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The Future of Philosophy

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1. vydání

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The Normative Task of Philosophy

The manifold various approaches to philosophical works remind us that in the history of philosophy over the past hundred years, that we have been faced with permanent differentiation. If we remain within the tradition of analytical philosophy, it becomes apparent that a major breakthrough occurred primarily in connection with Quine's critique of empiricism. The originally normative role of analytical philosophy came under the significant pressure of naturalism. In some philosophical circles normativity became the next obsolete philosophical concept. Philosophy in the Czech Republic is particularly redolent of this naturalistic pressure over the last decade. The conflict between naturalized and normative philosophy is still alive in the spectrum of the entire tradition of analytical philosophy and is reflected in a recent series of texts.[1]

The study *The Future of Philosophy* emerges as one of the products of the pressure of naturalized philosophy on a new generation of philosophers, who in various postgraduate studies are striving to set the direction of philosophical disciplines. 'The Future of Philosophy' represents a collective effort to evaluate the goals which should be philosophically investigated, either in general or specific areas of research. The study is a breath of axiology in philosophy, an assessment of meaningful goals and values in philosophy to restore, maintain or retain.

1 THE POVERTY OF CONTEMPORARY PHILOSOPHY

Philosophy suffers from many ailments, some of which are widespread and some specific to the Czech environment. One specific Czech malady is the insufficiently developed system of training students of philosophy, with post-grammar school concentrating mainly on the history of philosophy. This leaves students with an inadequately developed ability to apply philosophical methods. Hence the very skills that would make a philosopher valuable in interdisciplinary dialogue, the

1 Haug 2014; de Caro, Macarthur 2010.

competence of argumentation, conceptual analysis, critical thinking for example, remain predominantly average or even below average.

If we merge the unmanaged method with historical sentiment that is inherent in a large number of students of philosophy, then the result is not soaring philosophical exploration, but only mediocre exploring of the history of ideas. Departments of philosophy in the Czech environment over the past twenty-five years, could not decide if they wanted to be truly philosophical departments or departments of the history of ideas.

A more general poverty of philosophy is poor mnemonics, that is the constant rebirth of traditional philosophical problems in new conceptual garb and with the same uncritical effort to promote their solutions. For example, we can observe the development of analytical metaphysics that animates (not only) scholastic metaphysics and recurring in places that until a few decades ago seemed permanently forbidden to the analytical philosopher.

One positive review, however, of this effort to revive traditional philosophical problems deserves is the application of philosophical methods. As is evident in Ivo Dragoun's chapter: *In Support of Segal's Internalism*, contemporary analytic metaphysics is, without irony, a spectacular conceptual game, that enables us to explore the compatibility, coherence and consistency of metaphysical concepts and systems. From there it is only a step towards the application of the same conceptual game to conceptual systems of modern science, especially physics, as we shall see.

Resignation on its own philosophical method is actually one of the main characteristics of naturalized philosophy. This is not to deny the validity of logical argumentation, critical thinking and conceptual analysis. It is "only" about their levelling out. Typically, naturalists declare that these methods constitute the very basis of scientific work that is already implicitly present in the work of any researcher. According to naturalists, the philosopher does not have any exclusive method that would entitle him to separate and benefit scientific activity. Naturalists admire the experimental methods of special sciences, resting on their success vis-a-vis comparison to the sterility of philosophical methods, and draw the firm conclusion of the need to deliver all problems into the arms of sciences.

Defending the normative task of philosophy does not prove that a philosopher has, or should have, some specifically philosophical methods that are not accessible to other researchers. Defending normativity only declares that the philosopher should be a specialist on the correct application of the methods that are related (see above) to conceptual analysis, critical thinking, the logical argumentation, etc. The normative task of philosophy requires the careful monitoring of changes of scientific inquiry and critical reflection on the development of concepts, theoretical systems and modes of reasoning inherent in the various special sciences.

The greatest poverty of contemporary philosophy lies in philosophers not grasping this given normative task. Concretely, the philosopher is not directly able to use developed philosophical methodologies. If he tries, he either locks himself into self-serving conceptual games (analytical metaphysics), or he does not suppose the need for critical oversight sciences, because he blindly trusts in their self-regulating abilities.

2 NATURALISM AND NORMATIVITY

In recent years, in the context of the dispute between naturalized and normative philosophy, the question if it is possible to create a new form of naturalism sensitive to issues of normativity is regularly discussed. For this potential approach has been called simply: liberal naturalism.[2] The main common feature of both scientific naturalism and liberal naturalism is rejecting the supranatural, whether with regard to existing entities or to cognitive abilities.[3]

The whole debate could be forgotten by simply pointing out that this is a misunderstanding. Naturalism need not be conceived as an ontological doctrine.

2 De Caro, Macarthur 2010 (NaN).

3 It is possible to define scientific naturalism by two doctrines: the ontological and methodological: *"Ontological doctrine of Scientific Naturalism: The world consists of nothing but the entities to which successful scientific explanations commit us.*
Methodological doctrine of Scientific Naturalism: Scientific inquiry is, in principle, our only genuine source of knowledge or understanding. All other alleged forms of knowledge (e.g., a priori knowledge) or understanding are either illegitimate or are reducible in principle to scientific knowledge or understanding" (NaN, p. 4)

After adopting a naturalistic stance (i.e., methodological naturalism) a naturalist may admit the existence of whatever entities, but only scientific (empirical) methods. In so doing a naturalist can also recognize normativity as a specific human dimension and which is fundamentally skewed from a scientific understanding.

2.1 Liberal Naturalism

Many authors concede that liberal naturalism is rarely defined precisely. We conclude that this approach seeks to emancipate the social sciences and humanities by adopting a plurality of forms of understanding (nonscientific but non-supernatural) and a plurality of existing entities (nonscientific but non-supernatural). Finally, they propose a negative definition:

> *"Liberal Naturalism, as we have seen, is best thought of as occupying typically overlooked conceptual space between Scientific Naturalism and Supernaturalism. A necessary condition for a view's being a version of Liberal Naturalism is that it rejects Scientific Naturalism, hence that it rejects the ontological doctrine or the methodological doctrine, or both."*[4]

Mario De Caro's and Alberto Voltolini's *Is Liberal Naturalism Possible?* try to examine if there is logical space for liberal naturalism between scientific naturalism and supernaturalism. According to liberal naturalism, there are entities that are both non-eliminable and not only irreducible to scientific entities, but also ontologically independent of scientific entities.

One fundamental problem for liberal naturalism represents a dilemma neatly formulated by Ram Neta:

> *"What if digestion, or respiration, or reasoning are natural kinds, their nature consisting simply in the mechanisms enable them to occur? Is the liberal naturalist committed to denying this possibility? If so, then I confess I can see no good reason to*

4 NaN, p. 9.

> *accept Liberal Naturalism. And if not, then I confess I do not understand just what the Liberal Naturalism is."*[5]

The authors define constitutive claim of naturalism and complement the epistemological and ontological provisos of naturalism:

> Epistemological Proviso: "[…] *one might still have to turn to forms of understanding (such as conceptual analysis, imaginative speculation, or introspection) that are neither reducible to scientific understanding nor supernatural."*

> Ontological Proviso: "[…] *there may be entities that do not and cannot causally affect the world investigated by sciences and that are both irreducible to and ontologically independent of entities accountable by science but are not supernatural either, since they do not and cannot violate any laws of nature* […]."[6]

According to the authors examples of noneliminable entities are 'modal properties'. They also present examples from mathematics and ethics (freedom of will). What scientific naturalism regarded as "mere" logical fiction, is conceived in liberal naturalism as full entities.

According to the authors ontological tolerance and methodological discontinuity successfully grasp one horn of the dilemma but the second horn requiring an answer to the question if it is then naturalism also has to be grasped. Caro and Voltolini, affirm this:

> "[…] *contrary to what Kim claims, floating free is not necessarily indicative of what is supernatural* […] *since it may also be a feature of liberally natural entities."*[7]

This position turns Kim's renowned argument against nonreductive physicalism in the philosophy of mind inside out. According to the authors, all is cogent

5 NaN, p. 70.
6 NaN, pp. 75–76.
7 NaN, p. 78.

if liberal naturalism does not require other kinds of understanding inconsistent with rational understanding.

Unacceptable, however, is the abnegation of Alexander's dictum, with the assertion:

> "[…] *the fact, that controversial kind of entity has no causal power, far from being a problem, is a necessary condition* […] *for accepting it as real.*"[8]

I am not convinced that this is a cogent defence of liberal naturalism. Jaegwon Kim's contention eventually sounds tragicomic: regardless that the liberally natural entities have no causal influence (i.e., epiphenomenalism), to the contrary, precisely in this way they are real. Even if I try to apply a specifically philosophical way of understanding, this proposed solution is not convincing.

2.2 Naturalized Epistemology

The main impact of a Quine's naturalized philosophy is that there is no special philosophical knowledge which could constitute the basis of science. Methodology and logic and all formal disciplines are part of empirical science, not their independent foundations. Rosenberg summarizes this as follows:

> "[…] *science is as much a guide to philosophy as philosophy is to science. The difference between science and philosophy is one of degree of generality and abstractness, not a difference between necessary truths and factually contingent ones.*"[9]

In addition to the rejection of philosophy as the foundations of science and the assumption that science can solve philosophical problems entail naturalism posing two important challenges: the application of physicalism and Darwinism across sciences, including the social sciences and humanities. Physicalism embraces physics as a basic science, which fundamentally limits and determines all other disciplines that in principle are reducible to it.

8 NaN, p. 78.

9 Rosenberg 2005, p. 160.

We can detect Darwinism as a basic interpretative framework in the chapters of the book devoted to the philosophy of mind, the philosophy of biology and ethics. We can hardly imagine that Darwinism could be questioned, because it represents for much of today's scientific discussion a stubbornly incorrigible tenet. The whole development (and evolution) of human ability of knowledge is interpreted through Darwinism. The latter in the philosophy of science is a powerful explanatory framework describing the development of scientific knowledge. Scientific progress is a sequence of local adaptation and is modified by random variations (theoretical speculation), and selection under the influence of the environment (experiments).[10]

The basic problem of naturalism, however, is distinguishing between justification and causation, respectively the question: How can the naturalist justify rules and methods? At the end of the 1980s Jaegwon Kim pointed to this fundamental difficulty of naturalized epistemology. The core of his reservations is present in the following assessment:

> "*When we talk of 'evidence' in an epistemological sense we are talking about justification: one thing is 'evidence' for another just in case the first tends to enhance the reasonableness or justification of the second.* […] *A strictly nonnormative concept of evidence is not our concept of evidence; it is something that we do not understand.*"[11]

We may reformulate the question in Rosenberg's view as follows: Does naturalism not really need a first philosophy? What else is naturalism than just a first philosophy?

> "*Appeal to a 'first philosophy', an epistemology prior to and more secure than science, is out of the question. And naturalism cannot appeal to science or its success to ground its rules. For the appeal to a 'first philosophy' would be circular, and*

10 Deutsch criticizes the uncritical acceptance of Neo-Darwinist metaphor while himself applying a Neo-Darwinist explanation in great depth and complexity. (Deutsch 2011).

11 Kim 1988, pp. 381–405.

grounding its rules on science's technological success would be to surrender naturalism to a first philosophy – […] pragmatism."[12]

The opaque situation of naturalism with regards to justification can be summarized as follows:

1) Justification is not possible without a first philosophy.
2) Naturalism in principle rejects a first philosophy.
   ERGO
3) Rigid naturalism is untenable because it fails to justify its own principles. If it does, it becomes pragmatism.

Despite the judicious statement in the previous quotation, Alex Rosenberg is currently one of the most devout defenders of naturalism. His current critical exchange with Timothy Williamson clearly reveals this.[13]

The problematic status of naturalism as a first philosophy also reveals several other weaknesses. Jeffrey Roland comments in detail the stumbling blocks of Quine's naturalism with reservations that are complementary to Williamson's reservations. Roland demonstrates how uncertainties in Quine's naturalized epistemology led to the dispersion of his followers. The main uncertainties are the status of formal disciplines (mathematics and logic) and the opaque status of causality.[14]

Quine's notion of principled naturalization of mathematics and logic can lead on the one hand to a radical version of naturalized epistemology in which we can imagine the revision of mathematics and logic to the needs of the empirical sciences.[15] On the other hand, this has led some followers of Quine to a moderate position, providing an independent status for formal disciplines.

12 Rosenberg 2005, p. 162.

13 Williamson 2014a, pp. 29–32; 2014b, pp. 36–39.

14 Roland 2014, pp. 43–61.

15 Quine refers primarily to the abandonment of some traditional logical principles with regard to quantum mechanics.

Quine's naturalized epistemology does not offer clear guidance to its interpretation with regard to the tendency towards realism or idealism. Conceived purely instrumentally Quine's opinion may be seen as idealistic and Quine himself may be dubbed a modern Bishop Berkeley. The analogy between these two personalities certainly does not remain at the anecdotal level.[16] Others of Quine's followers, however, rely on the realistic interpretation, and in an effort to rehabilitate in Quine's naturalized epistemology the notion of causality, they fundamentally depart from the naturalistic basis.

There are therefore a number of reasons why strict naturalized epistemology, which is usually associated with Quine is not cogent. The most important reason is the very Darwinian infusion of naturalized epistemology. The philosopher should in principle be cautious in adopting metaphors from scientific theories. He should reflect on the transitiveness of all interpretative aids within which lies the normative task of philosophy.

3 SOME OF THE KEY TASKS OF THE PHILOSOPHY OF SCIENCE

Each chapter of this book is devoted to some special aspect of philosophy. The introduction is no exception, where the selected area is the philosophy of science. Its area is here conceived somewhat broader than traditionally. The traditional philosophy of science is here supplemented by a physicalistic basis which defines the possibilities of knowledge in empiricist epistemology in the spirit of Bas van Fraassen's constructive empiricism. This introduction assesses the status of philosophy of science in the historical overview and its current status. Finally it concerns itself with the problems of the philosophy of physics, namely the conceptual analysis of theories of modern physics.

16 If we have to choose to whom Quine is closer – Locke or Berkeley – we would choose the latter because according to Quine knowledge serves primarily to organize experience.

3.1 First Task: Physicalistic Stance

The concept of physicalistic stance is derived, by analogy, from Fraassen's concept of empirical stance presented in *The Empirical Stance*.[17] Fraassen defines empiricism not as a dogmatic position, but as a stance expressing a permanent rebellion against metaphysics. His extensive argument, which tries to purge empiricism of its final remnants of dogmatism, is one of the most important results of analytic philosophy since the Davidson's article *On the Very Idea of a Conceptual Scheme*. The core of the argument lies in the assertion that the basis of empiricism is not satisfied as an indisputable factual proposition,[18] but as a stance:

> "*Such a stance can of course be expressed, and may involve or presuppose some beliefs as well, but cannot be simply equated with having beliefs or making assertions about what there is.*"[19]

Fraassen's concept of stance embraces attitudes, commitments, values, and goals that constitute the normative basis of empirical knowledge. Fraassen asserts that naturalist science teaches us to hold certain beliefs, according to which empiricist science teaches us how to renounce beliefs.

With a bit of poetic license, we can define physicalistic stance in paraphrasing answers to the classic Kant's questions:

> What is the world? *The world is a permanent interaction of physical entities. And all that follows.*
> What should I know? *I may know the potential physical realizers of all emergent entities.*
> What should I do? *Explain and do not forbid explanation.*
> What is a man? *The being passively seated in a local minimum, acquired with sufficient internal energy for trips to the achievable maximum and returns back.*

17 Fraassen 2002 (ES).

18 "*There is no factual thesis itself invulnerable to empiricist critique and simultaneously the basis for the empiricist critique of metaphysics.*" (ES, p. 46)

19 ES, p. 48.

We may reserve the last answer for meditation and focus on a comprehensive definition of physicalism with respect to the first three answers. Unlike materialism, physicalism abstracts from the need to define the basic level of reality with regard to the nature of its substance. Physicalism only provides that:

> *Any entity, structures of entities and systems of entities in their mutual relations are fundamentally physical.*

It is necessary to rid reductionism of negative metaphysical connotations. Critics of reductionism widely assume that reductionism removes from the world of all non-physical events, states and properties and replacing them with a purified physicalistic ontology. Reductive physicalism, however, needs to be understood as a certain stance rather than as a dogmatic position. Physics for the reductive physicalist means merely the opportunity for a comprehensive explanation of the world. Physics does not bring knowledge of objective structure of the world, which would be an unwise metaphysical desire. Physics brings only a variable set of models that are empirically adequate, it provides explanations of phenomena and allows predictions to further enhance knowledge.

Reductive physicalism as a stance states that science should be uniform and should not give up on bringing explanation. Explanation is thus always principally a reductive one, replacing a complex and confusing set of empirical indications with a simplified and tangible set of models. Physicalism as a stance provides that:

> *Any entity, structures of entities and systems of entities in their mutual relations are principally explained physically.*

Invitation of some form of nonreductive physicalism implicitly expresses resignation to explanation. It is a defeatist attitude, and it yields disproportionate and unjustified conclusions about the possibilities of science. There is no justification that would make some class of phenomena definitively described as fundamentally inexplicable. If we look at the historical development of science, we can clearly see that overcoming such seemingly principal barriers is a normal practice of science.

Epiphenomenalism is in some ways even more absurd. Epiphenomenalism commits us to a rampant inflationary ontology that postulates the level of facts about which we cannot say nothing (any description), only a statement of their existence. Such a metaphysics which dogmatically cling to irreducibility, posits arather strange world. On the one hand it yields a potentially very simple realm of physical interactions, and on the other hand a plethora of disjointed entities that float in an explanation vacuum.

Physicalism as a stance is motivated by logical empiricism: there cannot be any contradiction in the conceptual system (e.g., downward causation versus causal closure of physical domain) and physical principles must be empirically adequate. Physicalism as a stance includes: economics of thinking, the claim of explicability (do not leave an explanatory vacuum) and the requirement of unity of causality.

The most general model of explanation, compatible with physicalism is functional explanation, which implements functional reduction. Functional reduction is robust in that it constitutes an explanatory theory, which creates a bond between the various domains (biological and physical, mental and physical, etc.). Functional reduction, as Jaegwon Kim demonstrates, involves three steps: the functionalization of reduced property, the identification of functional realizer of reduced property and the development of explanatory theory. To functionalize the property is to define it in a way that expresses its causal potency. Identification of functional realizer of reduced property means finding the physical mechanism responsible for the occurrence of reduced property. A list of properties of the physical realizer need not be general nor complete. According to Kim functional reduction can be developed even in a situation where we do not have saturated knowledge of the physical level, which is responsible for the occurrence of a higher domain. According to the knowledge of the physical domain, we can then establish an explanatory theory.[20]

Philosophy may adopt a yet more general challenge, namely the challenge to grasp conceptually the choice of stances. Why to be a naturalist, an empiricist,

20 Kim 2005, pp. 161–170.

a materialist, a physicalist, an external realist, etc.? Here again, as we saw in Fraassens, the need to reflect on the normative task of philosophy is compelling.[21]

3.2 Second Task: The Renaissance of the Philosophy of Science

Philosophy of science is currently a neglected discipline. It is often assumed in academic circles that this area of study thrived from the 1940s up to the 1970s and has exhausted its potential. Philosophy of science has undergone three successive stages: In the syntactic phase (from the 1940s) the fundamental questions were concerned with the structure of the theories and with them related conceptions of scientific explanation. In the semantic phase (from the 1960s) the issues of the demarcation of science and the development of science predominated. The pragmatic phase (from the 1980s) was characterized by the model-based views of theories and a plethora of these theories.

Feynman's statement that the philosophy of science is about as useful to scientists as ornithology is beneficial for birds is well known among scientists and philosophers. However, although birds themselves for obvious reasons do not use ornithology, if man uses it, it may well be beneficial for birds. There is an analogy with the philosophy of science here: although the scientist is unable to use it, from not-so-obvious reasons, then the philosopher may develop it for the benefit of science.

The reasons that the many scientists do not weigh the philosophy of science are essentially socially operative. Although in some respects the boundaries between the natural and the social sciences and the humanities disappeared, which, for example Brockman was identified as the emergence of the so-called "third culture", we are not in a situation where the promoters of the natural sciences have learned to understand and employ approaches from humanities. In fact there is a common belief held by some influential popularizers of science that their own discipline

21 Also relevant here are the transcendental conditions of knowledge: "*I think it is an interesting philosophical question 'What exactly is the status of propositions such as that there exists a reality independent of representations of it?'*" (Searle 2012, p. 200).

is able to provide explanations of phenomena traditionally associated with the humanities. The situation is sometimes even worse, because some philosophers in the spirit of naturalism also join scientists who believe that the close interrelationship with the science finally bestows dignity, if not sense on philosophy. Such a sense, however unfortunate and tragicomic at times, is tantamount to the philosophy's self-destruction.

We can summarize some important characteristics that define the philosophy of science, and which justify its claim to be a valuable tool for the development of knowledge and which highlight the need for its renaissance: The philosophy of science is a normative discipline that enhances the reflection of science. The philosophy of science poses questions for the general determinants of scientific activity (truth, unity, goal, etc.) The basic questions posed by the philosophy of science are repetitive, but their meaning is due to the transformation and expansion of scientific concepts.

We can summarize that in times of fundamental changes of science, its hidden philosophical dimension becomes evident. Science and philosophy in this regard are indivisible. If we understand philosophy *in nuce* as defined primarily by method of investigation, then any scientific discipline preserves in the degree of abstraction that is its own the philosophical dimension. It is important to keep in mind that it is not only an unimaginative exploration of the past of science and therefore the historiography of science. Reflection on scientific concepts allows science to develop. Philosophy is thus defined as an irreducible propensity and ability of critical thinking, which itself possesses a flexible adaptation of theoretical systems. As such, it is an indispensable aspect of science. The philosophies of individual disciplines have developed for the past decades in this medium.

3.3 Third Task: An Analysis of the Theories of Contemporary Physics

The contemporary philosophy of physics is currently developing in several directions. It is primarily a historical conceptual analysis of modern physics[22] and a reflection of the physical theories of the 20th century[23] and, finally, the critical line

that focuses on the conceptual analysis of current physical theories.[24] Precisely the latter area is an area of inquiry which is philosophically interesting and for physics valuableper se, because the foundations of physics (not only historically speaking) are philosophical.

The critical line of philosophy of physics provides a reflection of physical theories, more specifically of models that physicists are constructing to depict reality. Its important task is to prevent separating physics from the understanding that is shared by the broad scientific community. It has been resigned to this task since at least the late 1950s, when the analytic tradition of philosophy also gradually diminished the efforts to indicate the physical concepts into relations with other concepts applied by a language community. The fact that today there is a perceived discrepancy between the "natural" world and the world of physical theories is therefore not due to the instrumental fact that physical models are only useful tools or that these physical theories only define their definition dictionary (i.e., relativism). Rather, it is simply because investigation in this direction lacks a potent scientific endeavour. A fruitful collaboration of physicists (and other scientists) with philosophers can restore philosophy to its traditional role of the prime mediator of knowledge.

As with all disciplines physics has its own ontology, methodology and axiology. Each of these areas are developing, changing, and possibly even undergoing a revolution, and this mostly without adequate reflection of physicists themselves.

The ontology of modern physics includes a large number of entities on which conceptual definition still focuses. The introduction of new entities is mainly expressed in theoretical models, which then in aggregation (with the support of the theoretical principles) define the physical theory. New models always create new ontological commitments. Many analytical philosophers, to mention only Russell and Quine, were aware of the nexus of philosophical expertise and various scientific disciplines.

22 Torretti 1999.

23 Maudlin 2010.

24 Stenger 2006.

The number of entities whose use is not explicitly stated (pluralism), and even sometimes generates contradictory consequences (e.g., timeless Feynman diagrams of the one hand the thermodynamic arrow of time on the other) have recently become part of the ontology of physics. The resulting situation escalates especially with the development of modern cosmological theories. Where on the level of theory it is possible to say almost anything (in terms of consistency) and on the level of the experiment there is no possibility of testing, physicists arrive at a philosophical message and paradoxically construe a new metaphysics.[25]

If we conceive the last mentioned problem as a side-effect of attempts to popularize physics, there still remains much work for the philosopher in connection with inferring conclusions from ontological conceptual systems of physics.[26] The need is to remain alert to the unreflected development of concepts, mutations of principles and changes in views of laws.

The methodology of physics also deserves close attention, particularly those issues relating to changes of experimental physics. First, it is important to defend the experimental nature of physics, because some physicists are talking about an incipient postempirical phase of physics. This involves a reflection of all these theories which conceptualizes the experimental situations and a description of the relationship between theory and its experimental support.

Finally, axiology of physics deserves major attention. Its contours are not always explicit but assume a pivotal current role in realism in the conception of scientific theories, attempts at unification through intertheoretical reduction and confidence in mathematical symmetries.

Many concepts of 'realism' are hazardous because their proponents are willing to sacrifice the condition of empirical adequacy and anticipate a postempirical phase of physics.[27] A useful antidote is Fraassens' constructive empiricism which, unlike instrumentalism, does not claim that science is merely a tool, but that its

25 Krauss 2012.

26 In the context of entities such as virtual particles, inflaton, multiverses, etc.

27 *"Collectively, we see that the multiverse proposals (…) render prosaic three primary aspects of the standard scientific framework that in a single-universe setting are deeply mysterious. In various multiverses, the initial conditions, the constants of nature and even the mathematical laws are no longer in need of explanation."* (Greene 2011)

status as such is not demonstrable. Unification should always serve primarily as a means of explanatory reduction, not as an end in building speculative theories such as various multiverse theories, M-theory, etc.[28] The success in applying mathematical symmetry in grasping the nature of conservation laws of physics in 20th century physics has misled some physicists into believing the irreducible coherence of physics and mathematics. Efforts should be made to preserve the autonomy of physics from mathematics.

4 THE FUTURE OF PHILOSOPHY

This book seeks to outline the topics that might yield a promising future for philosophy. It represents the attempt to understand axiology of philosophy in its various disciplines. The beginning emphasizes that the normative task is to be kept in mind in all following chapters. The book does not limit itself to speculation about the future direction of philosophy, but concentrates on the effort to define the core values that philosophers should maintain, develop and renew.

The following chapters are arranged according to the traditional sequence of philosophical disciplines. We begin with metaphysics and logic, continue with philosophy of mathematics and epistemology, philosophy of mind (cognitive science), and philosophy of biology. The final and longest section of the book is devoted to ethics.

The first section entitled *Conceptual Analysis as a Goal, a Medium and a Tool* contains three chapters devoted to analytical metaphysics, theory of argumentation and logic. The hyphen is a conceptual analysis that takes in individual creative approaches different forms:

In the chapter *In Support of Segal's Internalism* Ivo Dragoun conducts conceptual analysis in the spirit of contemporary analytic metaphysics. It shows that, although there is a conceptual analysis as a goal in itself, it is by no means mere aimless play. Dragoun defends the internalistic position of Gabriel Segal against Sarah Sawyer's criticism.

28 Baggott 2013; Kragh 2011.

Dragoun begins with Burge's extension of the original Putnam externalistic position and shows that the basic premise of externalism (ET: *The mental content of a psychological state is, at least partly, individuated by relevant facts about subject's environment.*) is incompatible with naturalism and with the intuitive concept of causality. However according to Dragoun the most contemporary philosophers tend to externalism. The example of Segal's defense of internalism shows that internalistic strategy does not have to sacrifice extensions in an effort to salvage the internalistic view of the content. The content and extension may be individuated internalistically. Thus the main reason externalists are repelled by internalism may be eliminated.

In a key part of the chapter Dragoun shows that Sarah Sawyer's seemingly devastating critique actually leaves Segal's internalism unscathed. The reader can dramatically observe as Dragoun isolates Sawyer's two main objections and cleverly exposes her argumentative structure as incorrect.

What Ivo Dragoun's conceptual analysis of the very goal of philosophical inquiry is for Martina Juříková a useful medium of philosophical methodology. Juříková's chapter *Critical Thinking – an Effort to Increase the Competence of Philosophy* highlights the plight of philosophy between current scientific disciplines, as it has lost relevance in discussions of the nature of science. One possible way to return philosophy to a meaningful position is the revision of philosophical methodology. Juříková focuses on one task of philosophical methodology – the development of critical thinking through argumentation theory and informal logic.

Juříková demonstrates that formal and informal logic are interrelated, and in particular that informal logic is a necessary medium of assessing the validity (factual truth) of argument where formal logic alone would not be successful. One of the major preoccupation of useful informal logic, which leads to assess the validity of the argument, is the recognition of argumentation errors. Juříková focuses on three of the most urgent informal argumentation misconducts, namely: *an appeal to consequences* (argumentum ad consequentiam), *a slippery slope argument*, and *post hoc ergo propter hoc argumentum*.

Ivo Pezlar closes the section devoted to various aspects of conceptual analysis, when he defines it in his chapter *Logic as a Toolbox* as primarily a useful tool

in pragmatic logic. For Pezlar logic has always been primarily a study of how we achieve understanding, with an attempt to formalize the results of these findings. The difference of the current logic, compared to a normative conception of the past, sees in the fact, that current logic is from the development of computer science and artificial intelligence linked with practice, especially with the creation of useful applications. According to Pezlar the future of logic lies in a close interrelationship (abolishing borders) with computer science and artificial intelligence.

Pezlar sees the dark side of today's logic residing in its excessive application fragmentation. In the long term the profitability of single logical tools for specific tasks becomes an obstacle. Pezlar amusingly observes: "(…) *we don't want to make hammers for each specific nail; we want ideally one hammer that can drive in all sorts of nails.*" (Here p. 75) Pezlar challenges for building theory, which will study the all individual logics in a single manner and explain their interdependence. It would be a global theory (toolbox) that will supervise its individual subsystems (tools).

Pezlar sees successful experiments of this type in Gabbay's labeled deductive systems (LDS). He sees the main revolutionary innovation of these systems as introducing into the logical calculus instead of atomic formulas (propositions, etc.) pairs consisting of formulas and its labels. Labels can be selected arbitrarily, such as elements from another logical system. Both logical systems within the LDS then work simultaneously, which increases the overall efficiency of LDS.

Pezlar concludes his vision for the development of logic as a toolbox by reflecting on the possibility of extending the idea of LDS in the sense that it would allow for appropriate toolbox to combine logical systems and create new "(…) *being able to plug these systems together to make a new one.*" (Here p. 83) The modularity achieved in this way is a desirable future of logic.

The second section *Philosophy for Mathematics and Mathematics for Philosophy* presents two notable contributions to the philosophy of mathematics and epistemology:

In the chapter *Ethnomathematics: A Political Challenge to the Philosophy of Mathematics* Iva Svačinová sees the future of the philosophy of mathematics in exploring its political dimension and its political potential. Svačinová decides to demonstrate these aspects on the issue of ethnomathematics, i.e., a program that

explores mathematical ideas that were (and are) developed in different cultural groups independently of the development of Western mathematics.

The main question Svačinová strives to answer is: How to use the ethno mathematicians' philosophy of mathematics to achieve political goals? She breaks this question down into two sub-questions, namely: What sort of the philosophy of mathematics is adequate for ethnomathematical program and for what reasons? What role does ethnomathematics attribute to the philosophy of mathematics? Ethnomathematical program challenges the supremacy of values of Western mathematics and accuses it of hegemony over cultural mathematics (in postcolonial countries).

Svačinová notes that it is ethnomathematics looking for a suitable candidate between the philosophies of mathematics which would support its program. Svačinová primarily explores Bill Barton's "mimicry" argumentative strategy and for its evaluation uses tools of New Rhetoric. She evaluates Barton's conception, according to which is the view of the program of ethnomathematics, as compatible with Wittgenstein's philosophy of mathematics.

Jan Votava's chapter *Epistemology: The Probability Revolution Continues* sees the future of epistemology in still vigorously co-opting the ideas of probability theory. He argues that probability theory has experienced in science a phase of revolutionary recovery. This epistemology cannot remain neutral, particularly given that for practical applications of epistemology the concept of probability is indispensable.

Votava progressively shows how the concept of probability in practice-oriented epistemology is suitable for decision making, subsequently also demonstrating its suitability in the process of justification of our knowledge. He calls attention to a wide range of improvements in our thinking, both in science and in philosophy. The key is the application of mathematical tools of probability theory (Bayes' theorem). Votava contends that progressive development can be assumed in epistemology in terms of elaboration and in problem solving.

The third section of the book *Philosophy in Arms of Biology and Neuroscience* contains chapters devoted to the philosophy of mind (cognitive science), and philosophy of biology:

In *Philosophy of Mind and Cognitive Science* Václav Kočí contends that much, if not all, of the philosophy of mind succumbs to naturalization as mental phenomena will be (and largely are) successfully explained in the foreseeable future by neuroscience and cognitive sciences. Kočí is convinced that this is certainly not bad news for philosophy per se or philosophers but rather only for speculative philosophers. It is not bad news for philosophers who practise the reflection of practical results of sciences, such as the proponents of the theory of identity, eliminativism and functionalism.

Kočí is confident that in the following years the connection between the philosophy of mind and cognitive science and neuroscience will further intensify with the current deepening of the explanation of the mind through the mechanism of evolution. Kočí's naturalistic position is widely based on the success of experimental sciences and he predicts future development in the ability to imitate the human brain, seeing no fundamental obstacle preventing them explaining such intricate problems such as consciousness.

Vladimír Vodička's chapter *Philosophy of Biology: Selected Topics* is the original introduction to the problems of the philosophy of biology. Vodička's main goal is to present the philosophy of biology as a modern progressive direction of philosophy and to clarify the causes of its origin. Basic interpretative tool of modern philosophy of biology represents Darwinism. Darwin's theory represented by Vodička is one of the biggest changes in human thought that affected all other scientific disciplines, where philosophy was no exception. Vodička even claims that any philosophy contradicting Darwinism is merely beating an empty sack. The philosophy of biology is an salient example, i.e., naturalized philosophy.

Vodička shows the philosophy of biology through its development, supplies the lead actors and highlights the main areas of interest. He recognizes six main areas of concern of the philosophy of biology: evolutionary epistemology, ethics and biology, nature/culture, function and teleology (and design), reflections on biology in general, and others (philosophy of mind, religion, etc.). His analysis updates each topic over the development of the philosophy of biology from the early '70s.

The final section *Ethics between Naturalism and Normativity* include two closely thematically linked chapters that reflect current trends in ethics, towards naturalism. It shows the current state of ethics and provides a vision of the future direction of ethics as a philosophical discipline and is critically analyzed.

Michal Stránský's chapter *Naturalistic Future of Ethics* tries to define the ethics from the position of naturalism. Stránský is based on Harris' distinguishing between the three modes of operation of ethics: descriptive, prescriptive and persuasive conceptions. According to Stránský the ethics that should dominate the future are the persuasive approach aimed at influencing and motivating individuals to moral behaviour. Stránský evaluates the tradition of ethics derived from Kant's *Critique of Practical Reason* and champions ethical naturalism. It appears obvious that to neglect the empirical findings regarding morality, the eternal system of Kantian moral philosophy has few practical implications.

Stránský evaluates ethical naturalism with sober restraint. He realizes that specialized neurological (and other) research of morality is not the work of a philosopher. On the other hand, the descriptive nature of ethical naturalism alone is not adequate to solve prescriptive and above all the persuasive task, which Harris strove to resolve. Stránský's normative task must absorb different kind of specialists than neuroscientists, which specialists should be the moral philosophers.

Otakar Horák's chapter *Introduction to Naturalized Ethics: Selected Topics* is designed in the spirit of naturalism which, however, Horák shows to be a highly differentiated topic. He himself turned to evolutionary mechanism, which is a fundamental explanatory principle for building ethics. Morality is a natural phenomenon that we can understand throughout the description of our evolutionary past, as social and intelligent creatures.

Horák then presents the main results of the descriptive project of naturalized ethics and shows how reciprocal altruism, premoral sentiments in subhuman animals, etc., evolved with the evolution of man and human culture. Considerable attention is paid to describing the origin of evil, grasped not a metaphysical entity, but a natural consequence of the changes of nature and culture.

Horák does not hide his scepticism about the traditional concept of normative ethics. He endorses the current direction of the influential naturalized ethics, which claims to be the main factor in deciding moral emotions and intuitions. Reason remains mostly behind as a post hoc rationalization of primal emotions. However, Horák also endorses a mutually balanced role of reason and emotions that facilitate stable and practical moral decisions.

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CONCEPTUAL ANALYSIS
AS A GOAL, A MEDIUM AND A TOOL

In Support of Segal's Internalism

INTRODUCTION

The debate between externalists and internalists has been with us for over 30 years. Most of the philosophers involved in the debate seem to have accepted some version of externalism. Internalism is not dead, though. One of the most promising strategies against externalism has been formulated by Gabriel Segal. Segal's defence of internalism[1] has not received much attention and the arguments raised against Segal's proposal seem to be somewhat weak. The focus of this paper is to expose the weakness of some of the arguments thus strengthening the case for internalism. I shall look particularly at Sarah Sawyer's criticism of Segal.

The paper has three sections. In section I, externalism is outlined. This will provide a background for the discussion that follows. In section II, Segal's proposal is sketched out. Sawyer's objections are discussed and refuted in section III.

I.

The original externalist argument was formulated by Hillary Putnam.[2] Its application was limited to semantics of natural kind terms. Thus we talk about *semantic* externalism. The extension of Putnam's original argument to intentional states in general is straightforward.[3] The meaning of a term varies with varying truth conditions. Analogously, the content of an intentional state varies with its varying truth conditions, and a different content implies a difference in the intentional state within which the content is embedded. The content of an intentional state can be expressed in the form of a proposition where the relevant term – i.e., the

1 See Segal 2000.

2 See Putnam 1975, pp. 131–93.

3 Colin McGinn was the first to notice it. See his 'Charity, Interpretation and Belief' (Ginn 1977, pp. 521–35.

term whose truth conditions determine the truth value of the whole proposition – refers to a natural kind. Putnam's restriction of externalism to natural kind terms was raised by Taylor Burge. Burge argues that externalism has much wider application than suggested by Putnam. According to Burge it applies not only to natural kind terms but rather to many other, probably all, terms. Thus Burge's claim represents a much more serious challenge to internalism than Putnam's version. I shall, therefore, continue to focus on Burge's version.

'Arthritis' thought experiment:

This thought experiment is well-known;[4] a brief outline will suffice. The experiment is a version of Putnam's Twin Earth story and consists of three steps:

Step 1: We are supposed to imagine a scenario in which a subject, Alf, has a large set of beliefs about arthritis. Most of the beliefs are true. Apart from these true beliefs Alf develops a false belief that his arthritis has spread to his thigh. Such a belief is false because the term 'arthritis' applies, by definition, to and only to inflammation of joints. Despite this misapplication, Alf is understood as having a 'grasp' of the concept of arthritis on the grounds of his commitment to deferential usage of 'arthritis'.

Step 2: We are asked to imagine a counterfactual scenario in which a counterfactual Alf is identical to the actual one with respect to all his physical and non-intentional psychological properties. The only difference between the scenarios is that in the counterfactual one the term 'arthritis' is used by Alf's community to refer to a rheumatoid ailment affecting not only joints but muscles too. Thus Alf's belief in the counterfactual scenario is true.

Step 3: Interpretation. Burge concludes that the counterfactual Alf "*lacks some – probably* all *– of the attitudes commonly attributed with content clauses containing 'arthritis' in oblique occurrence.*"[5] He lacks them because he does not have, unlike the actual Alf, a concept of arthritis. He has *a* concept, which he expresses by the term 'arthritis' but this concept refers to a different disease. Thus Alfs have

4 See Burge 1979, pp. 73–121.

5 Burge 2002, p. 600..

different concepts although they are intrinsic physical duplicates.[6] The difference is stemming from a difference in their respective environments. The difference in concepts constitutes a relevant difference in the propositions that contain them, i.e., in the propositions that express the mental content of relevant intentional states.

The externalist thesis that the thought experiment is purported to support is this:

ET: The mental content of a psychological state is, at least partly, individuated by relevant facts about subject's environment.

Contrast it with the internalist thesis:

IT: The mental content of a psychological state is fully individuated by intrinsic microstructural properties of the subject.

Against the background of the thought experiment, (IT) says that if Alfs are intrinsic physical duplicates, as stipulated, then their mental contents (plus psychological states) must be identical too.

To understand why externalism created such a stir and what the core of the debate between externalists and internalists is, we need to expose the philosophical commitments that seem to be at stake here. The worry is that (ET) is incompatible with a) naturalism about psychological states and b) with a certain intuitive understanding of causation. Let us refer to (a) as a naturalistic premise and to

6 Katalin Farkas argues convincingly that the identity relation between the subjects in Twin Earth stories cannot be grounded in their microscopic physical constitution. She claims that the relevant identity rests in the subjective indistinguishability of the mental states that the subjects are in. Farkas' argument seems to me to be decisive. However, I shall stick with the usual way of characterizing the identity of twins because it is well-established and not much turns on it in our context. For more about the Farkas' argument, see her 'What is Externalism?' (Farkas 2003, pp. 187–208)

(b) as a causal premise. Now the incompatibility of (ET) with (a) and (b) can be demonstrated in a following way:[7]

C1: Naturalistic premise. Naturalism says that our minds are fully embedded in the causal nexus of nature, i.e., psychological states have causal powers.

C2: Causal premise. The premise says that only real, i.e., intrinsic properties, enter the causal nexus. Relational, or so called Cambridge properties, are excluded.[8]

C3: Causal Individuation Premise. Identical entities = identical causal powers. Entities/properties are individuated by their causal powers.

C4: Alfs are in different psychological states. [Step 3]

C5: Alfs' psychological states are marked by different causal powers. [C3, C4]

C6: The property of being in the world with a different meaning of 'arthritis' (WDA) is a Cambridge (or relational) property, i.e., not a real property.[9]

C7: Property of (WDA) cannot enter the causal nexus and affect the counterfactual Alf's causal powers. [C2, C6]

Therefore:

C8: (C4) is false. Both Alfs are in the identical psychological states. [C3, C7]

In other words, an externalist wants us to accept that there can be a difference in the causal powers of our psychological states without any mediating difference in the proximate causes of such states. The proximate causes are understood in terms of intrinsic microstructural properties of a subject and these causes are real, not relational. (ET), however, claims that the changes of psychological states are possible because of a relation – *Cambridge* relation – to an extrinsic property

7 The following is a concise reconstruction of Tim Crane's argument against externalism. See his *All the Difference in the World* (Crane 1991, pp. 1–25).

8 For the argument see Shoemaker 1984, Chapter 10.

9 Recall that (WDA) is stipulated to be the only difference in the scenario.

only. How to understand this seems to be a mystery, leading to a question: Why would anyone want to be an externalist?

To answer the question, we have to go back to Putnam. It was he who first pointed out that our theoretical understanding of language is distorted by two incompatible assumptions about meaning.[10] The assumptions:

A1: Knowing the meaning of a term is just a matter of being in a certain psychological state.

A2: The meaning of a term determines reference (or extension),[11] i.e., difference in reference = difference in meaning.

The two assumptions are incompatible because if the meaning of a term is, at least partly, constituted by a subject-independent connection to its referent then knowing the meaning cannot be a *mere* subjective, psychological matter. One of the assumptions had to be given up. Putnam suggests (A1) which is an option that accords with deep intuitions of the realism of Anglo-Saxon philosophy. The unwillingness of most of the philosophers involved in the externalism/internalism debate to give up (A2) together with its extension to psychological states[12] forced them to accept some version of externalism. In other words, the dilemma facing a philosopher confronted with a Putnam/Burge kind of thought experiment is either to construe the content of psychological states narrowly (i.e., internalistically) at the cost of severing the traditional tie between thought-content and its extension, or to become an externalist-epistemic disconnection from the world or externalism. Most philosophers opted for externalism. But is it the end of it for an internalist?

10 See Putnam 2002, p. 582.

11 See Ibid.

12 The extension of (A2) to psychological states: The mental content of a psychological state determines extension, i.e., difference in extension = difference in mental content. Recall: a different mental content entails a different psychological state.

II.

The standard interpretation of Burge's 'arthritis' story constitutes a framework that entails the dilemma discussed at the very end of section I. It seems to be extremely difficult to avoid the dilemma once the framework is entered, i.e., once it is accepted that Alfs have different concepts. Therefore Gabriel Segal simply refuses to enter the framework claiming that Alfs have identical concepts.[13] Segal's suggestion is surprisingly simple. It comes in three steps:

S1: We have to distinguish between a conventional association of a term with a concept and subject's association of the same term with a concept.
S2: Alfs associate identical subjective concepts with 'arthritis', i.e., they both understand 'arthritis' as a rheumatoid ailment affecting both joints and muscles. None of them has the conventional , experts' concept of 'arthritis' (judged from the vantage point of our, actual world).
S3: Introduction of neologisms. This enables a coherent reinterpretation of the 'arthritis' kind of stories.

(S1) should be fairly uncontroversial. It seems to be hard to deny that one might have an intention to express a clear belief (concerning a concept) using, nevertheless, an incorrect expression. It must have happened to all of us. The most obvious cases are the mistakes we make when using foreign languages. A beginner in English might want to talk about a tree using, incorrectly and unknowingly, the word 'tea'. The point is, as Tim Crane says, that "[f]*or beliefs to be expressed in words, they have to go via second order beliefs about which words are the right ones for expressing which beliefs*".[14] The distinction between speaker-meaning and expression-meaning seems to be also necessary to account for figurative uses of language, as argued by Donald Davidson.[15]

13 Segal is not alone here. Several other philosophers have proposed the same. See for instance:
Crane 1991, pp. 1–25 or Loar 1985, pp. 99–110.

14 Crane 1991, p. 18.

15 See Davidson 1986, pp. 433–46.

(S2) should be similarly plausible. Consider this: In Czech the word 'bilion' expresses the same number concept as the English word 'trillion', while the Czech word 'miliarda' expresses a number concept identical to the one expressed in English by the word 'billion'. As a native Czech speaker learning English, I used to identify the Czech 'bilion' with the English 'billion'. On one occasion, a native English speaker noticed that my understanding of 'billion' was not correct. Asked for my definition of 'billion' I gave a simple answer – something along the lines of how many zeroes there are after '1'. That clarified the issue. I was understood as having associated the concept of trillion with the English expression 'billion'. Examples like this one seem to show that, normally, we do not hesitate to ascribe a non-conventional association of a concept with a term to speakers. The native English speaker that had corrected me might have chosen not to do so remembering that whenever I say 'billion' I actually mean trillion.

This would be clearly analogous to the 'arthritis' story but for one detail. Unlike the 'bil[l]ion' story where the concept I wrongly associated with the expression 'billion' could be referred to using the word 'trillion', no ready-to-hand expression that would match Alfs' concept is available in the 'arthritis' story. This is, obviously, irrelevant to the logic of the internalist argument. It could be, however, one of the, say, psychological reasons behind our reluctance to ascribe identical concepts to both Alfs. Possessing no suitable expression to refer to Alfs' concept, we might feel inclined to succumb to a separate Burge's argument in favour of the claim that the actual Alf has a 'grasp' of the concept of arthritis (unlike the counterfactual one).[16]

(S3) is a final and pragmatic step in Segal's strategy. Instead of referring to Alfs' concept as a 'rheumatoid ailment of joints and muscles' it is much more convenient to say, for instance, 'tharthritis', as has become standard in this case. The important point here is that Segal's proposal does not sacrifice extension. Alfs' concept – 'tharthritis' – has an extension that could be characterised as:

16 Burge believes that an intention of a speaker to use words deferentially is a reason to ascribe to the speaker a 'grasp' of concepts that the experts associate with the words. We shall not discuss this claim here. I find the claim extremely implausible. More importantly, nothing relevant turns on it in this paper.

a rheumatoid ailment of joints and muscles, i.e., for Segal both content and extension are individuated internalistically. Thus one of the strongest incentives for converting to externalism is supposed to be removed. Both Alfs are still talking *about* something out there in the world.

III.

My discussion of Segal's proposal was, admittedly, very sketchy. It is, however, quite sufficient for the purpose of this paper. The reason is that Segal's position is generally accepted as coherent, "[it] *leaves individualism intact, with reference and content alike determined individualistically*".[17]

An externalist seems to have a problem with an implication of Segal's proposal. Sarah Sawyer says:

> "*The primary objection to the view is that the introduction of neologisms to express idiosyncratic concepts threatens to undermine both ordinary practice of ascribing psychological states by means of standard terms and a scientific psychology that appeals to concepts expressed by standard terms.*"[18]

In other words, an externalist claims that Segal's proposal – proposal to introduce neologisms in 'arthritis' cases – leads to 'conceptual and referential fragmentation'.[19]

In this section I shall examine the objection together with related considerations as discussed by Sarah Sawyer in her *There is No Viable Notion of Narrow Content,* (see footnote 18). The page references in what follows apply to this essay of Sawyer's. I shall argue that Sawyer's criticism is far from devastating.

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17 Wikforss 2001, p. 218. See also Sawyer 2003, pp. 265–273, where Sawyer, referring to Segal's position, admits that "there are alternative interpretations of [Burge's thought experiment] which are consistent with individualism", (p. 267).

18 Sawyer 2007, p. 29.

19 Wikforss 2001, p. 218.

Segal, as Sawyer notices (p. 29), recognizes the above formulated objection – let us call it: the fragmentation objection (FO) – but he insists that "*the proposal does not threaten us with a widespread revision of current lay or scientific practice*".[20] According to Sawyer (p. 29), Segal gives two reasons for the claim.

> K1 –"*Many subjects do possess the standard concepts and hence their states of mind can be captured by standard terms and without the introduction of neologisms.*" (p. 29)

> K2 – When the subjects do not possess the standard concept, the concepts they do possess are, in the vast majority of cases, close enough for the practical purposes at hand. Therefore the standard concepts can be ascribed.

Ascription of (K1) to Segal is just wrong. Nowhere in his book does Segal say anything like this. In the relevant passage that Sawyer refers to in this context, Segal talks about the ascriber's rather than the subject's possession of a standard concept. Thus Segal says: "*The need to adopt neologisms evidently only arises in cases where the ascriber lacks a ready word for a concept of the ascribee's.*"[21]

Segal simply means that in many cases our language already contains suitable expressions to capture a subject's concept. Even if (K1) is a correct interpretation of what Segal talks about on the page that Sawyer refers to, nothing at all hinges on it. Segal explicitly admits that 'at least some conceptual variation'[22] is possible. Sawyer notices it and focuses her criticism on (K2). We shall say more about (K2) when discussing what we have referred to as the 'fragmentation objection', (FO). Sawyer's argument behind (FO) is this:

> A1: Conceptual variation is rife.
> *Therefore:*

20 Segal 2000, p. 142.
21 Ibid., p. 142.
22 Ibid., p. 145.

A2: There will be only few concepts that are common among speakers.
Therefore:
A3: There will be too few concepts for psychology to study and 'idiosyncrasies would dominate'.[23]

Segal's position allows him to accept (A1). (A2) is a straightforward deduction from (A1) and as such would be accepted by Segal too. The problem is the move from (A2) to (A3).

Segal accepts (A1) and (A2) because, *strictly* speaking, it is coherent to hold that there is always some difference in our concepts and, consequently, we do not share any of our concepts[24]. It doesn't follow, however, that there are not enough concepts for psychology to study, because, as Segal says: "[I]*n ordinary [psychological] practice, we can get by perfectly well without being precise and explicit', which is 'simply because scientific psychology does not, by and large, study the idiosyncrasies of particular individuals*".[25] The quote is a variation of (K2). Consider this:

Subject S1 has the following standard beliefs about water, i.e., her concept of water is: a liquid that is transparent, odourless, tasteless, fire quenching, thirst quenching, H2O. Subject S2 has identical beliefs plus a false belief that water dissolves antimatter. Both S1 and S2 undergo a simple psychological test. There is a chair on fire in front of them. They are handed two buckets, labelled 'water' and 'oil' respectively and asked to put the fire out. Both subjects, being rational subjects, choose the bucket with 'water' label to perform the task.

Now, it is natural to say that both subjects chose the water bucket because of their 'grasp' of the concept of water (i.e., that water is fire quenching). However, S2, *strictly* speaking, does not have a concept of water. (Probably, even S1 does not have one. It is plausible to expect that S1, when confronted with a series of highly theoretical questions about the microstructural properties of water would

23 Sawyer 2007, p. 30.

24 In this context, Segal refers to holists like Bloch and Davidson, who claim that two individuals do not share any of their concepts. See footnote 10 chapter 5 in Segal's *A Slim Book about Narrow Content*. Segal himself, however, isn't a holist. It's just that his position allows him to accommodate the charge of holism.

25 Segal 2000, p. 146.

answer at least one of them incorrectly). The fact that S2 falsely believes that water dissolves antimatter is irrelevant to the 'fire' task. The overlapping of S2's concept of water with the expert's one is large enough for the purposes of the psychological experiment. This justifies the ascription of 'water' concept to S2 although she, *strictly* speaking, doesn't possess one.

The problem now is, it could be objected, that it seems implausible to say that S2 doesn't have the concept of water. The italicised '*strictly*' bit is of an importance here. The ascription of a standard concept will be appropriate in the vast majority of cases. We are forced to adopt the '*strictly* speaking' way of interpretation (and to suggest the introduction of neologisms) only because it was required by certain subtle explanatory requirements posed by the philosophical debate between externalists and internalists. Normally there would be no need to start talking about neologisms. But when an externalist insists that Alfs have different concepts, an internalist has to resort to the '*strictly* speaking' way and introduce a neologism to explain what is really going on in Twin Earth stories. The actual Alf has, *strictly* speaking, a concept of thartritis (as has the counterfactual Alf) and only practical considerations allow (or demand) ascription of arthritis concept to the actual Alf. However, the practical considerations that justify the ascription of standard concepts in vast majority of cases do not translate into ontological commitments. The actual Alf, *strictly* speaking, doesn't possess the concept of arthritis therefore no externalist account of it is needed.

There is more that Sawyer says in support of externalism and against Segal's proposal. She claims that broad concepts have the following advantage over the narrow ones:

> "*Broad concepts remain stable across idiosyncratic variations, where narrow concepts, in contrast, are anchored to those variations. Antiindividualistic concepts are anchored in part by the nature of the things to which they refer, and not solely by the beliefs of people who employ them.*"[26]

26 Sawyer 2007, p. 30.

I shall call this claim the *constancy of reference argument* (CRA). The logic behind (CRA) is simple. The nomological character of nature 'imbues' broad concepts with constancy. Psychological states, on the other hand, are notoriously unstable. Anchoring concepts in nature is thus supposed to secure the constancy of reference.

The following three objections can be raised against (CRA):

O1 – Anthropological objection
O2 – Conceptual variation doesn't imply referential fragmentation
O3 – The utility of a theory doesn't imply its correctness

(O1) is supposed to remind us of something that is trivial and yet frequently overlooked. When Sawyer says that broad concepts are stable because they are anchored in nature (see the quote above, p. 10), it might look like concepts are peculiar entities that somehow managed to anchor themselves in nature. But, clearly, concepts didn't anchor themselves, humans did. And humans not only might have anchored them differently but they still might, say, re-anchor them. The reason is simple: science has not stopped evolving. There is no reason to believe that cases like the following one should cease occurring:

The extension of water before 1920 did not include D_2O (deuterium oxide).[27] It has been included since then, though. An alternative scenario was quite possible back in 1920. D_2O could have been put under a semantic umbrella of a different concept. Consequently, no semantic changes to the pre-1920 concept of water would have been made and the extension would have been different from the actual one. Externalists seem to strongly overestimate the theoretical achievements of modern science. As if they believed that modern science has more or less completed its project of formulating the final theory. That's extremely implausible. There is no reason to believe that, say, five thousand years from now humans will not look at our understanding of reality across the same epistemic gap as we do now with respect to people in the Stone Age.

27 The example is taken from Segal 2000, p. 128.

The following needs to be mentioned in this context. K. R. Popper understands scientific progress as if adding new layers, as if a snow ball rolling down the hill picking up more and more snow on the way.[28] If we understand science in this way, i.e., as a continuous accumulation of knowledge, then concepts, being grounded in the core of the snow ball, remain, perhaps, relatively stable. This theory of Popper's has been, however, discredited by T. Kuhn in his *The Structure of Scientific Revolutions* (Chicago, 1962). Kuhn argues convincingly that science does not evolve in a linear and accumulative way as suggested by Popper. Science moves forward, at least sometimes, in a series of paradigmatic 'leaps' that, as a rule, render even the most fundamental explanatory concepts of the previous scientific paradigm completely obsolete or radically transformed with respect to their extension. A radically different science will provide a radically different description of reality with the key concepts referring to different chunks of reality.

(O2) denies that conceptual variation necessarily leads to referential fragmentation. Note that one of the motivations behind externalism is of an epistemological nature. An externalist wants a reasonably stable and reliable epistemic connection to the world. If conceptual variation is rife and implying a referential fragmentation, then we all talk about a different world. The implication is not correct though. Consider a familiar example:

Presumably, 'an organism with kidneys' and 'an organism with heart' express two different concepts. However, the extension is identical, or rather, a complete overlap. And even in cases when the overlapping of extension is not complete, which will be the vast majority of cases, it would be unnecessarily dramatic to talk about 'referential fragmentation'. The overlapping of extensions of varying concepts among competent speakers will be, typically and in *normal circumstances*, large enough to secure the identity of reference. By '*normal circumstances*' we mean the practical purposes of our lives that ground the language games we play every day. Coming back to subjects S1 and S2 who have slightly differing concepts of water, we would say that the extension is a nearly complete overlap. It is important to notice that, *strictly* speaking, S1's and S2's concepts of water might be radically

28 For more see his *The Logic of Scientific Discovery* (Popper 2002).

different. Both subjects could be confronted with a large set of subtle theoretical questions about the microstructural properties of water. The subjects, being no experts on the matter, would, presumably, give different answers to many of the questions. To say that extensions of their concepts of water are (not *strictly* speaking) a nearly complete overlap is just a way to say that their concepts overlap with respect to those aspects that are relevant and constitutive in *normal circumstances*. Having a false belief that water is poisonous and a false belief that water dissolves antimatter will, clearly, affect our competence as a player of standard language games in a radically different way.

(O3) says that explanatory utility of a theory is not, considered alone, a sufficient indicator of the theory's correctness. How does it apply to (CRA)? (CRA) amounts to charging Segal's proposal with sacrificing reference. If only broad concepts are referentially stable, i.e., if narrow concepts lead to referential fragmentation, it is plausible to say that reference was, in a sense, given up by Segal.

This seems to be a revival of the dilemma that philosophers who accepted the externalist reading of Burge's story were facing. The externalist reading implied the claim that Alfs have different concepts. The dilemma, discussed at the end of section I was: either externalism or giving up reference. Most philosophers have been reluctant to give up reference. Segal, however, doesn't face the dilemma because, as we have seen, he refuses the externalist reading of Burge's story. He insists that Alfs have an identical concept, i.e., the concept of 'thartritis'. The important upshot of this is that Segal is still waiting for an externalist to provide a substantial argument for externalism.

There is a relevant difference between a philosopher who accepts the externalist reading (who enters the framework of the dilemma) and Segal as an internalist. It is consistent to offer (CRA) as a supporting consideration to the former because the former has already accepted what was substantial, i.e., the externalist reading of the story. Segal is in a different position though. Normally, when two competing theories seem to be backed by comparably plausible arguments and/or empirical data then and only then the explanatory utility or simplicity or other peripheral considerations can be taken into account and decide in favour of one of the theories. However, this is not the case here. To make (CRA)

appealing to an individualist of Segal's variety, a substantial argument must be provided first.

The logic behind (O3) applies to another and analogous argument that Sawyer uses to argue against Segal and in favour of externalism. Sawyer distinguishes concept and linguistic meaning.[29] The distinction is supposed to account for the possibility of constancy of reference in thought through change in belief. Thus Sawyer says: "[L]*inguistic meaning of a term may vary as the changes in belief are accepted across the community, but the concept expressed can remain the same.*"[30] This is supposed to be understood as an advantage over Segal's position that "*allows no slack such as that between concept and conceptual explication* [or linguistic meaning]".[31]

But again, the very distinction between concept and linguistic meaning (or conceptual explication) lies in the core of the dispute. Whether concepts can be understood along externalist lines is just another form of the initial problem. Once you understand concepts externalistically, the notion of linguistic meaning becomes separate. But from Segal's perspective it looks as a question begging to use the distinction against his position because he is still waiting for a substantial argument in favour of such a distinction in the first place. And let us remember, the only substantial argument provided by externalists is Burge's story, which is, as we have seen above, an argument that Segal's position is immune against.

CONCLUSION

I have examined the viability of Segal's version of Individualism against the objections raised by Sarah Sawyer. The objections were:

29 Sawyer 2007, p. 21.

30 Ibid., p. 30.

31 Ibid., p. 30. In the paragraph containing the quote, Sawyer uses the expression 'conceptual explication' and 'linguistic meaning' interchangeably. However, she doesn't want to suggest that the notions are identical. Clearly, conceptual explication and linguistic meaning are different notions. Their function in Sawyer's argument is analogous, though. They account for the fluidity of language games. Their separation from the notion of concept allows concept to retain its epistemic role of providing stable and reliable connection to the world.

1. Segal's proposal amounts to conceptual fragmentation which leads to a revision of ordinary conceptual apparatus used by special sciences.
2. Segal's proposal substantially weakens the constancy of reference of our standard concepts.

With respect to (1), I have argued that although something like conceptual fragmentation might be quite common it doesn't follow that a substantial revision of ordinary scientific practice is required. In vast majority of cases the overlapping of differing concepts will be large enough for the purposes at hand to justify an ascription of a standard concept.

With respect to (2), I have argued that:

i. the notion of constancy of reference rests on an implausible picture of scientific progress,
ii. the conceptual variation doesn't imply referential fragmentation,
iii. (2) is, from the perspective of Segal's position, circular.

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Critical Thinking – an Effort to Increase the Competence of Philosophy (demonstrated on the example of evaluation of argument validity)

The future of philosophy is uncertain, or, despite there being no doubt about it that philosophy will continue to receive attention mainly in the academic environment, its possible influence and effect on science in the future is, to say the least, uncertain. Special disciplines took over the role of the sponsor of scientific research and philosophy is thus often commenting on problems that have been long since solved by science. Philosophy has been able to scrape by on its own as a commentator; it is however as a commentator whose criticism does not need to be taken into account. The situation is nevertheless not as hopeless as it might seem, there still exists a possibility of equalizing the position if philosophy with respect to specialized fields, especially natural sciences, and thus to have philosophy accepted in discussions on the problems of science as their relevant participant. The future of philosophy lies therefore, in my opinion, in an effort to increase its own competence.

I believe that one of the necessary steps in order to achieve this is revision of the methodology of philosophy as a scientific field. One of the tasks of the methodology of philosophy should be assessment of methods and methodologies to be used by philosophy as tools in order to achieve certain purposes.

In the present text I would like to focus on one of the goals of philosophy: the development of critical thinking and the means whereby it can be achieved, namely the theory of argumentation and informal logic.

THE CRITICAL THINKING MOVEMENT

Starting from its theoretical beginnings in the 1970s, the programme of critical thinking has been closely tied to the system of public education. The necessity of development of critical thinking which is necessary for analysis and assessment

of common, every-day views and arguments is hardly a privilege of philosophy, but rather one of the goals of general education. The most substantial among the first reforms in general education, which helped to make the necessity of development of critical thinking more visible, can be attributed to the movement which is presently referred to as the Critical Thinking Movement after the Executive Order issued by the California State University in 1980:

> *"Instruction in critical thinking is to be designed to achieve an understanding of the relationship of language to logic, which should lead to the ability to analyze, criticize and advocate ideas, to reason inductively and deductively, and to reach factual or judgemental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief. The minimal competence to be expected at the successful conclusion of instruction in critical thinking should be the ability to distinguish fact from judgement, belief from knowledge, and skills in elementary inductive and deductive processes, including an understanding of the formal and informal fallacies of language and though*t."[1]

Starting from 1980, we can see the Critical Thinking Movement spread across the whole of the North America and other English speaking areas.[2]

The Executive Order clearly defined the goals to be achieved in teaching of critical thinking. These goals have lost nothing from their relevance since the 1980s and should even now be taken into account in considerations regarding public education. In the Czech environment there is unfortunately no such explicit order and thus it is assumed only implicitly that some such goals should be present in instruction. It is nevertheless true that it would be very beneficial for

1 Dumke 1980, p. 3.

2 Development of this movement can be according to certain authors such as Paul (1995) divided into three waves, wherein the focus of interest of the said movement changed with the individual waves, from the establishment of theoretical foundations and the relation between critical thinking and formal logic, to theoretical plans to involve critical thinking in instruction, to their actual realization. Even after 1995, the programme of development of critical thinking remains relevant and its inclusion in, American at least, public education system is one of the basic pillars of public education policy.

instruction in philosophy to follow this trend in the Czech environment, too and to have a programme of support of critical thinking introduced and thoroughly implemented in our education system. I believe it is not enough to implicitly assume that students in the field of philosophy and others will during the course of their studies achieve some sort of development with regard to critical thinking; it is necessary to instruct them systematically even in fields such as informal logic and argumentation.

INFORMAL LOGIC

As was mentioned above, I believe that the two fundamental tools for development of critical thinking are informal logic and argumentation. This is not merely because the first impulse for the establishment of informal logic can be seen to be the need to assess and analyse arguments which are formulated in the natural language. In its beginnings, informal logic was understood by certain critics as an effort to find an alternative to formal logic, whereas the said effort was seen as unsuccessful an informal logic as not constituting logic in the true sense of the word.

> *"I have a great deal of sympathy with the intentions of those philosophers who speak of 'informal logic', but I don't think that any clarity is gained by using the term 'logic' for what they are doing."*[3]

I believe this critique is unjustified. I shall try to prove on the example of argument validity that informal logic is closely related to formal logic and that we are moreover able to determine the imaginary line that separates formal logic from informal logic. Generally, we can say that in order for an argument to be sound, it needs to at the same time fulfil the condition of formal validity and the condition of factual verity of the premises. In formal logic we can judge only the first condition, that is to say, formal validity of the argument, in other words, whether

3 Hintikka 1985, p. 1.

the conclusion follows from the premises in a valid manner and whether some of rules of logic implication is not violated.[4]

Regarding the question of soundness of the said argument it would nevertheless be too hasty to believe that we can in informal logic decide whether an argument is valid or not without knowledge and use of formal logic. Informal logic should therefore not be seen as an alternative to formal logic, because it is built on the foundations of formal logic – it is not possible to imagine analysis and assessment of arguments without assessing the validity of the given argument, whereas we are unable to assess such validity without knowledge of the rules of formal logic. However, in informal logic, assessment of arguments does not stop with the assessment of their validity. Informal logic extends substantially beyond the set of arguments that can be assessed by formal logic, precisely because it also assesses arguments formulated in the natural language. It can therefore also deal with the second phase of argument evaluation, that is to say, evaluation of the factual truth of the premises. Formalization as the basic instrument of formal logic brings with it a substantial privilege unavailable to informal logic, namely the possibility of definitively deciding whether an argument is valid or not, without the necessity of assessment of the factual truth of the premises. Informal logic does not stop at evaluation of validity. Formal logic intentionally avoids propositions formulated in vague natural language, whereas informal logic finds itself, precisely due to the vague nature of the natural language, in a precarious situation wherein it is often impossible to decide definitively and without error whether an argument is valid or not. Despite the fact that such situations would appear to call for the probability theory or the tools of many-value logic systems, informal logic is able to solve such problems without resorting to the said instruments. The reason behind this is not a reluctance to formalize, but rather a desire to solve the problem in real time with only the help of the best possible reasoning, whether it is deduction, induction or abduction.

4 I shall discuss logical fallacies below.

PRAGMATIC LOGIC AS ONE OF THE INFLUENCES OF INFORMAL LOGIC

Apart from the already presented Critical Thinking Movement, the beginnings of informal are also closely tied to the philosophical tradition of Polish pragmatic logic, the basic assumption of which is that pragmatic logic as a part of education can contribute to a) unambiguous and consistent thinking, b) precise and systematic expressing of ideas and c) adequate justification of the conclusions. Pragmatic logic will also serve as an illustration of the fact that informal logic was incorrectly criticized as a supposed alternative to formal logic.

> *"However, pragmatic logic is to be applied not only to scientific research or at school, but also to everyday speech communication. As Ajdukiewicz clearly states, pragmatic logic is not the opposite of formal logic, but both formal and pragmatic logic complement each other. Moreover, pragmatic logic is useful for the teacher, who aims – among other things – at training students to make statements that are relevant, unambiguous and precise, which is 'one of the principal tasks of school education' (Ajdukiewicz 1974, p. 3)."*[5]

We do not need to choose between formal logic and, in this case, pragmatic logic and decide which of them constitutes a legitimate implement of science and education. Formal and informal logic can complement each other within the discourse of science and education, they do not contradict each other and there is thus no reason for refusing any of these tools.

TYPES OF ARGUMENTATION

Informal logic is used mostly in argumentation, that is to say, in case we want to use arguments to defend or refute a standpoint which is to be proven to either be or not be based on the given premises. Argumentation can therefore be most simply divided into defence of a standpoint or an effort to refute it. If

5 Koszowy 2010, p. 41.

a standpoint precedes arguments, the argumentation involved is retrogressive, whereas if a standpoint is presented after the arguments, the argumentation is progressive. Correct distinction between the premises and the standpoint they imply is the basic precondition of correct interpretation and relevant discussion.

In the present text, I shall not discuss the structure of argumentation, but rather focus on the problems related to evaluation of soundness of argumentation in the manner already outlined above. Argumentation and informal logic are often confused with argumentation fallacies. By being able to recognize and distinguish argumentation fallacies, we are able to contribute in a relevant manner to the decision as to whether an argumentation is sound or not. This is nevertheless not always so simple, as there are various types of argumentation which in turn determine the relations between the individual arguments. It is not always the case that invalidity of a single argument results in invalidity of the whole argumentation. I shall try to introduce these types in more detail.

The simplest type of argumentation is the so-called single argumentation, with this type a standpoint is based on a single premise. In order for a standpoint to be accepted as valid, the said premise needs to be valid also, and it has to be possible to find at least one implicit premise which is generally acceptable.

Example 1 (single argumentation)

1. Karel deserves his promotion.
   1.1. Karel worked hard in order to earn his promotion.
   (1.1′) Those who work hard deserve their promotions.

The second type of argumentation is the so-called multiple argumentation, with this type of argumentation a standpoint is based on at least two premises which while they do support the same standpoint are independent of each other. The premises can be supported by partial argument, but invalidity of one of them does not result in invalidity of the whole argument. They do not need to be both valid at the same time for the argument to be considered valid. The premises

should not contradict each other, but even in case of contradiction of individual premises the argument as a whole can still be valid, namely in the case that the valid premises are more important in the defence of the standpoint than those that are invalid.

Example 2 (multiple argumentation)

1. You could not have met my boyfriend in the Louver Café in Olomouc yesterday.
   1.1. The Louver Café is not in Olomouc, it is in Prague.
   1.2. I do not have a boyfriend and I did not have one yesterday, either.

The third type of argumentation is the so-called coordinative argumentation, with this type of argumentation the standpoint is based on premises which together provide the reasoning behind a given standpoint. It is therefore not possible to consider a standpoint valid provided any of the premises is invalid; a standpoint can only be inferred from valid premises.

Example 3 (coordinative argumentation)

1. Eva was born on 25 July 1984.
   1.1a Eva was born in July.
   1.1b Eva was born on the 25th day of a month.
   1.1c Eva was born two years later than her sister who was born in 1982.

The fourth type of argumentation is the so-called subordinative argumentation wherein the standpoint is based on a set or chain of premises. Within this chain, individual premises are inferred from further, preliminary premises. The validity of the standpoint and the whole argument thus depends on the validity of all of the premises involved. Should there be an invalid premise in the chain of premises the standpoint cannot be considered to be valid. It may happen that a standpoint can be considered valid, but unless it is sufficiently supported by premises (in this case it is supported by a chain of premises one of which is invalid), the argument as a whole cannot be considered valid.

Example 4 (subordinative argumentation)

1. I cannot come to your party next week.
    1.1. I am not free to go next week.
        1.1.1. I have to stay at work next week.
            1.1.1.1. If I don't, I'll be fired.
                1.1.1.1.1. I have received a notice at work warning me I'll be fired if I take another day off.

The four types of argumentation listed above are the basic types. With the exception of Single Argumentation they can be, and usually are, part of more complex and complicated argumentations. In such cases it is important to analyse the argumentation in question and identify the basic types of argumentation involved. The evaluation of validity of the whole then follows the same rules as the individual basic types. However complex and complicated the argumentation in question, it can always involve argumentations of the Multiple Argumentation type which prevents having the whole argumentation prematurely declared invalid as soon as a single invalid premise is discovered. In case such invalid premise is not in cooperation with the remaining part of the argumentation, there is no reason to immediately refuse the argument as invalid. In such case it is necessary to assess the validity of the remaining arguments which are not in cooperation with the invalid premise and, if they prove to constitute a sufficient defence of the standpoint, there is no reason to accept the standpoint as valid.

SOUNDNESS OF THE ARGUMENT – ARGUMENTATION FALLACIES

One of the frequent and popular subjects of attention of informal logic and argumentation are formal and informal argumentation fallacies. By means of identification of these fallacies we can securely proclaim an argument to be fallacious, or point out its incorrect use. As was already hinted at above, validity of an argument means that the condition of formal correctness of the manner in which the

standpoint is inferred from the premises is fulfilled as well as the condition of factual verity of the premises. The capability of distinguishing between sound and fallacious arguments is one of the main preconditions of development of critical thinking. A participant in a discussion is thanks to their knowledge of formal and informal fallacies not only able to construct their argumentation in the natural language in a correct manner, that is to say, without the said fallacies, but also to spot fallacies in their partner's argumentation.

I shall now try to briefly introduce the basic formal and selected informal fallacies which I consider to be essential with regard to determining whether an argument is sound or not.[6]

FORMAL FALLACIES

Unlike informal fallacies, formal fallacies are based on the logic structure of an argument. If a standpoint does not correctly follow from its premises, the argument in question does not fulfil the first condition, that of formal validity. In such case it is not even necessary to investigate factual verity of the premises. It is therefore more than appropriate to always verify formal validity of an argument first. Logical reasoning follows several rules, and even if it may seem that their violation is improbable, I shall try to demonstrate that these mistakes (whether intentional or unintentional) do occur. Further four formal fallacies may arise from inappropriate application of the rules of logical inference.

Affirming the consequent is a fallacious use of the rule of modus ponens ($P \rightarrow Q, P \vdash Q$, i. e., if P implies Q and P is true, then Q is true also). *Affirming the consequent can be expressed in the following manner:*

6 There is not enough space here for categorization of argumentation fallacies; various categorizations appeared in specialized literature and each of them was built according to its own key. A useful and substantial summary of argumentation fallacies can be found in van Eemeren (2002, 2009), Damer (2009), Walton (2010), in the Czech environment a categorization of argumentation fallacies was proposed by Picha (2012).

P1: If P, then Q.
P2: Q
C: Therefore P.

Let us demonstrate it on an example:

P1: If it is raining, the roads are wet.
P2: The roads are wet.
C: Therefore it is raining.

Affirming the consequent means that the second premise is apart from the implication $P \rightarrow Q$ formed also by Q as the succedent of the said implication, while the conclusion is the antecedent of the same implication. The example clearly shows that the conclusion does not follow from the premises. Even though the conclusion itself may be true, the argument is invalid, because rain is not the only possible reason for roads to be wet. The said roads could for instance have been watered. In this case, the cause and the effect are confused for each other. Rain is the cause of wet roads, yet wet roads do not imply rain.

Let us produce another example for completeness's sake, a more clear example, since the conclusion is false, which makes it more evident that the antecedent and the succedent in an implication cannot be reversed.

P1: If Andrej Babiš owns the Leo Express company, he is rich.
P2: Andrej Babiš is rich.
C: Hence, Andrej Babiš owns the Leo Express company.

A similar formal fallacy is that of denying the antecedent, wherein the modus tollens rule is applied fallaciously ($P \rightarrow Q, \neg Q \vdash \neg P$, i .e., if P implies Q and Q is not true, then P is not true.)

Denying the antecedent, that is to say, a fallacious application of the modus tollens rule, can be expressed in the following manner:

P1: If P, then Q.
P2: It is not true that P.
C: Hence, it is not true that Q.

Let us demonstrate it on an example:

P1: If it is raining, the grass is wet.
P2: It is not raining.
C: Hence, the grass is not wet.

Fallacious application of the modus tollens rule is very similar to fallacious use of the modus ponens rule, as in this case also the cause is identified incorrectly. Grass can be wet from dew. Rain is not the only reason for grass being wet.

Two further logical fallacies are results of fallacious application of logical conjunction and disjunction. Denying a conjunct is a fallacious use of conjuction, wherein a so-called false dilemma is created, this particular use being often considered to constitute an informal fallacy. The rule of negation of a conjuction implies that $\neg(A \wedge B), A \vdash \neg B$ and $\neg(A \wedge B), B \vdash \neg A$.

Denying a conjunct thus means that a valid variant of negation of conjunction is purposefully ignored, most often in the case when both propositions in a conjunction are false. Denying a conjunct follows one of these invalid rules $\neg(A \wedge B), \neg A \vdash B$ or $\neg(A \wedge B), \neg B \vdash A$. *The fallacy can be expressed in the following manner:*

P1: It is not true that A a B are both true at the same time.
P2: A is not true.
C: Hence, B is true.

Or analogically:

P1: It is not true that A a B are both true at the same time.
P2: B is not true.
C: Hence, A is true.

In a real discussion, the arguing party seeks to propose a false dilemma in order to confuse their opponent or the audience. The problem lies in that the person using the argument wrongly treats the A and B propositions as being contradictory. A and B are two terms of conjunction, they can both be true, but can also be both false or have one of them be true while the other is false. But if one premise is false that doesn´t mean the conclusion is true. It is therefore not necessary to pick one of the statements of the false dilemma, because both of them are allowed to be false. Let us demonstrate this on an example which clearly shows that the conclusion is invalid:

P1: It is not possible for you to be with them and
at the same time be with us also.
P2: You are not with us.
C: Therefore you are with them.

Or analogical example:

P1: It is not possible for you to be with them and
at the same time be with us also.
P2: You are not with them.
C: Therefore you are with us.

Another very similar fallacy is that of affirming a disjunct, which involves a similarly fallacious application of disjunction. Validity of disjunction implies that $A \vee B, \neg A \vdash B$ or $A \vee B, \neg B \vdash A$. *Affirming a disjunct is an erroneous application of one of following invalid rules:* $A \vee B, A \vdash B$ *or* $A \vee B, B \vdash A$, *because the veracity of one disjunct says nothing about the truth value of the second disjunct. Affirming a disjunct can be expressed in the following manner:*

P1: A or B is true.
P2: A is true.
C: Hence B is not true.

Or analogically:

P1: A or B is true.
P2: A is true.
C: Hence B is not true.

Let us demonstrate this on an example which clearly shows that the conclusion is invalid:

P1: This Food is tasty or cheap.
P2: This Food is tasty.
C: Hence this food is not cheap.

Conclusion is invalid, because the food can be tasty and also cheap at the same time.

Fallacious use of disjunction is rarely intentional, but is often a result of the imperfection of our natural language since the word "or" is frequently understood as implying exclusive disjunction, that is to say, that either one or the other of the possibilities can be true but not both of them at the same time. However, the nature of (inclusive) disjunction allows for both operands of a disjunction to be true. The exclusive variant of disjunction does exist, in that case truth value of operands of a disjunction must be contradictory. For example, "it either rains, or it does not" is a proposition which employs exclusive disjunction. Due to these semantic obstacles we could talk of a semantic error rather than a formal fallacy in the case of affirming a disjunct.

Also among formal fallacies are two fallacious inductive inferences, namely hasty generalization and appeal to probability. Both of these fallacies nevertheless follow from the restriction placed on induction as a process of inference of a general statement from particular premises. In closed systems such as mathematics we can speak of the so-called complete induction, wherein the premises contain all elements of the set to which the induction is related, and we can therefore consider the induction to be a validated

inference of the conclusion from the premises. In humanities and natural sciences use of complete induction is rare and we should therefore accept a conclusion based on induction as merely probable, statistically or preliminarily true. Due to the principle of charity which is a useful guide in communication, interpretation and argumentation alike, we accept the majority of statistically verified and probable standpoints as true, albeit of course sceptically, considering the possibility and probability of other standpoints or relevance of the sample used.

INFORMAL ARGUMENTATION FALLACIES

Informal argumentation fallacies are presently given more attention than the aforementioned formal ones. For this reason I shall mention here only three representative examples of informal fallacies which I personally consider to be the most interesting and causing the most pressing problems in philosophical discussions. It also needs to be said that informal fallacies cannot be identified using formal means and it is therefore necessary to use increased caution in their identification and evaluation.

Argumentum ad consequentiam, or appeal to consequences, is an argument which points out the logical or causal results that a statement has, has or could have and, based on whether these results are seen as acceptable or unacceptable, a decision is made as to whether the statement is accepted or refused.

Appeal to consequences is very interesting for informal logic as well, because neither in history nor at present can be found a single unified approach to the question of whether appeal to consequences constitutes an argumentation fallacy or a form of correct rational argument.

The first mention of appeal to consequences can be found already in Aristotle, it is nevertheless important to note that Aristotle himself did not rank this argument among argumentation fallacies, but rather considered it to be naturally correct and merely pointed the possibility of it being abused in persuasion. Sometimes appeal to consequences is incorrectly ranked as an argumentation fallacy (in Aristotle) due to erroneous identification of the said argument with affirming

the consequent, whereas however this logical fallacy lies in inferring the converse from the original statement.

From the history of philosophy, we can mention the use of appeal to consequence in Pascal's famous wager on the existence of God in his *Pensées*.

The first modern mention of appeal to consequence can be found (according to Walton 1999) in McCosh's *The Laws of Discursive Thought: A Text Book of Formal Logic* from 1879. McCosh points out that as far as utility is concerned, the use of appeal to consequences is legitimate, whereas if truth or validity is involved, the argument is not rational but rather constitutes an argumentation fallacy.

We are not able (according to Walton 1999) to present a clear definition of when appeal to consequences amounts to an argumentation fallacy and when it does not, which is why Walton presents three possible hypotheses according to which the argument can be evaluated.

1. It is fallacious to use the argument in order to accept or refuse the verity of a statement based on the supposed consequences of its acceptance or refusal. A correct use on the other hand is to accept or refuse a mode of action based on the supposed possible consequences of such action.
2. A fallacy occurs if in an argumentation statements which state facts are mistaken or for confused with evaluating statements. It is not acceptable to evaluate a descriptive statement by pointing out undesirable (or desirable) evaluative consequences, as this would involve confusion of facts with values. Correct use involves statements that express guidelines or recommendation for the case of a certain mode of action.
3. The fallacy occurs when context is changed during the process of argumentation. The argument is valid and common in considerations from or against a proposed mode of action. In a critical discussion wherein the truth value of a thesis is to be proved, use of appeal to consequences is irrelevant – it cannot be claimed that a thesis is true or false because its acceptance or refusal has good or bad consequences. The appearance of validity is due to shifting of context.

All three of these hypotheses base their evaluation of appeal to consequences on the subject of the given discussion. The first hypothesis distinguishes between practical and theoretical decisions, that is to say, between decisions involving actions on one hand and truth value of propositions on the other hand. The second hypothesis is based on distinguishing between facts and values. The third hypothesis is based on distinction between goals of conversation frames wherein an argument is used in order to achieve a certain goal.

Apart from the problem with evaluation of a specific use of appeal to consequences we can commonly encounter problems with the very definitions of the argument because it is in critical discussions easily mistaken for argument to absurdity, slippery slope or the queque variant of the ad hominem fallacy.

Even in case that appeal to consequences is considered to be a rational form of argument, be it due to its perceived positive or negative consequences, we need to be aware of the restrictions on which this form of argument is built, and which can be expressed (according to Walton 1999) by the following three critical questions that the discussion should answer:

1. How big is the probability and how likely is it that the presented consequences might, could or must occur?
2. What proof is there supporting the statement that the specified consequences indeed occur (might, could or must occur) as a result of the given premise?
3. Are there any consequences liable to result from the opposite, which should be taken into consideration?

Slippery slope arguments appear very frequently in discussions of bioethics and applied ethics. We can generally say that speakers commit this fallacy if they assert that certain events will lead to other events which will have serious or even fatal consequences, without there being a rationally explainable or causal relation, whereas the speaker does consider these events to be causally linked. It is also important to note that it takes but a small step in the "wrong direction" from the original event or condition and it will result in a chain of most probably unintentional,

irreversible and definitely undesirable consequences. In real argumentation, slippery slope is thus reminiscent of a warning that encourages stagnation and inaction under the threat of the aforementioned unwanted consequences.

> *"A slippery slope argument is a kind of argument that warns you if you take a first step, you will find yourself involved in a sticky sequence of consequences from which you will be unable to extricate yourself, and eventually you will wind up speeding faster and faster towards some disastrous outcome."*[7]

It might appear that slippery slope argument and appeal to consequences are fallacies of the same kind, this however not true. While appeal to consequences comments on truth value of facts or validity of standpoints with respect to their possible consequences, slippery slope argument tends to warn of negative consequences but is far more than a mere warning. The potential threat is understood as a rational reason not to take the original step at all, which makes it a form of persuasion, in certain cases bordering on manipulation. Walton (1992) points out, similarly as with appeal to consequences, that slippery slope argument can be used in correct manner, in which case it in involves inference based on induction and that the individual steps used to persuade a speaker can be in fact proved rationally and connected in a chain of implications. If however such proof and validation of use of a slippery slope argument is not possible, then it constitutes a case of argumentation fallacy. The danger of fallacious use and, above all, premature acceptance of these arguments is linked mainly to the subject of discussions wherein the argument is applied. This is because the discussions in question often involve the issues of applied ethics which could in the future serve as legal precedents, whether it is in case of abortions, euthanasia, or others. Walton (1992) further points out that a slippery slope argument is not easily labelled as valid or invalid, because, more so than with other types of arguments or tools of argumentation, it depends on the force and persuasive power of the argument; it is not granted that an argument can be unambiguously decided to be correct or

7 Walton 1992, p. 1.

fallacious and, more so than elsewhere, it is necessary to be cautious with regards to reactions and opinions of the general public. Real argumentation and attempts to defend or refute a slippery slope argument is very similar to argumentation reductio ad absurdum. And since, as was already mentioned, a correct slippery slope argument consists of a chain of valid implication, we should also pay attention to fallacious use of the modus ponens and modus tollens arguments as introduced above.

Post hoc ergo propter hoc is the summary label for argumentation fallacies which erroneously refer to a supposed causal relation. We can generally label these fallacies causal fallacies, because they often mistake correlation for causation.

> *"Establishing the temporal priority of one event over another is not a sufficient condition for inferring a causal relationship between those events. One cannot assume that post hoc ergo propter hoc – that an event that occurs after another event (post hoc) therefore occurs because of that other event (ergo propter hoc). A chronological relationship is only one of the indicators of a possible causal relationship. Other indicators might include a spatial connection or perhaps some history of regularity."*[8]

Examples of causal fallacy in argumentation may appear absurd, but they nevertheless do appear in everyday communication. An example of a typical confusion of a chronological sequence with causality: Before you moved in, we never had any problems with heating; it is broken now, therefore it logically follows that it's your fault. Another, more serious argument which mistakes correlation for causation: Until we had our child inoculated, she was completely healthy, now we received results stating that she's autistic, therefore vaccination causes autism.

These three representative examples of informal fallacies clearly demonstrate that deciding whether an argument is valid can be difficult due to complexity of the existing methods of argumentation. There is therefore no other solution than focus more time and critical attention to this topic. I believe that study of informal logic and argumentation may contribute to development of critical thinking and

8 Damer 2009, p. 180.

will allow philosophy as a field of science to once again take a place of respect in the discussion with specialized scientific fields.

In conclusion, it needs to be added that acceptance of informal logic and argumentation as a philosophical discipline is hardly unanimous in academia. For example, Woods (2000) asserts that informal logic is no part of logic or philosophy and that more than it belongs in the domain of pedagogy, linguistics and other specialized fields rather than that of philosophy. On the other hand, Freeman (2000) argues that informal logic can contribute within philosophy to epistemological discussions and that the field of argumentation is not the limit of its contribution or position in it.

Discussions on the relation between informal logic and philosophy are still ongoing and beneficial as thanks to them, new questions arise which can in turn be made use of by philosophy; it can try to answer them and thus prove that it still has something to offer, not merely to itself in its own enclosed space, but also to other scientific disciplines.

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Logic as a Toolbox

1 INTRODUCTION

Over the last few decades, a distinct turn in logic took place. More and more logicians started to be interested in capturing the way in which we *actually* reason in our everyday problem solving as opposed to earlier tendency towards the way in which we *should* reason.

It is no surprise that this new drive towards more mundane aspects of reasoning was motivated mainly by the boom of computer science and artificial intelligence, which both had practical aspirations deeply ingrained in them from the beginning. And once we started to teach computers how to think in fashion similar to ours, it was very quickly evident that classical logic will not take us too far; that it is too idealistic, too rigid to guide our everyday decision making.

It goes without saying that this newly found applications of logic in computer science, artificial intelligence and other related fields (such as e.g., linguistics) naturally led to an increasing demand for various logical systems. This drew in more practically oriented logicians, who – with distinct applications in mind – modified and crafted new logical systems from the old "philosophically" motivated ones (Jaakko Hintikka's (1929–) epistemic logic[1] and how it found its way into multi-agent reasoning is a prime example of this[2]).

But computer science and AI cannot take all credit for this new turn. Similar sentiments aimed at more accurate recreation of our reasoning methods can also be observed in "pure" mathematicians and logicians of the first half of the 20th century. Most notably Gerhard Gentzen (1909–1945) and Stanisław Jaśkowski (1906–1965), who are both considered to be founders of natural deduction.[3] This logical system was designed – in opposition to David Hilbert's (1862–1943)

1 See Hintikka 1962.

2 See, e.g., Fagin et al. 2003.

3 See Gentzen 1934 or Jaśkowski 1934.

axiomatic approach[4] – to portray more accurately the way in which we actually construct mathematical and logical proofs.

Long story short, in the '60s and the following years various groups of logicians, early AI pioneers and computer scientists started working on formal systems that would be more suitable for modeling the way that human minds work and deal with information in practice. This is the era that later gave rise to various kinds of non-monotonic logics, default logics, defeasible reasoning, epistemic logics, belief revision and others. Of course, that is not to say that the interest in traditional topics of logic was gone. Not at all, all there was, was a sudden rise in interest in other areas, too, such as were seen as more practice-oriented in nature.

It is important to note that nothing in the way that logic *per se* was done and exercised changed. Logic, very broadly speaking, is a study of the way in which we reason. It tries to analyze it and synthesize the results in some formal system, or at least in series of rules that guide valid reasoning. This has not really changed throughout the ages since Aristotle. What did change was rather the overall climate surrounding logic. More specifically, when computer science and artificial intelligence joined in with their goal of building machines that can aid us or replace us altogether, suddenly there was also a market for logic, and thus industrial demand. No longer was it just an academic area of study, but rather a field with diverse areas of possible application.

But of course, computer science is not just an area of application for logicians and their untamed ideas, much of research undertaken in computer science inspires and influences logic and its direction as well (e.g., logical and functional programming). My point is logicians and computer scientists have a lot to learn from each other.

Some think that this shift in focus of logic towards more mundane matters and blurring of the boundaries between logic, computer science and AI is a bad thing, that it makes logic as a whole too relativistic, spreading it too thin, so to speak. But I disagree; I think that a great strength and potential lie in this approach of combined effort and cooperation.

4 See Hilbert 1918.

However, there is also a darker side to it. Gradually it became commonplace to have logical systems that tackle just one issue and have no other aspirations. This one issue, after all, might be the sole reason for creating these systems in the first place. What it essentially all came down to was finding the right tools for the job. But, of course, there is usually not just one right tool, but many, all of which could finish the job, although at varying efficiency. You can knock in a nail with a hammer, but you can just as well use a wrench or a crowbar. Sure, it will be more difficult and time consuming, but with a little bit of finesse it can be done nonetheless.

On the other hand, this situation is hardly an ideal scenario. Creating *ad hoc* logical systems for tackling various philosophical or practical issues might be at first very efficient and time saving, but from the long-term perspective this approach is highly inadvisable and we soon end up flooded with various logical systems, which bear no apparent resemblance or connection to each other. And that is a problem: we don't want to create hammers for each specific nail; what we want ideally is a single hammer that can drive in all sorts of nails.

2 EXPANSION AND CONTRACTION

Such immense growth in plurality and diversity of logical systems could not stay for long without spawning the opposite tendency to unify them back together. Reasons for this are both philosophical and practical. Ideally, we would like to admit that there is not a plurality of "anything goes" logics, but rather a single one (in the broadest sense) and each of these various logical systems just reflects certain hand-picked aspects of it. And the practically motivated desire for unifying various systems stems form the simple fact that it is easier to work with and implement one system, one environment (although with possibly many interacting sub-systems, but all governed by the same global principles) than ten systems each operating with different principles, strategies and policies behind them.

I think we, as human beings, try to be consistent in our beliefs and actions as much as possible. We don't like inconsistencies and contradictions. And if we encounter them (either we notice them or they are simply pointed out to us by

someone else), we try to make sense of them – preferably as quickly as possible – with all sorts of explanations ("I must be missing some piece of vital information", "I must have overlooked something", "I must have made a mistake somewhere", "Somebody is lying to me", "They have to be using a different source of information", "I must be meaning something else by this word than you do", etc.). I have yet to meet a person, who would be satisfied with the explanation along the lines of "You know, it's just one of the contradictory facts of nature, you just have to accept it and there is nothing you can do about it". We don't like this, we like things that make sense to us.

What is more, we can juggle several logical systems and choose the appropriate one of them for the task at hand. We use certain kind of logic when proving some theorem in classical logic and a different kind of logic if we want to prove that someone is a guilty in court. We also often use phrases such as "by your logic", "your logic is flawed", etc., which, I believe, are not just figures of speech, but hints at something very concrete, i.e., that the idea of someone or something obeying or acting upon different logics is not an entirely alien concept to us.

Yet all of these different logics have something in common. For one, they all have been developed by humans in efforts to describe the way in which we reason in general or in some specific area. And furthermore, we can usually grasp (even if only intuitively at first) the relations between these various systems and how they interlock and connect (or not) to each other. And it is this immense versatility and adaptability, this almost seamless transition from one logic to another depending on the current goals that allows us to excel, where computers struggle, even though they exceed us greatly both in speed and precision of computation.

This common ground calls for some theory that would be able to describe and study all these logics in some unified way and make precise the individual connections between them. This theory must provide framework that would not only be able to describe all these various logics, but also be capable of allowing certain communication between them and being able to track the transitions from one logic to another. In other words, it must be a global theory capable of supervising the interconnections of all of its subsystems.

Back to our tool metaphor, logic perceived as such unifying framework is no longer just a tool, but rather a whole toolbox, which provides us with specific and specialized systems. To put it slightly differently, we want some general unifying logical framework that would allow us to describe and operate with all our tools in a unified fashion.

Does it mean that we want to have one single true logic, e.g., intuitionistic logic, and describe all other logics from its perspective? Not necessarily, rather we seek some overall logical methodology or general principles that would enable us to accommodate all various logics, and if need be, connect them to each other in a way we find desirable.

One of the most successful attempts of providing such unifying system for linking different logics is, I believe, Gabbay's labelled deductive systems.

3 LABELLED DEDUCTIVE SYSTEMS

Traditionally, logic operates with formulas (propositions, sentences, statements…) which are the atomic units of the respective systems. Labelled deductive systems (or LDS for short) comes with a slight twist.[5] It argues for pairs, i.e., the basic units are not formulas, but couples consisting of formulas and labels. You can think of labels as means of providing extra information about formulas. That is, after all, what labels are usually used for in real life as well. These labels can be essentially anything you need: formulas from different logics, terms from lambda calculus, modes of justification, etc.

This might not seem as something revolutionary, but what makes LDS novel is that labels are considered to be integral part of the overall LDS calculus. They are not just some notational convenience for reasoners providing meta information about the formulas. They are part of the logic itself. The LDS treats labels the same way as it treats formulas themselves. This shift is of crucial significance. As Gabbay, the founder of the LDS, said:

5 See Gabbay 1996; de Queiroz et al. 2011; Ohlbach, Reyle 1999.

> "*This sounds very simple but it turned out to be a big step, which makes a serious difference, like the difference between using one hand only or allowing for the coordinated use of two hands.*"[6]

So the key idea behind LDS is that you are working with two logical systems simultaneously, yet separately (just like our hands do). Thus we have the labeling calculus on the one hand, and the main content calculus on the other, with the former keeping the latter in check.

This so called two-dimensional setup, i.e., first dimension of formulas alongside second dimension of labels, makes LDS a very versatile, flexible and customizable formalism. And it doesn't matter whether your motivation is purely theoretical or practical. It can satisfy both camps. But most importantly, it makes LDS a very potent candidate for our overarching logical framework capable of binding together different kinds of logic.

Our discussion has been so far very informal, so let's have a closer look at the LDS itself. Suppose we use lambda calculus as the labeling system and propositional logic as the main content system. Thus the basic declarative unit of LDS will look like this:

$$t : A$$

which can be read as term t labels formula A. As we have already mentioned, the labels might represent essentially anything we need or deem necessary, useful or helpful. As we have already said, the most general idea is that label t provides some kind of additional information about formula A that A cannot provide alone (i.e., it is a piece of information of a different nature).

For example, labels might represent proofs of the respective propositions, mode of their justification or indicate their source (e.g., *newspapers*: A, *television*: B). Labels can be also used for listing the premises (data) from which a certain formula was derived (e.g., $D : A$, where D is set of formulas (parts of database) from which

6 Gabbay 1996, p. ix.

A was deduced), or simply for explicit tracking of all previous assumptions (e.g., *A*, $B : A \wedge B$). Label might also stand for a number representing reliability (or priority, number of votes, etc.) of the proposition on a scale of 1 to 10 (e.g.,5 : *A*, 9 : *B*). Furthermore, we can view labels as simple timestamps for easy checking of when the last verification or update of the item at hand took place (e.g., 2013/10/10/13.45 : *A*). Possibilities are numerous, but – as we have already said – we will limit our attention to the case where labels represent terms from lambda calculus.

The corresponding main content logic will then be defined accordingly to the labels (in our case lambda terms) and all the logical moves will be policed by the labeling system. This symbiotic connection is important to realize. The two-dimensional logical system is no longer just a calculus of logical deductions on formulas, but a harmonious combination of a functional calculus of labels and a logical calculus of propositional formulas.

Therefore in LDS the traditional concept of consequence between formulas of the form:

$$A_1,\ldots,A_n \vdash B$$

i.e, if $A_1,\ldots, A_n$ holds, so does *B*, is replaced by the concept of consequence between labeled formulas:

$$t_1 : A_1,\ldots,t_n : A_n \vdash s : B$$

i.e., if $t_1 : A_1,\ldots, t_n : A_n$ holds, so does $s : B$. And naturally, while in traditional logic (proof-theoretical) consequence is defined via inference rules applied to formulas, in LDS consequence is defined by rules operating on both formulas and labels. And of course, the same applies also to the notion of truth (validity) that has to take into account the two-dimensional nature of the LDS as well.

Thus, e.g., the truth of a formula might be defined in the following way:

Formula is true *(valid) if and only if a deduction of it can be constructed where the label contains no free variable.*

In other words, formula is *true* if it relies on no assumptions. In this case, labels were used for handling assumptions, i.e., no free variable amounts to no assumptions (more on this later).

So the main purpose of adding the extra dimension of labels to the formulas, thus making the basic unit $t : A$ instead of just A, was, in our case, to gain more explicit control and insight into the logical system and matters at hand (i.e., better book keeping of deduction steps in proofs: tracking assumptions, their withdrawals, etc.).

In logic we are usually most interested in proofs. Let us therefore see how LDS can improve our proof techniques, specifically in natural deduction. In natural deduction, a certain formula is typically considered to be true (valid) if it relies on no assumptions. In other words, by the time we arrive at the formula we wanted to prove, all assumptions made to that point should be withdrawn. Thus assumption withdrawing rules are of key importance.

One of such rules that allow us to discharge assumptions is the *Implication Introduction* rule (→ I) which in its most basic form looks as follows:

$$\begin{array}{c} [A] \\ B \\ \hline A \to B \end{array} (\to \mathrm{I})$$

This can be read as: if you deduce B from the assumption A, you can assert formula $A \to B$ (i.e., A implies B) as proved and discharge assumption A.

Now let's inject labels into this picture. We get:

$$\begin{array}{c} [x : A] \\ b(x) : B \\ \hline \lambda x.b(x) : A \to B \end{array}$$

Brief commentary is in order. We already know what is happening in the content dimension on the right hand side, but what about the label dimension on

the left? Essentially, it says the following: if you have some variable x upon which you build some term (function) b, that depends on the x (this is what the notation '$b(x)$' indicates, i.e., that b is a functional term depending on the variable x), then you can abstract away x from the term $b(x)$, which amounts to the notation '$\lambda x.b(x)$'. Thus, the binding of free variables in labels (in the functional/label dimension) corresponds to the withdrawal of respective assumptions (in the logical/content dimension).

In other words, the lambda abstractor 'λ' in the conclusion binds the free occurrences of x in the term $b(x)$ (which may be one, many or none) and this corresponds to discharging the initial assumption A, because by abstracting away from x, we are essentially throwing away its original instance from consideration. Or to put it differently, the act of withdrawing an assumption A on the logical side is reflected by binding the variable x on the functional side.

Let's try to demonstrate this on a concrete example. Suppose that x is an integer, let us say 64, and $b(x)$ is some "integer-to-ASCII" function applied to that integer, then $\lambda x.b(x)$ is a function that takes an integer and returns the corresponding ASCII character. This means that for number 64 it would return the symbol '@', for $x = 65$ it would return letter 'A', for $x = 66$ you would get 'B' and so on according to the following snippet of the ASCII table:

Decimal	Character
64	@
65	A
66	B
67	C
68	D
…	…

But how can this assist us in constructing proofs? We can use labels for keeping track of withdrawal of assumptions, and thus having better control over it in general. This is of crucial importance, because of the way validity was defined (i.e., reliance on no assumptions).

In other words, it simplifies the process of checking if really all the assumptions have been withdrawn by the end of the deduction. All we have to do is look at the label at the conclusion and check if all the variables introduced in the course of the deduction (= arbitrary labels, such as e.g., the variable *x* above) are bound (= discharged) by some abstractor (such as e.g., λ-abstractor in the example above).

Finally, we demonstrate a proof in LDS. Suppose we want to prove that from the proposition "I have an apple and a banana" follows "I have a banana and an apple".

First let's use *A* instead of "I have an apple", *B* instead of "I have a banana". So in the end we want to prove the formula $(A \wedge B) \rightarrow (B \wedge A)$. Further, we will need two additional inference rules (aside from Implication Introduction, which we already introduced earlier):

$$\frac{A \wedge B}{A}\,(\wedge \mathrm{E}) \qquad \text{and} \qquad \frac{A \quad B}{A \wedge B}\,(\wedge \mathrm{I})$$

which are called *Conjunction Elimination* (∧ E) and *Conjunction Introduction* (∧ I), respectively. Now for the proof itself:

$$\dfrac{\dfrac{[x : A \wedge B]^x}{x_2 : B}\,(\wedge \mathrm{E}_2) \qquad \dfrac{[x : A \wedge B]^x}{x_1 : A}\,(\wedge \mathrm{E}_1)}{\wedge x_2, x_1 \wedge : B \wedge A}\,(\wedge \mathrm{I})$$

$$\lambda x. \wedge x_2, x_1 \wedge : (A \wedge B) \rightarrow (B \wedge A)\ (\rightarrow \mathrm{I}^x)$$

Now, what happened here? First let's have a look at the content side. We started by assuming the formula $A \wedge B$. From this we separately inferred, via the rule of Conjunction Elimination (∧ E), the second and the first formula, i.e., *B* and *A*. From this we inferred with the help of Conjunction Introduction (∧ I) the

formula $B \wedge A$. And finally in the last step, since we have successfully deduced the formula $B \wedge A$ from the assumption AB, we applied the Implication Introduction rule ($\rightarrow$ I) to declare as proved the conditional $(A \wedge B) \rightarrow (B \wedge A)$ and simultaneously discharged the initial assumption $A \wedge B$. Thus, we have proved that from "I have an apple and a banana" indeed follows "I have a banana and an apple".

Now let's have a look at the labeling side. We begin with some arbitrary data structure x with two components. In the next step we extract from this structure the second and then the first component (i.e., x_2 and x_1). Then we make a new structure, but now with reversed order (i.e., $\langle x_2, x_1 \rangle$). After that we apply the lambda abstractor. So finally we get a function that takes structure x as an input and returns a new structure with swapped order $\langle x_2, x_1 \rangle$. This is what the notation '$\lambda x. \langle x_2, x_1 \rangle$' tells us.[7] For example, if we would apply this function to the couple $\langle 5, 7 \rangle$, we get in return a new pair $\langle 7, 5 \rangle$.

Notice that this essentially amounts in meaning to the formula $(AB) \rightarrow (B \wedge A)$, i.e., A and B switch places similarly as did 5 and 7 above, and this is precisely why is LDS described as two separate systems harmoniously working together.

4 MODULARITY

In the previous section I tried to briefly demonstrate how LDS can act as a framework for different sub-systems by connecting two logical systems, namely lambda calculus and natural deduction. But there is another, I believe, important concept that we have not really discussed so far and was just briefly hinted at earlier, which is modularity – the idea of having different types of independent logical systems at our disposal designed for certain specific tasks and having the ability to combine these logics as desired; in other words, being able to join these systems together to make a new one.

Back to our toolbox allegory, in ideal case we would not only want many versatile tools in our toolbox, but also for them to have certain kind of synergy, i.e., the

7 Strictly speaking, the proper notation should be '$\lambda x_1 x_2.\langle x_2, x_1 \rangle$', but for simplicity's sake we write just x as a variable for the whole data structure $\langle x_1, x_2 \rangle$ and expand it only when necessary.

possibility to connect them together in modular fashion and thus creating a new tool capable of doing something that the older tools could not do on their own.

For example, we might have some logic of actions, situation logic and temporal logic and we want to connect them together to get a logic capable of representing how certain actions can affect situations over the course of time. From this point of view, logic – in its broadest sense – is rather an aggregate of several interconnected logical sub-systems.

For illustration of this general idea we don't have to go too far. LDS, I think, is a major example of this concept, although still in its infancy. And we have already briefly shown that lambda calculus can work quite nicely hand-in-hand with natural deduction (or to be more precise, with natural deduction treatment of intuitionistic logic).

But this also means that if we were to find or develop some other system capable of working in unison, e.g., with lambda calculus, then we will also know that this new system should work in unison with our content system, because we already know that it works with lambda calculus. In other words, if we find some new system capable of labeling lambda calculus the same way as lambda calculus is capable of labeling natural deduction, we also discover new labeling system for natural deduction, and thus new means of communicating between two different systems. This could lead to development of rules not for formulas or terms, but for their respective logics. So in a sense we would be creating some sort of logic of subordinate logics.

Of course, I am oversimplifying things here a lot, but I think the main idea at play here should be clear. In short, the two-dimensionality of LDS provides us with a possibility to build bridges between various logical systems. Thus we can also imagine LDS as some sort of glue capable of joining together different systems in a more or less modular fashion.

A "plug-and-play" approach of this kind, built upon module-based reasoning, where we can lock together or detach different logical systems to craft a new one, I feel, carries overall a lot of promise for the future. In other words, I believe that modularity, which leads to greater generality and versatility, is the future of logic, or at least a part of it. Whether LDS in particular will be a part of that future I am not yet sure, but it certainly appears to be on the right track.

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PHILOSOPHY FOR MATHEMATICS AND MATHEMATICS FOR PHILOSOPHY

Ethnomathematics: A Political Challenge to the Philosophy of Mathematics

0 INTRODUCTION

What is ethnomathematics a why should we pay attention to it when considering the future of the philosophy of mathematics? As an answer to the first part of the question we can offer a general definition: it is a program investigating mathematical ideas which have been developed by various cultural groups independently of the development of Western mathematics. One of the key ambitions of the program is the strife to achieve acknowledgement of the equal position of cultural mathematics with respect to Western mathematics which is often seen mainly as a formal academic discipline.[1]

Should we then proceed to the second part of the question, it might seem that the program of ethnomathematics is little more than a marginal topic with a mere distant relation to the philosophy of mathematics or the future of the said philosophy. I shall nevertheless strive to demonstrate that investigating of ethnomathematics and its relation to the philosophy of mathematics offers an unorthodox perspective fusing the political and philosophical approach to mathematics. This perspective will allow us to see the philosophy of mathematics in a heretofore sparsely reflected context: as a politically significant tool in the struggle for acknowledgement of equality of different cultures. This text is a concrete case study of the political dimension of the philosophy of mathematics on the material provided by the ethnomathematical program. I therefore see one of the possible future options of reflections of the philosophy of mathematics in an explicit

1 Ethnomathematicians associate the concept of Western mathematics with our usual, conventional understanding of mathematics, i. e., with what ethnomathematicians refer to as the so-called Eurocentric model of mathematics: the assumption that there exists only one single universal mathematics based on the knowledge brought about by the development of axiomatization in ancient Greece, further developed from the 16th century onwards by European mathematicians (cf. Joseph 1997, p. 64). Western mathematics is thus defined by ethnomathematicians not only historically and geographically, but also by means of its proponents – mainly Western academic mathematicians.

awareness of its relation with the political dimension of the problem and in deeper investigation of its political potential.

0.1 The Political Dimension of Ethnomathematics?

Ethnomathematics can be generally understood as a research program which is primarily interested in mapping out of the so-called cultural mathematics. Let us start from the following concept of ethnomathematics:

> "*Ethnomathematics is the field of study which examines the way people from other cultures understand articulate and use concepts and practices which are from their culture and which the researcher describes as mathematical.*"[2]

Ethnomathematics, based on the presented definition, focuses on such aspects of cultures as we can label as mathematical, whereas the research in turn focuses primarily on the cultures of the former colonies.[3] According to Marcia and Robert Ascher, we recognize such concepts as mathematical which in some way correspond to this label in our own culture: "[f]or example, all people, literate or not, impose arbitrary orders on space. Particular orders develop within cultural contexts and their form and content will necessarily be expressive of the culture in which they arise."[4] Mathematical ideas of these cultures are in the context of ethnomathematical research identified by variously defined "pan-mathematical" universal activities under which we can count various types of counting, localization (in the sense of conceptualization of space), measurement, design (i.e., design of objects and their shapes), games and explanations (as a search for a way to represent relations between phenomena).[5] An alternative proposal would then understand mathematics as a set of so-called QRS systems which conceptualize

2 Barton 1996b, p. 214.

3 The current significant field of research of cultural mathematics are African mathematics (cf. Gerdes 2007, 2010; Zaslavsky 1999), Maori mathematics (cf. Ascher 1987), mathematics of Native Americans (cf. Ascher 2013), mathematics of Pacific Islanders (cf. Goetzfridt 2008), etc.

4 Ascher 1986, p. 125.

5 Cf. Bishop 1990, pp. 59–60.

quantity, relations or spaces, and ethnomathematicians consider each culture to be developing its own QRS system.[6] An important aspect of ethnomathematics is thus in explicit pointing out of the close tie between mathematics and its cultural context. Ethnomathematics emerges in response to such understanding of mathematics as is based on the idea of the possibility of eliminating cultural influences from mathematics, from the understanding of mathematics as being wholly independent of its cultural context. Understanding of mathematics as a culturally neutral set of knowledge is, according to ethnomathematicians, typical of Western mathematicians and the common concepts of philosophers of mathematics, and it is necessary to be objected to.

Let us then consider the ethnomathematical program as emerging from the clash of views regarding the supposedly superior status of Western mathematics with respect to the so-called cultural mathematics. Ethnomathematics is a program which attempts to emancipate cultural mathematics, while its demands also aim to realize concrete political steps: inclusion of elements of cultural mathematics into school curricula – primarily in those cultures which said mathematics originate from. Should we consider the usual understanding of the philosophy of mathematics as a field of philosophy which is mainly interested in investigating the nature of mathematical objects and the ways of understanding them (cf. Horsten 2012), we can then ask what place does this area of philosophy have in the political ambitions of ethnomathematics. The question which I shall try to answer in the present paper is: In what way do ethnomathematicians use the philosophy of mathematics in order to achieve their political goals? I shall strive to answer the question on two separate levels. On the first of them I shall focus on presenting a concrete philosophy of mathematics, that is to say, a concrete ontological-epistemological whole which ethnomathematicians consider to represent an adequate basis of their program. It will therefore involve identification of the demands of ethnomathematics on the philosophy of mathematics with regard to the political ambitions of the program. On the second level, I shall be interested in finding out about the role ethnomathematicians ascribe to the said ontological-epistemological whole within the

6 Cf. Barton 1999, p. 56.

framework of their political efforts. The discussion will thus involve identification of the ethnomathematicians' strategy with respect to realization of their political ambitions. The question can therefore be divided into two separate sub-questions:

1. What kind of philosophy of mathematics is adequately suited for the ethnomathematical program and why?
2. What role does ethnomathematics ascribe to the philosophy of mathematics?

The answer to the first question is based on investigation of the assumptions and demands of ethnomathematics. The answer to the second question emerged from investigation of the manner in which the philosophy of mathematics is used in ethnomathematicians' arguments. Both answers will be presented on a concrete case: analysis of the contribution of Bill Barton, a New Zealand philosopher who is explicitly trying to provide philosophical background for the said field of study. On the first level, the goal will be to find an appropriate philosophy of mathematics such as would, according to Barton, be adequately suited to the demands of ethnomathematics, whereas on the second level, I shall provide an analysis of Barton's arguments through the lens of the so-called post-colonial theory and show how and to what ends is the philosophy of mathematics used.

1 THE STARTING POINTS: SUPERIORITY OF WESTERN MATHEMATICS?

Let us consider the ethnomathematical program as emerging from the clash of views regarding the supposedly superior status of Western mathematics with respect to the so-called cultural mathematics. We can thus consider this clash of views to arise from the fact that those identified by ethnomathematicians as the "Western philosophers of mathematics" defend the thesis that mathematics is in a certain sense a unique set of knowledge. The source of this uniqueness is its universality connected with its value neutrality: mathematical assertions are a priori, they precede experience, and thus by their very nature independent of context,

not tied to any cultural, political or social values of any given group.[7] Their opponents, the ethnomathematicians themselves, then attack this view. Their attack can be identified as consisting of two stages: the first step being the assertion that Western mathematics does not constitute a superior set of knowledge; hence it needs to be shown that this mathematics is much like any of the cultural mathematics tied to a certain context and system of values. In the second stage, ethnomathematicians reinforce this refusal by labelling this view of mathematics as a neutral and therefore unique set of knowledge – hegemony. These two steps can then be used to identify the political level of the ethnomathematical program which aims for the following goals: to elevate cultural mathematics because a) there is no reason for their heretofore inferior position, and b) the hegemony of Western mathematics needs to be refused.

1.1 The Values of Western Mathematics

The key moment in argumentation of ethnomathematicians in the first phase of their attack on the superiority of Western mathematics is their pointing out of the connection between Western mathematics and the certain values and context tied to its emergence in Ancient Greece.[8] Ethnomathematicians here refer to analyses of historical and anthropological literature (cf. Bishop 1990, p. 56). Joseph Bishop shows that mathematics is connected with four typically Western values: rationalism, objectism, control and progress. The core of the rationalism considered is relying on deductive reasoning and logic, which according to Bishop results in Western contempt for the mere trial based practices or traditional wisdom (cf. Kline 1964; Bishop 1990, p. 56). By objectism is understood a manner of understanding the world as if it was composed of discrete objects which may be removed and abstracted from their context. This de-contextualization which allows us to generalize is key to Western mathematics and science, which according to ethnomathematicians however does not mean that it is a universal value shared by all cultures. The third Western value according to Bishop is the potential for control: mathematical ideas are directly applicable concepts, or they can

7 Cf. Ernest 1998, p. 11.

8 Cf. Joseph 1997, Ernest 2007.

be used via science and technologies as a means of control of physical and social environment (cf. Bishop 1990, p. 58). The last value is then the tendency to progress: a search for alternatives. According to Horton's comparison "In traditional cultures there is no developed awareness of alternatives to the established body of theoretical tenets; whereas in scientifically oriented cultures such an awareness is highly developed."[9]

An important moment whereby ethnomathematicians confirm the perceived lack of superiority of Western mathematics is then the accent they put on the assertion that the aforementioned values are not universal and applicable for all cultures but are rather tied to the cultural conditions of Western culture. Hence, while these values may appear to us valuable or preferable with regard to the possible Western criteria (such as effectiveness), this does not mean that the values are automatically appropriate for all cultures .[10]

In this manner, ethnomathematicians deny the value neutrality and lack of context of Western mathematics. Western mathematics is – in terms of having or lacking a cultural background – put on the same level as the other cultural mathematics. The question then is whether there is something that would make it unique in comparison with these other cultural mathematics. Is it, being a system based on rationalism, objectism, progress and control, somehow better than the others? Here too ethnomathematicians deny its special position: they refuse to put values on which a cultural system is based into some kind of hierarchy. They consider the criteria according to which we would compare such values impossible to establish: they would always have to be set from within a particular culture.

1.2 The Hegemony of Western Mathematics

If it is the case that Western mathematics is merely one of such systems, why is it so widespread and so often used? This is where ethnomathematicians come up with the following answer: what happened is that the rational values of mathematics became intertwined with its application as a means of power. In this line of argumentation they make use of a reference to the Foucaultian concept of

9 Horton 1967.

10 Cf. Bishop 1990, p. 58; Barton 1996a, p. 163.

knowledge-power,[11] or Gramsci's concept of cultural hegemonies.[12] Mathematics as a specific set of knowledge is tied to execution and promotion of power interests. More specifically, mathematics is one of the "most powerful weapons" used during colonial enforcement of Western culture in the cultures of Africa, India or the Pacific islands.[13] By taking advantage of strategies of education, trade and administration, these cultures are forced to accept Western values of rationalism, objectism, technological control and progress, that is to say, in the context of these cultures, values that are not native.[14]

Our belief that mathematics lacks value content is thus in fact a result of a successful execution of power strategy of the dominant group, which ended up in suppression of significance of other cultural mathematics. According to Gelsa Knijink this constitutes a case of the so-called double violence: first, a culture was forced upon other cultures, then this act of enforcement was forgotten. To be concrete: in the first step Western (European) culture was dominant along and its achievements including mathematics were forced upon other cultures, whereas the result of the second step is then that the originally European style of mathematics is understood as the only possible manner of adequate mathematical thought.[15] Thus, although anthropological research gives us evidence of different cultures developing their own various mathematical concepts, the problem lies in that we refuse to acknowledge these concepts due to the existing power hierarchy and understanding of Western mathematics as being superior.

Barton develops his ideas in the similar direction, defining discursive mechanisms[16] which lead towards exclusion of cultural mathematics from the thought of Western mathematicians. Barton discusses two types of mechanisms: mechanisms of universalisation and isolation. The principle behind the mechanisms of universalisation is the desire to keep all mathematical ideas that appear across

11 Cf. Skovsmose 2007.

12 Cf. Coben 1998.

13 Cf. Bishop 1990; Seah, Bishop 2000.

14 Barton 1996a, p. 163.

15 Knijnik 2012, p. 89.

16 Although Barton does not explicitly point this out, his mechanisms are significantly similar to Foucault's discursive practices (Foucault 1971).

cultures together in one place, to explain them by means of the same concepts, of a unified structure. Ideas contributed by cultural mathematics are thus subsumed under the already existing (Western) mathematical categories. The mechanisms of isolation on the other hands work based on separatist tendencies: they accentuate the boundaries of mathematics and define what can be understood as being mathematics in the first place. They therefore simply refuse to consider the ideas of cultural mathematics as being mathematical at all.[17]

1.3 The Political Goals of Ethnomathematics

Provided mathematics is a system as culturally based as all other cultural mathematics, and is thus equal to them in this respect, ethnomathematicians see no reason to consider it superior, nor any reason for the other cultures to be controlled by means of Western mathematics. Ethnomathematics is on this level an explicitly political program, its goal being abolishment of perception of Western mathematics as being superior:

> *"Ethnomathematics is political because it destroys the existing hegemony on mathematics by academic mathematicians and curriculum developers. A possible consequence of this is that the existing hegemony will only be replaced by another. Those developing ethnomathematics need to be aware of this political dimension to their work, and to address it in a way that makes political use transparent. For example, providing ethnomathematics with a secure philosophical base describing the ways in which mathematics is relative can help to prevent any hegemony."*[18]

From the program declaration presented by Barton, we can read the value level of ethnomathematics' argumentation. Cultures and their achievements are equal, Western mathematics has the same value as mathematical systems of other cultural groups – and these should have the same chance of using and developing their systems and passing them on to their descendants via school curricula. Ethnomathematicians are thus concerned mainly with the abolishment

17 Cf. Barton 1996a, p. 251; 2008, p. 113–115.

18 Barton 1996a, p. 170.

of the privileged status of Western mathematics. Their strife for emancipation of cultural mathematics can then be summed up in three steps: (1) mapping and investigation of cultural mathematics,[19] (2) cultural rebirth and reawakening that consist of, among other things, inclusion of elements of cultural mathematics in school curricula,[20] (3) new reflection of the history of Western mathematics such as would reveal Western bias and deliberate suppression of other than Western contributions to its development.[21]

Ethnomathematics thus explicitly starts from the standpoint of multiculturalism and de-colonization. This view leads ethnomathematicians to refusal of oppression: equality of cultures and their cultural achievements is a basic assumption. Hence, individual cultural mathematics also need to be given equal opportunity for preservation and development. It is therefore necessary to work on emancipation of cultural mathematics while at the same time pointing out the colonization history of Western mathematics. From the position built in this manner, ethnomathematicians have at a certain point started to seek philosophical underpinning for their thought. As was already mentioned above, I shall illustrate the philosophical background of ethnomathematics based on an analysis of the texts of Bill Barton which form an explicit attempt to establish a philosophy of (ethno) mathematics.

2 BARTON'S "SEARCH FOR THE SUITABLE CANDIDATE"

Barton in his dissertation and, subsequently, in other texts as well[22] attempts to reflect the ethnomathematical program, whereas his explicit goal is to provide suitable philosophical foundations for the ethnomathematics' demands. Hid

19 Cf. for example Ascher 2002; M. Ascher, R. Ascher 2013; Gerdes 2007, 2008; Goetzfridt 2008; Zaslavsky 1999.

20 Cf. Gerdes 1988, 2010; Zaslavsky 1993, 1998, 2001. Contemporary opinions regarding the form and extent of inclusion of ethnomathematical elements into school curricula is very plastically recorded in te discussion that took place in the Educational Studies in Mathematics journal (cf. Rowlands, Carson 2002; Adam et al. 2003; Rowlands, Carson 2004).

21 Cf. Bishop 1990; Joseph 1997; Powel, Frankenstein 1997.

22 Cf. Barton 1996a, 1999, 2008.

efforts, as was already mentioned, are politically motivated: he seeks to find suitable philosophical foundations so as to help overthrow the Western hegemony. According to Barton, the field of ethnomathematics shows what he considers to be a surprising lack of philosophical works, which may be the reason why "[...] many mathematicians do not consider [ethnomathematical] writing even meaningful: the concept of cultural mathematics is ruled out by their philosophical standpoint".[23] A text discussing the philosophical level of ethnomathematics such as Barton strives to provide is thus for him an effective tool of getting through to the (Western) mathematician audience.

Barton's method which he employs repeatedly in his texts can be labelled as the "search for the suitable candidate": Barton first carries out an analysis of the already existing ethnomathematical works, attempts to identify the ethnomathematical criteria for a suitable philosophical background and to find such philosophical concept as would correspond to the said criteria. His goal is to show "[...] that there is room for cultural conceptions of mathematics *within an accepted discourse in the philosophy of mathematics*" [Italics added, I.S.].[24] His method is then as follows: he first refuses the classic conceptions of the philosophy of mathematics as unsuitable because they refuse to give the status of mathematics to cultural mathematics, then refuses the modern conceptions which are on one hand willing to consider cultural mathematics as mathematics, but do not see them as equal in value to that of Western mathematics. Finally he arrives at a concrete philosophical conception of mathematics which, according to his belief, is able to fulfil the proposed criteria and thus provide the philosophical underpinning of the ethnomathematical program.

2.1 Analytic Tools

Before I proceed to a concrete analysis of Barton's strategy, I consider it necessary to specify the optics I employ in the present text. I selected two analytical views in order to facilitate a more plastic image of Barton's method and to allow us to more closely determine the criteria of its rate of success.

23 Barton 1996a, p. 172.

24 Ibid., p. 172.

The first concept is chosen with respect to the evident political (de-colonizing) level of Barton's efforts. I consider it relevant to look at his argumentation through the lens of concepts reflecting this political level: specifically, I shall interpret Barton's argumentation strategy as a strategy of post-colonial "mimicry". I shall in other words use the concept developed in works of the theoretician of post-colonialism Homi Bhabha (1994): this concept will allow us to consider Barton's strategy as a specific manner of revolt of the colonized subjects against the authoritative power of the colonizer, to interpret its context and the author's motivation.

The second concept I decided to use will then allow me to concretely analyse the "mimicry" strategy as an argumentation strategy with respect to the author's motivations. For my analysis, I shall take advantage of concepts introduced by the so-called New Rhetoric, a theory of argumentation presented by Chaim Perelman and Lucie Olbrechts-Tyteca (2008). This theory offers concepts for analysis of discourse practices which are supposed to persuade specific audience. It will therefore allow us to specify the tools which are from the standpoint of ethnomathematicians seen as suitable for persuading the Western mathematician audience to start considering cultural mathematics as systems equal to Western mathematics.

2.1.1 THE "MIMICRY" STRATEGY AS AN ARGUMENTATION STRATEGY

The concept of mimicry is among the significant concepts of the last decade's post-colonial theory. In Bhabha's work it serves to label a process wherein a colonized – and thus, controlled – subject is made similar to the colonizer (by means of cultural import, teaching of language, etc.). The original impulse behind the process is the colonizer's effort to re-shape the colonized subject in their own image; however, the result of this effort turns against the colonizer.[25] This is because during the process the colonized subject acquires a part of the tool set which previously served to oppress them: by thus imitating the colonizer, by accepting this "camouflage" they gain the option of participating on the power regime

25 Cf. Bhabha 1994, p. 87.

and thus influence the discourse.[26] Let us use Bhabha's example: should the colonizer teach the colonized subject to speak English, the colonized subject can now raise demands in an intelligible form.[27] We can take the example further: should the colonized subject be required to use rational arguments, they cannot at the same time be automatically considered an emotional and childish barbarian who needs to be tutored and taken care of. The colonial discourse built on the binary oppositions of rationality and irrationality, advancement and primitiveness thus develops a crack and space opens for emancipation of colonized cultures. If we start from Bhabha's concept, the strategy of mimicry can be seen as such course of action of the colonized subject where this agent uses the tools that originated in the process of colonial oppression in order to further their own interests.

Barton is a figure who in his works explicitly takes the side of the colonized. The political level of the ethnomathematical program as formulated by him is a clear proof of this. His method in the texts he presents in support of emancipation of cultural mathematics then does show features of the mimicry strategy. Barton uses a Western tool: the conception of a certain philosophy of mathematics already emancipated in the Western discourse is employed to shield his own attempt at influencing the colonial discourse which continues to refuse to accept the interests of ethnomathematicians, or to consider their works to be meaningful.

The mimicry strategy is thus used here in a concrete form which we can understand as employment of discourse-accepted means of emancipation of efforts which so far have not been accepted by the same discourse. This is because Barton does not choose just any philosophy of mathematics, he explicitly chooses from those that are already accepted, discussed and considered in the discourse wherein he strives to gain acceptance. He then chooses such philosophy as is best suited to his demands. If he manages to find one, the demands of ethnomathematicians will have to be accepted in the sense that it will no longer be possible for the existing hegemony of Western mathematics to remain valid. How then does Barton identify a suitable mimicry? And what is the method of use of such mimicry?

26 Cf. Kochhar-Lindgren 2001, p. 298.

27 Cf. Bhabha 1994, p. 87.

The concrete tools for the respective analysis will be provided by the theory of the New Rhetoric.

According to the New Rhetoric, theory of argumentation is "[...] study of the discursive techniques allowing us to induce or to increase the mind's adherence to the theses presented for its assent".[28] The theory of argumentation builds on the following idea: the proponent presents a thesis to an audience and uses a certain discursive technique with a concrete goal: he wants this audience to agree with the given thesis. The New Rhetoric then evaluates the success of the argumentation strategy of the proponent with respect to whether it results in the audience being persuaded or not. In order for the proponent to persuade his audience it is necessary that he correctly predicts the reaction of his audience: he needs to correctly identify the audience's original belief and such argumentation patterns as will transfer persuasive power from the audience's original belief to the proposed conclusion.

From the standpoint of the New Rhetoric we can interpret the mimicry strategy as an argumentation strategy with a specific audience: the colonizer who can be described by a specific sum of original beliefs and a tendency to be susceptible to persuasion in a certain manner, by means of certain concrete argumentation patterns. In this case the proponent thus has to use such themes and methods of persuasion as originate in the colonizer's inner circle and are held in their high esteem.

2.2 Barton's Audience, Themes and Patterns

Let us first discuss identification of Barton's audience. I base my paper on three of Barton's texts.[29]. The first of them is Barton's dissertation in the field of mathematics education, the text from 1999 was published in *ZDM: The International Journal of Mathematics Education*. Even from this relatively superficial information we can deduce that Barton aims at an audience which is academically trained (as well as in theory of education), and has a specific area of interest. We can generally assume that the audience in question will probably be more easily influenced by

28 Perelman, Olbrechts-Tyteca 2008, p. 4.

29 Barton 1996a, 1999, 2008.

an argumentation built on rational principles. If we proceed to add to these clues Barton's explicit statements in the texts, we will see that Barton strives to address specifically Western mathematicians, according to whom the concept of cultural mathematics is excluded from their philosophical considerations.

> *"It is a glaring omission in ethnomathematical literature that philosophical considerations have not been addressed. This may be a reason why many mathematicians do not consider such writing even meaningful: the concept of cultural mathematics is ruled out by their philosophical standpoint.*
>
> *However, it is not [my] intention to argue comprehensively for a particular position in the philosophy of mathematics, to reject other positions, and to thereby establish that a cultural view of mathematics is, philosophically, the only possible view. What is shown is that there is room for cultural conceptions of mathematics within an accepted discourse in the philosophy of mathematics."*[30]

Barton thus considers his audience to consist of people who are already explicitly opposed to acceptance of cultural mathematics, and the source of reasons used against ethnomathematics is the philosophy of mathematics. Specifically: Barton's audience is constructed as an audience consisting of people who accept or reject a concept based on the philosophical reasoning behind it. This audience then at the present moment refuses to accept the concept of cultural mathematics simply because it fails to find adequate philosophical background that would allow it to be considered as an emancipated conception. Barton considers his audience as one that is connected to a concrete sum of assumptions.

If we proceed to identify these assumptions, the New Rhetoric works with what it refers to as the so-called factual and preferable assumptions. The first type of assumptions constitutes that which is considered real in discussion, the second type is connected to the values held by the audience. One of the premises

30 Barton 1996a, p. 172.

which we could consider to be factual in case of Barton's strategy is the "fact"[31] that Western mathematicians do not accept the concept of cultural mathematics to be meaningful. Another basic assumption can be seen as based in the domain of what is preferable, namely as a "hierarchy of values"[32]: provided a concept has a philosophical reasoning behind it, it should be accepted sooner than based on any other type of argument. The third assumption, from the factual domain, can be seen as the following "assumption"[33] which Barton strives to prove and illustrate in his text, namely that there is a philosophical reasoning compatible with the concept of cultural mathematics. The conclusion he supports with these premises is the assertion that cultural mathematics should be accepted as meaningful by Western mathematicians.

If we focus on the argumentation patterns used, Barton employs a method which can be interpreted by means of two types of patterns. The first type of pattern used is the so-called argument from the structure of reality, specifically the pattern of argument from authority:[34] Barton asserts that finding an already emancipated philosophical concept is a sufficient reason for acceptance of cultural mathematics. As we shall see later, Barton does not opt for just any explanation – he wants to find one that is already sufficiently established, one that has sufficient authority with his audience. He refuses to accept as his full background

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31 The New Rhetoric considers a premise the acceptability of which is not put into question by any parties of a discussion to constitute a fact. These involve such claims regarding reality that do not need to be justified to rational beings (cf. Perelman, Olbrechts-Tyteca 2008, p. 67)

32 Value hierarchies are premises which determine the order of accepted values: they determine whether the given audience prefers an argument appealing to certain values to other values (cf. Perelman, Olbrechts-Tyteca 2008, p. 80).

33 According to the New Rhetoric assumptions are such premises as count on something being real. Unlike with facts, this assumes that in discussion, validity of assumptions will be supported by the proponent (cf. Perelman, Olbrechts-Tyteca 2008, p. 70).

34 Argumentation from the nature of reality is based on beliefs regarding the functioning of reality wherein the proponent assumes that these were already recognized and accepted by the audience. The success of the argument is derived from whether the audience shares the assumptions regarding the character of events which preceded these events (cf. Warnick – Kline 1992, p. 8).
The pattern of argument from authority then works by deriving consent with a thesis from it being proposed by a figure of sufficient authority (cf. Perelman, Olbrechts-Tyteca 2008, p. 305).

other explanation which likewise offer some sort of support yet are not sufficiently established.

The other pattern used in his argumentation is the quasi-logical pattern of "incompatibility", which is used to point out the contradiction between two mutually exclusive alternatives.[35] Barton shows that if his opponents fail to accept cultural mathematics based on his presentation of a suitable conception, they find themselves in contradiction of their own assumptions. The argument can be reconstructed as follows:

[C]: The concept of cultural mathematics should be accepted by Western mathematicians as meaningful.

[P1]: Western mathematicians do not accept cultural mathematics as meaningful.

[P2]: Western mathematicians do not find in emancipated philosophies of mathematics a conception compatible with the conception of cultural mathematics.

[P3]: If a concept has a valid philosophical reasoning behind it, it should be accepted.

[P4]: Among emancipated philosophical conceptions, there is a conception compatible with the concept of cultural mathematics.

[P5]: Wittgenstein's conception is compatible with the concept of cultural mathematics.

By constructing the argument in this manner, Barton makes space for discussion regarding compatibility of mathematical and ethnomathematical premises. He strives to show that within a concrete attempt – namely Wittgenstein's philosophy – there exists such concept of mathematics as corresponds to

35 Quasi-logical arguments take advantage of similarity with the patterns employed by formal logic and mathematics. The persuasive power of this type of argumentation is then derived from the fact that the audience recognizes the logical structure of the argument and from the fact that the structure of syllogism has a certain inherent persuasive power in our culture. The argumentation pattern of "incompatibility" takes advantage of similarity with logical contradiction (cf. Perelman, Olbrechts-Tyteca 2008, pp. 195–196).

ethnomathematical requirements and Barton's intuitions as to what a philosophy of mathematics suitable for ethnomathematics should look like. What are then Barton's ideas which are supposedly adequately "embodied" in Wittgenstein's conception? Why does Wittgenstein's conception correspond to Barton's intuitions compared to other conceptions? Barton's "search for a suitable candidate" focuses on explanation and ensuring the key premise P4. Finding suitable support for P4 along with such value preference as captures P3 leads to necessity of refusing P2. If P2 is not a valid reason to refuse the concept of cultural mathematics, then according to Barton the desired conclusion should be admitted, that is to say, they should be accepted as meaningful.

2.3 QRS Systems and Mathematical Worlds

Barton's intuitions which he holds regarding the concepts of cultural mathematics can be summed up under two concepts of the so-called QRS systems[36] and mathematical worlds which Barton takes over from Sal Restivo.[37] In his 2008 text he then offers a metaphor of mathematics as a "never-ending braid" whose individual threads are the individual cultural mathematics.[38]

In all cases, the basis of Barton's conceptions is the inseparable connection between mathematics and its cultural environment, or the cultural group which develops the mathematics in question:

> QRS system is *"a system of meanings by which a group of people make sense of Quantity, Relationships and Space. So the model of mathematics being proposed here is one where each cultural group has its own QRS system"*.[39]

According to Barton, it is necessary that in a given conception of mathematics "[...] *it must make sense to talk about Maori mathematics, or English mathematics,*

36 Barton 1999, 2008. Barton however considers a definition of mathematics similar to the QRS systems conceptions already in his text from 1996 (Barton 1996a, p. 203).

37 Barton 1996a, 1999, 2008.

38 Cf. Barton 2008, p. 99.

39 Barton 1999, p. 56.

or carpenters' mathematics."[40] Mathematics as the umbrella term is thus a set of all QRS systems out of which Western mathematics is only a single element.[41] What is then the relationship between the individual QRS systems? This question can be answered if we focus on the concept of mathematical worlds which Barton also uses for his image.

The concept of mathematical worlds is borrowed by Barton from Sal Restivo (1983, 1992). Restivo is a sociologist of mathematics and, as Barton does not fail to mention, he is thus not a suitable authority for ethnomathematics' needs:[42] "*Restivo does not provide a full philosophic background, he merely states a position and produces some evidence*",[43] or "[u]*nfortunately* [Restivo] (…) [did not] *elaborate a philosophy of mathematics which will support [his] sociology.*"[44] Barton therefore uses Restivo's concept of mathematical worlds merely in order to make the intuitions, which are to be later provided with a philosophical background, more precise.

According to Restivo, mathematics is a social and cultural phenomenon. He proposes a weaker and a stronger interpretation of the relationship between mathematics and culture. According to the weaker interpretation, mathematical ideas and activities vary from one culture to another and the total sum of these results produces the world of mathematics. The stronger interpretation denies the idea of a single mathematics that is the result of the various cultural mathematics: it assumes that the individual cultural mathematics are completely different systems which are not mutually translatable and thus incommensurable (cf. Barton 1996a, pp. 192–193; 2008, p. 125). The idea of the single world of mathematics is thus changed into the idea of mathematical worlds. It goes from the idea of a single

40 Barton 1999, p. 56.

41 Barton names it the "near-universal conventional mathematics" and uses the acronym NUC-mathematics (cf. Barton 2008, p. 10).

42 From the standpoint of the mimicry strategy this step can be seen as confirmation of the "value hierarchy" described: in that this involves argumentation from a suitable philosophical authority – a sociological concept expressing similar intuitions is not sufficient.

43 Barton 1996a, p. 192.

44 Barton 1999, p. 55.

frame wherein different cultures use different expression to say the same thing to the image in which various cultural frames co-exist, whereas their systems of expressions cannot be reduced to a single shared system.

According to Barton, the ethnomathematical program should seek such background as would develop the stronger rather than the weaker interpretation. Why? The reason is the ethnomathematic's requirement of achieving equality of all cultural mathematics. In case of the single mathematical world to which all cultural mathematics contribute it implicitly holds that a single culture contributes more than the others – and is thus more significant. The second reason may be the fact that we implicitly assume mutual translatability of cultural mathematics, that is to say the possibility of interpreting all cultural mathematics in a single one, supposedly in Western mathematics, which would again confirm its dominant position.

Mathematics is thus understood by Barton to constitute a set of QRS systems which are mutually incommensurable and the only thing they have in common is the fact that they all somehow conceptualize quantity, relations and space. These conceptions nevertheless cannot be translated into one another: doing so is only possible at the cost of distortion and loss of information, much as it is with the use of mechanisms of universalization and isolation which are employed to translate cultural mathematics to Western mathematics. The intolerable distortion is caused by the attempt to abstract a mathematical system from its cultural context. The assumption made by such abstraction is the assertion that mathematics is independent of culture. This is however in direct contradiction of the principal assumption of ethnomathematics, namely that stating that mathematics and its cultural context are inseparably interrelated.

Barton is however aware of the fact that the idea of mutually untranslatable – and thus in a certain sense "inert" wholes goes against our evidence. He is also aware of the individual mathematical conceptions – and their respective cultural groups – interacting with each other in practice, of the development and changes they undergo in time. These changes and interactions are captured in the metaphor of QRS systems as a never-ending braid. The mutual translation is thus to a certain extent possible and takes place:

> *"Imagine two groups who have developed independently of each other. Each has its own way of dealing with quantity, of expressing relationships, and of representing space. As the two cultures begin to interact with each other, their ways of talking and ways of doing things will be mutually translated as far as is possible into each other's systems. Gradually a merging of QRS systems is liable to take place, and, ultimately, it may happen that one will dominate, or that a new system will emerge, probably one which draws more heavily from one system than another. At the end of this process it will seem that both cultures have the same system."*[45]

If we allow for mathematics to be considered as mutually interacting QRS systems, it shows more clearly what led to the fact that we understand Western mathematics to be the universal system: it became the more widely used system in concrete social interactions – and its acceptance was due to the change of cultural circumstances. This however does not mean a change of conception of Western mathematics: it remains merely one among many cultural mathematics, it is not superior, but rather favoured by current contextual conditions which allow it to spread. An important aspect of this picture accentuated by Barton is the fact that "[...] *there is no presumed external "mathematics" or rationality by which one system is judged better than another. This is entirely an internal process, a human process, a cultural process."*[46]

What are then the requirements placed on a suitable philosophy of mathematics by ethnomathematics? Barton's texts may be seen as a search for a candidate which would fulfil three primarily conditions, above all. A suitable philosophical conception on which ethnomathematics is to be based, needs to:

1. refuse the idea of universal mathematics
2. understood mathematics as context-based
3. see individual cultural mathematics as equal

45 Barton 1999, p. 56.

46 Ibid., p. 56.

The requirements are closely interrelated, the desired result being a culturally relativist picture of mathematics.[47] The first requirement may be interpreted as an attack on the idea of a single, universal mathematics. For Barton, this idea is connected to the realist – or more specifically Platonist – position. To accept this requirement is thus according to Barton primarily to refuse mathematical realism.

While acceptance of the first requirement does in a way open the possibility of relativism, the second requirement explains it: mathematics needs to always be understood relative to the culture wherein it emerges and develops: the relationship between mathematics and the culture is always key and considered impossible to ignore by ethnomathematicians. It is a specification of an attack on the myth of cultural neutrality. To accept this requirement means to refuse the idea of separation of mathematics from its cultural context.

The third requirement is political in nature and motivated by a desire to prevent colonialism. If we accept it, we refuse the idea of superiority of one system over others. It is primarily a means of taking a clear position against the dominance of Western mathematics; principally however it is a position against dominance of any system. Equality of conceptions is thus the culmination of relativism but also a political goal which aims to prevent cultural hegemony of a single cultural unit over others.

2.4 A Suitable Philosophy of (Ethno) Mathematics?

As was already mentioned above, Barton makes a certain sort of inspection of the existing emancipated philosophical conceptions as part of his search for the suitable candidate for a philosophy of ethnomathematics. In the first phase, he refuses the classic conceptions as utterly unsuited to the formulated requirements, in the second phase he deals with certain conceptions that emerged in the twentieth century. He finds positive features there, they are however ultimately refused, too, because they fail to fulfil Barton's criteria completely. He ultimately manages to find a single suitable philosophical conceptions which does fulfil the

47 Cf. Barton 1999, p. 54.

requirements fully – and he thus considers his mission, to show that "[...] *there is room for cultural conceptions of mathematics within an accepted discourse in the philosophy of mathematics*",[48] to be accomplished.[49]

Barton's strategy of supporting P4 can be followed with respect to the three aforementioned general ethnomathematical requirements. These requirements are constructed hierarchically: acceptance of the first requirement is a necessary precondition for consideration of accepting the second one. This in turn is then a necessary precondition for acceptance of the third requirement. Barton's inspection of the existing philosophical conceptions can be seen as moving on a scale from those who refuse the first requirements and are thus deemed completely inadequate to the one which does fulfil the third requirement, and thus necessarily also the preceding two, and is therefore found to be completely adequate.

2.4.1 SHORTCOMINGS OF THE TRADITIONAL CONCEPTIONS?

Traditional conceptions as understood by Barton include realism and its opponents: logicism, intuitionism and formalism. These conceptions are incompatible with the very first of his requirements.

Mathematical realism is according to Barton an "essentially inadequate" conception for cultural understanding of mathematics:[50] this is due to its assumption of existence of a realm of mathematical object which can be adequately described in one single manner. This assumption is at the same time a key feature of realism and significantly influences the way we understand cultural mathematics. Even if we should allow for the possibility of existence of cultural mathematics – as various attempts to describe the state of things in the mathematical realm – the assumption of the existence of a single ideal description is an obstacle to seeing said attempts as equal. The presumably existing Platonist world provides us with a gauge by which we can judge: we could say which conception is closer to the ideal.

48 Barton 1996a, p. 172.

49 Regarding the structure of the argument which aims to prove compatibility of the concept of cultural mathematics and some conception of philosophy of mathematics, Barton only needs a single acceptable expert in order to refute the idea of unacceptability of EM that completely lacks philosophical background.

50 Cf. Barton 1999, p. 55.

Unsurprisingly, it would be Western mathematics. This result is then unacceptable from the standpoint of the political aspect of ethnomathematics, as it "[...] *allows colonial, ethnocentric categorisations of primitive mathematics or sophisticated mathematics, etc*".[51]

Similarly unsuited – and for the same reasons – are the competing philosophical positions. The idea of a universal and context-independent mathematics remains despite the fact that these positions come from different ontological backgrounds. This is because the idea of a single universal mathematics is precisely what these foundationist programs are striving to preserve: they attempt "[...] *to secure their foundations so well that there is no room for doubt about mathematics, to eliminate the possibility of more than one (competing) conception*".[52] The means by which they strive to attain this goal differ: logicism tries to convert mathematics to logic, intuitionism relies on constructing mathematics from safe ur-intuitions, and formalism converts mathematics to manipulation of symbols according to a set of rules. The assumption of existence of a universal system is shared by all of them; hence none of these systems is compatible with even the first requirement of ethnomathematics.

2.4.2 FAILURE OF THE MODERN CONCEPTIONS?

Given the philosophical systems based on the idea of universal mathematics are inadequate, it is necessary to choose from explicitly relativistic conceptions.[53] Barton is not the first ethnomathematician interested in these systems – even Ubitarian D'Ambrosio, the founder of ethnomathematics, considered social constructivism, seeing possible options in Bachelard's, Kitcher's or Lakatos's conceptions.[54] Barton makes his distinction from D'Ambrosion clear: to him, these conceptions are not full adequate, either. He appreciates some of their elements, which make them seem to be headed in the right direction from the standpoint of

51 Barton 1999, p. 55.

52 Ibid.

53 In the version from 1996, Barton also lists the neo-realism of Penelope Maddy and Michael Resnik among relativistic conceptions. This is later listed in the 1999 version among modern conceptions (cf. Barton 1996a, pp. 178–180; 1999, p. 55).

54 Cf. D'Ambrosio 1987.

ethnomathematics: these involve mainly the inclusion of the human element in the considerations of philosophy of mathematics. He however at the same time points out their limits, namely the remaining possibility of comparing cultural mathematics to each other. The aforementioned conceptions thus do fulfil the first two requirement, but are incompatible with the third.

Let us consider an example of the conceptions investigated by Barton. Barton discusses the contribution of Gaston Bachelard who makes use of the concept of a historically relative concept of objectivity: objectivity being an ideal rather than actual reality.[55] This, according to Barton, allows for consideration of not merely a conception of mathematics that changes in time, but also of cultural mathematics as based on different concepts of objectivity and rationality. Nevertheless, Bachelard reasons that it is possible to develop a progressively improving understanding of what objectivity is. This possibility of increasingly precise approximation of "real" objectivity is a problem for ethnomathematics: "Ethnomathematics [...] *requires simultaneous progress in different directions under an assumption of equal validity/objectivity*".[56] The same reason is why the conceptions of fallibilism and quasi-empirism fail: they assume that in case two mathematical worlds clash, we shall be able to consider one of them to be better according to a certain criterion – due to not being falsified or corresponding to experience better.[57]

The key problem according to Barton is the persevering ideal of a certain kind of mathematics or ideal criteria for evaluation of mathematics that are disconnected from culture. Should thus a cultural mathematics emerge, it is compared to the ideal: according to Barton, this is the same thing as if "[...] *the mathematics within each culture is a shadow of the 'real' mathematics. As cultures interact, that mathematics which is more developed (closer to the 'real' one) will subsume the other, and an illusion of one mathematics developing towards a universal perfection is maintained*" (Barton 1999, pp. 55–56). This is once again a reason to refuse these conceptions: comparison will allow us to proclaim some cultural artefacts better than others. This he believes would again lead to preservation of hegemony.

55 Cf. Barton 1996a, p. 181.

56 Barton 1999, p. 55.

57 Cf. Barton 1996a, p. 188; 1999, p. 55.

2.4.3 WHY WITTGENSTEIN?

As was already mentioned, Wittgenstein's conception of mathematics does fulfil Barton's requirements,[58] Barton specifically considers the interpretation of Wittgenstein's new notes presented by Stuart Shanker (1987) to be the best suited for his purposes. Barton stresses mainly the metaphor of mathematics as the "way mathematicians talk" and the conception of philosophy of mathematics as dealing with the way mathematical expressions are used and what the logic of these expressions is rather than whether they in fact refer to something real.[59] If we approach mathematics in this manner, according to Barton it will become clear that mathematical expressions are normative assertions rather than descriptions. Barton completes the picture of this interpretation by citing Wittgenstein's example of an encounter with a native tribe: should we happen upon a native tribe which divides by zero or asserts that 13 squared is 172, it is clear that this tribe does not understand numbers and calculations as the same type of things or activities as we do, because this kind of use is not comprehensible for us.[60]

If we understand mathematics in this manner, according to Barton a space is created for the desired relativist concept. If mathematics is a way of speaking, we can then consider the influence culture has on this kind of speaking which will lead to different types of speaking in different cultures. If mathematics is a set of normative rules, we can then consider existence of different sets much like it makes sense to consider different sets of rules of grammar.[61] According to Barton, this conception also assumes that we appreciate the value of such systems with regard to the framework wherein they develop rather than compare individual cultural mathematics to each other.

Wittgenstein's philosophy in this interpretation is thus according to Barton an exclusive candidate that does fulfil the requirements of ethnomathematics: it refuses the concept of universal mathematics, assumes the relativist standpoint, and avoids hierarchization of cultural mathematics. It should therefore function

58 Cf. Wittgenstein 1956.

59 Cf. Barton 1996a, p. 196; 2008, p. 127.

60 Cf. Barton 1996a, p. 197; 2008, pp. 127–128.

61 Cf. Barton 1996a, p. 203.

as an adequate support for the premise P4. Due to the supposed value preferences of the Western audience which according to Barton does have a tendency to prefer emancipated philosophical authorities, we can say that Wittgenstein is considered by Barton to be a sufficiently strong authority in the field of Western philosophy. Listing Wittgenstein's conception as supporting P4 should then lead to the proposed conclusion, that is to say, to have audience that consists of Western mathematicians and philosophers accept ethnomathematical texts as meaningful. This conclusion should then lead to concrete steps, namely the audience starting to adequately consider the related demands.

3 THE WESTERN PHILOSOPHY OF MATHEMATICS AS AN IMPLEMENT OF EMANCIPATION AND A STRONG POLITICAL AGENT

The presented analysis thus allows us to answer the question we asked at the beginning, the question of how is the philosophy of mathematics used to achieve the political goals of ethnomathematicians. The answer to the first part of the question which asked for a philosophy of mathematics adequate for the goals of the ethnomathematical program is, at least based on the presented Barton's text, Wittgenstein's philosophy. Wittgenstein's approach fulfils the requirement of providing such conception of philosophy of mathematics as would refuse the universalist understanding of mathematics and see mathematics as interconnected with its cultural context, and consider the individual cultural mathematics to be equal. The reason why this kind of conception of ethnomathematics is required was identified as the political ambition of ethnomathematics: the struggle to prevent hegemony of one cultural unit over others, related to de-colonizational and multi-culturalist foundations of the ethnomathematical program.

The second part of the question tried to identify the role of the philosophy of mathematics in the ethnomathematical program. The answer may be considered in relation to the presented argumentation strategy as an instance of employment of the mimicry strategy. Barton's argumentation method, the audience he chooses and the manner in which tries to persuade show us the philosophy of

mathematics in two concrete roles: as an implement of the cultural hegemony of Western mathematics, but also as an implement of emancipation of its opponents. Let us start from what both of these roles of conception of the philosophy of mathematics share: it is understood as a set of concrete ontological and epistemological conceptions from which it is possible to choose one based on given concrete requirements.

The philosophy of mathematics understood as an implement of cultural hegemony is based on the idea of an audience consisting of mathematicians and philosophers of mathematics who do not find in the presented set of philosophies any suitable conception compatible with acceptance of cultural mathematics. This fact is then the reason why they refuse to acknowledge the demands of ethnomathematicians and refuse their works as meaningless. If we pay attention to Western philosophers and mathematicians as political agents, then seen from this perspective they form an audience connected to the power of accepting or refusing someone's emancipation efforts.

The philosophy of mathematics understood as an implement in the struggle against cultural hegemony, that is to say, an implement of emancipation of ethnomathematicians, is based on employment of the mimicry strategy. The fact that ethnomathematicians succeed in finding in the set of various philosophies of mathematics a single suitable philosophical conception is used in the argumentation as the proposed reason for acceptance of cultural mathematics. If we pay attention to the audience, it consists of mathematicians and philosophers of mathematics seen in the mimicry as an audience which needs to be addressed and persuaded by appropriate means – namely by such means as the audience itself employ. This is because successful persuasion of the audience opens the possibility of concrete political steps: introduction of cultural elements into school curricula.

Where can we then find an original contribution of the ethnomathematical perspective to our traditional understanding of the philosophy of mathematics? It accentuates an aspect which we usually do not associate with the philosophy of mathematics. In both cases, the understanding of the philosophy of mathematics compared to the ideas we normally associate with the philosophy of mathematics is changed. Regardless of whether we do or do not believe in cultural neutrality of

mathematics, or of our preferences regarding philosophical conceptions, it is not possible to perceive the philosophy of mathematics from the post-colonial perspective and in confrontation with the ethnomathematical challenge as a neutral field of research which is dedicated merely to the character of mathematical objects and the ways in which the truths of mathematics can be learned about. The philosophy of mathematics seen through this optic is understood as an implement which is essentially interconnected with power, and philosophers of mathematics are seen as agents who currently hold power advantage over their opponents, the ethnomathematicians. Investigation of the understanding and role of mathematics in political ambitions of ethnomathematicians thus opens the possibility of future insights into the philosophy of mathematics that will be closer to Foucaultian understanding of knowledge as an implement of power. Any future reflection of the philosophy of mathematics should take into account its own position and potential within the power relations and strive to conceptualize them adequately, because, as is demonstrated by the example of ethnomathematics, it is for certain agents inseparable bound to its political usability. I therefore consider further development of thoughts regarding the political level and the implicitly present values of philosophical conceptions and the general attempt of identifying the agents and their concrete interests related to the philosophy of mathematics to be one of the important directions in considering the future development of the philosophy of mathematics.

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Epistemology: The Probability Revolution Continues

How the future of epistemology (philosophical theory of knowledge) should and could look like? I am convinced that a particularly great promise lies in investigations connected with the concept of probability. Several reasons for this statement can be specified. Firstly, if we look at developments in other fields, we see a growing influence, importance and scope of the probabilistic approach – this development can be called the probability revolution (Kruger et al. 1987). Philosophy can hardly escape strong influence of styles of thought employed in science. Secondly, epistemology should not be studied for the sake of epistemology itself. If we look at epistemology from the perspective of practice, we can see the leading role probability should have. Probabilistic reasoning is an integral part of our practical decisions and of justifying our beliefs. Thirdly, epistemology should focus on areas where some progress can be made and subject of probability fulfils this criterion. I will look at these reasons in more detail in this text.

HISTORICAL PERSPECTIVE

People always understood the concept of probability in an intuitive way. They knew that something was about to happen, that something could happen, but probably will not, that something is risky and something is promising. They understood that various pieces of information are more or less credible, that many are granted while the answers to many important questions are extremely uncertain.

In the 17th century however (the century of the great boom of practical applications of mathematics), a big step forward was made. Creation of the mathematical theory of probability was a breakthrough refinement of human thinking on matters related to uncertainty.

It is piquant that this revolution was launched in connection with something so lacking in loftiness and academic dignity as gambling. It is nevertheless hardly surprising. Questions related to gambling are relatively simple and it can therefore be quite easy to solve them by calculation.

A French intellectual and gambler, Chevalier de Mere, was dealing with a problem related to the division of bank in the event of untimely termination of a game. He wanted his friend, genius mathematician and physicist Blaise Pascal to solve it. Pascal looked into the problem in correspondence with another brilliant mathematician, Pierre Fermat. In these letters from 1654 they jointly laid the foundations of probability theory.

Pascal and Fermat limited their inquiry primarily to a relatively narrow range of applications related to the topic of gambling. Thus we can say that the origins of probability theory application were not too serious. Still, it was Pascal who dared to apply the first simple probabilistic quantification to the subject of highest importance – to the problem of existence of God. He wrote that in this metaphysical area our reason cannot decide anything. There is no argument which can make one side outweigh the other. Hence, according to Pascal, the probability of existence and non-existence of God is of the same value, and therefore (because there are only two mutually exclusive options) the value equals one half. We can disagree with Pascal's premise that there is no argument which can make one possibility more probable than the other. Apparently, however, Pascal seems to be right in the second part of his reflection: provided that his first premise is true, then it would be correct – and even inevitable – to attribute the same probability of one half to both possibilities. Anyhow, mathematical form of probability reasoning started its entering into the sphere of philosophy with considerations of this nature.

Other thinkers, such as Christian Huygens, Abraham de Moivre and Jacob Bernoulli, gradually expanded upon the work of Pascal and Fermat. The full generalization of probability theory was however only reached with the work of Pierre Simon de Laplace. For him (1902) the theory was a tool applicable to all problems, in which incomplete information plays a part. Taking into account that we almost never have complete information about any single problem, the

probability theory became all-embracing and universal. In Laplace words, this theory is applicable to "the most important questions of life, which are indeed for the most part only problems of probability". Another of the same author's statements, according to which "probability theory is nothing but common sense reduced to calculation", is also famous.

In the 20th century, probability has become a key pillar of all scientific disciplines. The probability based statistical hypothesis testing took position of a central research tool. Probability theory, however, maybe also lost something due to its firm embedding in science. Scientists often want to build only on concepts which are very precisely measurable. Probability can be measured precisely if it is fully derived from the proportions of recurring events. This could be the main reason why the broader Laplacean concept of probability was almost totally displaced by frequentist school, which directly identifies the notion of probability with frequencies of these recurring events. But not all and even not most of our probability estimates can be derived purely from the frequencies of previously recorded events. Thus the concept of probability was significantly narrowed.

One of the important impulses to rediscover a complete and general Laplacean probability was the work of American physicist Edmund Thompson Jaynes. He described the theory of probability simply as a generalization of traditional logic (Jaynes 2003). More precisely, in Jaynes' system classical deductive logic is a special case, which occurs when all of considered propositions have only extreme probability values – 1 or 0 for absolute certainty of truth or falsity of a claim. However these extreme values are rare and in practical matters our confidence rather oscillates somewhere between absolute values of one and zero.

Jaynes and others were trying to point out the fact that probability theory tools can also be used in situations, where probability values couldn't be derived from precise frequency measurements, that probability can also be conceived more generally as a degree of our beliefs. Progressive movement of Bayesianism is built on this general approach. Bayesianism has seen a large increase in support in recent decades and his influence even caught up to the importance of frequentism in many respects. Bayesian statistics is probably the best known part of this school of thought, but there are also more philosophical lines of inquiry – especially

Bayesian epistemology. The key fact is that probability understood as a measure of belief is (in contrast to the frequentist account) fully applicable in philosophy.

Statistical methods designed for the needs of scientific work grew into a broad set of highly efficient and sophisticated tools during the 20th century. The task of epistemology is then twofold: 1) discovering the possibilities of probabilistic approach for philosophy as well as for our reasoning in general and 2) contributing to the reflection of the foundations of probabilistic methodology of science and to further development of these methods.

Scholars before Pascal basically did not think that it would be possible to work with the concepts of chance and uncertainty with the help of mathematical formulas and calculation. Today, even ordinary people express their certainty for example by statements about ninety percent chance of something happening. When fathers of the modern scientific method wanted to apply statistical methods in biology, their attempts were met with incomprehension and they opted to found their own quantitatively-oriented journal (Cox 2001). Today the situation is quite different – statistical analysis in (not only) biological articles is taken for granted. Generally speaking, the probability revolution brings with it a gradual propagation of scope in which probability methods are being used. Generalization to cases in which probability can be understood only as a measure of belief is currently the most important next step in this process. The number of philosophical texts using Bayesian approach is growing (see for example Chandler & Harrison 2012). For now we only focus on that these methods can actually be applied, and how.

PROBABILITY AND DECISION MAKING

What should the future of epistemology look like? In the first place, epistemology should try to be useful not only for epistemologists themselves, but also for people outside philosophy. It means that the results of epistemological inquiry should be related to practice. In reality, academic research, especially research in philosophy, is often completely cut off from the outside world, philosophers often write only for themselves.

But undoubtedly, there is a great potential here. The subject of knowledge is fundamentally associated with practice after all. People want to know in order to use the knowledge to guide their decisions, to choose the best courses of action. If we stick to this practical orientation, we can easily comprehend the prime importance of probability, as following considerations help to show:

The first step in decision making and thoughtful practice is to set a target (or targets). This task certainly does not belong in the domain of epistemology. The next step, however, is to explore possible variants of behaviour (there is always a huge number of them) and evaluate the probability and the extent to which these actions can move us closer to the target. It is clear that the assessment of possible effects of potential actions is very complex and uncertain undertaking. Our actions often cause unintended consequences; action beneficial in one area can have negative effects elsewhere. The further into the future we are trying to look, the faster dramatic complexity and unreliability of our practical considerations grow. Therefore it is clear that practical human thought is through its uncertainty inextricably linked with the concept of probability. Epistemology should develop theoretical foundations and methods which would be helpful in making our probability estimates as accurate as possible.

PROBABILITY AND JUSTIFICATION

As mentioned before, epistemology (much like all other philosophical disciplines) tends to turn away from practical orientation and move to academic nitpicking. One of the causes and symptoms is excessively systematic approach. Theoretical fundamentals are addressed at first and only when they are perceived as adequate enough, attempts to transfer them to practical consequences and applications are being made. But these fundamentals are in fact never fully adequate and many a researcher's work is therefore restricted to issues, which are hopelessly distant from any practical merit. Strategy of starting with a purely theoretical considerations prevails in today's epistemology.

If the first step in terms of practical approach is goal setting, formulating of definitions comes first in the approach driven by theory: epistemology is

a philosophical study of knowledge, then how should the concept of knowledge be defined? Creating definitions and disputes about their wording are probably some of the least useful academic activities. But we shall look at this approach in epistemology a little closer, before a suggestion for a compromise idea will be made.

Knowledge is traditionally defined as justified true belief. The traditional exposition of epistemology topics continues with a great debate on such a clarification of the classical definition as would address the so-called Gettier problem. This problem highlights some very special and exceptional cases for which the classical definition does not apply. (For example, imagine you see a real house surrounded by fake houses. You consider all those houses to be real. Under these circumstances, could your belief that the house you see is a real house be real knowledge?)

This is an apt picture of a style of thought that focuses more on the system than on the real issues. A compromise approach to epistemology could be easily built on the classical definition in the following manner:

From the three notions – truth, justification and belief – it is the concept of justification which is by far the most important from the practical point of view. It is justification which quality of our beliefs is dependent on; it is justification, which can be done better or worse. Whether we will achieve the truth is something which we can only hope for, if we do our duties in the field of justification to our best ability. Our future beliefs are dependent on our justifications in the same way. The process of justification is connected with our activity; truth achievement and belief are just passive consequences. The concept of justification should therefore be given priority.

A practical approach to the problems connected with justification is represented by argumentation theory and formal and informal logic. These fields teach us the best ways to justify our beliefs. Prominent place among these ways belong to the following basic rules and requirements:

1) Formulate your premises clearly and precisely.
2) Present the structure of your arguments in a clear and precise manner.
3) Use valid argumentation schemes.

4) Avoid ways of reasoning that have been recognized as erroneous and misleading.
5) Search honestly for implicit premises in your arguments and state them.

Although this list is not exhaustive, the main focus is clear: precision, clarity, accuracy, intellectual honesty. From the point of view of our present reflection it is important that even the theory of argumentation (or informal logic) can lead us in a fairly straightforward way to probability (see Bernoulli 1713). Consider the most basic cornerstone of justification and argumentation theory – a pair of propositions, one of which is a premise (a statement which provides justification) and the second is a conclusion (a statement which is being justified). This logical relation is represented by this simple scheme:

P
Z

For better clarity we can create an illustration of this relation.

P: Jeweller's window was broken at night.
Z: Someone tried to burgle the jeweller's shop.

Actually, such simple arguments almost always consist of two premises, one of which is unstated (implicit) and its content is the belief that Z can be derived from P. In our case, the complete argument is as follows:

P1: Jeweller's window was broken at night.
P2: If jeweller's window was broken at night, then someone tried to burgle the jeweller's shop.
Z: Someone tried to burgle the jeweller's shop.

In this version our argument becomes a deductive argument. In deduction, if the premises are true, then the conclusion is necessarily true as well. Now ask

yourself this question: is it possible to rationally agree with both premises and yet disagree with the conclusion? Although our argument really is a deductive one, the answer is yes. If such a possibility seems unnatural to us, it is only because our thinking does not take sufficient account of probability.

Our illustration can be for example easily specified like this: We got the information about the broken window from a testimony of another man. Although we believe him, we are aware of the possibility that the information could be wrong. Also the connection between the broken window and alleged theft (that means the connection the second premise talks about) of course could not be automatically taken for granted – it does not apply to all cases. For example a road accident could have caused the broken window.

Now the person to whom the information about the broken window was given can easily estimate the probability of P2 being true to be approximately 70 %. The same probability can then be assigned to the premise P1. The conclusion could of course be established in our argument only if both premises are true (in other words if conjunction of P1 and P2 is true). And the elementary rule of probability theory tells us that the probability of conjunction of some statements is calculated by multiplying their individual probabilities. Thus the probability of conclusion in our illustration comes at 49 percent ($0.7 \times 0.7 = 0.49$), which means that if any other reason why we should believe the jeweller's shop was burgled is not added to our judgment, the conclusion is more likely than not (albeit narrowly so) false. One can therefore at the same time agree with both premises, disagree with the conclusion and be completely rational. The same result would naturally have occurred in any probabilistic assessment of such an argument, where the product of respective probabilities would not exceed 0.5.

The mere fact that these seemingly schizophrenic positions are possible constitutes interesting information obtained through simple probabilistic reflection. And what is more, we can assume that this situation might be relevant for a large number of our judgments (although we probably fail to realize so for the most part), because of two reasons: Firstly, it seems plausible that careful examination would reveal that true probability of our beliefs is mostly better approximated by numbers between 0.5 and 0.8 than by numbers approaching certainty. Secondly,

while the above example with the jeweller's shop has the simplest possible structure, our actual judgments often depend on a much larger quantity of premises and assumptions. But the bigger number of assumptions there is, the more certain must each individual assumption be in order to maintain a probability of conclusion above the critical value of one half. For example, if some opinion is dependent on seven assumptions , then even 90 % probability of each assumption would not be high enough to make the conclusion more likely to be true than false. If we draw inspiration from the area of argument fallacies, we can call this effect a probability slippery slope.

The existence of this type of slippery slope implies that if we want to think carefully (which is the task of philosophy), then we should not evaluate only the truth or falsity of each premise in our judgments, but we should always also assess their probabilities, because without doing so we cannot know whether our conclusions are or are not results of the probability slippery slope fallacy.

There are more types of various probabilistic relations. Our example was just a first step towards some other more sophisticated probability methods, which can be used as a test of correctness of our reasoning. What I shall present here is a mere hint of what these methods can look like.

At first it is convenient to note, that these methods (including the simple consideration demonstrated in the jeweller's shop example) usually do not work exactly as shown – that is to say that we know the probability of certain propositions and from these we in turn calculate some unknown probability of another proposition. The real manner of using these methods can in practice look rather like this: we have some idea of probabilities of all our beliefs, both premises and conclusions, from the very beginning. When we try to express these probabilities explicitly and then apply the probability calculus (with the help of exact mapping of the logical structure of our arguments), we find that previously assigned probability values are not mutually consistent. We are therefore forced to adjust the values and thereby refine our belief system.

Now let us look briefly at one of the more sophisticated tools which probability theory can offer, namely the Bayes theorem. The simple multiplication of probabilities presented above is focused primarily on controlling probability

of the conclusion. Using the Bayes formula we can test the connection between a premise and a conclusion. (In our example with the jeweller's shop this connection is represented by premise P2.) Here is one version of the theorem:

$$p(Z|P1) = \frac{p(P1|Z) * p(Z)}{p(P1|Z) * p(Z) + p(P1|\overline{Z}) * (1 - p(Z))}$$

In order to apply it, we need the following information:

p(Z|P1) – Probability that the conclusion is true assuming the truth of P1. In the case of our example this probability is identical with the probability of premise P2.
p(Z) – Prior probability of the conclusion. In our example the probability with which we would – without having knowledge about the broken window –expect that someone tried to burgle the jeweller's shop. (This level of expectation people have, albeit unconsciously, before they learn about the broken window.)
p(P1|Z) – Probability of P1 conditional on Z. In our example it is the probability that, if there is an attempted theft at the jeweller's, it will result in a broken window.
p(P1|$\overline{Z}$) –Probability of P1 conditional on negation of Z. In our example it is the probability that the jeweller's window will be broken, provided there is no attempted theft at night.

Real exposition of various probabilistic relations that are relevant in the context of our reasoning would be far more extensive. But even now we can clearly see that our thinking, whether in philosophy or elsewhere, can be refined by mathematical tools, if we wish to conduct our considerations in the most careful way. And what the very essence of philosophy is if not a strong effort to think about general human questions with maximal thoroughness?

On the basis of claims made above I will try to sketch by two brief points some part of the vision of the future, toward which philosophy could be led by probability oriented epistemology.

1) It is known that no small portion of students choose their field of further education so that they avoid doing math. There are some fields suitable for those who are afraid of math, but their number has decreased over time. We can say that philosophy still largely belongs to them. However, it seems that this situation could and should change. Students of philosophy should be taught not only logic, but also probability theory and its applications in our reasoning.

2) Furthermore, it is clear that the relevant probability calculations in complex arguments would be totally unfit for manual counting. Philosophers should therefore develop and start to use their own specialized software applications (like experts in most other disciplines do), where argument structures and corresponding probability estimates could be entered and the application will be able to notify its user of all inconsistencies and/or to fill in the missing values.

This vision certainly seems to be controversial and daring. However, this is as it should be – were it otherwise, it would not be a vision of the future, but rather a description of the present.

Perhaps the most important reason why this vision may seem unrealistic to many is the requirement of regular estimation of probabilities of statements, premises and assumptions we make. Because when we already have the numerical evaluation of certainty of our beliefs, is it quite natural to begin calculating with them. If precise probabilities are given, there is no reason to doubt the possibility and usefulness of calculus. The main obstacle is that the required initial estimates are almost always very imprecise and subjective. I will try to address this issue now.

Almost all probability estimates which are needed to start a probabilistic calculation are inaccurate, subjective and difficult to make. Entering a dramatically inaccurate estimate into a highly precise computational procedure may even seem to be ridiculous. Why should we attempt at such an inaccurate estimation at all? I think there is a very clear answer to this objection: because we are actually making these estimates all the time and we in fact cannot and should not stop making them. We rely on many intuitive probability estimates in our every decision and every single judgement. We rely on intuitive assessment of certainty of various assumptions in the process of forming our beliefs and opinions. (How

could we, after all, take our conclusions seriously, if we did not intuitively assume that our arguments are unimpaired by the probability slippery slope?)

The requirement presented here does not urge us to start doing something we have not been doing before. The requirement does not urge us to think imprecisely about problems which we were able to solve without imprecision and subjectivity until now, because there are no such philosophical problems.

It is only required that we make our implicit probability estimations explicit. We should merely start to be directly aware of how our intuitive crude approximations and estimates are actually being made, processed and used. And it is obvious that if we will be explicitly aware of these estimates, we will be forced to think about them more accurately and to formulate and develop arguments and methods which could help us make our estimating more exact, well-founded and sophisticated. In short, nothing more is required than to think carefully – which could also sum up the mission of epistemology and philosophy.

There are three parts to the method we are speaking about:

1) Estimating probabilities of our beliefs.
2) Identifying logical relations between our beliefs, showing structure of our arguments.
3) Making calculations on the basis of the information obtained in (2) and (3).

The first part is problematic, and one which I try to defend in the present paper. The second one is a standard part of contemporary philosophical practice. As regards the third, we can say something similar as we already have, above: These calculations are being constantly and implicitly made by our intuition. It is clear, however, that the probability calculus is capable of doing it far more accurately.

We can therefore put it this way: Intuition means implicit inaccurate calculation with inaccurate implicit estimates. If we try to use mathematics and precise determination of probabilistic relations as well, we will have accurate explicit calculation with inaccurate explicit estimates. Is it worth to use both methods? The

answer is obviously positive. By using the explicit method we are trying to limit possible sources of error – inaccuracy in both estimates and calculation is worse than inaccuracy in estimates combined with heightened accuracy in calculation. Applying probability estimation and calculation is nothing else than a more detailed reflection of our intuitive reasoning.

PROGRESS IN PHILOSOPHY AND EPISTEMOLOGY

We often hear that there is no progress in philosophy. Philosophical knowledge does not accumulate; we still start from the beginning. No philosophical problem has ended in clear solution and consensus. What is the point in talking about the future of philosophy and its branches in such a situation?

But perhaps we do not see progress only because we expect too much. I think that we may have moved forward in two aspects, one of which is more related to the depth, extent or elaboration of philosophical analysis, while the second is more related to its results. I will try to show how both of these aspects can be linked to the notion of probability.

PROGRESS IN TERMS OF ELABORATION

Philosophical problems were not solved, but all sorts of conceivable points of view, belief systems, arguments, counter-arguments, methods, and concepts are described in detail, thoroughly mapped and elaborated on. If the whole of philosophy is only a footnote to Plato (as remarked by Whitehead), it is at least a very detailed and comprehensive footnote.

The difference between situation of a thinker with ancient literature at hand and a thinker without any literature at all seems to me of the same degree and importance as the difference between the state of an ancient student and the state we have today. Today, gigabytes of philosophical analysis may be devoted to the same narrow part of inquiry, which Plato deals with in a single paragraph, whereas many ways of carrying on the philosophical quest which Plato did not even mention are being investigated.

This may seem insufficient only if we have excessive and unrealistic demands, if we are comparing current state with some kind of utopia of final and ultimate consensus.

Whoever is willing to engage seriously in refining his philosophical position can now build on the extensive work of those researchers with whom he shares the style of thought and worldview background in the widest possible extent. All sorts of philosophical approaches and positions have already been elaborated on and mapped to a very large extent. We have a number of formulated and analyzed arguments concerning all sorts of philosophical problems right at our hands.

In this light we can be optimistic: the same kind of progress can be expected from further development. How could this development look like in more precise terms? We can surely expect further growth in quantity. Such a simple prediction, however, would be too easy. I will try to make the vision a little more detailed:

We have lots of arguments for and against a variety of positions and opinions. What we lack, however, are tools for judging between these arguments, for assessing their weight. Each side is used to stress the arguments in favour of its position and against the opposing position. But we lack methods to decide between conflicting reasons, which would enable us to determine which side should prevail.

Many would probably say that the right method for deciding between opposing arguments is to determine which arguments are wrong or flawed and which are sound. This however is the fallacy of black-and-white thinking. There are almost no real-life arguments which could be considered absolutely flawless and completely bulletproof. Everything can somehow be questioned, assumptions can be challenged. And vice versa: few arguments have absolutely no weight. (Argument with no weight would not make us even slightly inclined towards its conclusion even if there were no other arguments whatsoever.)

Actually, we often mistakenly simplify the situation and consider our arguments plainly good and the arguments of our opponents plainly wrong. How often do we hear that some argument is not good (not relevant, containing an error)? And how rarely on the contrary do we hear statements like this: "Well,

that is a pretty good argument, but I think that my arguments still prevail, because..."?

This asymmetry is due to our need to simplify things and is powerfully reinforced by the experimentally well documented phenomenon of confirmation bias – a common mistake of favouring our own present opinions irrationally. But the reality is complex, not simple, and comparing reasons for and against is complex and difficult as well. We need a tool not only for discriminating between right and wrong, but also for weighing – and it should be the task of epistemology to develop it. We should replace the binary yes-no approach with thinking in terms of extent. Someone could complain that this new way of thought would only further complicate our already overcomplicated intellectual problems. But there is no mistake in such complication – at least we would be closer to the actual complexity of problems we face.

PROGRESS IN TERMS OF SOLVING PROBLEMS

If we expect philosophy to make progress in terms of answering its questions, then there seems to be no such accomplishment. The actual advancement however may be less obvious, different from our naive expectations. If someone's initial ideas are largely based on misconceptions, then the progress need not consist of learning about how things really are, but also in the more modest achievement of simply finding out the real value of these ideas and abandoning them. The result is a state of ignorance preferable to living in error. Progress can consist of destruction and negation.

Following statements can be considered realistic:

1) We really are in the position of those who began with erroneous ideas and who have a significant tendency to overrate the credibility and certainty of our beliefs. The second part of this thesis can be supported for example by experimental findings in cognitive psychology.
2) Reality is complicated and to achieve real knowledge of it is at best difficult, especially if the focus is on philosophical issues.

If the first two theses are correct, then the third one should also be acceptable:

3) In our situation, it is easier for us to make progress through negation, than through positive advancement in terms of finding the right answers.

The third statement suggests that it could be effective to focus our attention firstly on questions associated with the progress through negation: Is philosophical progress of this kind possible? Has it already occurred? Can it be further extended, and if yes, how and to what extent? The second question is addressed in the last statement.

4) Some progress through negation has already been made, especially in the branch of epistemology. Namely, the quest for certainty was practically abandoned.

Philosophers (including Plato, Aristotle, Descartes and Kant) have traditionally tried to find, formulate and establish a system of certain or necessarily true knowledge. Today the situation is different. We do not believe in absolute certainty any more. In other words, we have become fallibilists, which could be the most important and perhaps the only advance in terms of some particular answers philosophy can offer.

This shows us that progress in philosophy could be possible after all. It also means that further progress trough negation could be made in future. I believe that even in spite of our acceptance of fallibilism we still significantly overrate our knowledge. The next logical question must be: If we cannott be absolutely certain, what degree of certainty can we consider realistic under various circumstances? And this, of course, takes us to the domain of probability.

SUMMARY

Future of epistemology and of philosophy in general could be based on working with probabilities. This possibility can be supported by these reasons:

1) The importance and impact of the concept of probability rose significantly in modern times, especially in science. Currently this line of development is represented by the popularity of Bayesianism.
2) We inevitably make complex and difficult probability estimates in our decision making. Epistemology, as well as all science and philosophy, should try to help us with this basic aspect of our intellectual activity.
3) Every judgment we make presupposes estimates of probability of all relevant premises and assumptions. We would not know whether our conclusions are not only results of the fallacy of the probabilistic slippery slope without these estimates.
4) Estimating probability explicitly is a natural consequence of thinking with maximum thoroughness.
5) We have many arguments for and against various conclusions, but we lack a tool for determining their relative weight.
6) One of the few advances possibly made in philosophy consists in acceptance of fallibility of our knowledge and abandoning of the quest for certainty. We can extend this positive development by asking what degree of certainty (probability) can be ascribed to our beliefs.

Mathematical treatment is an inseparable part of most academic disciplines. Philosophy is not considered to be one of them, but this should change in the future. Epistemology should attempt to make this vision reality.

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PHILOSOPHY IN ARMS OF BIOLOGY AND NEUROSCIENCE

Philosophy of mind and cognitive science

Predicting the future of specific scientific fields is very difficult, mainly because of the possibility that new, unforeseen discoveries are made and the course will change immediately. Information I gained during my studies and through my own research has led me to the opinion that philosophy of mind could possibly turn towards neuroscience and cognitive sciences. Maybe, philosophy of mind loses its purpose and all mental phenomena will be explained on exact neural basis; that is opinion in a nutshell. It is not quite original or innovative; in fact, many philosophers consider it to be obsolete and discredited.

When we try to predict future, the forecasts are often rather dark. When we consider humanity, we often imagine pictures of mass destruction, catastrophes and lack of resources. Even the optimist must accept that the standard of living in developed world is threatened by a possibility of significant decline.

The demise of philosophy as a whole and the taking over of its role by special sciences has often been anticipated over the last few decades (or even centuries). Philosophy of mind is apparently no exception. I do not want to be excessively sceptical about the future of philosophy of mind, but I do believe that many of its topics will be explained by exact sciences, mainly neuroscience.

But should we fear this happening? I do not believe so. The developments in the field of cognitive science may well be encouraging momentum of philosophy of mind, even if it should mean having to leave behinds peculations and focus instead on theoretical considerations often practical results of scientific fields. My starting position is therefore that over the next few years, many followers of such theories in philosophy of mind as do not reflect the developments in neuroscience and other special sciences will fall away. The leading role will be assumed by naturalism, as it has presently become the probably most popular theory. Only theories that accept it for their foundation will be viable. These include identity theory, eliminativism and functionalism.

The idea that philosophy of mind was losing its justification and its role was to be taken over by brain science appeared several times in the 20th century.[1] Those were mostly naive notions, quickly refuted, and, after discovery of compelling counterarguments, abandoned. Exact sciences were not yet ready. Neural science which would have liked to reduce the mental sphere to only observable phenomena simply could not handle all of it.

A typical problem was that of the question of consciousness, or the intrinsic qualities of our mental content. Even with the best observational method developed by scientists in the recent years, we apparently cannot tell what it is like to have a sensation of pain, joy, or what it is like to be experiencing the colour red. These sensations are in fact completely private and scientists do not have (and cannot have) access to them; at least according to critics of such notions.

I do not want to repeat outdated views or to simplify and predict the end of a philosophical discipline. However, if we take into consideration the enormous progress that neuroscience has experienced and is still experiencing, we can hardly believe that philosophy of mind can exist without meeting the demands on scientific results. The advancement in neuroscience must be reflected in philosophy of mind. It is of course hard to predict the exact form of this reflection, especially in the long term. It is of course possible that I am wrong and no such reflection will be necessary. Philosophy of mind might be able to continue discussing its internal issues of the nature of qualia (i.e., what it is to experience an event), consciousness, the nature of the mind's content, etc. Theoretical and speculative concepts of philosophy of mind seem however to have lost a substantial part of their importance and attractiveness not just for me, but for many naturalistically oriented philosophers.

Personally, I have been so far engaged mainly with supervenience, the opinion that promised to preserve the possibility of non-reductive materialism. Supervenience establishes the dependence of the mental on the physical realm. Although for some philosophers this was an appealing option of non-reductive materialism, it means to defend the existence of a mental sphere irreducible to

1 Heil 2013, pp. 8–11.

physical basis, of which I am personally rather sceptical. The late Jaegwon Kim, prominent philosopher in supervenience, was dealing with causal efficiency of the mental sphere.[2]

Kim noted that when we are talking about two spheres, mental and physical, we arrive at virtually the same problems as René Descartes did. I cannot elaborate on Kim's argument in the present paper in too much detail, but to put things simply, when dealing with mental and physical events, there is a danger of overdetermination, cross-level causation and causal drainage. Regardless of how the problem is solved, it shows that non-reductive materialism is a complicated position and that a change of our view on the mental sphere may be necessary.

The concept of two separate substances was largely refuted and today there are merely a handful of philosophers who take it seriously. Nevertheless, it provides a starting point for further discussion, because it is easy to understand and represents a very simple and elegant theory. Unfortunately, this clarity and simplicity may be the very root of misunderstanding of what mind is and how it differs from the body.

I spoke of non-reductive materialism. The theory was promising, because of its capacity to preserve the irreducible mental domain. Consider however the following problem that Kim raised in his book *Mind in a Physical World*. We have two mental events, M1 and M2, and they are irreducibly dependent on underlying physical events P1 and P2. When M1 causes M2, it also means that P1 causes P2. We may ask what the actual causal relation is. M1 and M2 could not exist without physical basis, therefore P1 causing P2 is somehow stronger and mental events just follow actual causal relations in their underlying basis. This would mean epiphenomenalism – a conclusion by no means desirable.

Therefore I believe that in the future, philosophy of mind will be affected mainly by two factors. The first is convergence with neural and cognitive science, whereas the development in this area will be determined by scientists investigating the brain, or by those philosophers who are not afraid to get acquainted with their results.

2 Kim 2007, p. 200.

The discoveries of neuroscience will enter the discussion on the nature of mental phenomena, much as it has entered the discussion about ethics. Although it may seem scandalous, I tend to believe that the view of mind which lacks proper reflection may lose its importance in such discussion. Maybe in the future we shall talk about mind in folk psychology or everyday speech, but it will have no validity to talk about mind in exact sciences. This would be an extreme consequence and I will try to provide some arguments for why it should take place. I believe that our ordinary experience with mental phenomena is strong and appealing enough so as to make it hard for us to give up these notions.

The second factor that might influence philosophy of mind, and one which I believe is currently missing from contemporary discussions is the issue of evolution. The concept of the evolutionary emergence of mind is apparently poorly designed and in the background of some discussions I can feel a substantial undercurrent based on strict separation of the physical and mental domain.

When I was studying the history of philosophy of mind, what struck me as odd was the lack of evolutionary ideas despite the fact that the mechanisms of evolution have been known to humanity for more than 150 years. The mental sphere simply cannot be seen as something closed and substantial with completely separate properties, simply due to the fact that the mental domain emerged from the physical world in a series of small, successive steps.

I tried to explain my starting positions. In the following text, I try to deal with topics introduced here. Firstly, I would like to focus on the evolutionary emergence of mind and try to outline the debate on evolution in philosophy of mind. I would like to describe the implications for the future discussion of mind. Secondly, I want to speak about the history of philosophy of mind, especially those currents of thought which proclaimed commitment to naturalistic explanations of mental phenomena. I will try to explain why these attempts failed or are currently considered to be obsolete. The aim will be to show that future development in cognitive science and neuroscience may overcome some of the obstacles raised by philosophers when it comes to naturalistic explanations of mental phenomena.

In this paper, I promote the role of cognitive and neural sciences, and claim that it will be their discoveries that will affect philosophy of mind. It is of course

possible for me to be mistaken in my interpretation of the contemporary situation in the aforementioned fields, given my background in philosophy. My expectations might be exaggerated and the scientific fields in questions might in fact turn towards completely different problems. I hope that the nature of this paper does allow me some freedom of speculation even if the presented ideas of future discoveries in neuroscience sound like science fiction.

I.

Charles Darwin published his work on the mechanisms of evolution more than 150 years ago. As it seems, it penetrated the discussion about mind only modestly. This presents a contrast with, for example, computers which albeit discovered much later represent a very significant source of progress in philosophy of mind and stimulate further discussion. The computational model of mind entered the common-sense discourse and comparisons are made of the relationship between minds and brains and the one between software and hardware. It is therefore questionable whether evolution can ever find its way into discussion about mind, provided it did not happen so far.

The situation is aptly described by Juraj Hvorecký in his article *Naturalization of conceptual content* from the book *From an evolutionary point of view*[3], where he says that there are philosophers who are generally committed to evolutionism and claim their philosophy to be consistent with findings of natural sciences, yet this claim is not readily apparent in their actual works. The commitment remains on the level of declaration.

The discovery of evolution nevertheless represents a massive stimulus not only for philosophy. It was mainly biology and related areas that experienced such rapid progress as to have almost overshadowed the abrupt advancement of modern physics. As progress in physics began to slow down in the second half of the 20th century, biology took over the position of the most progressive exact science.

3 Havlík, Hříbek 2011, p. 338.

What are the implications of evolutionary theory to philosophy of mind? Acceptance of evolution (and materialism) may be illustrated by Alex Rosenberg in the recently published book *The Atheist's Guide to Reality: Enjoying Life without Illusions*[4]. Rosenberg is discussing an experiment realized by Eric Kandel. Sea slug is a rather large creature, almost 50 cm long, with small number of big neurons, so that any change in them is easily observable. Kandel subjected the sea slug to an experiment similar to that of I. P. Pavlov's dogs.

He combined a painless electrical stimulus (conditioned stimulus) and a painful stimulus (unconditioned stimulus). While in normal situation, the sea slug would not respond to unconditioned stimulus. But when there was a combination of both stimuli, the sea slug started to respond to conditioned stimulus in the same way, even after withdrawal of unconditioned stimulus. The sea slug seemed to learn something trough classical conditioning.

But on the neural level, the change was observable. The synapses between the neurons were opened, so that electrically charged molecules could travel between the neurons, creating the memory of sea slug. They learned something by changing the synapses between neurons. As Rosenberg says, they did not learn anything about the world.

Kandel did not stop with sea slugs and started to experiment with mammalian brains, subjecting rats to a new and quite different experiment. The result was the same – the rats developed changes in their brains. Changes that were of the same type as those developed in the sea slug brain. They changed their neural synapses, but they did not learn anything about the world.

Given there are the same changes in the brain of the sea slug and the rat, there is no reason to think that our human brains work differently. According to Rosenberg, we are all learning on the same basis, our brain states are not about something in the world outside. What we do have are merely very complex and numerous synapses with highly specialized neurons, but there is no need to think that the content of our minds refers to anything in the outside world.

4 Rosenberg 2012, pp. 146–156.

Neurons in our brains are specialized to receive inputs and sending out outputs in an overwhelmingly complex network. Rosenberg further describes other experiments with human brain that support his thesis, which certainly raises disturbing questions about how our brains and our consciousness work.

The difference between human brain and the brain of, for example, a chimpanzee, lies in the much greater wrinkling of the surface of human brain rather than in qualitative differences. In successive steps from the primitive "brain" of a sea slug to our brain there is no gap that could allow us to have privileged skills or experience events in completely different ways. This however does in turn give neuroscience a chance to deal with mental content itself.

Predicting the future course of neuroscience is difficult. This is however not a reason to be pessimistic. There does not appear to be a chance of a sudden regression, which allows us to speculate discoveries bordering on science fiction. I believe that in the coming years, related scientific fields will develop: research of artificial intelligence, psychology, even discovery of organic materials with unusual properties. I am convinced that organic materials can be used in designing computers and evolutionary hardware. Maybe we can create an artificial brain, or at least I do not see any principal reason as to why this should not be possible. It might then be possible for computers to simulate the human mind.

For computer science it is currently difficult to analyse human brain due to, among other problems, its complexity. The numbers of neurons and their possible synapses are vast enough to make our computing capacity inadequate. This might nevertheless change – the recently presented carbon computer does not have the desired properties yet, but it could have them in the future. Likewise, creation of quantum computers may increase our computing capacity substantially. In the next twenty years we may achieve the necessary standard and the nature of research will change significantly.

We understand the nature of chemistry and physics so well that we can predict how two molecules will interact without actually making them interact in a laboratory. Computers can be used to make the predictions, limiting actual testing in laboratory to molecules with the desired properties and bonding pattern.

This may affect our cause too. With understanding of how brain works, computers could provide us with accurate prediction of processes in real brains. This may affect not only cognitive sciences, but also ethics, psychology or economy.

Leaving aside the opinions of Alex Rosenberg who spoke about consciousness very disapprovingly we can ask ourselves whether there is any chance to study consciousness in a strictly scientific manner. Consciousness is sometimes taken as an example of private experience that cannot be accessed by any science. I do not believe that consciousness is some sort of substantial part of our mind, but I do think that we should try to understand what is going on in our brains during conscious experience.

Rosenberg's solution is in some ways extreme. The problem of evolution and the desire to explain the problems associated with mind and intentionality (how we can think something about the world) does not mean only acceptance of such concepts of eliminativism or behaviorism. The naturalist might as well accept the validity of different research areas without assuming their strict reduction to physics. An example of such contemporary use of the evolutionary argument for naturalistic explanation of intentionality is given in the aforementioned article by Juraj Hvorecký.

II.

So far, I was dealing with some of the problems that may occur to the philosopher of mind who seeks an interpretation of mental phenomena in accordance with the latest findings of neuroscience and biology. In the following text, I will try to explain why it is important to reflect on knowledge provided by special sciences, and how philosophy of mind can partially preserve its significance.

I see cognitive science, or unified cognitive science (if such a thing can exist) as the most promising in this respect. This science is usually defined as an interdisciplinary exploration of mind and related phenomena. It incorporates the findings of neuroscience, philosophy, linguistics, psychology, anthropology and computational science. I see this as a very modern concept because of its interdisciplinarity, and of course due to the variety of sciences included, which

allows for a truly comprehensive understanding of mind seen from several different angles.

The dominant school in understanding of mind is currently functionalism.[5] I would like to stop here for a while. The oldest theory in philosophy of mind is considered to be that of substance dualism, which was proved to be nonviable and was replaced by other theories. In the 20th century identity theory, eliminativism and fuctionalism emerged (as well as many others). Identity theory and eliminativism are both compatible with rigid scientific view of the world, however the former theory soon ran into problems related primarily to the possibility of multiple realizations of mental states.

Identity theory tells us that mind is nothing but the brain. Changes in the brain are changes in mind and in the future, with advancements in neuroscience, full understanding of the brain will be achieved. Multiple realizability is an assumption that realization of mental states is not restricted to the brain but can also be implemented by advanced computers or some other substances, such as alien brains, that could be developed under markedly different conditions. We nevertheless assume that such aliens would still have minds. It is also true that our brains are plastic and if damaged, they can partially correct themselves and certain parts of brain can take over the function of others.

Eliminativism takes a negative stance on the whole mental sphere, underestimating mental phenomena. However, this is a particular problem in terms of our everyday experience. Of course, the fact that we have subjective experience of mind and that we understand the mental as something present in the world is no guarantee that it is also somehow true. We could simply be wrong and eliminativism actually builds its arguments on the errors and unreliability of folk psychology. Arguments in support of eliminativism include those based on neuroscience. Our brain can be seen as a very complex structure of neurons which are able to receive inputs and send out modified outputs. Each neuron is a separate and actually simple computational centre. I nevertheless believe that for most people the idea of complete elimination of the mental remains an unappealing option.

5 Heil 2013, p. 87.

Functionalism is nowadays the most popular theory in philosophy of mind, cognitive science and psychology. Its success stems from the achievements of computational science accomplished as computers became widespread. It is also compatible with the whole naturalistic or materialistic view of the world. Let us imagine a computer and ongoing computational processes. How can we answer the question of whether these processes are material? Obviously they are material and the functionalists say that these processes are realized or implemented by material systems. There is no reason why functionalism should be in conflict with materialism, although it does not reduce mental phenomena to the physical realm, as it is done in the identity theory or eliminativism.

What are then the advantages of integration of philosophy of mind into cognitive science? First, there are opportunities for further development. Cognitive science has made great advancements since its beginnings, even created a new field of research. The understanding of our brain can now be more specific.

Thanks to interdisciplinarity, we can borrow research methods of other scientific fields. It is not necessary at all for philosophers of mind to engage only in speculations or theories. Scientific hypotheses have to be testable through experimentation or observation, and this might be allowed by means of massive use of computational models of the mind. We may be able to simulate the functioning of the brain and mind, or their individual components. According to some scientists it might be possible in the future to artificially simulate consciousness itself.

I would like to mention a book by David Lewis-Williams and David Pearce named *Inside the Neolithic Mind*[6]. They noted that humans are not in fact in state of full consciousness or unconsciousness at all times. In fact, these are the poles on a continuous scale from a fully conscious state, changing due to fatigue, sensory deprivation or use of drugs, to an unconscious state. Although we can describe these states only thanks to private experience of people who experienced such states, the changes in consciousness can be correlated with neural changes in the brain. Introspection may not be a reliable source of knowledge, but it can be used

6 Lewis-Williams, Pearce 2008, p. 400.

as a starting point before consciousness can be incorporated into artificial models of the brain and mind.

This could be the starting point to a better understanding of the mental states of other beings which may not possess consciousness in its whole wide scale, and can achieve conditions similar to our states of altered consciousness. The problem is then, how to correlate their neural states with mental states, because it is not possible to relate their private experience.

The variety of experiments is very large. Indeed it might depend on the success that we achieve in creating accurate models of the mind or artificial brains, or merely implants that could be able to communicate with the human brain. Due to the advancements in nanotechnology development of such implants is not out of the question.

Experiments would not have to be limited to the aforementioned problem of consciousness, but cover also other components of the mind, which I have not mentioned yet, memory for example. The memory function has recently been subjected to revised research and it appears more and more plausible that memory is definitely not a storeroom, as it is sometimes pictured, where we store our memories like films of interactive photographs. On the contrary, each time we remember some event in the past, we re-create it and our memory can be easily and dramatically changed. Experiments were conducted which showed that people may unconsciously manipulate their own memories, causing them to be quite different from the way events actually occurred.

Philosophy of mind can then speak not only to questions about the very nature of the mind, but also on the related ethical issues. For example, imagine we really find out how to produce some kind of brain implants. Would it then be right to use them only in order to repair damaged brains, or should they be made available to people with undamaged brains only for the purpose of increasing their intelligence or other cognitive abilities?

There might be a crucial issue ahead of us – that of free will. What if the research of brain and development of brain models prove that the brain behaves deterministically in every way and that therefore there is no free will at all? Such conclusion is easy to imagine, as freedom of will might form an obstacle for us to

create an exact model of the mind. If we create an accurate model of the brain, there will be no place for free will. It is a rather disturbing idea that things created by us, like computers, could have some concept of free will.

The advantage of integration of philosophy of mind and cognitive sciences is in that philosophers of mind could affect the discussion from the inside. There are topics in cognitive sciences that are not discussed at all. Among such ignored questions is that of the qualia. Philosophers can lead cognitive sciences to this question and it can become relevant for other research areas as well.

CONCLUSION

I am quite sceptical about the idea of armchair philosophy, therefore I can imagine philosophers working with computers, creating statistical models of behaviour and deriving conclusions from simulations of the human brain. If any of the above became true, it would be very good news for philosophy indeed. Interdisciplinary appeal arises in many scientific fields, I therefore think that it is imperative for philosophers to become familiar with modern methods and findings of other scientific fields.

Cognitive science may bring us new, unexpected results, and philosophy may participate in them. Once incorporated into cognitive science, philosophy could become viable again and we would not have to be worried whether there would be a meaningful occupation for philosophers.

At the very end I want to give a little tutorial on how anyone (rather than only philosophers) can contribute to scientific progress in the field dedicated to the problems of mind.

In the 1990s, worldwide expansion of personal computers (and other devices with computational possibilities, such as smartphones or smart televisions) caught the interest of some scientists who wondered whether it would be possible to somehow use the computing potential of these computers for scientific purposes.

The result was creation of a platform that enabled connecting of hundreds of thousands of individual computers into a virtual supercomputer capable of

processing scientific data. Today, this platform is called BOINC (Berkeley Open Infrastructure for Network Computing) and is implementing dozens of projects. Every computer owner can install the program on his or her computer and donate part of their computer's performance to the participating scientific projects. It is possible to use the program even on smartphones and tablets.

The projects involved cover a wide range of research areas, from physics and mathematics to chemistry, biology and others. Many scientific institutions own huge amounts of data, yet lack the resources to analyse it. BOINC is a way for those institutions to implement projects that would otherwise not have a chance to acquire the necessary financial subsidies. Volunteers involved in the system are sponsoring science. The results of this activity are numerous and include discoveries of pulsars, new drugs, or even helping to construct some of CERN's facilities in Switzerland.

One of such projects is MindModeling@home (beta), wherein scientists perform various models of brain functions. The results can be found on their website at http://mindmodeling.org/ and the project is based at the University of Dayton Research Institute and the Wright State University.

It is quite unusual for philosophers (or any other regular people) to participate in real projects conducted by scientists. However, if you do own a computer, you can at least join the BOINC program. A wide range of different project can then stimulate interest in scientific progress in other areas. The BOINC projects also constitute great teaching material, as they provide formidable amount of information about ongoing research and its results. Without this volunteer activity, humanity would be deprived of much scientific knowledge.

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Philosophy of Biology (Selected Topics)

INTRODUCTION

This is not a classical introductory text to the philosophy of biology or at least it is trying not to be one. The reason is threefold. Firstly, there is a bunch of such introductory texts[1] written by the most prospective authorities in the field so that any effort to equal them would be like bringing owls to Athens. Secondly, typical introductory texts aim at taking those eager for knowledge in the field of philosophy of biology straight into it, but mostly lack any explanation of why someone should be interested in the subject in the first place, and of what sort of topics and problems are waiting behind the gate the readers are about to open and what they should be aware of before passing through. This is going to form the central part of this paper – providing the reasons and motivations for looking into philosophy of biology as a modern, dynamic branch of philosophy, while also presenting the influences that caused the philosophy of biology to come into existence. Thirdly, although the philosophy of biology is still a young branch of philosophy, having been established some fifty years ago, Czech milieu lacks an introductory text that could fill the existing gap. This text aims to remedy this shortage by providing a basic outline of philosophy of biology in its current state against the backdrop of actual motivation behind the philosophy of biology, a short history of the field, its main topics and possible new themes and problems.

MOTIVATION

In trying to understand what motivated and prompted a new branch of philosophy to be established one has to get to know about its main influences. Establishing the philosophy of biology as a new branch of philosophy or philosophy of science was motivated by a proliferation of knowledge and outcomes of biology over

1 See Sterelny, Griffiths 1999; Rosenberg, McShea 2007 or Godfrey-Smith 2014 for a rather novel way of looking atphilosophy of biology.

the course of approximately the last hundred and fifty years. Without denying an interest of philosophers and other thinkers in life, its manifestations and variation throughout the course of history from Aristotle to modern times, it all truly started with Charles Darwin and his work *On the Origin of Species by Means of Natural Selection*. Darwin presented a simply breath-taking explanation of the evolution of life that completely changed our view of the world. Ernst Mayr made a simple and plain claim that sums up Darwin's influence briefly but unequivocally:

> "*This event represents perhaps the greatest intellectual revolution experienced by mankind. It challenged not only the belief in the constancy (and recency) of the world, but also the cause of the remarkable adaptation of organisms and, most shockingly, the uniqueness of man in the living world.*"[2]

Just think about the whole tradition in philosophy with the apparently self-evident concepts of soul, anthropocentrism, creation of the world by God, his existence and many others to find out how deep and revolutionary Darwin's contribution to human knowledge was. To give a bit of a taste of how magnificent Darwin's discovery was,let us look at the problem of adaptation and creation. How do organisms become so well suited (adapted) to their environment was a serious epistemological problem. According to the view of William Paley in his *Natural Theology*, to explain adaptation and complexity of an entity, one has to fall back on divinity. After contemplating a found stone and a found watch, Paley reasons that the watch found on a heath

> "*being observed – it requires indeed an examination of the instrument, and perhaps some previous knowledge of the subject, to perceive and understand it; but being once, as we have said, observed and understood, the inference we think is inevitable, that the watch must have had a maker – that there must have existed, at some time and at some place or other, an artificer or artificers who formed it for the purpose*

2 Mayr 2001, p. 25.

which we find it actually to answer, who comprehended its construction and designed its use."[3]

The argument Paley presents has a long tradition and voices several things encapsulated in one proposition: complex entities, in this case the watch found on a heath as an exemplum, must have been created by an intelligent being, most likely God, because its design and purpose calls for it. It serves a purpose, it can be handled well and it is so complex that only an intelligent being is capable of having created it. Thus, divine power was a way to explain everything of similar nature. Darwin came with a strong and elegant alternative explanation. In order to have someone grasp Darwin's teaching about evolution, his theory could be briefly presented in three ways. The first one could be called "popularizing" and simply states that the evolutionary theory about evolution of life is based upon two assumptions: *natural selection* and *sexual selection*. Natural selection anticipates that organisms survive as long as they are able of adaptation to dynamically developing and changing milieu. Those organisms with appropriate attributes that helped them to deal with aspects of given milieu survive. Sexual selection adds that organisms securing mates to reproduce gain advantage to those that do not, noting that potential mates advertise sexually attractive traits of different quality based on which actual pairings are made. This is the first version of natural selection, the "popularizing" one.

A more thorough version is provided for instance by Robert Arp and Alexander Rosenberg. From their perspective:

- organisms vary because of inheritance
- the fact that more organisms are born than can survive leads to competition for resources and mates
- natural selection selects the traits that are most fit in an organism conforming to the environment

3 Paley 2001, pp. 41–42.

- organisms fortunate enough to have traits increasing their chance of survival have higher scores in reproduction
- natural selection accumulates traits increasing the probability of survival and reproduction which leads to speciation (producing new species) if enough time and proper environment is given[4]

The third version of natural selection is mentioned for example by Peter Godfrey-Smith as a "*combination of* variation, heredity, *and* fitness differences".[5] Organisms vary and through reproduction and heredity natural selection leads to differences among organisms in the traits they have at their disposal. Particular combinations of traits allowing for survival and mating differ in their rate of contribution to securing of resources and survival in particular environments, hence the drive to find a mate such as to vary the traits the progeny will have at their disposal… It is as simple as that.

All in all, natural selection explains which organisms survive, how and why they adapt, with no supernatural explanation needed. Darwin thus provided a naturalist solution to the epistemological puzzle of adaptation and apparent design. Organisms are in fact not designed to live in particular environments; it is the other way around. Adaptation of organisms is a result of the ongoing evolutionary process comprised of natural and sexual selection. Organisms that look as though they were designed for concrete environments were thus only lucky enough to inherit traits that help them to survive. With all the tradition and the contemporary attitudes to sexuality, man´s place in the universe, origins of life, etc. derived from the Scripture, Darwin´s theory was a game changer. Philip Appleman expressed it pertinently:

> *"It was not just that Darwin had undermined the Book of Genesis, or even that he had given scientific authority to the nineteenth-century affinity for endless continuities rather than eternal verities, or that the evolutionary orientation stressed context*

4 Rosenberg, Arp, p. 1 (edited).

5 Godfrey-Smith 2007, p. 489.

> *and complexity – although all such ideas threatened established religion. The most dangerous idea of all was that Darwin's universe operated not by design but by natural selection, a self-regulating mechanism. […] Natural selection pictured the world in a constant process of change, but without any apparent prior intention of going anywhere in particular or of becoming anything in particular."*[6]

Without any intention or goal to be achieved, with man being a common part of the process of natural selection, the world after publication of the *Origin of Species* could not be the same anymore and a huge amount of questions arose extending all over the various domains of human life and inquiry, with philosophy being no exception. Speaking of this "dangerous idea", it is well worth of also noting Daniel Dennett's remark. When evaluating Darwin's influence on human thinking as a *universal acid* in his famous *Darwin's Dangerous Idea,* Dennett wrote:

> *"Darwin´s idea had been born as an answer to questions in biology, but it threatened to leak out, offering answers – welcome or not – to questions in cosmology (going in one direction) and psychology (going in the other direction)."*[7]

No area could remain untouched by Darwin's theory. At the end of the *Origin of Species*even Darwin himself famously stated that psychology was the next field to be rethought on the basis of his evolutionary theory:

> *"In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation. Light will be thrown on the origin of man and his history."*[8]

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6 Appleman 2001, p. 14

7 Dennett 1995, p. 63

8 Darwin *2008*, p. 359

Even a cursory look on the current situation in psychology vindicates his presumption. Morality and altruism, cooperation, religiousness and violence, language and decision making, we need onlytake our pick and find that there is no subdiscipline or area of inquiry untouched by the evolutionary theory. This is where we find the first and maybe the foremost motivation for both establishing the philosophy of biology as a professional philosophical branch with Darwin's influence on modern thinking as one of its targets of research, and for all those interested in philosophy of biology to find out its roots and basis. Darwin entirely changed our view not only of nature, but also of the whole world and of man's place in it; in the case of philosophy

> "*the influence of Darwin upon philosophy resides in his having conquered the phenomena of life for the principle of transition, and thereby freed the new logic for application to mind and morals and life.*"[9]

Thus we owe the most important discovery in human history to Charles Darwin. His theory of natural selection, fully presented in the work *On the Origin of Species by Means of Natural Selection* in 1859 represents the far-reaching, sharpest breakpoint in the history of human thinking. Even if such assertion might seem a bit controversial, to be perfectly honest, it is more of an affirmation than a plain statement that is about to be explained and proved. While Darwin's theory of natural selection by common descent is today widely accepted by experts, scholars and academics acrossvarious fields, there are certain rather infamous counter opinions in the history of philosophy that are no longer sustainable in the light of evolution and the evidence supporting it. To underline Darwin's influence and the revolutionary character of his thought let us mention two famous examples from philosophy that were striving to refute both the possibility of a natural explanation of life origins and the importance of Darwin's legacy for philosophy.

9 Dewey 2001, p. 486.

CHARLES DARWIN – NEWTON FOR A BLADE OF GRASS

> *"For it is quite certain that in terms of merely mechanical principles of nature we cannot even adequately become familiar with, much less explain, organized beings and how they are internally possible. So certain is this that we may boldly state that it is absurd for human beings even to attempt it, or to hope that perhaps some day another Newton might arise who would explain to us, in terms of natural laws unordered by any intention, how even a mere blade of grass is produced. Rather, we must absolutely deny that human beings have such insight."*[10]

Quote from one of the most important philosophers of all times, Immanuel Kant and his *Critique of Judgment* tells us clearly that there will never be a "Newton for a blade of grass", that is to say that human capacities are not up to the task of explaining the nature of living beings – be they non-human animals, plants or humans. What a strong suggestion from such an inspiring spirit as Kant. Maybe it is a little unfair given the historical development, after all nearly seventy years passed before the publishing of *Origin of species* and the presentation of the theory of natural selection and hence Charles Darwin becoming the aforementioned "Newton for a blade of grass". Either way, Darwin proved Kant wrong, even if only in retrospect. Another critique came later on, with Ludwig Wittgenstein. This time the critique aimed, more interestingly, squarely at the relation between natural selection and philosophy, between Darwin's theory or any other scientific theory and philosophy, respectively. In his *Tractatus,* Wittgenstein wrote that

> *"Darwin's theory has no more to do with philosophy than any other hypothesis in natural science."*[11]

Fair enough, but Wittgenstein turned out to be wrong on both counts. Today it is pretty clear that natural selection and Darwin's evolutionary theory not only have a lot to do with philosophy, but that any philosophy being in contradiction

10 Kant 1987, pp. 282–283.

11 Wittgenstein 2001, p. 30.

of evolution amounts to nothing but hot air. At the same time, the fact that natural sciences forma still growing fountainhead for philosophy as a whole – be it neuroscience, cognitive psychology or modern physics– makes the second part of Wittgenstein's proposition equally untenable today. After Darwin, everyone wanting to get in serious research must come to terms with the fact that rejection of natural selection leads, sooner or later, to disaster. Pondering this is a waste of time because the support for Darwin's theory of evolution is huge and straightforward – an abundant amount of evidence supporting it is at our disposal and it keeps growing every single day. Fossil records, common descent visible through analysis of DNA, morphological similarity and homology, embryology, biogeography, and the list goes on.[12] After Darwin proposed a naturalist explication of the problem of adaptation, speciation or common descent, he set up new standards for future research and helped to convince several prominent figures to lean towards naturalism. Charles Darwin called himself a philosophical naturalist[13] and by providing humankind with his evolutionary theory he plainly proposed to look for explanation of various problems in science and evidence and to give up mere speculations. If it was possible to come up with a simple, elegant and above all functional theory in the realm of biology, why not apply the naturalist stance to other areas of human interest as well?

> *"In August of 1838, after hitting upon a mechanism for evolution, Charles Darwin confided to his notebook: 'Origin of man now proved. – Metaphysics must flourish. – He who understands baboon would do more towards metaphysics than Locke.'"*[14]

So much for philosophy and Darwin's influence that consisted of the already outlined conviction – if philosophy aspires to explain human nature, language, morality and the world as a whole, it must look not only for backup but also for a point of departure in science:

12 See Mayr 2001, Dawkins *The Greatest Show on Earth* or Coyne *Why Evolution is True* for more details.

13 Sloan 2009, p. 21.

14 Rosenberg 2002, p. 22.

> *"What morals can we draw for how to do philosophy from the success and fertility of Darwin's work? Many philosophers have argued that they must become more engaged with natural science if their subject is to make advances."*[15]

And they were quite right because all theories based upon nothing but speculation cannot withstand the weight of evidence collected by science and, lacking any support, turn into dead ends. On the other hand, those philosophers who look to science for support and inspiration turn to Darwin's legacy, to the importance of reversal in thinking and the research that Charles Darwin came up with.

Alex Rosenberg refers to such turn towards natural sciences in searching for answers with support from philosophy as naturalization (of philosophy) and to the standpoints that assume natural selection to be a fact and a point of departure for any research as naturalism:

> *"Naturalism, as we have come to call the willingness to appeal to biological, and especially Darwinian considerations in social science and philosophy for that matter, is now a very widespread view. Naturalism has come increasingly to be accepted in large measure I think because our understanding of biological findings, theory, and methods has improved substantially."*[16]

To sum up, after Darwin and the naturalization of thinking in the first place, for philosophy, any endeavour without evidence and backing from science is mere speculation. This holds true for far back inhistory, today and most likely the future. Philosophy strengthened by evidence, however, and working with the assumptions and findings of science, claims allegiance to naturalism. It is also worth stressing that the so called post-Darwinian intellectual landscape stands for one of the strongest, most innovative a thought provoking trends ever to arise in philosophy.[17]

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15 Lewens 2007, p. 258.

16 Rosenberg 2005, p. 39.

17 See Papineau, David, *Philosophical Naturalism*, collection of essays in *Contemporary Philosophical Naturalism and Its Implications* edited by Bana Bashour and Hans D. Muller

Even if it is nowadays hardly understandable why Wittgenstein made such a proposition after the revolution in thinking introduced by Darwin and natural selection, it is possible to admit, that it was not Darwin's theory alone that enabled philosophy of biology to be born, but rather also Mendelian genetics and the discovery of the structure of DNA in 1953 by John Watson and Francis Crick.[18] These two other great achievements completed the so called "great synthesis" or "new synthesis" in biology that stands for modern evolutionary biology up until today and has naturalism as its self-evident ingredient about which there is no dispute. Nevertheless, the naturalization of knowledge started with Charles Darwin in his *Origin of the Species* andthe prospect of evolution of life by natural selection.

PEAK IN THE POST-DARWINIAN INTELLECTUAL LANDSCAPE

Today we do know that Darwin's theory of natural selection is a scientific theory with all that it entails, but natural selection as a process by which all life evolves is a fact. We know thisbecause of the inexhaustible amount of evidence supporting it, yet its impact on thinking, exploring, explanation and understanding of our own kind seems to be underappreciated, even though no other theory has ever influenced our understanding of the world more than Darwin's natural selection, philosophy being no exception. Thus it could be stated that philosophy of biology is kind of an "answer" of philosophy to Darwin, a kind of reaction and rethinking of philosophy, its history, main problems and discussions, topics, terms and domains through the lens of natural selection.

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or those in *Naturalism and Normativity* edited by Mario De Caro and David Macarthur. Naturalism is also a talking point between AlexRosenberg and Timothy Williamson in *Philosophical Methodology: The Armchair or the Laboratory?*, pp. 29–42.

18 For detailed familiarization with history of evolutionary theory and great synthesis consider *Evolution: The Remarkable History of a Scientific Theory* by Edward J. Larson, Ernst Mayr's *The Growth of Biological Thought* or Joe Cain's summary "Synthesis Period in Evolutionary Studies" in *The Cambridge Encyclopedia of Darwin and Evolutionary Thought*, pp. 282–292.

There is no philosophical domain that could avoid taking into account Darwin´s theory with its influence or disregard the concept of natural selection. Let ushave a look at some recent bestsellers, acclaimed in their miscellaneous fields, such as *The Better Angels of Our Nature* by Steven Pinker, Paul Bloom's *Just Babies*, Alex Rosenberg's *The Atheist's Guide to Reality*, *Moral Tribes* by Joshua Greene or Peter Godfrey-Smiths' *Darwinian Populations* and Bruce Hood's *The Self Illusion*, to mention only a few. None of them attempts to deny or omit reference to natural selection as the basic, matter-of-course default assumption on which the presented models, theories, explanations and conclusions are built. No matter the topic, field of research or background education, the status is clear – natural selection as a fact is today so abundantly supported by such vast amount of evidence that to try to deny or refute it as a plain fact and a natural base for research would only serve to harm one's respectability among other experts in the given field. Thus we could sum up with Alex Rosenberg Darwin's influence on philosophy and human thinking about life:

> *"If ever there was a theory that put an end to traditional philosophizing, it was the one Darwin expounded. By providing a single, unified scientific theory of "the origin of man" and of biological diversity generally, Darwin made scientifically irrelevant a host of questions that philosophers and scientists had taken seriously since long before the time of John Locke. The theory of natural selection has put an end to much speculation about the purpose of the universe, the meaning of life, the nature of man, and the objective grounds of morality."*[19]

A univocal reaction to the theory of natural selection represented by philosophy by way of philosophy of biology and its scope goes hand in hand with philosophy´s acclaim of naturalization. In the light of this proposition a serious question emerges as to the relation between biology and philosophy, or between biology and philosophy of science, respectively, due to philosophy of biology

19 Rosenberg 2002, p. 22.

being a part of philosophy of science. Experienced veterans of the field show us how the relation in question should be approached. Elliott Sober asserted:

> *"Biologists study living things, but what do philosophers of biology study? A cynic might say 'their own navels', but I am no cynic. A better answer is that philosophers of biology, and philosophers of science generally, study science. Ours is a second-order, not a first-order, subject.* […] *Philosophy of science is a normative discipline, its goal being to distinguish good science from bad, better scientific practices from worse. This evaluative endeavor may sound like the height of hubris. How dare we tell scientists what they ought to do! Science does not need philosopher kings or philosophical police. The problem with this dismissive comment is that it assumes that normative philosophy of science ignores the practice of science. In fact, philosophers of science recognize that ignoring science is a recipe for disaster."*[20]

Alexander Rosenberg with Daniel McShea add the contention that

> *"the philosophy of biology addresses those questions that arise from biology but that biology cannot answer, at least not yet, and the further questions about why biology may be unable to answer these questions."*[21]

Questions put forward by the authors concern the nature of life and its hoped-for meaning, progress in the evolutionary process, character of the relationship between natural selection and any form of theism and so on. Last but not least, Peter Godfrey-Smith recently articulated his confidence about the relation discussed even more strongly. Godfrey-Smith initially distinguishes between philosophy of science and philosophy of nature in order to proceed to propose a program of philosophy of nature, one that is strongly relevant to the topic at hand:

> *"Philosophy of science* […] *is an attempt to understand the activity and the products of science itself. When doing philosophy of nature, we are trying to understand the*

20 Sober 2008, p. xv.

21 Rosenberg and McShea 2007, p. 3.

> *universe and our place in it. The science of biology becomes an instrument – a lens – through which we look at the natural world. Science is then a resource for philosophy rather than a subject matter* […] *It is foolish for philosophy to place itself* above *science, but it can certainly step back from science and gain an outsider's viewpoint. This is necessary, in fact, for philosophy to be able to pursue the task of seeing how* everything *hangs together. A philosopher will look at how the messages of one part of science relates to that of another, and how the scientific view of nature relates to ideas we get from other sources."*[22]

SCOPE AND AIMS

If there is any certain way to explain and describe what exactly the scope of any philosophical field is, it is legitimate to choose any of the styles listed below. It is possible to look at the history of the field, emphasize its main stages and then try to acquirea really rough outline ofits main areas of interest. Rosenberg and Arp formulated such approach plainly when they wrote that one way of explaining

> "*the agenda of problems in the philosophy of biology is by tracing the history of biology since Darwin and showing how its developments raised problems that have concerned both biologists and philosophers."*[23]

Whether it is a specific term like *being* in ontology or *proofs of God's existence* and their historical variances and disputes surrounding it in theology, it is in any case surely a good way of carrying out such task because it may give us at least a hint of the given field based on its historical development. History of any human practice positively brings up its respective contributions and assets through which it is possible to understand it better, to discover its roots and main influences that helped to constitute the field in question.

The second way of describing any philosophical field may consist of forming a set of proponents of the given field starting from its beginnings (if such a point

22 Godfrey-Smith 2013, pp. 12–13.

23 Rosenberg, Arp 2009, p. 1.

in history can be defined) until present and to work out the intersections in their works and thought. Those intersections account for the main topics and problems of the field in question and thus can be used as the background of the particular branch of philosophy. Thus in case of experimental philosophy these would involve *intuitions* for instance; with another illustrative example being the philosophy of mind with its piece de résistance of *free will problem* and the debates surrounding it. It is evidently true that this and the previous manner of describing a philosophical field are closely related. The second one differs from the first basically in that it aims at concrete problems and discussions that reached their peak in the past but remain relevant (as historical sources or as yet unresolved topics) today.

The third approach in the quest for descriptionof concrete philosophical fields could lie in assembling all of the relevant topics and disputes considered in texts of those authors seen as activein the given field, or by those authors whose contributions take the aforementioned topics into consideration. This might appear to be a circular explanation but what does characterize a philosophical field or branch better than the topic it tackles, the authors and texts devoted to these topics or the texts written by such respective authors? Thus in epistemology we find *a priori vs. a posteriori debates* about knowledge and its basis, *freedom* and *justice* in political philosophy and *character oftime* in metaphysics.

I believe that the philosophy of biology is no exception and that one may describe its scope, goals and main themes in any of the three aforementioned manners. I am not convinced that there could not be better or more efficient ways of describing it, I merely intend to provide a combination of the described methods so as to roughly depict the philosophy of biology as a still young, modern and dynamic subdivision of philosophy by meansof tracking its history, important authors and certain particular topics which remain relevant today.

DESCRIBING PHILOSOPHY OF BIOLOGY THROUGH ITS DEVELOPMENT, AUTHORS AND TOPICS

Many authors and topics in various branches of philosophy were filed under those particular branches in retrospect and the very naming of many philosophical

branches goes hand in hand with such retroactive reassessment of authors and topics. Thus on one hand it is always tricky to determine the beginning of any given field in philosophy, yet on the other a task like that is still possible and often useful. Human beings like to categorize. We organize and put things in pigeon-holes to achieve better understanding and increase usability. Whether through comparison or classification we are inclined to sort things in order to understand, comprehend and distinguish. Albeit our systematization is strongly arbitrary it functions and satisfies our needs and urges for orientation in concrete issues. Think only of the periodic table, of taxonomy in biology or the aforementioned branches of philosophy. There is always a beginning; there is always an end, both for good purposes.

Before we gain a certain type of grasp of the philosophy of biology based on several selections of texts from this field, let us have a look at the multitude of its various definitions and outlines..

James Lennox provides encouragement for the philosophy of biology by several questions worth of answering:

> "*Does biology deploy concepts, patterns of explanation, theories and research methods which are fundamentally different from those found in the physical sciences? If so, is this principle the case, or is biology destined to gradually merge with chemistry and atomic physics as a subdiscipline? Or to put the question from the standpoint of the objects of biological research – what, if anything, is special about living things? These are the underlying questions which motivate much of the philosophy of biology today.*"[24]

In *Sex and Death*, a still influential introductory text from the field of philosophy of biology, Kim Sterelny and Paul Griffiths observe that

> "*the results of the biological sciences are of obvious interest to philosophers because they seem to tell us what we are, how we came to be, and how we relate to the rest of*

24 Lennox 1992, p. 269.

> *the natural world.* […] *In all these cases biology seems to yield clear factual answers to questions of enormous moral and social significance.*"[25]

Francisco Ayala and Robert Arp pile up several definitions of philosophy of biology in such manner, that

> "philosophy of biology *can be characterized as a sub-discipline of philosophy – complete with topical subject-matter to be discussed momentarily – the concern of which is the meta-leveled attempt on the part of philosophers, biologists, and other thinkers to understand, evaluate, and critique the methods, foundations, history, and logical structure of biology in relation to other sciences, disciplines, and life endeavors so as to better clarify the nature and purpose of biological science and its practices.*"[26]

To conclude with a really concise definition, let us use Elliott Sober's dictum from his title *Philosophy of Biology:*

> "this book [i. e., *Philosophy of Biology*] concentrates on philosophical problems raised by the theory of evolution."[27]

There are certainly many other ways and texts proposing more or less similar definitions and demarcation of the philosophy of biology. Having clarified in outline what the philosophy of biology is and by which influences it is motivated, it is possible and appropriate to define its primary topics.

If we look at the contents and issues or topics of nine texts on the philosophy of biology from the period between 1976 and 2010, we can find a couple of things worth of attention. Presumably we can find out from the selections at least the following facts:

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25 Sterelny, Griffiths 1999, p. 3.

26 Ayala, Arp 2009, p. 2.

27 Sober 2000, p. xv.

- which topics were selected for
  - the particular selection of texts in a given year
  - all selections from between 1976 and 2010
- which topics appear most often
- the number and range of topics covered in
  - the particular selection of texts in a given year
  - all selections from between 1976 and 2010
- (subsequently) the names of the authors whose texts were selected
- (anticipated) the progress or trends in the selected topics

With no less than nine selections of representative texts from the field of philosophy of biology we may at least partially conclude which topics, questions, themes and problems could be labelled as important.

The first selection of texts was compiled by a doyenne of the philosophy of biology, Marjorie Grene, and her colleague Everrett Mendelson under the title *Topics in the Philosophy of Biology* in 1976[28] and covered in all ten topics: **history, reducibility, problems of explanation in biology: levels of organization, function and teleology, pluralistic explanation, evolution: adaptation**, the **species problem**. Thirty one years later, another well-known figure from the field of philosophy of biology, Michael Ruse, covered in second edition of the anthology called simply *Philosophy of Biology* the following topics: **life**, **design**, **tautology**, **punctuated equilibrium**, **classification**, **teleology**, **molecular biology**, **DNA**, **sociobiology**, **extraterrestrial life**, **ethics**, **religion** and **cloning**. No agreement on any of the important topics but one? Is this due to the editor's preference or due to a huge progress in the field and the emergence of entirely new topics? This is not easy to conclude seeing as the very

28 The truly first collection of texts on the philosophy of biology was published in 1974 under the title *Studies in the Philosophy of Biology: Reduction and Related Problems* as an outcome of the conference "Problems of Reduction in Biology" held in 1972 in Italy. The collection of texts was edited by Francisco Ayala and Theodosius Dobzhansky but being a compilation of papers presented at a conference it is not considered a properfirst anthology.

last selection of texts on the philosophy of biology, incidentally also edited by Michael Ruse,[29] *The Oxford Handbook of Philosophy of Biology*, shares some topics with each of the two earlier anthologies mentioned. These include, respectively, **adaptation**, **reductionism** and **species**, **adaptation** and **religion**. The curious thing about all of the aforementioned anthologies is that none of them presents an explanation regarding the manner in which the texts were selected with regard to the perceived topicality, and importance of the issues tackled.

For the purpose of providing a complexion outline of the philosophy of biology based on the selected texts from this field, it is opportune to use Jean Gayon's classification from his "Philosophy of Biology: An Historico-Critical Characterization", where he determines six classes of topics relevant to the philosophy of biology as "philosophical questions of general interest regarding biology and the living world":

- Evolutionary epistemology and related topics
- Ethics and biology
- Nature/culture (e.g., genes and culture)
- Function, teleology, design
- Reflexions on biology in general (e.g., laws, autonomy of biology)
- Other (philosophy of mind, emotions, religion, pictorial presentation in biology, etc.)[30]

In this way, the topics from the aforementioned period and selections could be divided into six classes. The manner of classification is presented in Table 1:

29 To be perfectly honest, this is not a coincidence at all, for Michael Ruse is the most productive author/editor of texts and anthologies related to the philosophy of biology, Darwinism and related issues.

30 Gayon 2009, p. 210.

TABLE 1

Classification of topics based on texts from nine anthologies on the philosophy of biology in six classes

Class	Representative topics (selection)
Evolutionary epistemology and related topics	Adaptation, species, reductionism, units of selection/levels of organization, evo-devo, tautology, microevolution and macroevolution, life, classification, information, etc.
Ethics and biology	Ethics, morality, altruism
Nature/culture (e.g., genes and culture)	Sociobiology, The Human Genome Project, cloning
Function, teleology, design	Function, teleology, design, ID
Reflexions on biology in general (e.g., laws…)	History, laws, status of biology among sciences
Other (philosophy of mind, emotions, religion…)	Religion, creationism, medicine, animal behaviour

According to the frequency of occurrence of particular topics the classification looks as follows:

TABLE 2

Thematic distribution of contributions in collections and anthologies from the field of philosophy of biology between the years 1974–2010.

year	Evolutionary epistemology and related topics	Ethics and biology	Nature/culture (e.g., genes and culture)	Function, teleology, design	Reflexions on biology in general (e.g., laws, autonomy of biology	Other (philosophy of mind, emotions, religion…)
1974	10	–	–	–	5	2
1976	5	–	–	1	1	–
1998	5	1	2	1	–	1
2006	7	2	1	–	1	1
2007	6	1	2	2	–	2
2007	11	1	3	1	–	6

year	Evolutionary epistemology and related topics	Ethics and biology	Nature/culture (e.g., genes and culture)	Function, teleology, design	Reflexions on biology in general (e.g., laws, autonomy of biology	Other (philosophy of mind, emotions, religion…)
2008	4	–	–	–	–	3
2009	5	1	–	1	–	3
2009	8	2	–	3	–	–
2010	12	2	1	1	1	8
Total	**63**	**10**	**9**	**10**	**3**	**24**

Albeit the presented classification and overview are necessarily limited in scope and provide merely a rough classification of the themes covered, one can still catch a glimpse of the philosophy of biology in the reflexion of the texts and their topics across the nine collections. Manifestly, evolutionary epistemology is the dominant topic, outnumbering all the other five classes of topics put together 63 to 56. In away, this trend corresponds with Gayon's findings and conclusions made by way of an example of the journal *Biology and Philosophy.*[31]We have already seen the topic classification, but what remains to be seen is whether this can gives an idea about the state of the philosophy of biology. The top topics are those under the class "Evolutionary epistemology and related topics" leading us to state that the philosophy of biology even today relies on its traditional topics. David Hull and Michael Ruse claim that a conclusion can be drawn from Table 2:

> *"Of the traditional issues in philosophy of biology, we have included four – adaptation, unit of selection, function and species. As central as adaptation is to evolutionary biology, problems arise with respect to its application."*[32]

31 Comp. Gayon 2009.

32 Hull, Ruse 1998, p. 1.

The "traditional issues" represent what have been considered to be the "hot" topics in the philosophy of biology and the central themes of this branch of philosophy, nevertheless these four are hardly enough to describe the whole wide range of the philosophy of biology. There are several others as we might find out in the aforementioned collections and anthologies but also in several introductory texts from the field. Philip Kitcher mentions the **status of evolutionary theory**, **units of selection and concepts and methods in evolutionary theory**.[33] James Lennox adds five key themes emerging after the so called "great synthesis", such as **chance and probabilistic nature of evolutionary theory**, **fitness and selection**, **units and levels of selection** and **nature of selection/adaptation explanations**.[34] Alex Rosenberg emphasizes **laws in biology**, **functional attributions and explanations**, **reductionism and molecular biology**, **levels and units of selection** (again), **biology and human sciences** and also **biology's relation to ethics.**[35] Recently, Michael Ruse and Peter Takacs turned their attention to the **units/levels of selection**, **evolutionary developmental biology** (evo-devo), **reductionism**, **ecology**, the **problem of species**, **teleology**, **evolutionary epistemology**, **evolutionary ethics** and **progress**.[36]

Altogether, each of the topics contributes to the wide field of philosophy of biology and stand as a promise of its future development. This in itself may suffice; yet there are several other, more recent topics that are currently emerging. The **theory of mechanisms** or rather the explanation of causation in terms of mechanisms provides a new direction in evolutionary epistemology where mechanisms are seen as

> *"complex systems whose 'internal' parts interact to produce a system's 'external' behavior."*[37]

33 Comp. Kitcher 2008.
34 Lennox 2005, p. 339.
35 Comp. Rosenberg 2013.
36 Comp. Takacs , Ruse 2013.
37 Glennan 1996, p. 49.

Although it may seem as a step backwards in history this is not necessarily so. As Carl Craver and Lindley Darden propose in their very recent endeavour *In Search of Mechanisms*, there are many good reasons to look for and use mechanisms in explaining various phenomena. Following their basic argument it is possible to understand the motivation:

> "*The search for mechanisms is one of the grand achievements in the history of science. The achievement is first and foremost conceptual: it is the very idea that scientific activity should be organized to advance the discovery of mechanisms that produce, underlie, or maintain the diverse manifest phenomena of our world. The achievement is, second, methodological: it involves the increasing acceptance and refinement of a set of tools for constructing, and revising descriptions of mechanisms.* […] *Across the life sciences the goal is to open black boxes and to learn through experiment and observation which entities and activities are components in a mechanism and how those components are organized together to do something that none of them does in isolation.*"[38]

Peter Godfrey-Smith also stresses the "mechanistic" trend in the philosophy of biology in his new introductory book called simply *Philosophy of Biology*:

> "*In cases like these, the activities of the parts of a system are described, and these activities and the relations between them explain how the more complicated capacities of the whole system arise.*"[39]

Godfrey-Smith does not limit himself to accent only the aforementioned standpoint, but rather goes on to present several traditional topics like **adaptation** or **function.** Even more interestingly, he dedicates a chapter to **information** in evolutionary theory. Building on findings from genetics, he pinpoints what comes into consideration when the problem of information comes into play:

38 Craver, Darden 2013, p. 27.

39 Godfrey-Smith, p. 23.

> "*Even if the strongest claims about the link between information and evolution are rejected, there seems to be something important here. The organisms resulting from the evolutionary process seem to benefit, in terms of adaptation, from the effects of past environments on their gene pool; geological processes don't include anything like that. And I said myself in chapter 6 that DNA is a kind of memory. If so, what is being remembered?*"[40]

Possibly one of the severest problems in all philosophical tradition concerning nature and living beings rests on their inherent attribute – **life**. In simple terms, although everybody uses the term as taken for granted, despite the fact that we do have several definitions at our disposal, the term itself and its usage is tricky. For instance, Addy Pross, having listed several unique characteristics of life as we understand it today concludes the following about the ephemeral nature of a "final" definition of life:

> "*With respect to the biological world, however, our current understanding of material systems is unable to address life's unique characteristics that we've discussed in some detail. Simply put, within the material world there exists an entire class of material systems – the biological class – that exhibits a distinct pattern of behaviour that remains unexplained in chemical terms. And, paradoxically, that lack of understanding accompanies us despite the fact that the intricate mechanisms of biological function are increasingly understood. Somehow we know more and more of the cell's mechanisms, yet that molecular knowledge seems to bring us no closer to understanding the essence of biological reality.*"[41]

Mark Bedau points out the fact that despite the exceedingly rich history of comments and bids for a definition of life, philosophy quite strangely omitted it, regardless of the fact that life presents a philosophical problem of its own; the plain fact that life still escapes our grasp after such a long time is definitely a concern for the philosophy of science and above of all the philosophy of biology. The

40 Godfrey-Smith 2013, p. 138.

41 Pross 2012, pp. 30–31.

whole world swarms with life, all t species originating in nature, all organisms, human beings being certainly no exception, are alive. Even more precisely, to talk about a plant that is alive or a living human being is a plain redundancy. Every organism is alive by definition. All the other things are remains, corpses or carrions and still we do not know how to grasp what life is. A simple fact, but a

> *"part of life's fascination is simply its complex and confusing nature. This complexity is especially interesting because life is as concrete and natural as anything else on our planet; it is no philosophical fantasy. What is more, scientists already know an incredible amount about life. All of these factors make life a rich and complex subject for philosophical reflection."*[1]

It would certainly be possible to continue and present several other topics and problems that fall within the scope of the philosophy of biology. Due to the lack of space to do so, let us look at a selection of five traditional issues, their main problems and the approaches advocated by those working in the field in Table 3:

TABLE 3
Selected issues tackled by philosophers of biology.[2]

Theme	Brief characterization	Selected approaches
Adaptationism	"How to understand the role of natural selection in relation to other evolutionary factors"	Empirical adaptationism
		Explanatory adaptationism
		Methodological adaptationism

1 2012, p. 1.

2 For a better and more thorough acquaintance see Sterelny, Griffiths 1999, Rosenberg, McShea 2007, Takacs, Ruse 2013, Lennox 1992/2005, Kitcher 2008 and others.

Theme	Brief characterization	Selected approaches	
Units and Levels of Selection	"At what level natural selection operates"	Individual	*Gene*
			Organism
		Group	
		Multi-level	
Reductionism	"Are the phenomena of explanatory interest in biology reducible to laws of the physical sciences"	Anti-reductionism	
		Reductionism	
Species	"What kinds of individuals are species"	Biological species concept	
		Phylogenetic species concept	
Religion	"What is the origin and evolution of religion"	Religion as an adaptation	
		Religion as a spandrel	

No introductory text to a philosophical field would be complete without a certain historical outline of its development and achievements. Granted, it is not common to conclude with a historical account, there are however two reasons for doing so here. A historical survey can serve as an invitation, but it is preferable to mount a horse and once one has already learned about its nature and temperament. Secondly, it is useful to know where one wants to go, where to stop and which roads have already been travelled.

In pursuit of giving a certain outline of the development of philosophy of biology, it is useful to focus on events that formed this field based on its topics, problems and important figures. Although the chronology that follows is not and cannot be exhaustive, it provides a basic overview for all those interested in the philosophy of biology whether it is with regard to its achievements in terms of actual texts, or as sources of inspiration for students.

1970 | *Darwin: A Norton Critical Edition* edited by Philip Appleman (first edition of the primary selection of texts aimed at evaluation of Darwin's impact on human thinking, both historical and current)

1972 | The conference "Problems of Reduction in Biology", Bellagio, Italy

1973 | *Philosophy of Biology* by Michael Ruse (the first text book / introduction)

1974 | *The Philosophy of Biological Science* by David Hull (a classic introduction);
"Symposium: History and Philosophy of Biology" under *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association*, Boston

Papers by:

- Kenneth Schaffner
- Michael Ruse
- David L. Hull
- William C. Wimsatt

Studies in the Philosophy of Biology edited by Francisco Ayala and Theodosius Dobzhansky as an outcome of the conference "Problems of Reduction in Biology" (first collection of texts from the field)

1976 | *Topics in the Philosophy of Biology* edited by Marjorie Grene and Everett Mendelson

Mid '70s | Alexander Rosenberg, Elliott Sober and Philip Kitcher entered the field of philosophy of biology

1982 | *The Growth of Biological Thought* by Ernst Mayr (a historical survey)

1984 | *The Nature of Selection: Evolutionary Theory in Philosophical Focus* by Elliott Sober;
"Special Issue on Philosophy of Biology" in *Journal of Philosophy of Science*, No. 2

Papers by:

- John Beatty
- Elliott Sober (twice)
- Elisabeth A. Lloyd
- Kent E. Holsinger
- Philip Kitcher

Reviews by:

- Robert C. Richardson on Dawkins' *The Extended Phenotype*
- Michael Ruse on Kitcher's *Abusing Science: The Case against Creationism*

1985 | *The Structure of Biological Science* by Alexander Rosenberg

1986 | Journal *Biology and Philosophy* founded by Michael Ruse (remains the field's prominent journal today)

1998 | *The Philosophy of Biology* edited by David L. Hull and Michael Ruse

1999 | *Sex and Death* by Kim Sterelny and Paul Griffiths

2004 | *The Philosophy of Biology: An Episodic History* by Marjorie Grene and David Depew

2006 | *Darwinian Reductionism* by Alexander Rosenberg

2007 | *Philosophy of Biology* edited by Michael Ruse;
The Cambridge Companion to the Philosophy of Biology edited by David L. Hull and Michael Ruse

2008 | *A Companion to the Philosophy of Biology* edited by Sahortra Sakra and Anya Plutynski

2009 | Journal *Philosophy & Theory in Biology* founded;
Contemporary Debates in Philosophy of Biology edited by Francisco Ayala and Robert Arp;
Philosophy of Biology: An Anthology edited by Alexander Rosenberg and Robert Arp;
Darwinian Populations and Natural Selection by Peter Godfrey-Smith;
Philosophy after Darwin: Classic and Contemporary Readings edited by Michael Ruse (a comprehensive anthology of texts focusing on Darwin's influence on philosophy)

2010 | *The Oxford Handbook of Philosophy of Biology* edited by Michael Ruse

2013 | *The Cambridge Encyclopedia of Darwin and Evolutionary Thinking* edited by Michael Ruse;
Philosophy of Biology by Peter Godfrey-Smith (with fresh issues and concepts)

CONCLUSION

To fathom the aims, scope and problems in a still relatively new branch of philosophy such as the philosophy of biology surely is could be achieved in various ways. This paper focused on providing such an elementary outline of the philosophy of biology as to explain which breakthroughs in human thinking and research had the main influence on establishing it and why one could be motivated to get acquainted with this field of philosophy. We acknowledged the way in which the theory of natural selection proposed by Charles Darwin has had an enormous impact on man's thinking and endeavours in various areas, particularly philosophy. We also emphasized the structure of the evolutionary theory and the various topics that go along with it and are specifically important to the philosophy of biology from the traditional vantage point up until the present day. By providing a glimpse of the concrete issues that the philosophy of biology is currently wrestling with, we intended to acquaint those interested in the philosophical aspects of the evolutionary theory with the problems of its current research and familiarize them with the historical development of the field by providing an outline of its crucial events. Everything considered, this paper aimed to make a contribution to the future of philosophical research and studies in the ever more dynamic field of philosophy of biology.

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ETHICS BETWEEN NATURALISM AND NORMATIVITY

Naturalistic Future of Ethics

Moral philosophy – ethics – is one of the disciplines which are kind of persistent, meaning the scope of problems which are seen as belonging to ethics are seemingly inseparable from the discipline itself. To evaluate what and why is morally permissible has been a part of philosophy since ancient times and these questions are bound to it by the same tradition as, for example, the problem of the nature of reality or human comprehension. Furthermore, since Aristotle, ethics has been eagerly considered to be a discipline whose results are connected and can contribute to human lives; that is to say, a practical discipline.

With progress of modern science, the majority of philosophical disciplines had to accept that the scope of their problems was taken over by other fields which surpassed the possibilities of philosophers in their specialization. Solution of the traditional questions was no longer necessarily philosophical. The persistence of ethics lies in that its domain has remained unchallenged for a long time. This is however no longer true and ethics, much as any other philosophical discipline, has to consider what makes it useful and why it should not be relegated to the status of a scientific-historical curiosity.

In this paper, I shall try to somewhat brighten this pessimistic view and show where to look for a compromise between ethics and disciplines which put its mandate in question. In my opinion, the answer lies in the kind of ethical approach referred to as naturalistic. First however, I must specify what I mean by "ethical mandate" and what it means to do an ethical research in the first place.

WHAT IS ETHICS ANYWAY?

In its broadest but least instructive definition, ethics is a philosophical discipline which studies the phenomenon of morality. We can narrow this definition down by specification of what "morality" means or which questions we can ask with connection with this phenomenon. We can start with the most elementary ones such as: What is goodness? How we can tell that something is good? What can we do to

achieve it? and, before or else: Why should we care? Then we can continue with the more specific questions such as: What does "virtue" mean? What is the language of morality? Is morality constructed by man or is it given to him from the moment of birth? Then we can conclude with very specific questions such as: Do I have the right to commit suicide? To what extent am I permitted to exploit natural resources? Is the capital punishment good for society? Am I allowed to eat my dog?[1]

The reason why Aristotle considered the asking (and, obviously, answering) of these questions practical lies in the hope that this kind of knowledge can benefit the mankind. It is not terribly bold to claim that without a functional moral system (i.e., generally accepted moral rules) living among other human creatures turns out to be substantially more difficult. The practical ambition of ethics therefore lies in an attempt to make one's life easier – it's easier for me if I know how the other person would respond to my behaviour. I can then consider the behaviour of others guaranteed due to the sanctions which they would suffer should they act in a way not permitted by the moral majority. Ethics contributes to this process by description, explanation, evaluation or even designation of moral rules. With regard to this it is important to ask how and why people behave towards each other and how they can do better.

The effort made in order to "benefit" is however not necessarily the same as the effort made in order to "know". This is where a difference in our expectations arises. There are those moral philosophers who in their research of moral conduct prefer to describe such conduct, and there are those who prefer to influence it by establishing more effective rules. These two camps are not without overlap and no moral philosopher will probably study one while leaving the other aside. Nevertheless, this difference in emphasis on ethical research suggests that ethics as a discipline can substantially differ in what it aims to accomplish.

One way how to distinguish between these different demands on ethics can be found, for example, in the book of the popular American philosopher, sceptic and neuroscientist Sam Harris, *The Moral Landscape*.[2] According to Harris, there are three meaningful projects of ethical research: If a moral philosopher

1 The moral importance of this question is revealed by Jonathan Haidt in Haidt 2012.

2 Harris 2010.

examines how and why people act morally, he engages in descriptive ethics. If he tries to create norms – decide how people should act so that their behaviour was truly moral – his project is prescriptive. Harris distinguishes one more possibility for an ethical project, namely how to influence a man to motivate him to actually behave morally. This kind of ethics would be persuasive.

The specifying of jurisdiction of ethics is an old problem. Its urgency can be revealed by a remark uttered by the giant of moral philosophy David Hume (1711–1776) in his *Treatise of Human Nature*.[3] In one passage of his book, Hume is bewildered by how easy it is in moral debates to move from claims about what is to the statements about what ought to be. Hume himself had probably no idea how influential his bewilderment would prove in the history of philosophy. I shall discuss the questions which rose from demonization of Hume's remark later, for now I would merely like to point out the similarity between Harris' classification of ethical projects and Hume's distinguishing between the questions of what is and what ought to be. If I were to make the statement "the drowning of kittens increases the magnitude of suffering in the world", I would be describing a phenomenon and I talking about what is (provided of course that my statement is correct). But should I say "kittens should not be drowned", or "It is immoral (wrong, despicable, etc.) to drown kittens", I would be setting a norm (making a prescription) and talking about what ought to be (or, in this case, ought not to be). Finally, the third class of Harris' projects could be supplemented by my making a suggestive argument for putting an end to drowning of kittens (and in this case I would be talking about what could be).

SEARCHING FOR THE BEST JUSTIFICATION

Based on this we can paint a quite specific picture of what ethics actually does and what competences belong to it. An awkward question which every philosopher has to face is whether the same problems are not solved by someone else, someone better and more qualified. Should that be the case, worries about the future

3 Hume 2000.

of ethics would be justified. Are there any candidates for such a position? There are indeed and they do not come only from academic institutions. Answers to the question of how to act has are provided, for example, by every religion – after all, every religion consists of a set of rules that adjust the relation between man and other people or institutions. State legislation has the same ambition (let us recall the popular but somehow limited phrase of "(compliance with the) law is the moral minimum"). Even the media seem to create some kind of moral space in which there is a clear idea of what is moral, which conduct should be praised and which should be publicly condemned. Finally, even our teachers, parents and friends tune our moral compasses. But it is fitting to ask whether it is reasonable to let these institutions affect our moral lives.

If we do not want to give out the power to answer ethical questions unwarrantedly, we have to consider the way of its justification. We cannot expect a satisfactory solution of moral dilemmas if we rely on unjustified moralistic rhetoric of self-appointed moral authorities. Much like in any other scientific or academic discipline, we can reach credible results in ethics only with the help of logical argumentation based on verified premises. Moral philosophy is trying to fulfil this requirement and is therefore a more suitable candidate for moral authority than, say, a self-styled religious leader speaking from a position of moral demagoguery.

Ethics has been trying to reach such status by many different ways. Honestly, some of them are not markedly different from those of religious dogmatism. Despite the complexity of argumentation, the starting point in thinking about morality has throughout the history of ethics often been occupied by some kind of a supernatural force. Starting at the very beginning, Plato, true to his ontological model, talks about the Idea of Good which stands apart from our physical world and can only be reached by philosophical contemplation. Plato's moral philosophy (or the study of the soul, which is the nearest Platonic equivalent) resonated through the whole of medieval philosophy where in the place of moral criteria we can find, unsurprisingly, God. One way or another, it means to infer moral conclusions from the presumptions which lie beyond our world and we should ask how to confirm their validity. Christian thinkers had (and still have) an easy job in this regard – the existence of God is given and not to be questioned, as

well as His attributes such as omniscience, omnipotence and goodness. Based on these attributes we can reach the conclusion that no one other than God can know better what is good for us, therefore it would be wise to obey His command. The understanding of this divine lesson is given to us by spiritual introspection (as described for example by Aurelius Augustinus), outside the perceptible world once again.

In moral reasoning, relying on God is something which cannot satisfy everybody (especially the atheists). Neither can anchoring of moral beliefs in the inaccessible realm of Ideas, no matter how exhaustively Plato argued for its existence. That is the problem with every ethical theory based on some kind of supernatural entity – it is not concrete enough, not convincing enough. Let us look for another criterion.

There are those who like to mock philosophers, not entirely without justice, for conducting their job from an armchair. This means that everything which a philosopher needs to do his job he carries with him all the time in his head. Thus he can sit down comfortably and have no interest at all in what is actually going on around him. The reason behind the mockery is the philosopher's detachment (real or imagined) from the real world and thus his perceived inability to talk about it.[4] For a quite long time however, this comment on the nature of their work would not have disturbed philosophers too much. They would have probably considered it fitting and the accusation of inability to describe the world would have been simply rejected by them as mistaken. Specifically, in ethics there used to be a strong conviction for a long time that morality is something intrinsically human (after all, there is no such thing as an animal capable of moral behaviour, they thought). The reason is that the ability of moral behaviour is given to us by our reason and that is why it is quality unique to rational creatures. If we can find prerequisites for moral conduct only within the limits of reason, it is only reason that is required to comprehend morality, and nothing else. Getting up from the chair is hardly necessary.

4 Remember the famous story of Thales who were contemplating the mysteries of universe so intensely that he did not notice the nearby cesspool (to the great amusement of a certain Thracian maid).

A prominent defender of this approach to ethical issues was Immanuel Kant (1724–1804) who from his perennial position of a philosophical celebrity effectively overshadowed any other approaches for a long time; among others the aforementioned David Hume whose approach to moral philosophy was considerably more naturalistic. Kant's moral philosophy introduced his famous categorical imperative – the general guideline for moral conduct, which in its most popular form looks like this: "Act only according to that maxim whereby you can at the same time will that it should become a universal law without contradiction."[5] The categorical imperative has several characteristic features: It is a universal principle, an a priori principle (i.e., derived not from experience but only from reason) and a formal principle. These features are characteristic for all Kantian thinking, as well as the conviction that only these features make for a good philosophy. This however is a philosophy created in an armchair.

Kant's glory established this approach to moral philosophy and for a time made it quite popular. It is a rational approach – supernatural axiom was replaced and reason became the foundation of morality, invincible and glorified as a mark of true philosophy.

To draw conclusions from formally defined and logically bound rational principles is more pleasant than to rely on unverifiable entities, but this position is not without its questions, either. The presumption of reason's exclusivity alone is problematic and based on a religious idea of man's position in the world. The behaviour we can call social can be found outside the human world among some kinds of primates but such observations cannot be done sitting down in an armchair. Universal judgment such as Kant's is always the prime suspect – for each "it is generally applicable to all people in all situations" a relativist can be found, enthusiastically searching for exceptions. To attempt to infer formal moral principles is a bold venture; but attempting to infer them a priori without any prior experience with human behaviour, preferences and reasons behind them is rather questionable. After all, even a rationalist philosopher has to start with some suppositions.[6] One

5 Kant 1978, p. ???.

6 And by "rationalist philosopher" I mean the kind of philosopher who favours the possibilities of reason rather than those of, say, empirical observation.

such assumption might be a pre-theoretical idea of what is good and why it is clever to desire it. It is not likely that anyone can reach such beliefs without any prior experience with morally escalated situations, moral education, cultural influences, etc. Or at least it is unlikely for anyone to have such beliefs independently of one's biological background, feelings of delight, fear and disgust, etc. Kant's categorical imperative too faces certain difficulties when we allow for situations outside the boundaries of our reason. This does not hold true of the categorical imperative only, either – even the biblical golden rule ("do unto others as you would have them do unto you") or some variation of ethical utilitarianism ("act only to increase the amount of well-being in the world"), in short all kinds of ethical theories can be undermined by the fact that situations (persons, cultures, psychopathological phenomena) can be observed such as contradict their perceived universality. The categorical imperative for instance is not completely immune to the possibility that a person invited to act according to the maxim which they wished to become a universal law, could be a masochist.[7]

The possibility that the mystery of human morality can be solved by reason alone is tempting and justifies the place of philosophers in ethics (after all, the competence of philosophers of logical analysis and critical reasoning is hopefully disputed by nobody). The possibility that human morality is guaranteed by some philosophically (theologically or simply non-scientifically) describable entity may be, if nothing else, comforting to some people. But is it really possible to ignore all the facts indicating that morality is much more complicated than that? Due to empirical research we know, for example, that other species as well can be observed to act in the manner somehow influenced by relations which we shall not hesitate to call values when it comes to human society (such as fairness, loyalty, care for others, etc.). Furthermore, we know that human opinion on what is right or wrong can be changed by fluctuation of various hormones in our bodies, or even by brain damage. Is it possible to construct a supposedly perennial and universal ethical system and not be concerned about the fact that people in different cultures have different moral intuitions and therefore different requirements

7 This and other possible objections to (not only Kant's) formal ethical normatives are described by Patricia Churchland in Churchland 2011, pp. 163–191.

for what has to be understood as moral? Above all: Is it beneficial not to include all these factors in ethical research and still insist that we can answer all questions of ethics without knowing why we were equipped with morality (equipped by nature; I am leaving the idea of morality as something given by God to his favoured creation aside as useless) and how we work in terms of morality, psychologically, sociologically and biologically speaking? If we admit that doing so is not beneficial, we must also admit that the only effective way to do moral research is to support it with empirical science.

Ethical research based on the assumption that morality is a scientifically describable phenomenon is called ethical naturalism. Naturalism in moral philosophy takes many forms, most often in the context of metaethics, as the analysis of moral statements. In this regard, every moral term is described as a statement about an empirical fact. Let us however look at ethical naturalism in its broader sense, i.e., not only as a form of analysis of the language of morality, but as an ethical inquiry based on empirical observation.[8] This is my candidate in the contest for the best moral authority.

It is fair to mention that ethical naturalism is the object of extensive criticism and was challenged by a famous objection which is still considered relevant by some. This objection was formulated by the British philosopher G. E. Moore (1873–1958) and is known as naturalistic fallacy.[9] Moore argued that goodness cannot be reduced to any natural quality (e.g., we cannot refer to happiness, well-being, prosperity, etc., as good) because anything we refer to as good is not fully covered by these terms. For example, we cannot replace the term "good" with the term "happiness", because if we could, the sentence "happiness is good" would be tautological; which it, obviously, is not. Asking whether happiness is good (prosperity is good, well-being is good) makes perfect sense. Moore concluded that every natural quality will fail in this test and therefore ethical qualities are not natural.

8 We could probably call it "empirical ethics" just as well, but it was established as ethical naturalism for example by Alex Rosenberg and his colleagues at the Duke University, an influential enclave of naturalism.

9 Moore 1959.

I shall not burden this text with the arguments used by natural ethicists to protect their discipline from this so-called fallacy.[10] After all, Moore raised his objection in a meaethical context marginal for our understanding of ethical naturalism. Of course, this is not the only objection there is, but ethical naturalism has managed to answer them all in one way or another. It does still have its opponents, however.

NATURALISM IN ETHICS

Naturalistic ethics thus relies on empirical research. What can such research look like in moral philosophy? As indicated, it can be of a neuroscientific nature. We can examine behaviour of the brain in morally escalated situations – with the help of modern imaging technology (EEG, fMRI) we are able to observe which cerebral areas are active and to influence this activity. In this way it is possible to compare moral intuitions of healthy individuals with the intuitions of those with neurological damage or deficiency in hormones critical for sociability. Such research reveals the boundaries between being immoral and being affected or ill. It furthermore makes clear that some moral values (typically concern for others, compassion or trust) are innate to human beings. Neurological (neuroendocrine, biochemical, etc.) research can reveal the development of moral sense in this way.[11] Not only human one, either – observation of other species uncovers similarities in social behaviour and suggests why it is so imperative for socially living animals to develop some kind of moral system. This kind of ethics cooperates with primatology.[12] Empirical research can also compare moral intuitions across people of different nationalities, religions, traditions, social status, political allegiance, etc. We can thus determine which conditions have influence on moral intuitions and which circumstances lead to increasing emphasis on specific moral

10 This discussion can be found for example in Churchland 2011, p. 188–190.

11 Such research is conducted for example by L. Tancredi, V. S. Ramachandran or the aforementioned P. Churchland.

12 This task is undertaken prominently by Frans de Waal (2006).

values. Such research can be considered anthropological.[13] Finally, psychological research can be implemented to reveal how people justify their moral decisions, what they hold to be morally relevant, what they loathe and what they welcome. The research subjects can be submitted to various ethical dilemmas and we can observe whether their decisions correspond with the standards they think they hold, i.e., their moral coherency.[14]

Research like this does have its demands. Mapping the neural system requires adequate equipment and those capable of operating it. Psychological research requires some degree of familiarity with conducting a psychological experiment (immunization of the experiment against circumstantial distortion, right selection of respondents and adequate work with them, etc.). Primatological research requires primates. Every field has its own experts and it is a fair question whether it is necessary for philosophers to adapt in their expertise. After all, it is not very likely that one man or one team would be able to have the necessary competence in all these fields and specialization is therefore eventually inevitable. We can legitimately ask whether these specialized experts are still philosophers or whether they call themselves philosophers, despite their distinctively psychological or anthropological work, only out sentiment. Is it then really necessary to preserve such sentiment? In this respect, the effort of moral naturalists to reduce morality to scientific phenomena can look somehow self-destructive – philosophy is not science per se, so why should it meddle in scientific research?

The effort is in fact not self-destructive. Although empirically minded philosophers will probably always rely on their more scientifically oriented colleagues, there is something which remains unchallenged in their competence. Let us go back to Hume's remark, mentioned at the beginning of this paper. If I say about something that it *is*, I'm not at the same time saying it *ought to be*. This remark, taken from the *Treatise of Human Nature* is still considered to be a relevant argument against overly naturalistic approach in ethics, although Hume himself was a naturalist at heart and did not mean by much more by this remark than to give a warning against hasty judgments in moral

13 To similar research is dedicated for example J. Haidt (2012).

14 See J. Haidt again, but also J. Prinz, J. Knobe, etc.

philosophy. No matter how misused the remark was, its merit lies in something important, as I have already pointed out above. There is a substantial difference in the ways of conducting ethical inquiry. Let us remember Harris' classification of ethical projects – descriptive ethics, prescriptive ethics and persuasive ethics. Let us then also look at the benefits following from moral research: We have data on the functioning of human moral sense (the brain and the endocrine system), we have also learned something about its evolution, we have the anthropological data… but we have no norm. The only thing we have is information about what is. We have the description. But description alone does not tell us what we should do to live our lives with moral impunity. There is no such knowledge in science, it seems. Let us look once again at the questions ethics aspires to answer. Can evolutionary anthropology or moral psychology tell us what morality is? It probably can. It can also tell us to what extent is our moral sense innate and what to expect from it. But when I start questioning whether stealing a car to take my injured friend to the hospital is the right thing to do, the knowledge of what hormones are involved in my decision-making or what other cultures think about my dilemma (not to mention a bonobo chimpanzee) does not seem very useful. Taking the step from one to the other is not an easy task to do and it does not seem that producers of such knowledge themselves are very keen to make it. Their project is descriptive, not normative.

The urgency of difference between the normative and descriptive approach to ethics can be illustrated on the New Society thought experiment, introduced by the neuroethicist Laurence R. Tancredi.[15] It is a utopian vision of society which is capable of effective use of neurosurgery to make its citizens more moral. This experiment is based on the following conditions: Neuroethical researchers like Tancredi are glad to examine the morally unacceptable behaviour of psychopaths. Murder, rape, torture, often with banal motives or no motives at all, all of that seem to be a prototype of morally despicable ("bad") behaviour; murderous psychopaths can therefore be considered the embodiment of evil. At the same

15 Tancredi 2005.

time however, there is no doubt that their "evil" behaviour is caused by the undesirable setup of their organism – by their inability to feel empathy, increased impulsiveness, tendency to aggression, etc. Their immoral conduct is the product of a genetic disorder catalyzed by unfortunate development conditions (typically by sexual abuse in childhood), not of a free choice to commit evil. Imagine that every psychopath, molester or deviant can be "cured" by neurosurgical intervention (as it surely could be the case, one day). Let us make an even bolder step in our consideration – if our moral behaviour is only a matter of the biochemical setting of our organism (as is indicated by the case of psychopaths), would it not be possible to regulate our entire moral sense by surgical means as in Tancredi's New Society? Would it not be possible to suppress cruelty, ruthlessness or the need to steal, and program a man to be good? Such possibility is still science-fiction, of course, but with the growing knowledge of neuroscience, with the increasingly precise comprehension of how our brain works when we are solving a moral dilemma and with acceptance of the fact that our conscious decisions are not so important after all, we reach the conclusion that this is not after all impossible. Progress in descriptive ethics, supported by empirical science, can tell us how to do such a thing one day.

The New Society of people that by design cannot be bad is tempting. But still, the thought that one day we can be programmed to be moral robots is somehow disturbing. At the very least, it would be evident interference in free will, which is still – despite the convincing neuroscientific evidence – held dear by us humans. Another source of unease is revealed by the difference between description and normativity – namely, the question of who will decide which moral program is the right one. Responsibility and personal power of any group of people authorized to say "this is what all people ought to do because this is right" are evident. It is also evident that such statement does not describe anything, it sets the norm.

That is the limit of descriptive projects, but simultaneously also a new option for philosophy. Neuroscientist can provide us with detailed information on how the human brain reacts to various kinds of moral situations and why we have the tendency to condemn some of them and approve of others. That is a description. Our tendencies to do something are however not sufficient to actually do it (just

remember the case of Haidt's unfortunate dog, briefly mentioned at the beginning of this paper – what relevant *moral* reasons do we have to waste a perfectly good meat by not eating our suddenly perished animal friend?). Similarly, the research of moral evolution does not push us much further – just because I am naturally predisposed to act in some way does not mean I should do so (after all, xenophobia and homophobia have their roots in evolution as well, but the evolutionary explanation of these phenomena is not considered to be terribly topical). The triumph of descriptive ethics would be the complete description of the phenomenon of morality and all its manifestations. However, it is up to normative ethicists to answer the question of what such a description would actually mean for how people should behave.

The results is that while the descriptive project of ethics can be claimed by special sciences – and let us fairly admit that ethics would be reduced to idle speculation without scientific approach to moral phenomena – following normative projects needs experts of a different kind. The reason why such experts should be philosophers rather than, for example, priests or politicians is that philosophers know the descriptive project of ethics quite well (or at least they should) and quite comprehensively. Their area of expertise is not brain or primates or some specific culture, their area of expertise is morality. They are familiar with the history of ethical inquiry and they know all the relevant facts. Their interdisciplinary knowledge allows them to express informed opinions on what ought to be. This makes them unique. In addition, their interest is due to expertise rather than personal motivation.

In this context it is appropriate to mention the part of ethics which has been neglected so far –applied ethics. Applied ethics is a special discipline of moral philosophy which deals with moral decisions in specific situations. Topics of applied ethics are, so to say, mainstays of philosophical discussions – the question of abortion, euthanasia, capital punishment, genetic engineering, pornography, etc., yet within its domain are also issues of business ethics, clinical ethics or education ethics and many other broad areas of human activity. Looking at these fields it becomes clear that we are not in the realm of distant academic theorizing but rather in the area of delicate topics whose solutions have direct impact on human

lives. Who should be in the committees that make such decisions, especially at such tricky moments as those of the creation of new legislation? Should these decisions be made with regard also to their morality, experts on morality must be present during the decision making process. Experts on morality, that is to say, philosophers.

CONCLUSION

This paper should have made it obvious how wide the range is of topics that ethics as a philosophical discipline deals with. Its ambitions have nevertheless remained the same since Aristotle – to improve human lives. Of course, there is much difference of opinion as to how this task should be accomplished – do we, as ethicists, want to describe a moral system? Or set it? Or even enforce it? Under these terms, we can approach the problem by means of various criteria – we can rely on everything from the Ten Commandments of God to rational and logically correct set of formal rules. Unless however we want to exclude from discussion the convincing results of modern science, we need to consider morality to be a natural, empirically examinable phenomenon and we have to adjust our judgment about what is moral to this fact. The criterion of moral research promoted in this chapter is moral naturalism. The findings of neuroscience, anthropology, zoology, psychology and psychiatry, sociology, etc., are foundations on which ethics should stand. The task of the philosopher is to try to find a way of how to use these findings to construct a moral system and create its norms. In this effort can be found the future of ethics.

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Introduction to Naturalized Ethics (Selected Topics)

INTRODUCTION

When I feel my moral sense falling apart, it gets restored whenever I watch any of the episodes of my favourite TV series *M*A*S*H* (1972–1983). It almost feels like I can put labels on the actions of specific characters – "Hawkeye" Pierce (Alan Alda) – who always stands on the right side and Frank Burns (Larry Linville) – exactly the opposite. In the last episode *Goodbye, Farewell, and Amen*, Hawkeye gets institutionalized after a nervous breakdown. As the story develops, we find out why. Imagine this – as the M.A.S.H. employees along with soldiers and fellow villagers are travelling in a bus during wartime somewhere in the South Korea, they notice an enemy hiding in the bushes. They turn off the lights and engine and try to stay as quiet as possible so that the North Koreans cannot find them. But then, a baby starts crying. Hawkeye realizes the noise the baby makes could reveal their location and consequently put the lives of *all* the people on board at risk. He asks the mother to keep her child quiet. After awhile, the baby does stop crying. Hawkeye realizes why – the mother suffocated her child, choosing life of dozens of people over one. Hawkeye feels guilty, hence his breakdown.

The behaviour depicted raises many morally relevant questions, such as – is it okay for us to sacrifice one to save many? Are we allowed to treat others as *means* to reach desirable *ends*? Should we care about the *consequences* of our actions? Is *moral character* of the persons involved relevant to the story? And last but not least, why do we even care about these (and similar) kinds of questions?

There are many intellectual traditions that developed answers to all these questions. For a very long time we have thought that moral laws are somehow fixed in the form of divine commands, of Platonic ideas of the absolute right and wrong, or irreducible to natural phenomena. We were told to keep ethics and science apart, as well. I believe we were profoundly mistaken. My suggestion is to keep all the deep moral questions while applying *new scientific methods* to them,

thus providing them with new answers. René Descartes (1983) famously presented his "tree of philosophy" where: "The roots are metaphysics, the trunk is physics, and the branches emerging from the trunk are all the other sciences, which may be reduced to three principal ones, namely medicine, mechanics and morals."[1] In this passage, Descartes argued for the so-called *prima philosophia* that establishes natural sciences which – as branches – come only after metaphysics in which they are rooted. Contrary to the genius of Descartes I am deeply convinced that the idea that philosophers and theologians are fully equipped to define and solve moral conundrums merely by sitting in their cosy armchairs and thinking long and hard (cf. *armchair philosophy*) without relying on the methods and knowledge of natural sciences can only lead us astray, into the intellectually shallow waters of *folk psychology*. For example, it is part of our common sense psychology to hold the belief that the mind is fundamentally different from the brain (*ontological dualism*); the idea Descartes famously claimed from his intuition.[2] Yet, the scientific community has ever since the well-documented injury of Phineas Gage in 1848 gathered sufficient empirical evidence proving that the brain is involved in all of our mental activities, thus making ontological dualism obsolete.[3]

Questions of morality are of great importance to us. They occupy the first chapters of our intellectual history whether we consider the very first writings of Mesopotamia, the Code of Hammurabi, the Hindu Vedas, the Egyptian Instructions of Amenemope or the Hebrew Bible.[4] We can see that the oldest written tradition reflects on the issues of "how are we to live", fairness, cooperation, good and evil. Whatever sympathies we might feel regarding our great intellectual *history* hidden in these (and other) documents, I nevertheless hold the opinion that – even though the so-called *Hume's law* might prove to be a valid objection to deriving "ought" from "is" – empirical evidence we have gathered during the *last decades* using the methods of natural sciences *should* have profound ethical implications

1 AT IXB 14; CSM I, p. 186
2 See Bloom, Skolnick, Weisberg (2007)
3 Damasio 2005.
4 Haidt 2008.

to our conceptions of morality and the moral values we cherish.[5] Modern science has developed the best methods to describe the world as objectively as possible. Since science provides us with the best knowledge available, philosophers can do no better than to adopt the standpoint of science; whether by using its knowledge or by adopting the contemporary scientific tools in philosophy.[6]

Naturalism comes in many flavours. In its stronger version, naturalism claims that all there is, is natural. In its broader sense, naturalism does not preclude the existence of supernatural forces and beings; it simply does not take them into account.[7] These definitions are still rather broad and leave considerable leeway for all sorts of positions, even those that are unscientific, such as neo-Aristotelian virtue ethics.[8] Naturalism can even lead to the contradictory positions of either moral realism[9] or anti-realism.[10] This paper will focus on *evolutionary* explanations of human moral capacities and behaviour. The idea is not completely new and dates back to at least 1975 when E. O. Wilson published *Sociobiology: The New Synthesis* in which he claims that "the time has come for ethics to be removed temporarily from the hands of the philosophers and biologicized"[11]. Several years later, sociobiologists were in serious trouble facing accusations of sexism, racism and genetic determinism. Recently, the idea of synthesizing human behaviour and biology has been – after some corrections – revived in the *evolutionary psychology;* essentially an attempt to explain human behaviour in terms of the theory of evolution.[12]

In this paper, I shall defend the position according to which morality is a natural phenomenon we can understand by describing our evolutionary past as social and intelligent beings. Morality, then, is no miracle but "a suite of psychological capacities designed by biological and cultural evolution to promote cooperation".[13]

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5 See Greene 2003.

6 See experimental philosophy, Knobe 2012.

7 Flanagan, Sarkissian, Wong 2007, p. 4.

8 Jacobs 2009.

9 Harris 2010.

10 Rosenberg 2011.

11 Wilson 1975, p. 562.

12 Haidt 2008, Downes 2010.

13 Greene 2013, chapter "Deep Pragmatism".

This way, I. Kant (2009) is off the (naturalistic) table. Kant's ethics is transcendental in assuming the existence of a priori dictates of pure practical reason, which is the position naturalism denies by claiming there is no evidence for anything called pure practical reason that produces moral laws in total isolation from the empirical world. Hand in hand with this and similar approaches goes religion. If our naturalistic premises are correct – namely the one claiming that all there is, is physical/natural world – then there is no metaphysical, supernatural world, ergo no inhabitants of these mysterious lands, whether what one has in mind are unicorns, tooth fairies or gods; ergo there are likewise no commandments regarding the absolute right and wrong originating from them. Consequently, the reason why we find hurting other people abhorrent is not because a god advised us so in the Bronze Age. In what follows, we shall see that the current state of knowledge of biological and cultural evolution can satisfactorily explain altruism, cooperation, good and evil within us and our sense of right and wrong.

DESCRIPTIVE EVOLUTIONARY ETHICS

In 1871, twelve years after *The Origin of Species* appeared, Charles Darwin (1809–1882) published *The Descent of Man*, in which he formulated his theory that man – including his mental capacities and moral sentiments – is a product of evolution by natural selection. The idea was considered quite revolutionary even among the evolutionists of the time. For example, Alfred Russell Wallace (1823–1913) thought that morality comes from God and Thomas Henry Huxley (1825–1895) imagined that morality was a cultural veneer over our brutal human nature.[14]

Today, scientific community accepts the so-called "*genes-eye view of evolution*"[15] which means that the fundamental unit of evolution is the gene (more precisely allele) which is *selfish*. The competition then is not between organisms; it is genes that compete for increase of their representation in the gene-pool. Genes are selfish because they prefer their own replication to replication of any other

14 Mužík, Stella, Klapilová 2011, p. 97.

15 Dawkins 1976.

competing genes. This of course is a mere metaphor. Genes have no intentions whatsoever, whether selfish or altruistic. This characteristic of genes as selfish nevertheless posed a problem for the biological origin of morality. The question raised was – how could *selfish* genes produce *altruistic* behaviour in their holders?

KIN SELECTION

Let us start with the definition of *biological altruism*:

> "*In evolutionary biology, an organism is said to behave altruistically when its behaviour benefits other organisms, at a cost to itself. The costs and benefits are measured in terms of* reproductive fitness*, or expected number of offspring. So by behaving altruistically, an organism reduces the number of offspring it is likely to produce itself, but boosts the number that other organisms are likely to produce.*"[16]

This seems odd. Why would any organism behave altruistically if such acts reduce its reproductive fitness? This interpretation seems to go against the principles of evolutionary theory. But, as we have mentioned earlier, what matters in evolution is genes. Imagine, for example, a mother who gives up food, sleep, leisure, friends and wealth just to take care of her baby 24/7? Does it make any sense, biologically speaking? From the perspective of genes, it perfectly does. Every human child shares 50% of genes with her mother which means that care for a child is a perfect investment into the further propagation of one's own genes.

Mechanism of kin selection was first formulated by William D. Hamilton (1936–2000) in two articles named *The Genetical Evolution of Social Behaviour I* and *II*[17] in which he demonstrated that an altruistic gene will be favoured by natural selection if the so-called *Hamilton's rule* is fulfilled. This rule states that $C < r \times B$, where C is the cost in fitness incurred by the donor of an altruistic act, r is the coefficient *of relationship* between the donor and the recipient (the value of r for full siblings is ½, for parents and offspring ½, for full cousins 1/8, and soon),

16 Okasha 2013.

17 Hamilton 1964a, 1964b.

and *B* is the benefit received by the recipient of the altruistic act. Based on the mathematics and calculations behind kin selection, geneticist J. B. S. Haldane (1892–1964) famously said when asked whether he would give up his life to save a drowning sibling, "No, but I would to save two brothers or eight cousins".[18] In other words, his own death would be biologically meaningful only in case it was compensated with lives of two full siblings (2 × 50% of genes) or eight cousins (8 × 12,5% of genes).[19]

Kin selection does not require animals to have the ability to distinguish relatives from non-relatives. Recipients of altruism are likely to be relatives if an animal aims its altruistic behaviour toward those who live in its immediate vicinity which is where relatives most likely live.[20]

The theory of kin selection predicts that animals are more likely to behave altruistically towards their relatives than other members of the species. This principle posed a problem for understanding behaviour of ants or bees, members of the *Hymenoptera* order, which invest their efforts into the reproduction of their queen rather than their own. The answer lies in the genetic system known as "haplodiploidy". Haplodiploid females share fewer genes with their own offspring than with their sisters. Under these conditions, helping the queen reproduce is a more effective strategy to propagate one's genes because of the increased number of sisters she will make.[21]

RECIPROCAL ALTRUISM

Kin altruism says that we behave nicely towards our relatives because it is an effective way to promote survival of our genes inside their bodies. However, not all people we deal with are our relatives. There must be some other mechanism that explains altruistic acts towards total strangers. A solution to this problem is provided by the *theory of reciprocal altruism*.

18 Segerstrale (2013) claims that the authenticity of Haldane's quote is dubious.

19 Pigliucci 2012, p. 48.

20 Singer 2011, p. 285; Okasha 2013.

21 Hříbek 2011, p. 193, Okasha 2013.

The theory of reciprocal altruism was first proposed by Trivers (1971). The basic idea is rather simple – it may pay for an organism to be nice to others because that way it can expect the favour being returned in the future ("If you scratch my back, I'll scratch yours").

Game theory in general and the *prisoner's dilemma* in particular illustrate what is going on in here. The prisoner's dilemma is a game that allows for formalization of different types of behaviour, whether cooperative or defection prone. If only two players play this game and each of them can either cooperate or betray the other, we get 4 possible scenarios of behaviour: 1. mutual cooperation, 2. mutual defection, 3. defection as a response to cooperation and 4. cooperation as a response to defection. To make the game more concrete, imagine you are member of a gang that vandalizes the city. You and your partner just robbed the bank but got caught and arrested. You are interrogated separately and can choose between cooperation and defection of your partner in crime. The strategy you choose influences the amount of years you spend in prison. The real dilemma you face is that you never know what your partner chooses to do. Thus, if you confess to the crime (cooperation) but your partner denies involvement in it, testifying that only you committed the crime (defection), you will serve many years in jail while he will be set free. On the other hand, if both of you cooperate and confess to the crime, each of you will go behind the bars, but for a shorter period of time than in the first scenario presented. In case you and your partner both deny having committed the crime, you will both end up in prison but only for a very short period because the police do not have enough evidence anyway.[22]

If the game is set like this it looks like altruism between non-relatives cannot be explained as a natural phenomenon because the best strategy one can adopt is always defect. But this is true only in case when the interaction between organisms is never repeated or the number of interactions is fixed in advance. In other words, if you never meet your partner again, there is no possibility for him to return the favour which implies that there is no reason to "scratch his back" in the first place. However, cooperation between individuals can evolve once the number of

22 Ridley 2000, chap. 3; Hříbek 2011, p. 194–195; Okasha 2013.

interactions between them is multiple (*iterated game*). This is nicely captured in the game strategy "tit-for-tat" proposed by mathematical psychologist Anatol Rapaport (1911–2007). Rules to follow in this strategy are very simple: 1. cooperate in the first round; 2. then, do what your opponent did in the previous round.[23] Later, Axelrod and Hamilton (1984) proved that once "tit-for-tat" strategy is established, it gets *evolutionary stable* which means that it can resist invasion by any other competing strategy.

Reciprocal altruism is not reserved to humans. Perhaps the most famous example of reciprocal altruism among non-human animals is that seen in blood-sharing vampire bats. Since food acquisition is not particularly easy for any member of the bat colony, it could easily happen that the vampire bat that ate yesterday could stay hungry today. This is a deathly threat to the bats because their metabolism is fast enough for them to die of starvation, should they fail to feed for two consecutive nights. Bats practice reciprocal altruism to avoid these unfortunate consequences by sharing part of their catch with another bat expecting it to do the same if they do not get lucky on some other night.[24]

Another example of reciprocal altruism in non-human animals is the warning call given by blackbirds or thrushes, which they use to warn other members of the flock once a predator is spotted. This is highly dangerous as the bird that warns the others captures the attention of the predator, which might ultimately prove fatal.[25] Some animals not only warn other members of the group after they spot a predator, they actively threaten or attack him, examples include African wild dogs or male baboons. Wolves, wild dogs, gibbons or chimpanzees share their food with others, which is another form of altruism. Dolphins, elephants or whales are known for helping sick or injured animals survive.[26] There are also various species of so called cleaner fish that provide service to other fish species by removing parasites from their mouths and gills. This is highly beneficial for both sides – cleaner fish get fed, client fish get rid of unpleasant parasites. Biologists

23 Ridley 2000; Hříbek 2011; Okasha 2013.

24 Carter, Wilkinson 2013; Pigliucci 2012, p. 50; Okasha 2013.

25 Singer 2011, chap. "The Origins of Altruism", subchap. "Animal Altruism".

26 Ibid., chap. "The Origins of Altruism", subchap. "Animal Altruism"; Shermer 2005.

have noticed that when a client fish is attacked by a predator, it does not simply flee. It waits for the cleaner fish to safely leave client fish's mouth without being swallowed and only then escapes from the predator.[27]

Direct reciprocity, which I have just described, arises when two individuals engage in repeated encounters. Modern human societies are nevertheless so large that there is only a small chance of meeting again and for an individual ever to be able to return the favour. Why would anyone behave nicely under these conditions? This is where the *reputation* of those involved comes in. If I know that you are a decent person that treats other people well, donates blood from time to time and perform other activities I find nice, then I am more willing to help you based on the reputation you have than if you are known as a freeloader and a cheater. In other words, I help you not because you have helped me but because you have helped others (= *indirect reciprocity*). This has been tested in many experiments such as the public goods game or the trust game.[28] Indirect reciprocity is a very complex social activity that requires complicated cognitive abilities, such as *theory of mind*, *cheating-detection* and *communication mechanisms*. Theory of mind is our ability to see others not as mindless automata but rather as living beings with thoughts, feelings and intentions. Only then can you detect someone's behaviour as cheating and later "tweet" it to others at your school, locker room, restaurant, or put it on Facebook (*gossip*).[29]

PRE-MORAL SENTIMENTS IN SUBHUMAN ANIMALS

Altruistic behaviour observed in ants, bees, birds, baboons or chimpanzees presented above teaches us an important lesson. If morality is a product of some purely practical reason reserved solely to humans (I. Kant) or originates from the heights of heaven (religion), then advocates of such conceptions face serious problems in how to explain altruistic acts in subhuman animal species. If our hominid ancestors split from chimpanzee lineage 5 to 7 million years ago, then

27 Okasha 2013.

28 Nowak, Page, Sigmund 2000; Fehr, Fischbacher 2003.

29 Trivers 2011; Nowak, Page, Sigmund 2000, p. 1291; Pigliucci 2012, p. 50–53.

any of the three big monotheistic religions – Judaism, Christianity and Islam – cannot explain *pre-moral sentiments* we share with subhuman animals, as none of these religions are more than several centuries old. The theory of evolution predicts that the further we move from humans on the evolutionary tree, the less resemblance with regard to altruism we should observe which is exactly what the data show. Should a crocodile decide to cheer up his buddy who had been rejected by a "lady" and offer him consoling company, the idea of morality based on the theory of evolution by natural selection would be falsified. Until now, we do not have such data.

We are a part of nature just like gorillas, hamsters or daisies are. There is no ontological difference between us and the rest of the world.[30] Binary logic, that is to say a person seeing the world as black or white, 0 or 1, with a sharp line between us and the rest, confuses us. In the so-called fuzzy logic, as Shermer (2005) puts it, "one sees the world in shades of gray". That way, on a "morality scale" of 0 to 10, we can rate humans at 9 or 8, great apes at 7, whales at 3 and so on. Our moral emotions evolved out of pre-moral feelings of our evolutionary ancestors. To support the evolutionary argument, Shermer put down this list of characteristics and sentiments we share with other mammals:

> *"attachment and bonding, cooperation and mutual aid, sympathy and empathy, direct and indirect reciprocity, altruism and reciprocal altruism, conflict resolution and peacemaking, deception and deception detection, community concern and caring about what others think about you, and awareness of and response to the social rules of the group."*[31]

Some of the observations of pre-moral sentiments in nonhuman animals are truly charming. When the two-year-old Sembe, a chimpanzee living in the Taronga Zoo, Sydney, got herself entangled in the ropes she was playing with, her mom, Shiba, came running to help her after she noticed her scream. Shiba carefully disentangled the loop, helped Sembe out and comforted her. Then she cut off

30 Tvrdý 2011, p. 33–34.

31 Shermer 2005, p. 720.

the loop that got her child into trouble so as to avoid any further dangerous situations.[32] Let us take a look at other examples. If you think that a sense of *first-order fairness* – resentment at getting less than somebody else – sets us apart from other animals as unique creatures, you are probably wrong. For example, in an experiment conducted by Brosnan and de Waal (2004), capuchin monkeys received reward for performing certain tasks. As long as both monkeys received the same reward – delicious grapes or not so popular cucumber slices – they had no trouble performing the task. If however one of the monkeys was treated unequally and received only a cucumber while the other monkey was – for the same efforts – rewarded with sweet grapes, the one that felt wronged got aggressive, shook the testing chamber and threw the slices of cucumber back at the researcher. These monkeys never showed any sign of *second-order-fairness*, in other words, they never shared their reward with a partner who was treated unfairly. Nevertheless, this kind of fairness was observed in chimpanzees that refused to accept a grape if the other chimp in an experiment was given only a carrot.[33]

We can see that any attempt to draw a sharp line between ourselves and other animals simply fails. All the *building blocks of human morality*, such as sympathy, caring behaviour, reciprocity, social order and community concerns, are to be found – to a certain degree – among many subhuman species.[34] If we go beyond pure morality concerns, we see the same pattern again and again. Other animals can laugh, use tools, learn sign language, reason, and recognize faces of other members of the same species.[35] With all that in mind, we can certainly agree with Darwin[36] who – more than 140 years ago – famously wrote in *The Descent of Man* that: "[T]he difference in mind between man and the higher animals, great as it is, certainly is one of degree and not of kind." Under these – evolutionary – conditions, morality is nothing but a variety of *moral intuitions and emotions* that evolved to help *social animals* protect their own genetic interests.

32 De Waal 2013, chap. "Bottom-up morality".

33 Van Wolkenten, Brosnan, de Waal 2007; Brosnan et al. 2010.

34 De Waal 2013; Haidt 2008.

35 Tvrdý 2011; Singer 2011; de Waal 2013.

36 Darwin 2011, p. 2390.

Emphasizing similarities does not mean denying differences. We seem to be the only animal that *consciously* assesses the *rightness* and *wrongness* of certain types of behaviour. Moreover, we engage in assessing moral character, behaviour and beliefs of people whose actions in no way influence us. This level of reasoning about the rightness and wrongness of actions of everyone around us requires greater powers of abstraction and anticipation. We discuss moral principles, have debates on abortions, death penalty, euthanasia, taxes, fair trade products, human rights and so on, all of which might influence billions of people unrelated and anonymous to us. Unlike other species, we reflect on what we do and *why* we do it. For that reason, if a lion kills a gazelle, it is not considered a murderer. The same principle does not apply to humans killing other humans.[37]

CULTURAL EVOLUTION

We are certainly driven by inborn values and emotions, but they tend to guide rather than dictate our behaviour. *Environment*, through imitation and teaching (= social learning), has a strong influence on behaviour's expression.[38] For millions of years our hominid ancestors lived in groups of tens or hundreds; within these small bands and tribes, kin selection and reciprocal altruism could naturally evolve. But over the last ten thousand years, human communities have expanded into large-scale societies where people often engage in contact with strangers. It might be the case that indirect reciprocity, as I have discussed it earlier, is not the only component in the mosaic of evolution of fairness in large and anonymous modern societies. Another factor that might have a huge impact is *cultural norms* and *institutions*.[39] Henrich et al. (2010) have conducted behavioural experiments across 15 diverse populations – among them subjects from Ghana, Siberia, Kenya, Bolivia, Fiji or Missouri (USA) – that tested these hypotheses. The degree of fair treatment of anonymous strangers was tested in three experiments, the Dictator Game, the Ultimatum Game and the Third-Party Punishment Game.

37 See Shermer 2005; Pigliucci 2012, p. 873; de Waal 2013, chap. "Bottom-up morality".

38 Okasha 2013; Fehr, Fischbacher 2003.

39 Henrich et al. 2010; Shermer 2005.

In the Dictator Game the proposer (dictator) is matched up with an anonymous subject (receiver). The proposer owns a certain amount of monetary units he can split with a receiver who has no say in the dictator´s decision. The acquired data showed that fair treatment of anonymous strangers in the game increased with the level of society's market integration (measured as a household's average percentage of calories purchased from the market, as opposed to fished, hunted or home-grown).[40] Fehr and Fischbacher[41] report that when the Ultimatum Game or the Dictator Game are played by children of different ages, the older ones are more generous which – according to the authors – implies the possibility of impact of socialization by peers and parents. Hoff[42] reports that different caste groups in India exhibit different willingness to punish "norm violations that hurt members of their own caste" which suggests "a cultural difference across caste status in the concern for members of one's own community".[43] All the findings of the aforementioned studies point to the conclusion that sociocultural factors, such as market integration, socialization or others (religion), take important part in shaping our moral behaviours toward strangers in large societies.[44]

SELFISH GENES, ALTRUISTIC VEHICLES

Imagine a bee protecting its hive using a sting that ultimately leads to its death and a human mother desperately trying to save her drowning child in a pond. *Biologically speaking*, these two kinds of behaviour are not that different. Both could be described as a product of kin selection which is nothing but a smart strategy developed by selfish genes to increase their chance of representation in the gene-pool. In humans however, *psychological altruism* comes into play, which amplifies the difference. Take, for example, an adoption of a child from the Third World or a donation of money to a non-profit organization. In these cases, people are

40 Henrich et al. 2010, p. 1482.
41 Fehr, Fischbacher 2003, p. 790.
42 Hoff 2010.
43 Ibid., p. 1468.
44 Henrich et al. 2010; Shermer 2005.

consciously motivated to help someone else they treat "as an end in itself rather than as a means to some other end".[45] We see that in humans, evolution has favoured those selfish genes that developed brains that deeply and honestly care about the well-being of other organisms.[46] The fact that genes might, in the long run, benefit from our nice behaviour does not make us hypocrites, because genetic benefit is hardly ever what we have in mind when we treat others nicely. Psychologically speaking, people can be altruists no matter how selfish their genes are.

THE EVIL INSIDE

Any description of our nature would be distorted should it concentrate only on our altruistic behaviour without mentioning the "dark side" which completes the picture. Sometimes, we are evil and do hurt others in a number of ways which include murder, rape or discrimination, to mention only very few things from a very long list of atrocities we commit.

Before I proceed any further, allow me to state the obvious. Just like there is no metaphysical or non-natural Goodness, there is no Evil of those same qualities. There are only people who ascribe the predicates of good and evil to actions based on their perceived beneficial or harmful effects on society or individuals. No natural process, human being or type of behaviour has the essence or intrinsic quality of being evil. A description of something or someone as bad or good is but a *useful tool* that helps us orient in the world and influence others by putting labels on their behaviours.[47]

We are nice to those we identify with and oblivious to concerns of those we do not think we have much in common. Because our hearts do not automatically reach out to everyone, we naturally divide the world into "us" and "them". The problem arises when the moral concerns of "us" clash with those of the "others". Not only do we think that those we do not identify with in moral questions are wrong, we also believe they are stupid, uneducated or ugly. We do not see this in

45 Pinker 2011, chap. "Better Angels".

46 Nesse 2000; Okasha 2013; de Waal 2013.

47 See Coyne 2014; Shermer 2005, subchap. "The Myth of Pure Evil".

other spheres of our lives – I might like roses and you might be a fan of tulips and we could still be friends. It is nevertheless rather hard to see how a devout Christian and a gay parade activist could get along. The evolutionary theory provides an explanation here. As we already know, morality has developed in social groups whose members cooperated in order to achieve goals they would not achieve by themselves. If you play nice, the group will appreciate it and you will be rewarded. Your share – of food, shelter, protection, etc. – is guaranteed. But if you cheat, others might get furious. As a result, you are greatly concerned about your reputation and the values that go with your image. You care not only about the way others share their food, you want to present yourself as someone who is reliable and never cheats or lies in this regard. We can see now that every moral belief we hold and every moral judgment we utter, reveals the way we want to be perceived in public space and the things we are concerned about. Whenever a person says, *abortion is wrong*, they believe they are advertising themselves as someone who deeply cares about certain values they find important and attractive; values that should govern the society they are living in because only such society is a good one.[48]

Evidence suggests that we treat moral beliefs almost like *facts*.[49] In other words, we think that the answer to the question, "Is abortion wrong?" is almost as definite as the answer to the question, "Is Bratislava the capital of Slovakia?" I believe that the reason we put this much emphasis on moral beliefs lies in the importance they play in the regulation of our social lives which is crucial for our survival. It is no wonder, our moral beliefs and judgments are accompanied by strong emotions. In general, emotions are automatic processes that tell us what to do. For example, fear of snakes makes us run away from them in case of a chance encounter. With regard to immorality, the moral emotion of *disgust* is a particularly interesting one. Why? Once we associate a member of the "out-group" with certain properties regarded as disgusting, the explosive cocktail of evil acts toward them is basically prepared. History is full of these examples, *Holocaust* being probably the most vivid. The Nazis referred to the Jews as less than human; rats in fact. These are ugly creatures people are usually disgusted by. If Jews are perceived as

48 See Ditto, Pizarro, Tannenbaum 2009, p. 313.

49 Goodwin, Darley 2008; Harris, Sheth, Cohen 2007.

disgusting rats or some sort of *dehumanized objects*, then… the dreadful results are well known. Bandura, Underwood a Fromson[50] conducted an experiment which tested exactly these inclinations we possess to hurt people described in a *depersonalized* and *disgust*-eliciting manner. Participants were told to inflict electric shocks on others in what they thought was a study concerned with the effects of punishment on the quality of collective decision making. Subjects could choose the intensity of the shock delivered on a scale of 1 to 10. Researchers then let these subjects believe they have overheard real discussions which described the recipients of the shocks neutrally (control condition), as an *animalistic rotten* bunch, or as perceptive, understanding, and otherwise humanized group. The results were disturbing. People were more willing to administer stronger shocks if they believed the recipient to be a member of the dehumanized group. In other words, once you believe that others are "not that human", you become more evil.

Another reason why we hurt others is because we have developed adaptations designed for competition. In other words, we often gain advantage only at the expense of others. To put it even more plainly, you can only get to the top, if others fall. For that reason, if two women compete for the same man, they often derogate each other, spreading rumours about their promiscuity, physical deficiencies and so on.[51] Another example that illustrates the imperfection of our minds that might eventually lead us to evil actions is our propensity to obey authorities. What was useful during our childhood might later become a source of immoral behaviour. An adult who merely follows orders can soon become a dangerous weapon in the hands of a psychopath or under the sway of ideological dogmas.[52]

We are certainly no angels and do hurt others. We should however keep in mind that we have evolved as moral beings and most of the time in most of the situations we do treat other people or even species nicely. Immorality merely occupies too much of our attention and biases our perception of the world. These tendencies make sense. Evolution made us hyper sensitive to threats because missing an angry predator or any other threat might prove fatal; game over, no gene replication.

50 Bandura, Underwood, Fromson 1975.

51 Buss 2000.

52 See Milgram 1963.

Under the influence of this *negativity bias* – which makes bad stronger than good – we simply do not remember all the lovely people we met at the store this morning but cannot forget about that ugly old lady that jumped the queue and ruined our mood for the day.[53]

VIRTUE ETHICS, CONSEQUENTIALISM AND DEONTOLOGY

We have developed three basic moral approaches that frame our moral behaviour, namely: virtue ethics, consequentialism and deontology. *Virtue ethics* is the oldest one; it dates back to antiquity and its founding figures, Plato and Aristotle. It remained the main approach in ethics until at least the Enlightenment.[54] Many philosophical schools have developed lists of virtues one should acquire in order to become a moral person. To possess certain virtues is to be a certain kind of person with a certain kinds of character traits that one finds morally valuable. Such an individual not only recognizes the value of honesty, courage, generosity, justice and other virtues but also acts on it. Unlike deontology and consequentialism which directly address the question of "Which behavior is wrong or good?" virtue ethics rather points to the questions of "What kind of person am I to be?" and "How am I to live?"[55]

According to Aristotle, every virtue occupies the middle position between its extremes. A courageous person, then, is neither reckless nor cowardly. The problem with this conception is that the middle is not a single point but rather a fairly large area that allows for a wide interpretation of how to actually behave.[56] In many cases, virtues might clash, which opens the problem of choice and hierarchy between them. Justification of certain character traits as virtuous is not particularly easy, either.

53 Baumeister et al. 2001; Haidt 2006, p. 28.

54 Hursthouse 2013.

55 Pigliucci 2012, p. 71.

56 Ibid., p. 72.

Deontology – where the Greek word *deon* stands for duty and *logos* for science or study – is a moral system which puts emphasis on the rules or duties as guidelines for the right and wrong behaviour. I. Kant (2013) wanted to establish philosophy on a firm ground, which made him abandon natural sciences that provided only probable answers, never reaching the heights of the universal, ever-true knowledge. Kant assumed that if a universal law is to be found, it must be devoid of any empirical content. Kant's categorical imperative which reads, "Act only according to the maxim by which you can at the same time will that it would become a universal law", meets these criteria. Without any empirical content, it is as formal and universal as possible. That is why it is – as Kant thought – applicable to any given situation by any reasonable agent.

The categorical imperative makes lying impossible. If you wish for a world where nobody ever lies (universal law), then you as well must obey this requirement at all times (maxim). The problem with this conception is that its application might lead to results that are highly counterintuitive. Imagine you are hiding a person followed by a criminal. The felon knocks on the door and asks for the victim. Since you are not allowed to lie, you must reveal the location of the victim thus enabling the crime to be completed.

The example with lying makes the difference between deontology and consequentialism[57] easy to grasp. While a deontologist obeys the rule of never lying unconditionally, a consequentialist evaluates any given moral choice in terms of its consequences. Thus, lying is permitted if it prevents a felon from committing a crime, which certainly is a valuable consequence.

One of the objections against consequantialism could be built on the evidence that people who prefer this ethical approach in the *footbridge-like moral dilemmas* show higher degree of psychopathy, Machiavellianism, and lack of

57 There are several types of consequentialism based on the various definitions of consequences. For example, according to *hedonic utilitarianism* "the fundamental guidelines for moral discourse are pleasure and pain. Things can be called good to the extent that they raise the amount of happiness in the world and bad to the extent that they raise the amount of suffering. The purpose of a moral code is to maximize the world's total happiness". (Wright 2012, loc. 5749–5757) *Eudaimonic consequentialism* evaluates consequences in terms of the so-called eudaimonia or flourishing life (Sinnott-Armstrong 2012).

meaning in life.[58] We certainly must ask ourselves rather disturbing question of whether the best moral approach could ever correlate with the decisions psychopaths prefer to make.[59]

NORMATIVE ETHICS

Many moral philosophers believe that one can indulge in normative ethics without resorting to knowledge from moral psychology, neuroscience and other scientific fields.[60] This is not crazy if one accepts the idea that *facts* concerning human behaviour do not imply how one *ought* to behave. This principle was summarized in the Humean "*is-ought problem*", namely that one cannot derive "ought" from "is" and later, in a similar vein, in the so–called "*naturalistic fallacy*" according to which the "normative" and the "natural" inhabit two separate sets with no intersection. Several attempts have been made to bridge this gap between facts and norms. Philosophers are certainly right when they point out that one cannot make a *deductively* valid argument where the normative conclusion absolutely follows from the factual premises. Deduction is nevertheless not the only logical inference there is. Let us take *abduction* (inference to the *best* explanation), for example.[61] To make the case more concrete, imagine your stomach hurts. What should you do? I am deeply convinced that any reasonable person would agree that even though one cannot make a deductively valid argument that you *should* go see the doctor, it is

58 Bartels, Pizarro 2011; Koenigs et al. 2007.

59 Conway and Gawronski (2013) object to a research by Bartels and Pizarro (2011) according to which antisocial personality traits such as psychopathy, Machiavellianism, and lack of meaning in life predict utilitarian responses to moral dilemmas which is supposed to imply that utilitarian judgments may not reflect the *presence* of a genuine moral inclinations as they only demonstrate *absence* of a single (deontological) moral inclination (Conway, Gawronski 2013, p. 227–228). According to Conway and Gawronski (2013, p. 228), utilitarian judgments are the result of *genuinely* moral concerns because "utilitarian inclinations are positively related to moral identity, which has been shown to predict a wide range of prosocial behaviors, including volunteering and food bank donations (Aquino, Reed, 2002), donations to outgroup charities (Reed, Aquino, 2003), and fewer antisocial sport behaviors (Sage, Kavussanu, Duda, 2006; for a review, see Shao, Aquino, Freeman, 2008)".

60 Doris, Stich 2003.

61 See Casabeer 2003, p. 842–843.

the *best* thing you *should* do. Similarly, if a woman is a victim of domestic violence and constant abuse by her aggressive husband, she *should* probably leave him or make him leave as soon as possible, which I find to be the *best* advice given the situation she is in.

Harris[62] thinks that the divide between facts and values is illusory because, as he puts it, all values are reducible to facts about maximizing the well-being of conscious creatures. If a certain activity or practice reduces our well-being, then it has no value. I, personally, do not find these claims controversial in any way, even though there are opposing views which blame Harris for committing the "naturalistic fallacy".[63]

There is a possibility that Harris (2010) and others, who try to bridge the gap between scientific facts and moral norms, are wrong. Even then we are not obliged to leave the basic position of naturalized philosophy where scientific facts matter. I am deeply convinced that psychology, neuroscience and other sciences can provide us with information that will ultimately make us change those of our moral attitudes that do not stand the test of facts. In order to illustrate my meaning, let us take a look at the moral emotion of disgust, again. Disgust is a very strong emotion that evolved in order to protect an organism from ingesting poisonous or noxious substances such as faeces or rotten flesh, which might prove fatal.[64] Chapman et al. (2009) have found out that the same facial muscle region that is involved in basic disgust (elicited by photographs of contaminants) and gustatory distaste (elicited by unpleasant tastes) is also active when a subject is morally disgusted by unfair treatment in an economic game. The conclusion one can draw from these data is that evolution has used the same muscle (and brain) apparatus to express not only disgust over poisons which are biologically dangerous but also over behaviour we find morally dangerous or unacceptable. In other words, the emotion of disgust has spread out into the moral domain to keep us away from individuals or entire social groups whose acts we find morally dangerous and wrong.

62 Harris 2010, p. 1–11.

63 Harris 2011.

64 Inbar et al. 2009.

It has been found that subjects who are higher on a disgust sensitivity scale, i.e., who get easily disgusted by smells, unflushed toilets and similar stimuli, also hold more disapproving attitudes toward gays when compared to those who are not that easily disgusted.[65] In a study by Inbar, Pizarro and Bloom (2011) the induction of disgust *caused* subjects to evaluate homosexual men more negatively which proved the *causal* link between disgust and moral judgments. These pieces of evidence suggest that discrimination of homosexuals is largely driven by subjective emotion of disgust which, much like any other subjective feeling, cannot have any validity in a reasonable debate. I myself am disgusted at the idea of ugly people having sex, but I do not think they are sinners. Similarly, I am disgusted by braised carrots but I do not aim to deprive those who enjoy this meal of their right to get married. The conclusion I want to draw here is that just like the emotion of disgust does not shape our public policy and beliefs about moral character of ugly people having sex or those who enjoy braised carrots, it should not influence the way we treat homosexuals, either.

The idea that emotions or intuitions we have about certain people or behaviours shape our moral judgments is now widespread and has been tested in many experiments. In a research done by Schnall et al. (2008) Stanford University students were asked to judge a consensual sexual intercourse between cousins. Participants were divided into three groups, two of which were exposed to a higher or lower level of disgusting smell produced by a fart spray located in a trash bucket two meters away from the subjects. In the control condition, no fart spray was present. Results have shown that subjects who were exposed to the highest dose of disgusting smell expressed the severest moral judgments of consensual sexual intercourse between cousins, relative to the other two groups. More interestingly, subjects did not realize their moral judgments had been influenced by these environmental conditions and thought that only deliberative reasoning was involved.[66]

This evidence suggests that emotions or intuitions play an important part in making moral judgments, thus leaving reason behind as a post hoc rationalization

65 Inbar et al. 2012.

66 Ibid., p. 1099.

of primal emotions.[67] Even though such conclusion seems attractive – given the facts just presented – I do not think it is an accurate depiction of the whole story which is a lot more complex. In order to illustrate my meaning, let us go back to the last episode of *M*A*S*H* (1972–1983) in which Hawkeye made a serious proposal to keep the baby quiet so that others in the bus could survive the potential attack by an enemy. This scene resembles the so-called *trolley problem* which pits decisions about the consequences of our actions (consequentialism) against the rules that govern them (deontology). Hawkeye certainly opted for the first option thus choosing life of many over one. An interesting question to ask is whether his decision was emotion-driven – just like in the case of Stanford students and fart sprays – or whether something else was going on. Greene et al. (2001, 2011) decided to untangle this riddle by studying of fMRI brain scans of test participants who solved the trolley problem and the footbridge dilemma. They found out that the deontological answers the subjects gave correlated with increased activity in the areas that are associated with emotions, while consequentialist answers – such as the one that Hawkeye gave – correlated with increased activity in the areas associated with reasoning. Results of this and similar studies led to the formulation of the *dual process-theory* which states that moral thinking always starts with intuitions and emotions like honour, loyalty, friendship, shame, anger, disgust, or guilt that are triggered *automatically*. In addition to this *automatic* mode we have a *manual* mode, i.e., reason, the dispassionate voice in our head that can *override* these automatic settings using utilitarian (a form of consequentialist) decision rules that measure equally to everyone. The theory assumes that intuitive emotional processes *compete* with reason until one of them wins and we make the judgment.[68]

One reasonable objection *dual process-theory* has is that it extrapolates data from the trolley problem and the footbridge dilemma – which are *specific* examples of decision-making that *a priori* pit consequentialism against deontology – to moral decision-making *in general*. The evidence from other studies rather suggests that in everyday moral decision-making, emotion and reason *interact* and

67 See Haidt 2001.

68 Ibid.

cooperate rather than compete.[69] Moreover, the idea of parcelling of the brain into a competition of fast and automatic processes (deontology) and slow and conscious rational thinking (consequentialism) might be attacked not only from the psychological but also from the neuroscientific point of view according to which brain regions typically viewed as affective are also involved in cognition and vice versa.[70]

Greene[71] thinks that *utilitarianism* which favours the greater good, even at the cost of harming someone, is the only appropriate moral approach when dealing with the members of an *out-group*. Consider this story. In the first scenario, *you* travel to a poor country for a vacation. You have a great time and enjoy yourself. Then a terrible typhoon hits the country and leaves it completely devastated. But you still have your credit card and can help by providing money to those in need. If you ask people whether they are – under these conditions – obligated to help, about 60% of them say yes. In the second version of the scenario, subjects listen to what is basically the same story, except instead of them it is a friend of theirs who visits the country. The story explains that they are in touch with the said friend who sends them pictures of the catastrophe to see for themselves. They can donate directly from their computer with only a few clicks. When you ask these subjects if they are obligated to help, only about 30% of them think so. Despite the fact that the two scenarios are almost the same in terms of the easy opportunities to donate and the knowledge about the damage the disaster caused, we see that the answers regarding the donations people think they should provide differ a lot. Why is that? The evolutionary perspective provides a reasonable explanation. As we already know, for thousands of years our ancestors lived in small bands of tens and hundreds whose members cooperated in order to achieve goals they would never accomplish alone. For them, other bands and tribes were nothing but rivals competing for the same resources. If anything, they should have negative feelings toward such groups. Since we have inherited these mental capacities from our ancestors, we do not feel obligated to help strangers we do not identify with, even

69 Liu, Ditto 2012; Gray, Schein 2012.

70 Pessoa 2008.

71 Greene 2013, chap. "Justice and Fairness".

though they are hit by a tragedy like a typhoon. Evolution simply did not build our hearts to reach out to those who are so distant and far away from the comfortable sofa of our living room. On the other hand, if you, in person, visit a country that was hit by a typhoon, your willingness to donate increases because you are more likely to feel like a part of the community that is no longer distant.

Greene (2013) argues that the data he gathered teaches us an important lesson about how to deal with moral dilemmas where members of different groups are involved. To put it simply, it is *emotions* that tell us our child comes first but it is *reason* that tells us every child from *any out-group* is as important as ours. In other words, emotions make us care about the greatest happiness for our own child, but reason (consequentialism) makes us care about the greatest happiness for everyone. Under these conditions, reason (consequentialism) is a perfect mediator between competing interests of different groups.

I, myself, find these ideas very impressive even though I am not absolutely convinced that it is solely reason that tugs our moral strings to those we do not identify with. Take slavery, for example. If you have no moral sentiments towards slaves, it poses no problem for you to build a logically coherent argument in favour of slavery, just like Aristotle did in *Politics*, Book I:[72]

> *"But is there any one thus intended by nature to be a slave, and for whom such a condition is expedient and right, or rather is not all slavery a violation of nature?*
> *There is no difficulty in answering this question, on grounds both of reason and fact. For that some should rule and others be ruled is a thing, not only necessary, but expedient; from the hour of their birth, some are marked out for subjection, others for rule."*

This quote nicely illustrates the fact that reason itself can take you in any direction. Only with moral emotion of sympathy towards slaves – that not only mentally puts you in the position of another person but makes you care about him or her – can you be *certain* that the rational argument will elaborate on those

72 Aristoteles 2009, p. 5.

feelings. Empirical studies have proven that *perspective taking* – which consists of adopting the vantage point of someone else – can expand sympathy even to strangers whom people strongly dislike, such as murderers. Perspective taking for a member of a stigmatized groups, like a woman with AIDS or a homeless man, can also lead to more positive attitudes toward the group as a whole.[73] This evidence suggests that pure familiarity, basic contact or consumption of stories that put us in the shoes of a character from a certain oppressed group so that we can feel for ourselves what it is like to be humiliated and discriminated against, help us develop feelings for those we once considered members of the out-group. My argument here is that reason alone would probably do little for the emancipation of any minority without feelings for its members.

The global world helps us develop these feelings. In a connected world, thus, an *anonymous* homosexual that was once considered a threat and a representative of the "culture of death" becomes a classmate, a neighbour or a customer who, all of a sudden, becomes a real person you might have a lot in common. On the other hand, our hearts definitely do not reach out to everyone. This is when reason should step up to remind us that we should distribute our resources as universally and fairly as possible.

This analysis leads me to the conclusion that moral feelings and reasoning or cost-benefit analysis are both important parts of normative moral thinking. Without moral feelings to guide you, reasoning itself can take you anywhere, as we saw in the case of Aristotle and slavery. On the other hand, emotions or intuitions without correction from reason might lead to all sorts of unfair behaviour that favour "likes" over "dislikes" and "non-likes". If you see things this way, then collaboration of deontology (emotions, intuitions), consequentialism (reason) and virtue ethics (moral character) seems to be the preferred solution. Nonetheless, I do not possess any magical formula that settles, with a definite certainty, what we ought to do in a particular situation. Life is too complex to set an algorithm like that. But I do have some recommendations and one of those would certainly be to use reason as much as possible in the moral problems of the "us"

73 Batson et al. 1997.

versus "them" type. Reason is especially appropriate in these situations because it liberates us from our parochial, limited and tribal thinking and opens us up to a position where we care about the greater good for *everyone* involved.[74]

METAETHICS

Metaethics is a branch of philosophy which explores the foundations and status of moral judgments, values and properties.[75] When we say that "Abortion is wrong", metaethics asks this question: do we simply state here a *fact* that is true or false or express an emotion, wish or preference in a form of command or prescription which are not truth-apt?

According to moral realists, moral judgments report true or false *facts* about the world.[76] Moral facts are then in no way subjective *projections* of one's internal attitudes but rather *perceptions* of "what is out there". Harris' argument for this position, presented here as a concentrated summary of the opinions described in *The Moral Landscape* (2010, p. ???), runs as follows:

> *"Morality and values depend on the existence of conscious minds – and specifically on the fact that such minds can experience various forms of well-being and suffering in this universe. Conscious minds and their states are natural phenomena, of course, fully constrained by the laws of Nature (whatever these turn out to be in the end). Therefore, there must be right and wrong answers to questions of morality and values that potentially fall within the purview of science. On this view, some people and cultures will be right (to a greater or lesser degree), and some will be wrong, with respect to what they deem important in life.*
>
> *… In my view, morality must be viewed in the context of our growing scientific understanding of the mind. If there are truths to be known about the mind, there will be truths to be known about how minds flourish; consequently, there will be truths to be known about good and evil."*

74 See Greene 2013.

75 DeLapp 2011.

76 Kim 2006; Sayre-McCord 2011.

Harris thinks that objective facts about how our conscious minds experience various types of well-being *determine* objectivity of morality which is either right or wrong. This seems reasonable until you realize that the concept misses the understanding of how our minds actually make moral judgments and why our moral beliefs change across historical periods (see above, Normative ethics). Take slavery, for example. Even though I am highly in favour of Singer's[77] idea of expanding the moral circle to *all* sentient beings – slaves included – I still cannot see the claim "Slavery is wrong" as an objective *perception* of how the world is. Rather, I find it to be a *projection* of our moral sentiments and rational arguments we have developed over time. Certainly, any moral statement about slavery should be *informed* by objective facts about the world, but that does not necessarily mean that the statement itself is objective. I would also argue that there is no such thing as *pure* moral fact that tells you what is objectively right and wrong. Psychological research suggests that the values we possess and the moral judgments we make, heavily colour the way we see "facts".[78] Our minds are biased and produce moral judgments influenced by motivations we usually do not realize. We are hypocrites by default who act like deontologists or consequentialists whenever it suits them and devote lots of time and energy to defend any change in their position by *bending* facts and searching for those we find "right" at any given particular moment.[79]

I believe that the Harris' position presented is nothing but a version of "*naïve realism*", that is to say a *biased* tendency to believe the world is exactly as we see it.[80] Once we accept the theory of evolution as our main framework for understanding morality, the *anti-realistic* position which does not put any truth-markers on moral beliefs[81] seems to be the more accurate explanation of what is really going on:

77 Singer 2011.

78 See Knobe effect in Knobe 2012.

79 Ditto, Pizarro, Tannenbaum 2009.

80 Lilienfeld, Ammirati, Landfield 2009, p. 392.

81 Sommers, Rosenberg 2003; Ruse, Wilson 1986.

> "[T]*here are no foundations of any sort from which to derive morality – be these foundations evolution, Gods will, or whatever. Since, clearly, ethics is not nonexistent, the evolutionist locates our moral feelings simply in the subjective nature of human psychology. At this level, morality has no more (and no less) status than that of the terror we feel at the unknown-another emotion which undoubtedly has good biological adaptive value.* [...] [E]*thics is a collective illusion of the human race, fashioned and maintained by natural selection in order to promote individual reproduction.*"[82]

CONCLUSION

For a very long time we have thought that morality occupies a separate territory set apart from natural facts. The last decades however have brought us an alternative that puts the research of morality fully within the context of biological and cultural evolution studied by natural sciences. We have seen that evolutionary mechanisms, such as kin selection and reciprocal altruism, have equipped us with moral sentiments and feelings that make us care about the well-being of others. Morality then is no miracle. People still find these efforts that "unweave the moral rainbow" made of supernatural fibers threatening, even though their worries are unfounded. Only if we understand our nature in terms of empirical evidence provided by natural sciences can we make the world a better place in which the kind Dr. Jekyll within us is intensified while Mr. Hyde is silenced or restricted.

Without any sharp dividing lines between science and philosophy[83] all that philosophers can do is to be humble, follow science and comment on it hoping that their insights might be useful one day. I am deeply convinced that the only way for philosophy to prosper in the future is to let natural sciences lead the way. Descriptive and normative ethics that do not take empirical evidence into account only lead to useless speculations which have nothing in common with reality.

82 Ruse 1986, p. 102.

83 See Quine 1969.

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Summary

Kniha The Future of Philosophy usiluje o rozvržení témat, která by mohla pro filosofii znamenat světlé zítřky. Představuje pokus o načrtnutí axiologie filosofie v jejích jednotlivých disciplínách. Normativní úkol je držen na mysli ve všech autorských kapitolách. Kniha tak není pokusem o futurologické spekulace o skutečném budoucím směřování filosofie, ale snahou o vymezení základních hodnot, které by měli filosofové zachovat, rozvíjet a obnovovat.

Kapitoly jsou řazeny podle tradiční posloupnosti filosofických disciplín, počínaje metafyzikou a logikou. Přes filosofii matematiky a epistemologii se propracovává k filosofii mysli (a kognitivní vědy) a filosofii biologie. Poslední oddíl knihy je věnován etice.

V prvním oddílu nazvaném Conceptual Analysis as a Goal a Medium and a Tool jsou obsaženy tři kapitoly věnované analytické metafyzice, teorii argumentace a logice. Jejich spojovníkem je pojmová analýza, která nabývá v jednotlivých autorských přístupech různých podob:

V kapitole In Support of Segal's Internalism Ivo Dragoun předvádí pojmovou analýzu v duchu soudobé analytické metafyziky. Ukazuje, že i když je zde pojmová analýza cílem sama o sobě, nejedná se v žádném případě o pouhou samoúčelnou hru. Dragoun hájí internalistickou pozici, internalismus Gabriela Segala brání před kritikou Sarah Sawyerové.

Tam, kde byla pro Ivo Dragouna pojmová analýza samotným cílem filosofického zkoumání, je pro Martinu Juříkovou užitečným prostředkem filosofické metodologie. Juříková v kapitole Critical Thinking – an Effort to Increase the Competence of Philosophy poukazuje na neutěšené postavení filosofie mezi současnými vědeckými disciplínami, neboť ztratila relevanci v diskuzích o povaze vědy. Jedním z možných prostředků, jak vrátit filosofii smysluplné postavení, které bude užitečné, je revidovat metodologii filosofie. Juříková se zaměřuje na jeden cíl filosofické metodologie – rozvoj kritického myšlení, a to prostřednictvím teorie argumentace a neformální logiky.

Ivo Pezlar uzavírá oddíl věnovaný různým aspektům pojmové analýzy, když ji v kapitole Logic as a Toolbox vymezuje především jako uži-tečný nástroj v pragmaticky orientované logice. Pro Pezlara byla logika vždy především studiem o tom, jak dosahujeme porozumění, se snahou výsledky těchto zjištění formalizovat. Rozdíl v současné logice, oproti normativnímu pojetí minulosti, spatřuje v tom, že je od okamžiku rozvoje výpočetní vědy a umělé inteligence spjata s praxí, především s vytvářením užitečných aplikací. Budoucnost logiky tak podle Pezlara spočívá právě v jejím sepjetí (odstranění hranic) s výpočetní vědou a umělou inteligencí.

Druhý oddíl Philosophy for Mathematics and Mathematics for Philosophy představuje dva pozoruhodné příspěvky k filosofii matematiky a epistemologii:

Iva Svačinová v kapitole Ethnomathematics: A Political Challenge to the Philosophy of Mahematics spatřuje budoucnost filosofie matematiky v prozkoumání její politické dimenze a jejího politického potenciálu. Tyto aspekty se rozhodla Svačinová ukázat na problematice etnomatematiky, tj. programu, který zkoumá matematické ideje, které byly (a jsou) rozvíjeny různými kulturními skupinami nezávisle na vývoji západní matematiky.

Jan Votava v kapitole Epistemology: The Probability Revolution Continues, vidí budoucnost epistemologie ve stále důraznějším kooptování idejí teorie pravděpodobnosti. Domnívá se totiž, že teorie pravděpodobnosti zažila ve vědě fázi revolučního využití. K tomu nemůže epistemologie zůstat neutrální, zvláště z toho důvodu, že pro praktické užití epistemologie je koncept pravděpodobnosti naprosto klíčový.

Třetí oddíl knihy Philosophy in Arms of Biology and Neuroscience obsahuje kapitoly věnované filosofii mysli (kognitivní vědy) a filosofii biologie:

V kapitole Philosophy of Mind and Cognitive Science vyjadřuje Václav Kočí své přesvědčení, že velká část filosofie mysli (ne-li celá) podlehne naturalizaci, neboť mentální fenomény budou v dohledné budoucnosti (z velké části už jsou) úspěšně vysvětleny neurovědou a kognitivními vědami. Kočí je přesvědčen, že to rozhodně není pro filosofii špatná zpráva. Špatná zpráva je to pouze pro spekulativní filosofy, nikoliv pro filosofy, kteří provádějí reflexe praktických výsledků věd (jako jsou zastánci teorie identity, eliminativismu a funkcionalismu).

Kapitola Philosophy of Biology (Selected Topics) Vladimíra Vodičky představuje originální úvod do problematiky filosofie biologie. Vodičkovým hlavním cílem je představit filosofii biologie jako moderní progresivní směr filosofie a objasnit příčiny jejího vzniku. Základní výkladový prostředek moderní filosofie biologie představuje darwinismus. Darwinova teorie představovala podle Vodičky jednou z největších změn v lidském myšlení, která ovlivnila všechny ostatní vědecké disciplíny, filosofii nevyjímaje. Vodička dokonce tvrdí, že jakákoliv filosofie, která je v rozporu s darwinismem, je pouhým mlácením prázdné slámy. Filosofie biologie je příkladem správné, tedy naturalizované, filosofie.

Závěrečný oddíl Ethics between Naturalism and Normativity obsahuje dvě úzce tematicky spjaté kapitoly, které reflektují aktuální trendy v etice, směřující k naturalismu. Kriticky hodnotí současný stav etiky a přinášejí vize jejího dalšího směřování jako filosofické disciplíny.

Michal Stránský se v kapitole Naturalistic Future of Ethics pokouší vymezit etiku z pozice naturalismu. Stránský vychází z Harrisova rozlišení tří způsobů provozování etiky: deskriptivní, preskriptivní a persuasivní pojetí. Právě persuasivní pojetí usilující o ovlivňování a motivování jedinců k morálnímu chování, je pro Stránského etikou, která by měla dominovat budoucnosti. Stránský hodnotí tradici etiky odvozenou z Kantovy Kritiky praktického rozumu a zaujímá stanovisko etického naturalismu. Jeví se mu totiž jako přirozené neopomíjet empirická zjištění, týkající se morality, neboť věčný systém kantovské morální filosofie má jen málo praktických implikací.

Kapitola Introduction to Naturalized Ethics (Selected Topics) Otakara Horáka je koncipována v duchu naturalismu, který ovšem Horák ukazuje jako velmi různorodé stanovisko. Sám se obrací k evolučnímu mechanismu, který představuje základní vysvětlující princip pro budování etiky. Moralita je přirozeným fenoménem, který můžeme pochopit popisem naší evoluční minulosti, jako sociálních a inteligentních bytostí.

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