe it *valid*. Field [2015, pp. 33–34]

According to this view, individual systems of logic give us various versions of (purportedly) logical consequence, but which of them is "genuine", truly Logical (if any of the available ones is) is an open question — a question, to which, nevertheless, there exists a determinate answer. As Field puts it (p. 34): "Whatever logic L one advocates, one should recognize a distinction between the concept 'valid-in-L' and the concept 'valid' "[10]. Hence there, it seems, must be also a determinate answer to the question whether it is correct to reason from premises instantiating a certain form to a conclusion instantiating a certain form. And this correctness cannot depend on which languages humankind might have developed in the course of our history and which languages logicians may have constructed in the last one and half century. There is simply something that is the "genuinely correct" sort of reasoning, and the task of logic as a specific discipline is to pinpoint it.

Field is not the only one to give away — implicitly, and perhaps inadvertedly — this kind of view; in fact, it seems to have come to be quite widely shared. Consider Hjortland [2019, p. 253]:

> No one is disagreeing about, say, whether the law of double negation is *classically valid*. It is, and that is uncontroversial. The disagreement is about whether or not it is *genuinely* valid.

And almost the same view is put forward by Glanzberg [2015, pp. 81–82]:

> [T]he entailments and other implications we do find in our languages, and our wider inferential practices, provide a rich range of examples around which we can structure our thinking about logical consequence. But to do so correctly, we must get away from the entailments and implications of a human language and human inferential practice, and isolate genuine logical consequence.

[10] True, Field is far from a prototypical exponent of the *logica dominans* position. His central question in the paper we refer to is what exactly it is that logicians who have a substantial disagreement about validity disagree about. He takes for granted that classical logicians are convinced that their notion of validity "extensionally coincides with genuine validity" (p. 35), and that logicians are naturally interested to find out whether the logic which they favor does pinpoint genuine validity. We find the adoption of the perspective within which such claims or question appear reasonable as inevitably linked with the *logica dominans* paradigm.

All the mentioned authors thus apparently take the view that there is "genuine" logical validity, and hence there are "genuine" laws of logic for granted. This seems to imply that there is also something like authentic logical reasoning — our Reasoning with the capital "R" — of which logic is a theory. This picture characteristically presupposes authoritative resolution of questions concerning logical validity and is thus associated with tacit or explicit adoption of the *logica dominans* paradigm.[11] We do not want to claim that all the scholars mentioned in this section are logical realists in disguise. We rather want to point out how pervasive the the assumption that logic must be firmly anchored in a realm that transcends human affairs is. We think we must get rid of this superstition and try to discard the terms like "genuine consequence" or "genuine logic" from our vocabulary.

5. Tools that help us reason

We are, we think, entitled to suppose that not only those who are ready to advocate the *logica serviens* conception but also those who explicitly or implicitly adopt the *logica dominans* picture agree that good logic can and should be useful. But what exactly it is that logic helps us with? Logic, as we have said, is supposed to formulate laws that tell us how we should think rationally and how we should construct trustworthy justifications and proofs. It is, however, not quite easy to say what exactly such "telling" amounts to. Consider a logical law, such as the disjunctive syllogism considered by Field in the above quotation:

(DS) $A \vee B, \neg A \vdash B$

Or consider one of Aristotle's putatively valid syllogisms, such as

(Bamalip) Every P is M, Every M is $S \vdash$ Some S is P

There are reasons to think that logical laws such as these do *not* instruct us directly that if we hold beliefs exemplifying the forms of their premises

[11] Acceptance of the paradigm need not be associated with the acceptance of logical monism. Even logicians who see logic as addressing preservation or transmission of truth need not be diehard monists. Thus, Sher [2020, p. 337]: "if truth is plural — i.e., there are different types of truth – then the preservation (transmission) of different types of truth might be based on different principles, giving rise to, or requiring, a plurality of logics".

(e.g., *It rains or it snows* and *It does not snow*, resp. *Every man is a mammal* and *Every mammal is an animal*), we should also hold the pertinent belief which exemplifies the form of their conclusion (*It rains*, resp. *Some animal is a man*). This was pointed out by Harman [1986] and has been commonly accepted since then [see, e.g., Steinberger, 2019]. The rules in question are thus not anything like straightforward instructions concerning the management of our beliefs. The ensuing questions like *Are they instructions concerning something other than beliefs?* or *Should they be seen as* instructions *or as something else?* are certainly worth attention, but they are not so central for us here. We want to turn attention to the fact that logical laws always feature "logical constants", like "$\vee$", "$\neg$", "every" or "some", and hence must be articulated in a context of a language which contains such expressions. But which language?

Traditionally, the laws were formulated in natural languages and logical treatises had the form of commentaries, resp. advices concerning the right usage (both overt and covert) of these languages. (Bamalip), for example, contributes to the introduction of standards concerning the proper use of common "quantitative" expressions in rational discourse. When we look at modern logic, we can see that its protagonists are preoccupied with developing new artificial languages — their main ambition is to introduce novel logical constants and study how they "behave" within the relevant, formally delimited, ever more complex and sophisticated systems.

Should we see the enterprise of logic as a tireless process of improving our languages, the basic vehicles of our reasoning? We are convinced that such an effort aiming at the improvement of the languages is something that makes sense: to underpin our fuzzy and haphazard natural languages by something more exact, more orderly and more transparent seems quite desirable.[12] In such a case the main benefit of "the project of logic" would be the production and honing of the tools with which — or in terms of which — we can (and in some cases should) reason and argue. Adherents of the *logica serviens* view would surely agree. In the course of evolution, they would maintain, we have developed certain vehicles of reasoning, natural languages (not purposefully, of course, more in a way like birds developed their wings and predators their claws), and then, at

[12] Not that we would think that we could throw away our natural languages and replace them with their artificial substitutes. But it is clear that the artificial languages can help us see imperfections and gaps in the natural ones and they can thereby help us bridge them.

some point, we took over the initiative and launched the project of upgrading them purposefully. (Of course, we know that various more or less purposeful local enhancements of our languages have been taking place beyond the boundaries of logic, especially in the context of the sciences.)

But we can also interpret the development of artificial languages as complying with the *logica dominans* paradigm. We may see the enterprise so that it doesn't aim at developing ever better (more useful) vehicles of our reasoning, but rather at producing (ever better?) surrogates of the ultimate vehicle of Reasoning — an otherworldly "language in itself". Such ideal language is independent of any contingent development of natural languages. All the common languages we humans have brought into being and use are at best approximations of such an ultimate language which exhibits a certain ultimate logic. How exactly one should envisage this language is not quite clear: some might see it as an ideal version of "the language of thought", others as a system of Fregean or Russellian propositions which exist beyond human minds. In any case, insofar as the ultimate laws of logic determine how logical constants function, they do not directly concern expressions in any parochially human language but rather components of the ultimate language.

What is important is that if we agree that the logical laws are inseparable from logical constants, then they make sense only in the context of a language — the language which contains the constants. When we adhere to the *logica serviens* picture we take any language which contains logical constants as only a relatively perfect language (be it a natural language with its unavoidably indistinct logical vocabulary or an artificial quasi-language whose distinct constants are modelled — by means of abstraction, idealization, regimentation, etc. — on the natural ones). If we embrace the *logica dominans* view, then we have to assume that there is something like an ultimate (fully-fledged) language of which *logical constants proper* are components. Nothing short of a perfect language — a pure "language in itself" — would do.[13]

Within modern logic, the idea that reliable reasoning necessitates a "language in itself" has often mutated into a tacit assumption that there must be a system "behind" natural languages, a system of structured meanings expressed, often quite imperfectly, by expressions of natural

[13] Such a language, needless to say, is unique only in some structural sense — *viz.* embodying the structures carried by logical constants. We can thus, strictly speaking, consider more languages all of which are perfect.

language. From Frege onwards, many logicians came to construe the semantics of natural language as a system of entities parallel to that of expressions of the natural language[14] and existing independently of it. In this way, the "language in itself" may cease to look esoteric: it is the system of what we can mean by expressions of the overt languages — the system of propositions and their parts. (However, as Hanjo Glock once put it in a lecture, if a typical language consists of a medium and a message, this unusual "language" is only a message without a medium.)

6. Good servant, bad master

The most serious weakness of the *logica dominans* thesis consists in the fact that it is impossible to refute and hence it is, in this sense, vacuous. We can criticize or refute proposed logical theories, but there is no way to compare them with the alleged reality they are supposed to replicate or approximate. There is no experiment that would allow us to decide if the genuine — objectively valid — logic is the classical predicate logic, paraconsistent logic or fuzzy logic. We can have intuitions that our thought is objectively more rational when we follow a particular logic, but measuring the proximity to the alleged ideal Reasoning is beyond our ken. We cannot but hope that our logical theories (or at least some of them) do approximate its genuine logic.

Moreover, as we keep pointing out, the *logica dominans* paradigm makes logic dependent on the idea of a "genuine" language. It is hard to imagine how we could investigate this genuine Logic, how we could gain access to the language which is its supposed substratum. Though some philosophers do like to talk, e.g., about a language of thought as if it were a reality, no evidence from the relevant sciences, like empirical psychology or neurophysiology, seems to be forthcoming. And searching the language in a human independent ideal sphere suffers a similar lack of underpinning evidence. Of course, we can claim that we have the evidence from some kind of Platonic recollection or an *a priori* analysis, but we do not think this is the kind of evidence a rational inquirer should accept.

The alternative paradigm, *logica serviens*, is fundamentally different in that, according to it, the measure of logicality or rationality of specific

[14] In algebraic terms, we can see the language as a many-sorted algebra and the system of meanings as a similar algebra, the semantic interpretation of the former in the latter being a homomorphism — a picture presented vividly by Janssen [1986].

ways of reasoning is not a reality independent of us, it is based on what is accessible for us, thinking beings. We judge the measure of logicality of our theories by their usefulness, by the extent to which they help us attain our goals (which are not always clearly given in advance), e.g., the goal of relative reliability and public control of our ways of reasoning and argumentation in various areas of discourse. Logic understood thus does also have a regulative role, but not a non-negotiable one — it is at least partially dependent on our acceptance of certain conventions (such as the convention of regimenting the English connective "if-then" in some of its uses by material implication). Also, in this case we must agree to respect certain logical laws and in this sense we do follow the rules of logic. (We follow the rules of logic to a certain extent similarly as we follow the rules of traffic — our submission to them brings us, individuals as well as communities, certain benefits.)

Take Aristotle's (Bamalip) syllogism presented above:

(Bamalip) Every P is M, Every M is $S \vdash$ Some S is P

Is it capturing a case of "genuine" consequence? It is easy to see that it is equivalent with[15]

(Bamalip*) Every P is $S \vdash$ Some S is P

and hence with[16]

(Bamalip**) Every P is $S \vdash$ Some P is S.

This is an inference pattern which is, when expressed in the language of standard modern predicate calculus, notoriously *not* sanctioned by the logic and hence presumably rejected by those of our contemporaries who have some logical schooling (while we conjecture that it would be accepted by a great many of those who do not have such schooling). Hence, it is controversial; but this is no obstacle. The point is that it sets a standard for handling "every" and "some", and such a standard need not quite coincide with common sense.[17]

[15] Substituting S for M in (Bamalip) yields (Bamalip*), while (Bamalip) is yielded by the composition of (Bamalip*) with the valid syllogism (Barbara): Every P is M, Every M is $S \vdash$ Every P is S.

[16] Substituting S for M in the valid syllogism (Dimatis) yields: Some P is $S \vdash$ Some S is P.

[17] We should not forget that (Bamalip) does not really set standards for "every"

Treating logic as *logica serviens* does not necessitate other languages than those which we humans developed to serve our needs. (Not that there would be some definite needs before languages and logic; the needs co-developed with them.) It turns out that the languages we use display something that we may call their (natural) "logical structure", which is important from the viewpoint of argumentation and reasoning. Logical theories then attempt to study and anatomize this structure and help us to establish it as stable, explicit and transparent; and perhaps improve on it by way of its — inventive — regimentation. This "fixation" of the logical structure then, if it is widely approved, may set normative standards of a proper use of our natural languages.

On the *serviens* construal, logic is normative in two ways. First, meaningful talk with its (proto)logical rules evolved as a rule-governed "game": just as it takes the rules of chess to constitute pawns, rooks, queens, etc. with which we can play amazing games, it has taken the rules of a language to constitute conjunctions, negations, implications etc., with which we can carry out our invaluable logical reasoning. The spontaneously evolved rules of language were, however, only implicit, fuzzy and haphazard, and it took logical theories to turn them into explicit and polished rules. And thereby, second, logical theories acquired the authority to adjudicate the correctness of application of the logical tools — directly in the relevant artificial languages and indirectly in common argumentation using natural language.[18]

However, the "logical structure" of natural languages is not something clear-cut and definite. It turns out that human natural languages display certain parallels with each other — all of them possess some means of quantification, means that allow for denying (negating), some ways of expressing conditionals, etc. In different languages, these means may have more or less different shapes; hence, saying that they share a "structure" cannot be taken literally — it takes a lot of theoretical work and a certain amount of creativity to articulate a structure such that the different languages may be seen as its embodiments.[19]

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and "some", but for their Greek counterparts. And the Greek counterparts need not be completely equivalent with the English terms, so it might be the case that our views of (Bamalip) differ from those of ancient Greeks simply because of the difference of the meanings of the words.

[18] We have discussed the problem of normativity of logic in detail elsewhere [see Peregrin & Svoboda, 2021].

[19] It is worth noting that the "logical structure" is merely one of many features

Of course, once we establish this structure, we may see it as "governing" our reasoning, in the sense that it is this structure that is displayed by our languages, which turned out to be an efficient means of communication. The crucial difference between the *logica serviens* thesis we endorse and the *logica dominans* thesis we reject is that in case of the former all logical structures are our creations (similarly as saws or drills). We don't want to get involved in intricate debates about whether structures such as mathematical objects reside in a domain of their own or are human constructs. We only insist that which structure is rightly called *logical* and which not is not given in advance but is rather a matter of our consideration — a matter of (the sometimes difficult) deciding whether the structure can *serve us as logical* (as a means of useful modeling of our argumentative practices).[20]

In the case of the *logica dominans* conception, a certain logical structure is imposed on our reasoning (and perhaps secondarily on our languages) from without. Then there are two possibilities: Then there are two of our theories — perhaps CPL — perfectly capture the genuine Logic (and then this theory is the only right logic, and competing logical theories are called *logic* only thanks to the confusion originating in our epistemic limitations — i.e. a lack of insight into the realm where Logic resides). The second option is that all hitherto proposed logical theories are just imperfect approximations of the genuine Logic. Then some (perhaps most) of the proposed theories may perhaps be called logical. But again, due to our epistemological limitations we are often unable to decide which of the theories deserves the epithet *logical* more and which less or not at all. We lack the insight which could provide the ultimate benchmark of the real logicality of our logical languages, and there doesn't seem to be any prospect for gaining it.

7. Laws of logic

Consider, once more, an inference pattern like (DS). From the viewpoint of *logica dominans*, we cannot help but try to decide whether it actually

common to natural languages across the board. (Such features are due to the general similarity of human communities and the humans that constitute them, and due to the similarity of needs and aims such communities have.) Every language, for example, contains phenomena like anaphora, presuppositions, past and future tenses etc.

[20] We address the question how theories gain the status of logical theories in [Peregrin & Svoboda, 2017].

holds or not. (If it does, then it is a fact of a similar kind as the one that Newton's second law holds.) But it is wholly unclear how to test whether it does. It is clear that (DS) does hold in the most common logical systems, such as classical logic or intuitionistic logic, but these are systems that we fabricated by means of our definitions, and it is not clear how our deliberate definitions can bear on what *really* holds. It is also probable that this rule holds for English (with "or" in place of "$\vee$" and "not" in place of "$\neg$"[21]), but again, English is a product of a contingent development and it is not clear how this would be relevant for what "really" holds. (Someone might insist that between the natural logic of English and real Logic there must be a kind of pre-established harmony, but to substantiate that this is not merely wishful thinking would be very difficult.)

When, on the other hand, we view (DS) from the viewpoint of *logica serviens*, then it belongs to the idealized model of what turns out to hold across natural languages couched in an artificial language.[22] We have already stated that every natural language — as far as we know — contains words and phrases that function as disjunctions and negations, which are perhaps not direct equivalents of English "or" and "not", but similar enough for us to talk about disjunction and negation across languages. (DS) is then an idealized articulation of what usually binds these two kinds of expressions together — how they are correctly used by the lights of the speakers. Hence, the comparison of different languages indicates that a disjunction and a negation obeying the rule (DS) are close to indispensable utensils of any effective vehicle of reasoning. (Just as a saw is close to an indispensable utensil of any effective carpentry toolbox.) In this sense (DS), as well as other laws that respectable logics cherish, are close to *sine qua non* components of an acceptable theory of rational reasoning — we can say that they hold necessarily.

It is, however, important to appreciate that the mission of logic within the *logica serviens* paradigm does not consist in describing a kind of linguistic reality — logicians as if "finalize" the rules which they extract from natural languages and give them canonical shapes. This process has

[21] The relationships between natural languages and the artificial languages we have developed for the purposes of their regimentation and formalization, i.e. criteria for what is usually called logical analysis, are far from transparent [see Peregrin, 2020; Peregrin & Svoboda, 2013].

[22] A vivid picture of the process by which such models are formed is presented in Shapiro [2001]

the character of converging to a *reflective equilibrium*.[23] The "finalizing" naturally opens space for competition of logical theories (which are all in comparable equilibria). Thus this paradigm, unlike the *logica dominans* paradigm, matches up with the scenery of present-day logic which accommodates numerous (sometimes diverging) theories and whose development doesn't seem to promise anything like the eventual convergence of all the knowledge and its culmination in a single comprehensive theory (a natural final aim of those who believe in Logic).

Logic from the perspective that we promote does not aim at finding the only right logical language but at proposing languages that are suitable to serve as respected conventions and which help guarantee that people don't talk past each other; that, for example, mathematicians can reach an agreement on what a respectable proof must look like. And if they disagree about this, that they know where the disagreement resides.[24] This perhaps may appear as a minor achievement for a discipline that should, according to the common picture, provide certainty, but we are convinced that logicians are likely to do better if their ambitions are modest but realistic rather than if their goals are grand but illusory.

8. Conclusion

Pursuing "genuine" logical laws, that is, submitting to "heavenly" logic as an adoption of the *logica dominans* thesis would require, leads us into a blind alley. Logical laws are not something that has nothing to do with us, something that we must discover just as we discover natural laws. Logic is not, as Wittgenstein [1956, §I.8], put it, "a kind of ultra-physics, the description of the 'logical structure' of the world, which we perceive through a kind of ultra-experience (with the understanding e.g.)". Logic is our creation, our tool, and we should grasp it as such — as *logica serviens*. We are aware of the fact that this account contradicts

[23] The principles of formation of theories leading to a reflective equilibrium in the realm of logic are examined in [Peregrin & Svoboda, 2017]. The principles were foreshadowed already by Goodman [1955]. For discussions of the concept of reflective equilibrium see, e.g., [Brun, 2020; Cummins, 1998; Elgin, 1996].

[24] That there is a space for meaningful (though not radical) disagreement in the assessment of individual logical sentences, as well as for disagreement about which system of logic is closer to the natural logic of a particular language or which logic will better serve our interests (and hence also a space for talking past each other), is convincingly established in [Warren, 2018].

the deepest intuitions of many logicians, as it seemingly undermines the authority of logic. We, however, believe that in view of the turbulent development of modern logic, which has brought about a host of competing theories, it is the only tenable position. Any attempt to sort the various theories according to their genuineness is clearly futile.

We urge a specific version of the *logica serviens* view. It is a thoroughly naturalistic picture, but not naturalistic in the sense that it would strive to ground logic in non-human nature. The relevant natural phenomena which logic rests on are human inferential practices and the languages that are their vehicles. From our naturalistic viewpoint, the only languages that serve as the vehicles of reasoning are natural languages, and possibly the artificial languages logicians have built.[25] However, we have pointed out that the crucial role of the artificial languages is different – they serve as idealized models of the natural ones in the process of pinpointing the laws of logic by means of zooming in on the reflective equilibrium. Those who suppose that there is (or talk as if there were) a language beyond these — an ideal vehicle of reasoning — engage, we are afraid, with regrettable wishful thinking.

Where the equilibrium, in a particular case, materializes, depends, to some extent, on the goals with which we approach reasoning. But as soon as we adopt a logical system as our standard we are bound to recognize its principles as having normative force. It follows that respecting logical principles is not so much a way to achieve some kind of final certainty concerning validity of inferences, it is a way to assure our mutual understanding or, more realistically, to narrow down, as much as possible, the space for misunderstanding (and thus to widen space of meaningful communication).

Acknowledgments. Work on this paper was supported by the grant No. 20-18675S of the Czech Science Foundation. The authors are grateful to Georg Brun, Vít Punčochář, Martin Steiner, Vladimír Urbánek and Marta Vlasáková for valuable help and critical comments.

[25] We discuss the relationship between our stance and the position of "anti-exceptionalism" elsewhere [see Peregrin & Svoboda, 2021].

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