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Logický pluralismus v historické perspektivě
Logical Pluralism from Historical Perspective
Teze dizertační práce

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2018

1 Logical pluralism and logical monism

The general topic is to some degree vague, which means that also any theses or arguments I propose are partially threatened with a considerable degree of vagueness. The thesis revolves around multiple related and not clearly distinguished issues. One of the formulations could run *I*s logical pluralism true? Yet immediately one has to ask what could logical pluralism mean. Naively put, it is the thesis that more than one logic is correct. But again, in what sense correct? Given these problems with the very formulation of the issue, it is no surprise that logical pluralism was maintained by diverse authors in many different and probably mutually iconmpatible forms. One might be tempted to regard logical pluralism as a flawed thesis or doctrine, yet if it is unclear what sense can be made of logical pluralism, then it must be equally problematic to make sense of the opposite thesis, namely logical monism, which, at least in the most immediate and naive form, asserts that only one logic is correct, be it classical propositional logic, intuitioinistic propositional logic or other logic yet. Matti Eklund, who tried to find some order in the forms of logical pluralism calls his article *Making sense of logical pluralism* (Eklund (fothcoming)). He also admits that if there is a problem with making sense of logical pluralism, then there has to be an analogous problem with making sense of logica monism.

As problematic as any formulations of logical pluralism or monism can be, it is obvious that during approximately the last one hundered years a formidable plurality of mathematical systems which are commonly called *l*ogics has emerged and we have to philosophically tackle the phenomenon in some way. The approach I ultimately arrive at cannot be straightforwardly called neihter pluralism nor monism but certainly is related to both of these opposed viewpoints. The plurality of logics we face today behooves us to ask what criteria determine that a given system, for example a system of syntactic rules, indeed is a logic. In the course of this work I conclude that we neither can determine any definite demarcation criterion for something to be a logic, neither can we straightforwardly decide the controversy between logical monism and logical pluralism. What I arrive at is a general account of what the significance of the plurality of logical systems is and what it tells us about the very nature of logic. This nature, however closely related to

them, is in an important sense independent of the specific systems such as the classical or intutuitionistic logic.

Although I rather try to tackle a contemporary problem of philosophy of logic, I depart from the simple observation that the plurality of logics is a relatively recent phenomenon, given the long history logic has had since Aristotle. I assume that there is a strong intuition that logic should in some sense be very definite. This is witnessed, among others by Quine, who, at least at a later stage of his development, could be seen as logical monist and who asked what should be more conclusive than logic in Quine (1986). It is therefore somewhat paradoxical that there be many logics, as this phenomenon seems to betray that we are not really quite sure about the very fundamental principles of our rationality. In this sense it can be said that until quite recent times, i.e. twentieth century, logicians would agree that there is only one true logic. This trationally pressuposed vantage point does not exclude the possibility that we can have disagreements about what the actual shape of the one true logic is, yet there must be some. It would then be only up to us to gradually discover it. Even though logic underwent signifant turbulences, as when Frege came up with a system which fundamentally differed from the traditional syllogistic, he still did not consider his logic as an alternative to syllogistic which could coexist together with it. Rather he thought that the traditional logic got some of the logical laws wrong while his system corrected what was defective. In similar vein also Brouwer and the intuitionists who tried to revise the shape logic received in course of the Fregean revolution saw themselves as the ones who had discovered the one true logic. Despite the development logic received up to the early twentieth century, the possibility of logical pluralism did not really emerge until later during the twentieth century or even in our century.

In a way we can thus say that until recently, logical monism was the common position. Yet this assertion is somewhat too hasty. As logical pluralism did not really occur and could not be made much sense of, so could neither logical monism have been maintained. It had to be seriously argued that only one logic is in some sense correct. And it is at this point that Kant enters the stage in my thesis. I consider him as the philosopher who tried to substatiate why logic has to be the way it was at his time and therewith prepared the preconditions for a debate between logical pluralism and logical monism to take place. It is true that formal logic, as opposed to what he called transcendental logic, is not so much a focus of his attention. Yet it still plays a very central role in his epistemology and overall philosophy because

also his transcendental logic is founded on the formal logic (in particular, the table of categories is based on the table of judgements). His famous dictum that logic had not made much progress since the times of Aristotle and that it actually was not capable of much progress at all, already testifies that he considered logic as something very stable and his position can be seen as, at the very least, proto-monist.

But as Kant's philosophy of formal logic is not easily extracted from his not very vast explicit treatment threof in his *Kritik der Reinen Vernunft*(Kant (1954)), I have tried to make its significance clear by analogy with his more explicit and discussed treatment of geometry. Similarly to the case of logic, Kant considered this discipline as very fundamental for our rationality, though for our intuition rather than for our reasoning. He was therefore in a way a geometrical monist. Just as in the case of logic, alternative geometries to the geometry he knew emerged which called his views into question yet with hindsight also enabled to regard him as a philosopher who opened the possiblity to discuss the plausibility of geometrical monism and geometrical pluralism. I summarize shortly how the new geometries emmerged (though a more thorough presentation can be found in my article Arazim (2012)) and how elliptic and hyperbolic geometry became established as portrayals of space equally legitimate as Euclidian geometry. The main result of the debates taking place during the nineteenth and early twentieth century, including the debates between Frege and Husserl or between Russell and Poincaré, is, as I see it, that geometry has to be seen from a more holistic perspective, namely as closely cooperating with mechanics. We can thus accept both Euclidian, elliptic and hyperbolic geometry, yet each choice forces us to revise our understanding of physical laws regarding the relations between movement and size of objects, etc. In a nutshell, we have to take more holist perspective. Such a result obviously shows that Kant's view of geometry has to be revised, yet a lot of the Kantian picture could be retained. Geometry still can be seen as description of space as an a priori form of our intuition, even though it has to be seen in a broader context.

This lead me to consider whether a similar holistic shift could lead us to a good account of plurality of logics, as well. An account which would both explain how more logics can be legitimate, yet still make all of them play a fundamental role in our conginitive apparatus in a broadly Kantian way. Given that it proved fruitful to relate geometry to mechanics, what discipline can we connect logic with? Maybe more interesting proposals could be put forward but the most naturally forthcoming one would be mathematics. Frege

famously tried to link logic to mathematics, or at least to arithmetic, when he was attempting to realize his logicist programme. This programme consited in trying to show that arithmetic can be deduced from logical laws and is therefore in fact a part of logic. Although his original endeavour failed, there are attempts at reviving it. Among other kinds of neo-logicism we discuss those which try what is very close to our general goal. Some authors, notably Tarski, Sher, McCarhty, Bonnay and others try to demarcate which systems are genuine logics by linking logic with mathematics. Yet their line of thought is in a way opposite to that of Frege, as they rather try to show that logic is contained in mathematics and not the other way round.

2 The problem of logical constants

The problem the authors just mentioned try to tackle is, though, a little bit more specific than the general problem of plurality of logics we are considering. It is rather the so called problem of logical constants they are concerned with. In fact, two logics can differ in two ways. Either they can share their vocabulary and differ in the way they interpret it. Classical and intuitionistic propositional logics can be metioned as an example of such a pair of logics. Yet two logics can also differ in their vocabulary, for example modal logics expand propositional logic, for instance S5 expands classical propositional logic. Or they can differ in both ways, as intuitionistic logic and S5. Now, when we consider the problem of demarcating logics, i.e., deciding which systems are genuine logics, we can identify a part of this problem, namely to identify the logical vocabulary, standardly called logical constants. Solving the problem of logical constants could thus lead us, for example, to the conclusion that logical constans are exactly those of classical propositional logic. This would, nevertheless leave the question of whether rather classical or intuitionistic or both or other logics yet get the logical laws guiding these constants right.

Given how difficult the general question of demarcating logic appears to be, it is promising to tackle it gradually and begin only with the problem of logical constants. Although this strategy is also not flawless, as it may not always be clear how to recognize that we speak of one and the same logical constant in different logics (mere identity of the signs designating them surely cannot be sufficient), it has been pursued by many authors whose approaches are mostly of two basic kinds. Some authors propose to demarcate logical constants by means of model theory, others by means of proof-theory. We

first consider the model-theoretic approach, as it is pursued in the already mentioned spirit of reviving logicism in the reversed order by showing that logic is a part of mathematics.

3 Model-theoretic demarcations

We diverged a little bit to explain what the problem of logical constants is because the model-theoretic approach to logic is both an attempt to solve this problem and also provides a more holistic conception of logic, which, as we hoped, could provide us a criterion for regarding something as a genuine logic. This approach is founded on the idea that logic should be indentified as the most general of disciplines. John Macfarlane in MacFarlane (2009) claims that when we call logic formal, we can mean three related, yet different things by that. One of them is exactly that logic is the most general discpline which, unlike all the other ones, fully abstracts from what we talk or reason about. For less general discplines, such as zoology, it surely matters whether we speak of horses or rather of dogs, stones, symphonies or something else yet. When we consider a given sentece from zoology, its trut value could certainly be affected by what the expressions contained therein refer to. When a given sentence belongs to logic in the sense that it is true or false due to merely logical reasons, then its truth value cannot be affected by what the expressions contained refer to. For example the sentece *All dogs are mammals* is true for zoological reasons and if we refered to snakes instead of dogs (by substituting the word *snakes* for *dogs*), the sentnce would cease to be true. When we take the sentence *If all dogs are mammals, then all dogs are mammals*, then it is plausibly true for logical reasons and obviously it does not matter at all whether we speak of dogs and mammals or of something completely different.

Alfred Tarski presented this approach very vividly in Tarski (1981), yet it was really fullly developed by Gila Sher in Sher (1991). Tarski was originally inspired, just as we were, by geometry, yet by a different aspect of its development in nineteenth centrury, namely by Klein's Erlangen programme. This programme consisted in characterizing diverse geometries, namely Euclidian geometry, affine geometry and general topology by means of transformations of space, i.e. of bijections mapping points in the space on points in space, thereby possibly interchanging them. Now, the various geometries are characterized by how invariant the notions they speak about are with respect to these transformations. For instance, Euclidian geometry is invarian with

respect to all transformations which map a given figure on a similar figure. In this sense Euclidian geometry is a concerned precisely with forms of figure, while disregarding their dimensions. As such, it is quite a general and abract discpline. Affine geometry and tology go further and are invariant with respect to even wider classes of transformations. Tarski's idea was to generalize this approach as much as possible and consider the notions which would be invariant with respect to all transformations. He proposes to regard the class of these notions as exactly the class of logical notons which neatly corresponds to the mentioned Macfarlane's kind of formality of logic, namely that it is a discipline disregarding identities of objects we speak about. In other words, logic should abstract from what we talk about, which distinguishes it as the most formal and general discipline.

Tarski's approach thus has to got a solid philosophical motivation and could also be buttressed by lots of mathematical results due to Tarski himself but also to Mostowski or Lindström. Yet nowadays, it is rather invariance against bijections between any universes in general which is considered as the optimal criterion. This approach is most vigorously defended and developed by Gila Sher. Yet in spite of all the virtues of this approach, it has its significant drawbacks which ultimately lead us to judge it as inadequate as an account of plurality of logics. First of all, it automatically disregards lots of logics which certaily deserve more consideration as to their legitimacy, for instance the intuitionistic logic. In fact, Sher's system is an expansion of classical logic and no modest expansion. It actually demarcates infinitely many expressions as logical constants, in particular the so called generalized quantifiers. To give an example, consider any cardinal number κ and construct any quantifier claiming that there are exactly κ things satisfying the given formula. Obviously, the number of logical constants is thus formidable and it becomes dubious to consider the class of such constants as a logical system. Furthermore, result by Vann Mcgee and Solomon Feferman have shown that this sytem even contains the full second-order logic and therefore bears all the foundational issues thereof. For example, the continuum hypothesis or its negation must be logical truths of this sytem, which appears to derob logic of its status as a discipline founding our very capacity to reason. Quite to the contrary, our undestanding of the logical constants as demarcated by Gila Sher is dependent on non-trivial results from set-theory. That is why this kind of logicism is reversed with respect to Frege's original programme and purports to show that logic is a part of mathematics.

Some authors, such as Denis Bonnay or Solomon Feferman, have thus offe-

red alternative invariance criteria, which would make the demarcation result in a more modest system, in Feferman's case even in classical first-oder logic. Yet how are we then to adjudicate which of the invariance demarcations actually comes closer to demarcating what really should be logic? Considering the various alternatives and the philosophical background of the model-theoretic demarcations - including an evaluation of Etchemendy's attack on the very idea of model-theory in Etchemendy (1990) - we conclude that despite their great mathematical value, these demarcations cannot themselves help us to philosophically tackle the problem of plurality of logics. We need to make more clear what the role of logic should be, what job it is supposed to do in order to be able to evaluate any demarcation whatsoever.

4 Pragmatic significance of logic

A naive suggestion which with some additional refinements also was and is sustained by prominent authors, such as Sher in Sher (2008), is that logic is here to expand our knowledge. We know some propositions to be true and thanks to logic we can learn about the truth of their logical consequences, as well. Yet it appears that logical consequences of what we know typically do no contain any new valuable information. When we examine the standard rules for the constants of classical logic, as presented in sequent calculus, we see that their conclusions always do not contain anything we would not know already by knowing their premises.

It is thus by far not clear what the role of logic in our overall conceptual schemes should be. Such a situation seems to give support to skepticism regarding logic, as it was voice by Descartes in Descartes (1965) who doubted that logic could be of any reasonable import for our cognitive enterprises, and more recently by Gilbert Harman who in Harman (1986) claims that reasoning according to logical laws not only cannot be very useful but can even cause considerable harm to our conceptual schemes. In order not to fall prey to this skepticism which would also render our quest for a viable account of plurality of logics idle, we have to find an account of pragmatic import of logic which would at the same time acknowledge that logic cannot in any straightforward sense expand our knowledge and still show that logic is an important and even fundamental.

These desiderata are fulfiled by logical expressivism which was first introduced by Brandom in Brandom (1994) and subsequently developed also

by other authors, prominently by Peregrin, for instance in Peregrin (2014). To uderstand what logical expressivism is and subsequently use it for our purposes, we first have to understand inferentialism on which it is based. Inferentialism, then, is a thesis or more generally a philosophical movement which explains meaning in languages by inference rules. A given sentence means what it means by the virtue of inference rules which spell out which other sentences it can be deduced from and which other sentences can be deduced from it together with further additional premises. Thus the sentence *Tristan is a dog* means what it means in virtue of, for instance, the fact that the sentence *Tristan is a mammal* can be deduced from it or that it can be deduced from the sentence *Tristan is of the canine species which typically lives with people*. These inference rules are implicitly present in our everyday discourse, yet they can also be rendered explicit, as when we formulate the rule that *Every dog is a mammal*. This is done by means of logical vocabulary, in this case by conditional and general quantifier (if we settle upon the most natural formalization of this sentence). Therefore we can speak of *logical expressivism*, as logic is here to express the inference rules present in our languages. When a given rule is rendered explicit, we can discuss it and consider possible modifications or even a rejection thereof. Making inference rules explicit is thus a crucial ingredient of our rationality. Furthermore, logic has to be unable to expand our knowledge in the sense we discussed, as only by not contributing to the inference rules can logic makes these rules explicit.

What consequences does the acceptance of logical expressivism have for a philosophical reflection of the plurality of logics? Can there be only one logic which makes inference rules explicit? Or can we think of more logics which would fulfil this task? How do we recognize which logic we use in this way? I think in general there is no reason to deny that more logics could serve logical expression, yet we have to examine the very notion of explicit and implicit rule to gain more clarity here.

Lots of inference rules and other rules as well are in some way only implicit and the task of making all rules explicit does not really make much sense. Lessons from later Wittgenstein which are partly revisited in this thesis show clearly some rules simply must be implicit. This is not to deny that every rule has to be capable of being rendered explicit in some context, it is having all the rules explicit at the same time which is impossible. The implictness cannot be identified with but still has to be linked with indeterminacy. What is implicit is in some way not completely settled. This makes us see that when we talk of making inference rules explicit, we cannot really want the

explicit rule to be completely identical with the one which was implicit in the practice, although the two surely have to be continuous. Making inference rules explicit thus typically has to involve also creating or at least sharpening the rules and making them more precise. This stress might make me diverge a little from the original logical expressivism of Brandom, yet it still holds that logic enables us to rationally control our inference rules, which I regard as the fundamental aspect of Brandom's undertstanding of what logic is supposed to do.

Logic thus enables us to gain a certain freedom with respect to our inference rules, as we can discuss and modify them. Yet logical expressions are also constituted by inference rules, for example by the rule that we can deduce $A \vee B$ both from A and from B. And this then opens also a freedom of higher order, yet of the same nature, namely to modify the rules guiding our logical expressions and therewith change our logic. But we cannot overrate the degree of this freedom. Some rules might be changed relatively easily, others only with great difficulty. The ease of modifying a given set of rules is related to the ease - in the case of logic rather difficulty - of making these rules explicit. If logic is an instrument of expressing the infrence rules, it must be difficult to render logic itself explicit, as this means making the activity of making rules explicit itself explicit, i.e. an operation of higher order so to say. Furthermore, modifying logic means not only modifying our practice of expressing rules but consequently also the nature of the very inference relations, such as consequence, incompatibility and others, which logic renders explicit. From Quinean holistic perspective from Quine (1951), logic is both a central part of our web of beliefs and is at the same time omnipresent in the whole web, as it defines its basic properties, the links between the nodes of the web.

Overall we have to admit that a modification of logic has to be only very partial and difficult. The problem though, might not be so much that the logic we use is just deeply hidded in the sphere of the implicit, in fact there is in some sense nothing to be rendered explicit. Our everyday logical practice surely has its rules but as they are largely not explicit, they are also, as we already explained, therewith indeterminate. A lot is settled by our logical practice, yet this does not mean that we must be therefore able to read one specific logical system, for instance classical first-order logic - off this practice. We have to realize that two logics hardly ever differ in the radical way that one would claim that a set of formulae Γ entails A, while the other would claim that it entails $\neg A$. Rather it is the case that one claims that A is

always entailed, while the other logic claims that there are interpretations of the premises as well as of A, which make the entailment invalid. For example, when intuitionistic logic refuses the law of the excluded middle, it claims that it is only in some very specific contexts, as in infinitistic mathematics, that the law fails. Such subtle differences, as important as they can be in specific contexts, cannnot be hoped to be discerned in our daily logical practice of making our inference rules explicit.

This means that the inference rules constituting our logical constants have to be treated in somewhat different way than the other inference rules. It is not possible to settle on using one given logic, simply because there would be no way to check whether it was indeed implemented in our practice. Futhermore, due to the problems of making the logical rules we follow explicit, we cannot even determine what the initial state was. The plurality of logics therefore does not enable us to simply choose which logic to use from now on. Yet it still enables us to see the potential of our logical concepts, each logic is a development of what is present in our practice and can help us see new possibilities this practice can attain. Thus a mutual influence between our logical practice and our logical theories (the logical systems) can be observed, both force each other to develop and this process is possible only due to the plurality of logics, otherwise no development would be possible.

Due to this continuous development of the logic we use and therewith of the very concept of logic no demarcation of which systems are genuine logics can be fully convincing. Still, it should be instructive to examine the proof-theoretical treatments of logical constants we contrasted with the model-theoretical ones, as they certainly can at least approximate what could be considered as good demarcations.

5 Proof-theoretical demarcations of logical constants

The history of these approaches is shortly summed up. As it goes back to Gentzen, it is only natural that these approaches are well suited to accompany our inferentialist outlook, Gentzen himself considered the rules of inference as specific definitions of logical constants. The first approach we consider is that of Ian Hacking. Although we do not agree with him in detail, we find his proposal that every demarcation should remain partly open very close to

our approach stressing the ability of logic to develop.

Kosta Došen presents a demarcation which has some openness to it and considers logical constants as *punctuation marks* in Došen (1989). As such, they mark the positions of propositions in the logical space of our deductions, which brings Kosta Došen very close to logical expressivism and to the demarcations provided by logical expressivist's themselves. Brandom in Brandom (2008) and Peregrin in Peregrin (2014) presented their demarcations. While Brandom bases his approach on the notion of incompatibility and naturally reaches classical logic, Peregrin bases his approach on the notion of consequence and naturally reaches intuitionistic logic as the most nataural logic to express this relation. It can be seen as a vindacation of logical expressivism that it enables fairly natural demarcations which point to the most standards systems as the logics for making infrence rules explicit.

Yet there are demarcations which purport to be even more in the spirit of logical expressivism. We mention the demarcations by Ulf Hlobil from Hlobil (2016) and Hlobil (2017), who countenances consequences between atomic formulae and presents a system which is non-monotonic and is more general than both classical and intuitionistic logic which can both be obtained from it as special cases. Furthermore, Hlobil also proposes methods to make the validity or otherwise of structural rules explicit, in particular whether a given case of logical consequence is monotone. This can also be seen as a step forward towards an expressivist account of logic.

6 Logical dynamism

We have arrived at a position which I like to call *logical dynamism*, as it emphasises the fact that logic can develop, though with more difficulty than, e.g., more empirical disciplines. Is our position a kind of logical pluralism or rather a kind of logical monism? I think our position manages to reconcile both the opposite tendencies.

On the one hand, there is a rule-regulated practice of making our inference rules explicit. It surely is not only possible but actually the case that regarding some specific inferences different people can have different intuitions as to whether they are correct but if the practice is to be rule-regulated, then the rules have to shared. This is, again, a broadly Wittgensteinian lesson. With the caveat that lots of the rules regulating our logic are implicit and therefore cannot be simply equated with any of the known logical systems,

we still share the implicit rules. In this sense there is really only one logic operative when we make our inference rules explicit.

Yet this monist trait of logical dynamism does not alienate it from logical pluralism, or at least one specific form thereof. As our logical capacity can develop, there are many ways in which this can happen. The various logics that have been developed so far and the ones which keep being developed can be thus seen as proposals of how the rules for logical expression could be. Although we cannot simply choose one of them and implement it by fiat, each such system can be seen at least as an idealized model of the possible shape of our logical practice. The practice can thus be cultivated thanks to this plurality of logical systems. We shortly review a few forms of logical pluralism which have been sustained, for instance in Carnap (1934) and Beall and Restall (2006), in particular we examine the classification of possible forms of logical pluralism presented in Eklund (fothcoming). Logical dynamism cannot be equated with any of them, it is a novel way of looking at the plurality of logics, though, as I hope, naturally elaborated from inferentialism and logical expressivism. And the stress on the multifarious ways in which our logical capacity can develop makes it into a form of logical pluralism.

7 Conclusion

Logical dynamism as the main fruit of this work has so far only been arrived at and has therefore been rather programmatically stated than developed. Though vagueness in the stated thesis is in general reproachable, it is only natural to reckon with it when the issue is as general as that of logical dynamism. Nevertheless, I hope more flesh can be put on the bones of my view. This can be done by using it as a method for study of history of logic, namely by paying special attention to the historical development of logical concepts as instruments for the expression of inference rules. Furthermore and perhaps more importantly, the emphasis on the dynamic aspect of meaning not only of logical expressions, can be developed in inferentialist philosophy.

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8 Publications

- 2013 *Pluralism in geometry*

  Miscellanea Logica IX, pp. 7-21, editor Michal Peliš, AUC Philosophica et Historica, , ISSN 0567-8293
  Autor: Pavel Arazim

- 2016 *Logical expressivist's logical constants*

  Organon F, 23, 1, pp. 2-20, ISSN 1335-0668
  Autor: Pavel Arazim

- 2016 *Inferentialism: Why Rules Matter (review of a book by Jaroslav Peregrin*)

  Organon F, 23, 1, pp. 128-138, , ISSN 1335-0668
  Autor: Pavel Arazim

- 2016 *Model theory and foundations of logic*

  Miscellanea Logica X, str. 7-21, editor Michal Peliš, AUC Philosophica et Historica, , ISSN 0567-8293
  Autor: Pavel Arazim

- 2016 *Logické vyplývání - kdo je na omylu?*(review of translation of the book *The Concept of Logical Consequence* (in Czech: *O pojmu logického vyplývání* by Johna Etchemendyho)

  Filosofický časopis, Vydává Akademie věd ČR, ISSN 0015-1831,
  Autor: Pavel Arazim

- 2017 *Expressivist perspective on logicality*

  Logica Universalis, 11, 4 , ISSN 1661-8297
  Autor: Pavel Arazim

- 2017 *Logical space and the origins of pluralism in logic*

  Miscellanea Logica 2017, 2, pp. 7-26, editor Michal Peliš, AUC Philosophica et Historica, , ISSN 0567-8293
  Autor: Pavel Arazim

9 Selection workshops and conferences at which I gave a talk

- 2014-2017 *Slovak-Czech Symposium on analytical philosophy, I gave talks in all the years, i.e., four times*
- 2015 *16th Szklarska Poreba Workshop on the Roots of Pragmasemantics*
- 2015 *Unilog Conference in Istanbul*
- 2016 *Inferentialism: Why Rules Matter, workshop on a book by Jaroslav Peregrin, Prague*
- 2017 *Prague gathering of logicians*
- 2017 *Logica 2017, a conference organized by Departement of Logic of Institute of Philosophy of Czech Academy of Sciences*
- 2017 *Logic Colloquium 2017, Stockholm*
- 2017 *The Nature of the Normative, Prague*

10 Teaching

- 2012-2018 *Seminar in analytic philosophy, Charles University in Prague, Faculty of Arts, Department of Logic*
- 2012-2018 *Critical thinking, Charles University in Prague, Faculty of Arts, Department of Logic*
- 2015, 2017 *Logic, University of Hradec Králové, Department of Philosophy*
- 2014-2015 *Critical thinking, University of Hradec Králové, Department of Philosophy*
- 2015-2017 *Seminar in Logic, ČVUT, FIT (Czech Technical University in Prauge, Faculty of Information Technologies)*

11 Selection of other academic activities

- 2013 *Colaboration on a book of exercises in critical thinking, under a grant led by Vít Punčochář*
- 2013 *Control of translations of two articles by Kurt Gödel from German to Czech; the work was done for the University of West Bohemia in Plzeň*
- 2017 *One of the organizers of Prague Gathering of Logicians*
- 2014-2018 *Editor of Logica Yearbook, proceedings of the annual Logica conference in Hejnice, Czech Republic)*
- 2017-2018 *Member of the team in the Grant 17-15645S Logical models of reasoning and argumentation in natural language; the grant is led by Jaroslav Peregrin)*