INTERDISCIPLINARY DESCRIPTION OF COMPLEX SYSTEMS

Scientific Journal

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Their contribution to the quality of the Journal's content is acknowledged.

Zagreb, 30th October 2013   Josip Stepanić

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EDITORIAL:
CHALLENGES OF INTERDISCIPLINARITY

Mind can be studied by many different disciplines, observed by very diverse methods and measuring techniques, approached on many different levels, and – to make thing even more complex – studied, observed, approached and described either from third- or first-person perspective. Mind is a very complex system indeed. The special issue *Challenges of interdisciplinarity* aims at showing that such an interdisciplinary approach is fruitful and even necessary if we are to understand the human mind. Authors' contributions[1] range from philosophically oriented critical reflections on studying the mind, to research on specific cognitive phenomena – all in some way trying to give an interdisciplinary account by connecting various disciplines, methods or perspectives.

The special issue starts with Olga Markič's critical reflection of neuroscientific understanding of human mind (neurophilosophy) and by arguing that philosophical reflection (humanistic view of the mind) is a necessary counterpart to empirically oriented research in "harder" sciences. The main part of the special issue with papers by Urban Kordeš, Toma Strle, Sebastjan Vörös and Fransisca Hog-Eng Tan consists of various attempts, critiques, proposals and empirical research on bringing together first-, second-, and third-person approaches to studying the mind (neurophenomenology). The challenge of interdisciplinarity is thus not only in joining different methodologies and disciplines that study the mind from a third-person perspective, but to combine third-person with first-person approaches. Contributions of Metka Kuhar, Zarja Muršič and Nina Mikuš all attempt to show the importance of interdisciplinary research of various cognitive phenomena. Kuhar shows that it is necessary to combine psychology, social and political sciences to give a more complete account of human deliberation. Muršič argues for tight connectedness of biology and culture from an evolutionary perspective. Her paper combines animal and human studies as well as neuroscientific and cross-cultural studies (neuroanthropology). The last paper (Mikuš) argues that in researching synesthesia we have to combine first-hand synesthetic reports (first-person perspective), genetics, neuroimaging and behavioural tests (third-person perspective) and thus nicely rounds up this special issue.

In the introductory paper Markič examines roles of philosophy in shaping cognitive science, particularly neuroscience research. Recent development, particularly new tools and methods for investigating the working brain, have placed neuroscience at the centre of cognitive science. But, as Markič suggests, it is also necessary to examine theoretical and philosophical assumptions that lie behind different understandings and interpretations of neuroscientific research. She discusses Descartes' legacy in cognitive science and examines the idea that the proper framework for understanding the mind is developed by neuroscience. She argues that radical reductionism and eliminativism are too extreme positions and are not supported neither by empirical

data nor by philosophical analysis. She suggests that minimal neurophilosophy and embodied approach are more promising approaches and stress the need to investigate the influence of cultural backgrounds on cognition. As she concludes, "it is not only one way traffic from neuroscience to higher level sciences but also vice versa" (Markič, this issue).

Kordeš, Strle, Vörös and Tan all argue that systematic research of experience from first- and/or second-person perspective should become an integral part of still mainly third-person cognitive science.

Kordeš presents an overview of current empirical methods for researching experience and explicates the most pertinent issues they face. Kordeš rightfully claims that epistemological and ontological issues should never be forgotten, but on the other hand also emphasizes that we should at the same time be aware that researching experience is also of methodological and technical nature. He puts forward the critique of the "just ask approach" from the perspective of Husserl's and modern empirical phenomenology. He concisely presents some most important techniques of empirical phenomenology (explication interview of Petitmengin [1] and descriptive experience sampling (DES) developed by Hurlburt [2]). Kordeš argues that DES is a method which can be used for systematically "mapping" of everyday experience, while explication interview enables a more specific insight into experience. Kordeš and Strle both agree that these methods should be seen as complimentary and not as opposing or contradicting each other. Even though these methods differ in their goal of what "level" of the experiential they want to study, they both aspire to avoid certain problems with which the "just-ask approach" is faced. Following phenomenological tradition, Kordeš argues that our usual (and habitual) observation of experience is most of the time full of interpretations and assumptions of what is to be experienced (as is the case in the "just ask approach"). He claims that our self-observation is actually more interpreting, ordering and categorizing, than really observing how we experience ourselves and the world. He nicely shows that rigorous training in self-observation is a necessary step if we are to avoid this habitual stance towards our experience. Kordeš lucidly argues that "[t]he skill of observation (gaining data) in the research of experience is just as important as in any other branch of science." (Kordeš, this issue). And thus first-person research is in this regard not much different to third-person research. At the end of his analysis he proposes that "in-depth first-person and – most importantly – existentially binding research is the only chance for truly in-depth insights into our consciousness, experience and human existential condition in general. Perhaps we should start this line of research by an in-depth critical study of the experience of people, who have dedicated their lives to the training of diverse techniques of mindfulness" (Kordeš, this issue).

Strle presents and critically evaluates Varela's [3] neurophenomenological programme and argues that it is a good proposal for studying experience. Strle claims that the programme of neurophenomenology as a "remedy" for the hard problem of consciousness [4] should not be understood as a solution to the hard problem (the problem of experience) on the ontological level. It does however remedy some methodological and epistemological issues with which third-person sciences are faced. Critically evaluating the theses of methodological and epistemic reduction, Strle argues for the irreducibility of experience on these levels. For, he claims, if we

are to explain and understand the experiential part of the mind, we have to firstly avail ourselves of the appropriate methods (first- and second-person methods). Kordeš and Strle agree that some problems that we face when researching experience only seem insurmountable, because we just have not tried hard enough. On the other hand, Strle nicely shows how Varela's claim of phenomenological reduction as a necessary condition for the possibility of studying experience systematically, is too strong. Nonetheless, there already exist some more or less systematic methods for studying experience, such as DES developed by Hurlburt [2] and explication interview developed by Petitmengin [1] and her predecessors. Although these methods, as argued by Strle, face some serious problems (e.g. the problem of training and the problem of setting criteria for the "correct" way of observing experience), we should nonetheless start incorporating them into mainstream cognitive science. Strle argues that using such methods is especially pertinent for investigating cognitive phenomena that intrinsically involve conscious processes, for example when studying emotions or decision making. Furthermore, the use of such methods is needed for studies where differentiation between conscious and unconscious processing is crucial. To support his claims, Strle presents some examples from the broader area of decision making, where it is relatively clear how "it could easily happen that our conclusions and interpretations of empirical results would be false or inaccurate" (Strle, this issue). Joining philosophical analysis, (neuro)phenomenology and examples from areas of cognitive psychology and behavioural economy, the paper puts forward a good account of the necessity of combining first-, second-, and third-person approaches to studying the mind.

Vörös's paper represents an original contribution to how studies of consciousness can benefit from insights of mystical traditions. Firstly, he gives a rigorous analysis of the term mysticism and mystical experience to avoid the false folk-psychological conceptions of the term. Vörös than identifies various areas where insights of mysticism could benefit consciousness studies and cognitive science in general. One such area is phenomenology where in his view, mysticism could contribute with its "special" insights into experience and its analysis of the experiential. Secondly, he argues, mysticism could provide insight into two metaphysical problems that plague sciences of the mind: the hard problem of consciousness and the problem of a (unified) self. With its fundamental experiential insight into "selfless nature of the self" and the non-duality of subjective-objective, mind-body, etc. mystical traditions could help resolve or at least elucidate the hard problems Western science and philosophy face. It could help elucidate – from an experiential point of view – the division of the mind and body, the concept of self or the posed difference between subjective and objective. Vörös concludes his paper with a provocative question to cognitive science: "Could it be that the greatest gift that mysticism could give to cognitive science is to save it from some of its own metaphysical spectres that haunt it – and thus help demystify it?" (Vörös, this issue).

Going on, Tan presents her original research on food-related experience. She shows how studying food-related experiences can help us ground and enrich third-person food-studies. She argues that instead of just asking participants about their experience through e.g. questionnaires, it is essential to gather first-person reports that stem from exploring the "how" of experiencing food-related phenomena. Her empirical research is also firmly grounded in theoretical part of phenomenology which she critically

discusses in her paper. She argues that the study of (food-related) experience should become a necessary part of the research area she explores. As her research shows, the phenomenology of food-related experience revels characteristics of the phenomenon that could not be revealed by classical methods used in food-related sciences. Furthermore, she explains how phenomenology of food-related experience can help us clarify hypothetical abstract concepts such as food-craving or hunger. She argues that "how we experience food, can give a vibrant insight to our cognitive integration of sensations, perceptions, thoughts and feelings, and such." (Tan, this issue).

Kuhar's paper represents another original attempt to bring together different disciplines and levels of research. She emphasises the necessity of bringing the understanding of psychological aspects of human deliberation into social and political sciences. She argues that in order to understand deliberation within governmental bodies and public institutions, and in order to understand direct citizen involvement in face-to-face meetings and the like, social and political science must take into account also psychological findings about deliberative processes. Social and political sciences must admit the need of understanding subjective and intersubjective aspects of deliberation. She argues that the analysis of deliberative processes must also include emotional, identity, value, interpersonal, etc. aspects. Furthermore, she argues for the importance of influence of attachment styles on the quality of deliberation. She concludes her paper with a proposal of further research and claims that "[a] deeper understanding of conditions potentially hindering successful deliberation would help developing more effective deliberation processes, strengthening deliberative competence of all (potential) actors in the public formal and informal public sphere and establishing/building trust in deliberation processes." (Kuhar, this issue).

Muršič introduces the topic of neuroanthropology as a possible new important pillar of cognitive science. In her paper she discussed the importance of natural and cultural evolution for the development of complex cognitive skills. She is particularly interested in capability to compute and use mathematics. Humans developed through millions of years of evolution and Muršič points out that success of the humans lies in well-developed and complex nervous system. But she also suggests that "humans have some abilities that no other animal possesses" (Muršič, this issue). She argues that "complex cognitive skills, such as mathematical reasoning, i.e. numerosity and arithmetic, are an addition achieved as a side-product of the development of specific human culture." She presents some studies in animal quantification abilities which show that animals do not posses a discrete representation of numbers although there is the sense of number as something that exists prior and external to the language. She concludes that "mathematics in humans does not develop because of natural evolution, but is a product of cultural evolution" (Muršič, this issue).

The special issue concludes with the paper on synesthesia. In this paper Mikuš introduces the term as "a phenomenon in which an otherwise normal person, while being stimulated in one modality experiences an emergence of sensations in other modalities" (Mikuš, this issue). She continues with discussing the main areas of synesthesia research: cognitive and psychophysical studies/theories; neural models/theories; gene studies and studies of localisation of the phenomena by fMRI and other neuroimaging techniques. In the second part of her paper Mikuš describes diagnostic criteria for synesthesia based on the main characteristics: it is involuntary

and automatic, perceptions are consistent and simple, it is memorable, it is spatially extended and is imbued by emotions. In conclusion she points out: "Due to its inherently subjective nature, synesthesia was for a long time being pushed aside on part of behaviorists … [but] During the past two decades it has become possible to speak of a trend of increased interest in synesthesia" (Mikuš, this issue).

Articles presented and evaluated in the introductory text to this special issue *Challenges of Interdisciplinarity* all explicate various problems and present different ways of studying the mind in an interdisciplinary manner. They argue for the need to bring together different disciplinary and methodological approaches, including first- and third-person perspectives, or call for the need of connecting different levels from which mind can be described and explained. Building bridges across different levels, methodologies, disciplines and various ontological-epistemic presuppositions is by no means an easy task. Nonetheless, we believe that combining different approaches and perspective is at least to a certain degree an achievable goal that cognitive science must strive to achieve in order to understand the human mind in its full scope. It is exactly this complexity that makes cognitive science so intriguing and exciting.

REMARK

[1]Authors have presented some of the ideas developed in their papers at the 16th International multiconference *Information Society* 2013, held in October in Ljubljana, Slovenia.

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Cordially,

Ljubljana, 25th October 2013

CogSci-issue editors
Prof. Olga Markič
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THE PHILOSOPHICAL FRAMEWORK FOR UNDERSTANDING NEUROSCIENTIFIC RESEARCH

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ABSTRACT

New tools and methods for investigating the brain have given neuroscientists a chance to examine the working brain and placed neuroscience as the central discipline in cognitive science. My main goal in this article is to examine theoretical and philosophical assumptions on which different understandings and interpretations of neuroscientific research are based and to show why philosophical reflection on neuroscience is needed. I first discuss different roles philosophy potentially plays in cognitive science. After a short presentation of Descartes' position concerning the mind body problem and cognitive science approaches to answer his challenge, I examine different theoretical frameworks for neuroscientific research.

KEY WORDS

CLASSIFICATION

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INTRODUCTION

Philosophy and neuroscience are two of the constitutive disciplines of an interdisciplinary filed of cognitive science from its beginnings in the mid of the last century. During this relatively short history the relationships between the basic disciplines (philosophy, psychology, computer science, linguistics, neuroscience and anthropology) were changing due to the advancements in particular disciplines and to the paradigm shifts and underlying hypotheses. New tools and methods for investigating the brain have given neuroscientists opportunities to examine the working brain and have placed neuroscience as the central discipline in cognitive science. My main goal in this article[1] will be to examine theoretical and philosophical assumptions that lie behind different understandings and interpretations of neuroscientific research and show why philosophical reflection on neuroscience is needed. But let me say first a few words about cognitive science and the role of philosophers in it.

José Luis Bermúdez has given a short definition of cognitive science as "the science of the mind" [1; p.2]. Scientist from different disciplines are trying to model and explain different mental phenomena, sharing a number of basic assumptions about how to tackle those problems. The most influential assumption of cognitive science was (is) that the mind is an information system and that mental processes are information processes of some kind. Cognitive scientists are studying mental processes from different perspectives: neuroscientists study the biological machinery, psychologists specific mental processes such as perception, learning or decision-making, biologist and anthropologists research the evolutionary and cultural aspects and computer scientist simulate and model them. But in contrast to empirical science where the stress is on observation, data gathering, classification, and experimentation, philosophical approach is based mainly on thinking. That is probably the reason that many scientists describe philosophers as "armchair scientists" who are just speculating. Andrew Brook, who is positively aware of the role of philosophers (see next section), has nicely captured this kind of dismissive reasoning that usually comes in one of the following two forms. The first stresses the speculative aspect and goes like this: "Philosophers mounted some interesting speculations about the mind in times past but we are now in a position where we can get out of the armchair and do real science on these things. Philosophy, imaginative and entertaining though it can be, has been relegated to the dustbin of history. There is still something to logic and maybe ethics but the rest of philosophy has been superseded by science" [2; p.219]. The second one goes as follows: "You philosophers with your relentless pursuit of the big picture exhaust me. What are the research payoffs? What we need at this point in time is disciplined work on specific issues, not big pictures painted in broad strokes. Even those of you who try to be interdisciplinary and responsive to what is now known bite off more than any mortal can currently chew." [2; p.219]. Brooks points out there is an important distinction between these two variants. The first takes philosophy, more exactly cognitive philosophy, as a bad rival to science, while the second acknowledges that philosophy is trying, even if premature, to integrate results in a bigger picture, something science does relatively rarely [2; p.219]. I will elaborate on this when discussing philosophy in cognitive science and neurophilosophy on the one hand and philosophy of cognitive science and philosophy of neuroscience on the other.

But are there really such dark prospects for philosophy? In contrast to such dismissive views I will point to positive and valuable roles philosophy needs to play in cognitive science. Philosophy with its long tradition has offered many different proposals how to investigate the mind. It has opened a wide space of alternatives that can potentially help to design experiments, search for new solutions and interpret results that represents hard riddles inside the existing framework. It is also not satisfactory to remain with just partial insights so cognitive science has to aim to integrate different viewpoints and the challenge of integration

is thus not only the philosophers caprice. I think philosophical reflection influences research in cognitive science (see also [3]). As I will try to show in the next section, those who believe that can escape it, are just not aware they are in reality under the influence of some (bad) philosophy.

THE ROLES OF PHILOSOPHY IN COGNITIVE SCIENCE

First, we need to say something about the methods philosophers are using. Tim Van Gelder in his paper about the roles of philosophy in cognitive science argues that the best way to identify philosophers is by their methods. It is not that other scientists are not using them but philosophers are "unique in *specialising* in them" [4; p.118). He focuses on the three basic methods every student of philosophy uses and practices during the study: argumentation, conceptual clarifications and historical perspective [4; pp.118-125]. With these basic tools in mind philosophers are playing different roles and van Gelder mentioned some of them by using metaphorical names: pioneer, building inspector, Zen monk, cartographer, archivist, cheerleader and gadfly [4].

The first one, the role of the pioneer, is quite obvious. The basic ideas and hypothesis of cognitive science were first proposed and debated by philosophers. For example, the idea that mental processes are the operations of a kind of physical system, or that thought processes are a form of symbolic computation. The role of a pioneer is not only a historical one since there are still open questions and the role of philosopher is "to tackle problems that nobody else knows how to handle yet, in the hope of transforming them into scientifically tractable questions" [4; p.126].

The second one, the building inspector, also seems quite natural. The scientific inquiry is preceded by a set of theoretical and methodological assumptions and the role of philosopher (or scientists pursuing philosophical reflection) is to inspect this foundations. This comprises of articulating the basic assumptions, inspecting them and if necessary, reconstructing them. In order to achieve the results philosophers have to have deep familiarity with the research area. In short, scientists of a particular discipline are not always aware of the presuppositions on which their research is based and it is not obvious that they are unproblematic, so they are in need of careful scrutiny. It is true that empirical success often corroborates initial assumptions. But one can not solely rely on the empirical measure. Although there are cases when failure can be explained by the need of more time and more empirical research, it is not always like this. Sometimes the reason is wrong assumptions and one needs to find out what is wrong. Here the philosophical reflection is required in order to understand and eliminate the problem [4; p.128].

The next three roles, the cartographer, the archivist and the cheerleader are closely related. Philosopher as cartographer tries to produce conceptual maps and provide an understanding how various elements fit together or why they conflict. A good example of such work is John Haugeland's book *Artificial Intelligence: The very idea* [5] where he presents an understanding of AI in terms of a wider conceptual and historical context. Taking into account historical context, philosopher plays a role as an archivist who digs deep into the repository of the past ideas and programs. By doing so he is better equipped for predicting the future prospects, failures or successful programs. In foreseeing the promising direction he may take the role of a kind of cheerleader.

Two, somewhat self-ironic roles, are the roles of the Zen monk and the gadfly. The first one concern the philosophical work that is far from everyday work in cognitive science, but that is somehow necessary. Van Gelder compares the philosopher to the Zen monk, who is supported by the community "to ponder those imponderable issues that everyone thinks should be thought about by someone, but for which nobody else has time or patience. In

theory, the philosopher-monk eventually reaches a state of enlightenment, but unfortunately that enlightenment is necessarily incommunicable to those who have not undertaken the requisite prolonged course of meditation and asceticism." [4; p.129]. The role of gadfly illustrates the tendency to express their statements strongly and provocatively and thus provoking others to try to challenge them.

I think that van Gelder has nicely captured the main roles philosophers play in cognitive science. Similar attempt is presented by Brook who understands methods in a broader sense, somehow combining van Gelder's methods and roles. He analyses the following four methods:

1) speculative hypothesis generation,

2) integrative interpretation,

3) exploration of thought experiments,

4) analysis of concepts.

Brook stresses that people with philosophical training "tend to pay more attention to the conceptual toolkit of cognitive science than is common in those with other kinds of training" [2; pp.221-222].

Cognitive science as interdisciplinary endeavour takes advantage of different methodologies, particularly, because it is at the crossroad of natural, technical and social sciences and humanities. It is for this reason that I take philosophical meta-thinking as indispensable, especially in exploring the potential conflicts between scientific and humanistic image. To conclude this section I would like to quote what Paul Thagard called his all-time favorite analogy for philosophy and for science. It comes from Francis Bacon's *The New Organon and related writings* when the two enterprises had not yet been distinguished: "Those who have handled sciences have been either men of experiment or men of dogmas. The men of experiment are like the ant; they only collect and use. The reasoners resemble spiders who make cobwebs out of their own substance. But the bee takes a middle course. It gathers its material from the flowers of the garden and of the field, but transforms and digests it by a power of its own. Not unlike this is the true business of philosophy; for it neither relies solely or chiefly on the powers of the mind, nor does it take the matter which it gathers from natural history and mechanical experiments, and lay it up in the memory whole as it finds it, but lays it up in the understanding altered and digested. Therefore, from a closer and purer league between these two faculties, the experimental and the rational (such as has never yet been made), much may be hoped." [3; p.252].

COGNITIVE SCIENCE AND DESCARTES' LEGACY

The nature of the relation between brain and mind is an old problem and also nowadays scientists and philosophers offer different solutions. Although almost everybody would agree that the brain gives rise to perception, cognition, emotion, volition and other mental states, there remains a challenge to precisely determine how mental phenomena rise from the brain. René Descartes made the famous distinction between the mind (*res cogitans*) and physical world (*res extensa*) and set the framework for the debates about the mind body problem. He thought that non-human animals are machines that could be explained from purely mechanical perspective and according to natural laws. The same method can also be used for explaining the workings of human body and for those human functions that are independent of reason, will and conscious awareness in the reception of sensations. But where mental attention is involved, a separate "rational soul" must be posited. By treating animals as machines, Descartes relinquished the idea that animals possessed consciousness and mental states. The only exception to the mechanistic explanation is the human mind (soul). His

purely mechanical view of biology is combined with the view that conscious mind is a separate incorporeal substance. He thus adopted an interactionist dualist position concerning the mind-body relation.

There exists a disagreement among philosophers whether Descartes' denial of the possibility of purposive animal behaviour was meant as an empirical or a conceptual thesis. On the one hand, Cottingham [6; p.249] points out that the possibility of a physical realization of cognitive capacities was not absolutely ruled out and that Descartes, as a good scientist, was probably aware of that. The more "scientific" stance on the nature of the mind paved way to empirical investigations and Descartes himself was enthusiastic for physiological research. But he found the brain and nervous system much too simple to generate complexity needed to constitute genuine thought and linguistic behaviour. On the other hand Shanker stresses Descartes' repudiation of the doctrine of the 'Great Chain of Being' and his insisting "that there is a hiatus between animals and man that cannot be filled by any 'missing link'. The body may be a machine (which was itself a heretical view), but man, by his abilities to reason, to speak a language, to direct his actions and to be conscious of his cognitions, is categorically not an animal" [7; p.316]. According to this view the distinction between mechanical, reflexive behaviour and involuntary movements on the one side, and purposive behaviour and voluntary movements on the other, can not be seen by an outside observer. Voluntary and involuntary movements can look the same. Nevertheless, the humans are able to see and report on their own volitions and thus distinguish between these two types of movements, while animals lack a similar capacity.

The view of Cartesian dualism stimulated many attempts to overcome the divide between animals seen as mechanical automata on the one side and rational human beings on the other. Shanker pointed out that the defence of the continuum picture could proceed in either of two directions to show: (i) that the behaviour of animals is intelligent or (ii) that the behaviour of man is mechanical [7; p.318]. The proponents of both approaches accept the reality of mental phenomena and are inheritors of Descartes' legacy, although they proceed from different starting points. Scientists taking the first path investigate neural mechanisms in animals and humans, and try to find out how mental phenomena and rational behaviour emerge as a product of evolution. They try to blur the lines between the higher animals and human beings "via a continuum of sentience" [7; p.318]. We can characterize this path as a "bottom up" approach. The proponents of the second path seek to reduce human beings to the level of physical mechanisms "by eschewing the appeal to consciousness" [7; p.318]. We can characterize this path as a "top down" approach.

I have argued [8, 9] that in aiming to find answers for the Descartes' challenge, cognitive science has taken both approaches. Classical cognitive science was an attempt of the top down approach using computer metaphor and functionalist representational theory of mind that offer an explanation of how there could be non-arbitrary content relations among causally related thoughts (e.g. [10]). This approach is based on the hypothesis that cognitive processes are manipulations of symbols according to the rules. The central claim of the computational-representational theory of mind states that [11; p.30] "it may be possible to construct a syntactically driven machine whose state transitions satisfy semantic criteria of coherence". Functionalist theories of mind are identifying mental states and processes independently of the neurophysiological states and processes (concrete physical realizations). The right level for explaining behaviour is on a higher, cognitive level which according to Marr [12] corresponds to the computational and algorithmic level, while neuroscience is operating on an implementational (realizational) level, specifying the biological (physical) mechanisms. In this way classical symbolic cognitive science provides a unified platform for interdisciplinary research based on the hypothesis that cognition basically consists of

information processing, more precisely, information is encoded in the form of symbolic representations with rules operating upon them. It represents the first scientific approach that seems to have tools to explain how it is possible to solve the problem of mechanical rationality. But, it also faced difficulties and criticism both from empirical research and philosophical analysis. The optimistic view that the computational properties of the brain will be enough to explain its ability to produce mental states seems to have serious limitations. John Searle, a strong critic of classical program, has quite early announced the necessary move to more biologically oriented approaches, although at that time he maintained that the brain is a digital computer: "Whatever else intentionality is, it is a biological phenomenon, and it is as likely to be as causally dependent on the specific biochemistry of its origins as lactation, photosynthesis, or any other biological phenomena. No one would suppose that we could produce milk and sugar by running a computer simulation of the formal sequences in lactation and photosynthesis, but where the mind is concerned many people are willing to believe in such a miracle because of a deep and abiding dualism: the mind they suppose is a matter of formal processes and is independent of quite specific material causes in the way that milk and sugar are not. …. Whatever it is that the brain does to produce intentionality, it cannot consist in instantiating a program since no program, by itself, is sufficient for intentionality" [13].

A TURN TO NEUROSCIENCE

Huge progress in neuroscience in recent years has brought many neuroscientists and philosophers to the conclusion that the proper framework for understanding the mind is developed by neuroscience. The reasoning goes like this: "For those who do neuroscience, it is highly effective to assume that brain events are "the" cause of mental events. There is overwhelming empirical evidence that whenever a mental event occurs, something happens in the brain. Conversely, when something happens to the brain, it frequently has an effect on the mental events of the person who possesses that brain. The omnipresence of these reciprocal causal connections has prompted the natural assumption that the mind is the brain" [14; p.54].

Although not all cognitive scientists agree that brain is identical with mind, they all agree that its presence is a *sine qua non* for it, suggesting that a successful theory explaining the mind will be neuroscientific. But it is not clear what exactly they mean by that. Ian Gold and Daniel Stolyar [15] have argued that it is not clear what this claim means and that it is ambiguous between two views: "one plausible but unsubstantive, and one substantive but highly controversial". They characterize the first one, the so-called *trivial neuron doctrine as*: "the view that a successful theory of the mind will be a solely cognitive neuroscientific theory. According to this doctrine, to the extent that psychological phenomena will be explained at all, the science that will do so is cognitive neuroscience" [15; p.813]. This theory adheres to the thesis that mind is a biological phenomenon (potentially) explicable by science. But this is not to say that the understanding will be based on biological concepts alone – folk psychological and psychological concept may and very probably will be required. On the other hand, it is possible to construct a much more radical theory if we simply replace *cognitive* neuroscience by *biological* neuroscience. Gold and Stolyar call this the *radical neuron doctrine.* According to the radical doctrine, neurobiology *alone* will provide the necessary conceptual resources to understand the mind. Consequently, "a successful theory of mind will be a theory of brain expressed in terms of basic structural and functional properties of neurons, ensembles or structures" [15; p.814].

A similar radical reductionist view was expressed by the neuroscientist Francis Crick: in his famous book *The Astonishing Hypothesis* where he wrote: "The Astonishing Hypothesis is that "You," your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behaviour of a vast assembly of

nerve cells and their associated molecules. As Lewis Carroll's Alice might have phrased: "You're nothing but a pack of neurons." This hypothesis is so alien to the ideas of most people today that it can truly be called astonishing" [16; p.3]. He thinks that "the scientific belief is that our minds – the behaviour of our brains – can be explained by the interaction of nerve cells (and other cells) and the molecules associated with them" [16; p.7].

Some eliminativists have advocated the elimination of folk psychological concepts, for example Paul Chuchland [17] has argued that neuroscience shows that our folk psychological theory is radically wrong and thus deserves the fate of phlogiston and witches. Such view represents a radical scientistic understanding according to which assumptions about the mental that we take for granted are just plain nonsense. Eliminativists see neuroscience as the only appropriate scientific approach for explaining behaviour. However, Gold and Stolyar [15] offer persuasive arguments against the radical neuron doctrine and suggest that it is false. I also suspect that there will not be a massive mismatch between concepts at the level of the mind and lower levels, or as Horgan and Woordword argued, "Folk psychology is here to stay" [18].

On the other hand, trivial neuron doctrine does not lead to radical philosophical positions. John Bickle [19, 20] has argued that we should wait for scientific psychology and neuroscience to mature and only then examine the existent intertheoretic relations between available theories and thus potential reduction or elimination. Some prominent philosophers of neuroscience [21, 22] consider the idea of intertheoretic reduction as inappropriate from the point of view of neuroscientific praxis. They argue that neuroscience is best understood as the study of neural mechanisms that help us better understand cognitive processes. The question then is if understanding neural mechanisms alone will suffice. Neuroscientist Gerald Edelman suggests that this is not the case: "even if we could accurately record and analyze the activity of millions of brain neurons as an individual formulates a sentence, we could not precisely specify the contents of that sentence by reference to neural recording alone. The idea that we might develop a "cerebroscope" capable of doing so is confuted by the complexity, degeneracy, and unique historical causal path of each brain" [23; p.66].

The viewpoint that neuroscience will in the end substitute all higher level sciences was explicitly expressed by philosopher Patricia Churchland who wrote a book *Neurophilosophy* [24], a provoking title for that time. Many but not all philosophers and scientists are using the concept neurophilosophy in an eliminativist manner as a substitution for philosophy. Patricia Churchland herself in her later book Brain-Wise [25] rejects such characterization and argues for a more balanced view, a kind of "co-evolution" of the disciplines. I feel that the motivation in neurophilosophy is to bring both disciplines closer together without in advance precisely specifying the relation between the mental and the physical. A good example is Henrik Walter's proposal for the core theses of minimal neurophilosophy:

1) *Ontology*: mental processes of biological organisms are realized by or with the aid of neuronal processes.

2) *Constraint*: philosophical analysis of mental processes should not contradict the best currently available brain theories.

3) *Heuristic Principle*: knowledge about the structure and dynamics of mental processes can be gained from knowledge about the structure and dynamics of neuronal processes. [26; p.123].

Walter characterizes neurophilosophy "as a discipline that moves in on the mind-brain problem from two opposite directions. Either we begin on the empirical side and happen upon philosophical questions, or we set out with philosophical puzzles and need empirical findings to solve them. … It is best understood as a bridge discipline between subjective experience, philosophical theorizing, and empirical research." [26; p.125]. He stresses that neuroscience and philosophy effect each other mutually: "While philosophy can provide

critical analysis of the concepts of neurophilosophy, the neurosciences can impose empirical limitations on philosophical theories … it could − in the end − lead to revising our intuitive commonplace psychological notions. In this way neurophilosophy has the potential to change our world view." [26; pp.125-126].

CRITICAL REFLECTIONS

We have seen that there are different views among cognitive scientists about the exact role neuroscientific research plays in explaining and understanding mental phenomena, although reductionist neuroscience seems to prevail. Neuroscientists often give "explanations" of memory, fear, love, or consciousness and "locate" them in specific brain areas, neuronal networks or molecular processes [27]. They ascribe psychological predicates to the brain or even parts of the brain. But as Bennett and Hacker [28] stress, "human beings, but not their brains, can be said to be thoughtful or thoughtless; animals, but not their brains, let alone the hemispheres of their brains, can be said to see, hear, smell and taste things; people, but not their brains, can be said to make decisions or to be indecisive" [28; p.73]. When substituting the person with the brain or parts of the brain, they commit what Daniel Dennett [29] and Bennett and Hacker [28] call mereological fallacy in neuroscience.

The reasoning behind "the natural assumption that the mind is the brain" (see the beginning of previous section) is according to Ted Rockwell due to the questionable additional assumption that pragmatic and complete causes are the same. He applies Mill's distinction between popular idea of a cause expressed in ordinary language which he calls the pragmatic cause, and conditions, which he calls the complete cause. His explanation is as follows: since there are numerous causal connections in the brain when someone thinks or feels, neuroscience naturally assumes that brain activity is the sole cause of mentality. He acknowledges that this may be a useful assumption for neuroscientific practice, but does not prove the metaphysical fact that the mind is, in fact, the brain. This observation does not lead back to some dualistic positions. As the title of Rockwell's book suggests, his motto is "neither brain nor ghost" [14]. He suggests that scientists are unable to understand the mind without referring to factors outside of neuroscience, such as behaviour or meaning reference. Referring to cognitive science he states: "The fact that all of these disciplines are now recognized as contributing to our understanding of the mind indicates that we can no longer understand the mind by merely understanding the brain. All of these sciences have recently been using information about the brain to varying degrees. But they use it by relating brain activity to behaviour, language, and so forth. … These sciences study brain activity as one small part of a nexus of relations between brain, body, and world [14; p.54]. According to this view mental states do not supervene only on intrinsic brain states − the supervenience base also includes relations that bind all three key players: brain, body, and world. It would be more appropriate to assume that "the mind emerges from *all* of the various factors in the brain, body, and world that produce mental" [14; p.55].

Different versions of embodied, embedded and situated cognition (e.g. [30-33]) stress that cognition is not an activity of the brain as such, but is instead distributed across the entire interacting situation. The basic ideas were presented in the book *The Embodied Mind* by Varela, Thompson and Rosch [30] where they "introduced the concept of enaction to present and develop a framework that places strong emphasis on the idea that the experienced world is portrayed and determined by mutual interactions between the physiology of the organism, its sensorimotor circuit and the environment" [34]. Only creatures with certain features (e.g. legs, hands, eyes) can possess certain kinds of cognitive capacities and that knowledge emerges through the agent's bodily engagement with the environment [34]. Similarly, Alva Noë describes his position as follows: "to understand consciousness − the fact that we think and feel and that

a world shows up for us – we need to look at the larger system of which the brain is only one element. Consciousness is not something the brain achieves on its own. Consciousness requires the joint operation of brain, body, and world." [35]. In this way embodied approach suggests how to overcome one of the major deficiencies of both computational models and neural models, i.e. their inability to provide a plausible treatment of consciousness.

David Chalmers has famously proposed that problems of consciousness can be divided into two groups: the "easy" problems and the "hard" one [36; p.200]. According to him, only the hard problem seems to resist methods of cognitive science because it is "not a problem about the performance of the function" [36; p.202]. It concerns the question "how something feels" or what Thomas Nagel famously expresses as "what is it like to be" [37]. In the words of Joe Levine, there is the so-called "explanatory gap" [38] between causal explanation from the third person perspective and the first person experience of how it feels. The methodological proposal how to bridge this gap, called neurophenomenology, was proposed by Francisco Varela [39] who suggests that "only a balanced and disciplined account of both the external and experiential side of an issue can make us move one step closer to bridging the biological mind – experiential mind gap:" [39; p.343]. Although this is relatively new approach there have been attempts to implement neurophilosophical method in studying various cognitive processes like emotions [40], metacognition [41] and thinking [42].

I agree with those (e.g. [27]) who take methodological reductionism as an essential experimental tool for the natural science (e.g. neuroscience) but stress the inadequacy when its explanatory power is over-extended. Humans are social beings and it is necessary to take into account both human biology and human culture and even religion [43], so new subfields of social and cultural neuroscience have just begun to investigate the influence of cultural backgrounds on cognition. Although this may bring interesting results one has to be careful not to jump to the conclusions too quickly. Nowadays, researchers are becoming more and more aware of the rhetoric around neuroscience and begin to analyse the allure of the "neurotalk" in the broader popular, social and political contexts. The proponents of the so called "critical neuroscience" aim to make contribution from human sciences to neuroscience and as Jan Slaby and Suparna Choudhury suggest "to demonstrate the contingencies of neuroscientific findings and, at the same time, to open up new experimental and interpretive possibilities" [44; p.46]. It is not only one way traffic from neuroscience to higher level sciences but also vice versa.

CONCLUSION

Neuroscientists are mostly occupied with empirical research and are often not paying enough attention to the theoretical and philosophical assumptions. In this article I have tried to show that philosophical reflection has an important role in the interdisciplinary field of cognitive science. On the one hand, particular standpoints on mind body relation significantly influence interpretations of empirical investigations and we have to carefully examine often not clearly stated presuppositions. On the other, we have to think about the possible consequences of neuroscientific results and their potentials to change the view about ourselves. This is perhaps one of the main reasons why there is so much interest for cognitive science, particularly neuroscience, also in general public. As Dennett says, "It is worth remembering that the main reason everybody – really, just about everybody – is fascinated with, and troubled by, work in cognitive science is that it so manifestly promises or threatens to introduce alien substitutes for the everyday terms in which we conduct our moral lives. Will we still have free will? Will we still be conscious, thinking agents who might be held responsible? Does suffering really exist? It is because we truly need good, philosophically sound, scientific answers to these

questions and not to any substitutes, that philosophers have a very substantial job to do in the ongoing progress of cognitive science." [45; p.235].

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REMARK

¹The article is partly based on material from [8, 10].

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FILOZOFSKI OKVIR RAZUMIJEVANJA NEUROZNANSTVENIH ISTRAŽIVANJA

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SAŽETAK

Nova sredstva i metode istraživanja mozga omogućile su neuroznanstvenicima ispitivanja rada mozga te postavile neuroznanost kao središnju disciplinu kognitivne znanosti. Glavni cilj ovog rada je propitati teorijske i filozofske pretpostavke na kojima se temelje različita razumijevanja i interpretacije neuroznanstvenih istraživanja radi pokazivanja zašto je potrebno filozofsko razmatranje neuroznanosti. Prvo razmatram različite potencijalne uloge filozofije u kognitivnoj znanosti. Zatim ukratko predstavljam Descartesovo stajalište o problemu uma i tijela kao i pristupe odgovoru na taj problem u okviru kognitivne znanosti. Naposljetku ispitujem različite teorijske okvire neuroznanstvenih istraživanja.

KLJUČNE RIJEČI

filozofija kognitivne znanosti, Descartes, neurofilozofija, redukcija, ugniježđena kognicija

PROBLEMS AND OPPORTUNITIES OF FIRST-PERSON RESEARCH

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ABSTRACT

The aim of the article is twofold. First, it aims to overview current empirical methods in the area of first-person research. Such a review cannot overlook epistemological and ontological issues, but must at the same time keep in mind methodological and almost technical nature of the problem. Empirical experience research is positioned within the frame of cognitive science and the overview of approaches and techniques of empirical phenomenology is presented, together with epistemological considerations. The second aim of the paper is concerned with the future of research in the discussed area. It suggests that in-depth, existentially liable introspection and self-inquiry should be considered as serious scientific research tools.

KEY WORDS

empirical phenomenology, first-person methods, cognitive science, mindfulness

CLASSIFICATION

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COGNITIVE SCIENCE AS NEW ENCOURAGEMENT FOR THE RESEARCH OF EXPERIENCE

Research of experience, or *empirical* research of experience to be precise, is an area which has been dealt with by science on several occasions (most vigorously in the framework of the project of the so-called German introspectionism at the beginning of XX. century), and, due to evident problems encountered in the objectivisation of the subjective, abandoned on no fewer accounts. The most recent attempt has emerged in the area of cognitive science – an interdisciplinary conjunction of different approaches in exploration of psyche. It is most interesting that it was exactly the progress in objective (third-person) research of cognition that spurred the re-emergence of studying the immediate, lived (first-person) human experience. It was neuroscientists themselves, whose mission is supposedly to find out the neurophysiological correlates to experience, who started to realize that it was not just the third-person perspective that was being problematic, but that our knowledge of the first-person one leaves much to be desired. This insight soon led to the realization that it was not easy to attain reliable data about experience. It does not suffice to just ask or merely to prepare a good questionnaire.

The need for a serious, scientifically sound study of experience had first been hinted at in the 70s by the cybernetics pioneer Heinz von Foerster [1], but it was his disciple, the biologist Francisco Varela, who articulated this need in a much more systematic and detailed way. The breakthrough article in which he introduced the concept of neurophenomenology [2, 3] was soon followed by the compendium entitled *The View from Within* [4]. Ever since the 90s, the empirical research of experience has been gaining its place in the framework of cognitive science despite strong criticism and opposition. These may be most clearly seen in the division of the areas of research into the psyche as sketched in the lectures of one of the most prominent cognitive neuroscientists Antonio Damasio [5; p.94]: events in the brain (physiology), behaviour (mostly psychology) and experience.

But the fact that first-person research got its place on the map of cognitive science approaches does not yet prove that Varela's ideas have flourished in the way delineated by him in his conception of the neurophenomenological project. The area of thinking about and practically realising such type of research is still a mere fledgling. We are still a long way from Varela's vision of two equally balanced areas of first-person and third-person research which would – each from its own side of the epistemological gap – build up a unified corpus of knowledge. In recent years, a wide array of attempts at gaining and interpreting data about experience has been developed. Nevertheless, the research of experience is at this stage still but little more than a kind of aid to third-person research; an aid to be used only in the case of greatest need and the results of which should always be proofed by other methods as well. This lack of methodological autonomy is for the most part the consequence of epistemological problems looming in the background, which scientists mostly tend to avoid. Due to that, the attitude pervading this area is for now still that it has failed to produce new insights into the psyche.

The aim of the present article is to offer a slightly more self-conscious view of the sensibility and possibility of gaining first-person data. Its scope is thus very wide. If we intend to understand the problems of experience research, we must not avoid the epistemological and ontological questions. Meanwhile we must also never lose sight of the methodological and almost technical nature of the problem. The present article intends to give an overview of the area with no ambition of offering definitive solutions. It has been written by acknowledging the superficial manner of addressing some of the very important aspects of the experiential landscape. Its aim is to present a kind of a map of approaches, accompanied by epistemological reflections to shed light upon their validity and significance.

PHENOMENOLOGICAL DATA

Let me begin by trying to delineate the area of empirical phenomenological research, what exactly it studies and what kind of data it operates with.

The question which part of reality does empirical phenomenological research actually study cannot be answered in the same way as with other sciences. Phenomenological research deals with a part of the world, which is most intimate, or rather immediate, to us, the world 'as it presents itself'. The physical world, human behaviour, social world ... all these are but diverse orderings of the experiential world – and all of them are less existentially immediate. Varela relied on the phenomenological tradition: "The phenomenological approach starts from the <u>irreducible</u> nature of conscious experience. Lived experience is where we start from." [2].

Perhaps our area of research has been most clearly indicated by the philosopher Nagel [6] in the title of his article *'What Is it Like to Be a Bat?'*. "Clearly 'what it is like to be' a bat or a human being refers to how things (everything) looks when being a bat or a human being. In other words this is just another way of talking about what philosophers have called phenomenality since the Presocratics. A phenomenon, in the most original sense of the word, is an appearance and therefore something relational. It is a *being for* as opposed to *being alone in itself* … " [4; p.3].

The question what is experience is hard to answer by reducing it to other psychological concepts. It cannot be described simply as *this or that*. When talking about the gestalt of experience, we are speaking about *what is it like to be* this particular human being in this particular chosen moment. The area of our research is experience, i.e. everything that goes on in the scope of an individual's awareness. Thus we are interested in *how* the content of consciousness is demonstrated, rather than *what* is being demonstrated. In relation to this, Merleau-Ponty [7; p.ix] states: Going back to the things themselves means going back into a world before knowledge.

At this point we might pose the question *what kind* of data about experience can be gained and *how*? Reflecting upon the *how* brings us to the paramount problem of phenomenological research: the fact that observation essentially changes the observed. For Searle this represented the key argument for rejecting empirical phenomenological research: Any introspection of one's own conscious states is itself a conscious state [8; p.97].

In his article Varela showed the inconsistency of such criticism: if Searle really had believed in the power of this argument, he should abstain from any statements about conscious states (which he naturally does not do). Directing our attention to the *how* of experience does indeed change our experiential landscape, but that does not mean that it becomes a completely different existential landscape. Dressed into attention to itself alone it mostly just begins to shine in a whole new light. Petranker [9] wrote that by observing *we become conscious differently*.

If we think it through, the situation in the area of phenomenological research is not so much different from the situation in other scientific fields. Physics for example is also unable to directly describe physical reality: at the quantum level it is forced to settle for the observation of the effects of the processes observed. At this level, similarly to the observation of experience, we cannot bypass the influence of the observer. Thus even in the areas of 'hardest' braches of scientific research we are able to observe traces of past events. Traces, or in the case of experience research, memories.

We may notice a deep and almost indivisible connection between phenomenological, methodological and purely executive (technical) issues of phenomenological empiricism. The

epistemological question: What can be perceived at all? is but a small step away from the question of carrying out such a research (What is with directing attention?). The results and validity of the observations depend on the way of looking. Husserl was well aware of this fact, as was Varela. The skill of observation (gaining data) in the research of experience is just as important as in any other branch of science. Neither did Varela overlook the fact that some types of Buddhist meditation have been indulging in training the skills of observing experience for thousands of years. Large parts of *The Embodied Mind* [10] and *The View from Within* [4] are dedicated to discussing the relation of mindfulness training practice (like e.g. Buddhist vipassana meditation) to first-person research. Here we do not wish to address the skill of observing the *here-and-now* of one's experiential landscape in detail, nevertheless it is perfectly clear that the practice of mindfulness is a skill of intimate self-research [2]. The question to what degree it is possible for Buddhist practice to come in useful in this and how remains open for now.

Even if direct observation of experience in the form of mindfulness/awareness is indeed the technique (skill) of observing the experiential landscape *here-and-now*, scientific research can only be endeavoured once we are able to articulate our insights. And the only way of perceiving experience that allows us to position experiential data into intersubjective space is the articulation of memories of past experience, the memory of experience itself being another kind of experience, of course. But here we already come across a difference, since memory is just a part of the larger field of awareness, which means it is possible for the observer to position himself outside of this part. Once such a position is achieved, it means that we might be able to observe the memory of experience from a (at least some) distance, thus allowing us to describe it. The only data available to phenomenological researchers is thus the so-called phenomenological data - descriptions of past experience.

The ways of gaining phenomenological data and the question of what this data can tell us about our psyche will be dealt with in the following two chapters. At this point let me just clarify a potential confusion in the terminology of the nomenclature of the science dedicated to the research of experience. Since most of the basic concepts in this field of research originate in Husserl's work, the accepted term has become phenomenological research. But since gathering of data based on observation was especially in his later period bitterly opposed by Husserl, it is only just to add the clarifying epithet *empirical* to it. Occasionally, one might even hear the term phenomenography, but it has yet to catch on. Sometimes we deem this research project to be *first-person research*, but this term is also problematic: while we do study the first-person perspective (as opposed to the third-person one dealing with behaviour and neurophysiology), it is nevertheless true that this term makes it unclear as to *whose* experience we are actually researching (first-person could thus designate the research of my own experience, while third-person might refer to the experience of the participants of the research).

DOES EMPIRICAL RESEARCH OF EXPERIENCE MAKE SENSE?

Before we review different attempts to gain first-person data, we cannot ignore the criticism and a wide array of scepticism that surrounds this field of research. Varela [2, 4] inspects the list of negative attitudes and objections in detail, especially the ones from the area of philosophy of mind and hardcore cognitive science. In both of his works he gives extensive answers, so let me at this point merely enumerate some of the most common areas or rather arguments of the critics from this field.

Perhaps the most common, even though rarely properly articulated, is a lack of interest for in-depth research of experience. There is a common naturalistic presupposition that consciousness is but an epiphenomenon and that it is essential to explain its neurological

basis. Once we reach that goal, first-person research will become obsolete.

Introspection changes experience (or rather, it is itself a form of experience).

This argument presented by Varela through Searle's words has already been mentioned above: it is quite problematic to (scientifically) study something that changes through the very act of observing it. It is a problem which all so-called non-trivial areas of research (should) face [11], from quantum mechanics to ethnology. In many areas we encounter a circular bond between observation/research and the observed/researched: In the area of experience research this bond is so immediate that there is absolutely no way to ignore it.

The subjective simply cannot be objectivised.

This is essentially a methodological problem. Many authors tend to be very sceptical about the usefulness of experiential data in understanding human psyche. Varela [2] quotes an example of Searle's findings that in all the years we have been endeavouring to study experience, no agreement about a valid method has been reached. While Searle's assessment is based on a rather superficial and naive overview of the history of first-person research, it is nevertheless correct to a certain point. But the conclusion drawn from it by Searle is problematic, to say the least. If we can agree that the knowledge about lived experience is important, this should motivate us to search for new, more viable methods instead of giving up hope altogether.

Understanding experience is being taken care of by psychology.

The final chapters of *The View from Within* [4] include an overview of responses of representatives from the fields of cognitive science and philosophy of mind to the described attempts of establishing a field of research dealing with experience. The title of Baars' article for example is most telling: The field of systematic phenomenology already exists. It is called psychology [4; p.216, 10]. The idea that there is nothing in the area of experience which psychology (or some other science) had not yet discovered was apparently still present at the turn of the century. Now, fifteen years later, it is virtually non-existent.

As already mentioned, in his articles Varela deals extensively with criticism from the side of cognitive science and philosophy of mind. Interestingly though, he does not mention the critiques from the opposite field, i.e. phenomenologists themselves. Varela [2] positions his own view of the meaning and role of experience research into the framework of continental phenomenolgy, which indicates that he planned for his neurophenomenological project believing to follow its phenomenological guidelines. It is a fact that during the preparation of *The View from Within* he collaborated with several important representatives of the French phenomenological movement (for example Natalie Depraz). It would seem that he received a positive reaction to his idea of the neurophenomenological project from these circles, even though such an attempt is very remote from Husserl's opinions and the viewpoints of many younger phenomenologists following in his stead, who directly oppose collecting empirical data about experience. Is the goal of empirical phenomenology as described here (and as described by Varela) exactly what Husserl tried to overcome in his later work? Husserl (following the publication of *Logische Untersuchungen* [12, 13]) noticed in his epistemological research the inconsistency of psychology which makes use of the laws of logic in its research while at the same time attempting to prove these very laws stem from the nature of the psyche, i.e. its field of research. In other words, how is it possible to study a concept if it is at the same time used as a tool?

But Husserl would not settle for leaving his phenomenological project in the unclear waters of the epistemological paradox. He strived to elevate phenomenology out of shallow

empiricism and make it into a primary (eidetic) science. Hribar [14; p.56] writes that Husserl denounced all his former work as being in general empirically oriented. In the *Idea of Phenomenology* Husserl wrote: In *Logische Untersuchungen* phenomenology is presented as *descriptive psychology* (even though epistemological interests prevail in it). But this descriptive phenomenology, which could be understood as empirical phenomenology, should not be confused with transcendental phenomenology. Phenomenology which desires to be an essential, epistemic (*a priori*) science of cognition excludes the empirical attitude. (Quoted after Husserl's *'Die Idee der Phaenomenologie'* in [14; p.56]).

For those who endeavour to study experience, this critique from our own ranks is much stronger and more poignant. Interestingly, Varela does not address this problem. As mentioned above, this might be due to the fact that he collaborated with a circle of phenomenologists who themselves flirted with empiricism and tried to apply philosophical insights in practice, such as the psychiatrist Jean Naudin, for example.

THE SPECTRUM OF DIFFERENT ATTITUDES TOWARDS EMPIRICAL PHENOMENOLOGICAL RESEARCH

As we have seen, there is no lack of epistemological-methodological problems in the field of experience research. Nevertheless, in recent years this line of research has become a prominent feature of the patchwork of cognitive science. In the follow-up I intend to review some of the most promising contemporary approaches and try to determine how their advocates deal with the above mentioned problems.

The 'just ask' approach (quantitative research)

The most common way of dealing with the epistemological-methodological problems of first-person research in the context of cognitive science is to simply ignore the issue.

In 1972 Heinz von Foerster half jokingly penned down the so-called 'first theorem': 'The more profound the problem we ignore, the better our chances for glory and success' [15; p.1]. Cynical and mocking as it may seem, it is nevertheless true. Cognitive neuroscience (and all other natural sciences before it, of course) has been able to achieve its immense progress exclusively by refusing to pose the questions about the fundaments of the phenomenon it is researching, i.e. what is consciousness, what is experience and what is the relationship between the experiential and the corporeal. The same goes for most of the quantitative studies of experience. As mentioned above, the majority of cognitive scientists tend to view the research of experience as a means to gain additional data for the study of the physiological basis of the psyche, i.e. as a kind of sidekick support. Fortunately, one does not have to delve too deep to meet this demand.

In this type of studies psychological methods are being used. In gaining experiential data they mostly rely on questionnaires offering participants multiple choice answers or scales by which they have to assess the degree of intensity of a given experiential modality (e.g. How happy do you feel? Pick a number between 1 and 10!). In the field of experience research, it is of course much harder to assure the reliability of data gathering – after all, its area of research is subjectivity itself. Despite that problem, this approach to research has been flourishing in recent years. The research connected to low brain activity (i.e. to what the brain does when not occupied by a concrete task) may serve as a good example. At the level of experience this activity is associated with the so-called mind wandering, the study of which makes good use of the above mentioned methods. The questionnaire-type of research in the field of quantitative empirical phenomenology is usually carried out in the form of experience sampling – the participants are asked to answer a set of questions at selected moments (for an

example of such studies see [16, 17].

The data gained in this way offer a good supplement to neurophysiological studies. They answer the questions of the frequency of given experiential categories, their intensity and the relation of (pre-selected) categories to (selected) contexts. It does not however enable us to check the adequacy of the selected options. This kind of research is therefore based on the assumption that we already know the structure of the experiential landscape – the task of first-person science is merely to determine its quantitative details.

The problem lies in the fact that all researchers dealing with more in-depth observation of experience (e.g. [4, 18]) find that our intuitive assumptions about this area are to a very large degree incorrect. Paradoxically, we see time and again that participants are not familiar with their (our) experience at all (the same being true for researchers, of course). The 'just ask' approach, as some designate it, is thus simply not viable. As suspected by Varela [2] and later empirically proven by Hurlburt [19, 20] a systematic and persistent training in observation of the experiential landscape is necessary. The studies which assume that their participants are well acquainted with their experience and therefore need only to be asked about it thus usually demonstrate little more than our own notions of what experiential landscape should look like. The same goes for philosophical arguments based on 'self-evident' examples in experience.

Dialogic quantitative methods

Experience – the area most intimate to us – appears to be at the same time the most opaque one. How can that be? Our awareness is virtually utterly unused to being directed at the how? of experience, due to its constant dealing with (being interested in, creating, manipulating) the contents of experience (the what?). Similarly to cinema, where the standard for a good film is to enable the audience to get completely sucked into the projected story and at the same time forget about the screen, the film projector etc., our everyday existential intentionality draws us into complete identification with the story, or rather, the so-called reality (in the everyday sense of the word). Husserl's notion of *natural standpoint* appears to be quite adequate a description of this essential and very pervasive feature of our psyche.

We are used to directing all of our attention to the results of ordering, interpreting, highlighting, categorizing and making sense of experience, and none at all to the process of doing so itself. The realization that we are poorly acquainted with our direct experience [10] could be transformed into a methodological guideline in the research of experience: the natural standpoint needs to be put into brackets. Since this action opposes our habits, or rather our natural standpoint, the observation of experience calls for systematic and persistent training.

It is not hard to notice that such insight into the nature of experience and the methodological guidelines for acquiring data on experience bear a striking resemblance to the fundamental concepts of Husserl's phenomenology: the natural standpoint, *epoché* and phenomenological reduction. But despite these allusions to Husserl's terminology, we must remember that in empirical research of experience all of these concepts are used in a more lax and wider scope than originally intended by the author of phenomenology.

It is not wrong to say that the skill of observing experience is actually the skill of defying the natural standpoint, or rather of bracketing its effects. Besides, phenomenological *reduction* appears to be an apt term for doing so [21]. But as mentioned above, the use of such terms is wider than intended by Husserl. The meaning of phenomenological reduction as a method of introspection in practice is twofold. The first aspect is the bracketing of assumptions, interpretations etc., i.e. the observation of experience as it shows itself to us. In order to achieve this, we must employ the other aspect: turn our attention to the structure of experience itself, exploring the area we have been neglecting for so long – the screen and the

projection mechanism. For example: instead of paying attention to the content of our thoughts, we should try to notice *how* we think. Do we quietly talk to ourselves or do we see images or do we simply know the content without any other symbolic experiential representation? Perhaps in empirical gathering of first-person data this second aspect is even more important.

Most of the contemporary schools of empirical research of experience have been developed basing on these methodological foundations. All of them share some common methodological guidelines:

- the simple principle of 'just ask' does not work. In order to study experience, one needs extensive training in the skill of introspection. Due to this, research has to be iterative,

- most of contemporary methods are dialogic. This means that the above mentioned iteration is achieved by repeated interviews with participants.

Other methodological guidelines stem from Husserl's phenomenology:

- the focus on phenomena (things as they show themselves in our experience) and bracketing of all habitual assumptions about things. The reduction of everything observed into phenomena as the only thing in our experience that is really given and certain,

- the search for as detailed descriptions of experience as possible and giving up interpretation. The training in describing experience (and in asking about such descriptions) without classifying it in any way, positioning it into theoretical frameworks, highlighting it etc. This includes also giving up any assessments about the 'reality' of the observed phenomena.

I will now present in more detail two methodological schools of empirical phenomenology, which are today probably most widespread and recognized: descriptive experience sampling and explicitation interview. A major difference between these two approaches lies in their attitudes towards retrospection. As seen in the previous chapter, the research of experience (with the exception of mindful observation of experience here-and-now) is in its essence a study of *memories* about past experience. In phenomenological research, memory is the basic medium that allows us to access our field of research. Undoubtedly, memory is not exactly an ideal interface; due to that one of the crucial questions any method needs to address is how to approach lived experience as precisely as possible. How to preserve past insights intact?

The biggest difference between the two schools of empirical phenomenological research that will be mentioned here lies exactly in their attitudes towards the problem of 'purity' of memory. The difference being that one of them tries to reduce retrospection to the minimum, while the other one strives to train the interviewer in the dialogic skill of 'purifying' the constructs induced by memory.

In Paris, a new methodological approach has formed around the phenomenologist and psychotherapist Pierre Vermersch. Its most prominent representative is Varela's assistant Claire Petitmengin. The researchers in this approach devised a dialogic method known as the explicitation interview [22]. Its major feature is the attempt to polish the art of interviewing so far that it might access even more remote memories and release them of the constructs deposited in the meantime. It appears that such 'purification' (which is of course an iterative process) is indeed possible and often quite successful. Petitmengin's research in the field of experiencing the self proved to be most insightful [23]. There is also the slightly older work from the area of the so-called preconscious states (e.g. [24]). She was also a member of the group, which pursued with the work in the field of neurophenomenology after Varela's untimely death. The group eventually dissolved, since participating neurologists did not perceive phenomenological work to be relevant enough.

The concept of the explicitation interview has gained some ground in recent years. Different derivations of this approach are being used in the study of experiential patterns, i.e. recurring elements of experiential landscape. An example of this is the emergence of thought [24] or the research of the experiential aspects of intuition [25].

A different approach to this problem is the one taken by Russell Hurlburt, the inventor of the descriptive experience sampling technique (DES) [26]. DES could be compared to geological probing of the ground: samples are taken at random points and later purified and analyzed in a laboratory. Similarly, DES probes (samples) experience at randomly selected moments. The probing is carried out with the help of research subjects who carry with them a special device, which emits a gentle signal at randomly selected moments. The subject then tries to 'freeze' his or her experience just prior to the beep. Unlike simply answering questions about experience (as with the quantitative experience sampling mentioned above), here we are dealing with free descriptions of experience, made in a handy notebook, or lately more often a portable recording device. As all other methods, this one is also based on repetition and interviews. No later than 24 hours after probing, the participant must meet with the researcher who tries to gain as much exact data about the experience as possible through a discussion of the samples. Unlike the explicitation interview, Hurlburt's technique is not directed into purifying the constructs of retrospection. Its power lies in the large number of collected samples and the reduction of the consequences of retrospection to the minimum. Hurlburt teaches that the researcher should give up the discussion of a selected sample as soon as one gets the feeling that the participant has passed from exploring his or her memories to pondering or construction. The principal training in this technique consists of the skill of 'open' interview and recognizing and avoiding interpretation (e.g. [19]).

The results of DES provide us with a kind of map of a participant's experiential landscape. The technique has been in use for almost forty years now and it is probably the most widespread and methodical version of contemporary first-person research. Ever since it appeared, researchers have gathered an astounding amount of data about experience, so that they were able to put together a kind of encyclopedia of basic experiential elements (the so-called *codebook*).

As we can see, these two approaches to experience research are complementary. Techniques such as DES are useful for 'drawing out' a map of everyday experience, while dialogic methods of explicitation can delve into more specific (selected) aspects of experience. So while contemporary empirical methods of experience research are to a large extent based on the guidelines of Husserl's phenomenological reduction, their research nevertheless remains at the level of gathering descriptive data - which is exactly the level Husserl tried to avoid. It is a fact that research of experience in the context of cognitive science does not share Husserl's ambition of being a primary eidetic science. One of the critiques of DES is that it remains on the surface of experience all the time. But Hurlburt is not discouraged by such comments [18]. He claims that this level is exactly what he is aiming at in his research. He even likes to pass the ball back by attacking the so-called armchair introspection [20], philosophical debates which do not base their arguments on systematic training of introspection but rather on self-evident knowledge about experience.

In-depth first-person research

Despite the fact that the most first-person research does not intend to answer deep epistemic questions, there are some (of us) who aim at a higher goal. For example, already the title of Varela's [2] article reveals his expectations that empirical phenomenology should bring (or at least help in bringing) the solution to the 'hard problem', i.e. the mind-body relationship problem.

Husserl clearly demonstrated the contradictory assumptions on which psychology is based (in

its role of a theoretical science). The vicious circle between exploring the psyche as the origin of rational argumentation and using rational argumentation as a tool to explore the psyche probably does seal the door of classic empiricism to understanding the nature of thrownness into experience. While we can use the methods of natural science to study the properties of our existential state, we can by no means do that in the research of its fundaments.

On the other hand it has to be said that Husserl's hopes for the emergence of a new, primary science did not come true. While phenomenology did become a well appreciated branch of philosophy, it never managed to gain the privileged position its author was hoping for.

But perhaps there is a way between the rock of naturalistic reductionism and the hard place of sterile logical argumentation. Varela and Hurlburt clearly demonstrated the impotence of bringing conclusions without basing them on systematic checking. Husserl on the other hand demonstrated the limitations of the power of empirical results, included in the network of classic psychological science (or the naturalistic method). Husserl – as most philosophers with education in mathematics do – had a negative attitude towards any kind of circularity, but he never demonstrated any weaknesses of empirical research itself. Due to his fear of paradox, he failed to notice the possibility for mutual (creative) circular inspiring between concepts and empirical findings. Inspiring in which each side slightly changes at every step, according to the results of the previous iteration (in contemporary qualitative research this process is called *sequential analysis*).

Perhaps it is necessary to take an earnest look at both sides: Husserl's theoretical warnings as well as Hurlburt's criticism of couch introspection. Is it possible to achieve so thorough an empirical research of experience that it will actually become fundamental? I believe that is so. I also believe that that is a kind of research Varela was aiming at.

EXISTENTIALLY BINDING SELF-OBSERVATION

As seen from the presented overview, the empirical research of experience is alive and gaining ground. So far we have yet to see some revolutionary breakthrough in this field, though. The gathering of data is still in its initial phase, approximately at the stage biology was in Humbold's era: the phase of collecting samples and finding out the basic forms of organization of the researched area. But there is hope that at some point quantity will transform into quality and new, unexpected insights will emerge from the accumulated data.

Besides the lateral gathering of data there is another option: the in-depth training of self-observation; thorough first-person exploration (in the narrow sense of the word), which does not draw back before self-questioning and includes also an awareness of its assumptions and limitations (and searches for the still unreflected ones). Here I am referring to a type of research in which the researcher and the researched are one and the same person.

Some authors believe phenomenological reduction in the deepest sense of the word to be exactly this kind of a persistent and systematic surveying of one's experiential landscape (in [27] Cogan poses his argument drawing on Fink [28]). As mentioned above, it would be wrong to ignore the similarities between the basic principles of phenomenological reduction and mindfulness training (with the help of techniques such as vipassana or zen Buddhism). The possibilities presented by the research of consciousness with the help of such meditation techniques have been addressed by Varela and his collaborators in two major works [4, 10].

The idea of researching experience through an intimate in-depth self-research is thus by no means a new one. The real question being how come that it has never really took root – at least in the framework of contemporary science. In a way, the answer is obvious: meditative delving into oneself does not accord with the notions of contemporary science. The idea of a

researcher rummaging through his or her personal experience is in direct opposition to the demand for objectivity (intersubjectivity) of scientific discovery. Nevertheless, this argument is not sound. First of all, it is perfectly clear that the findings of in-depth self-research could become part of the scientific corpus only when confirmed by several researchers. Secondly, in the so-called in-depth qualitative research we are lately encountering an interesting paradox: the more intimate we get, the more general our findings are becoming. In other words, there is a real possibility that in-depth self-research will in the end bring us to a level transcending individual specificity.

Another reason why systematic self-reflection has not yet become part of the canonical science of consciousness is that (contemporary) scientists refuse to indulge into existentially binding research. Varela [2] stated intimacy to be one of the necessary conditions for successful research of experience. Any researcher who earnestly ventures into the area of observing his or her own experience can expect this enterprise to change him or her. And this poses a crucial difference between this type of research and other methodological approaches – in this case personal involvement is not only allowed but indeed inevitable. Scientists embarking on in-depth first-person research of their experience find themselves in a similar situation as researchers of drugs in the 70s, i.e. in the times when most of them tried them out on themselves. And such research cannot be merely a job. The only possibility to achieve this is to make it into a kind of lifestyle. And that is very remote from contemporary role of researchers.

In spite of these almost insurmountable obstacles I believe that in-depth first-person and – most importantly – existentially binding research is the only chance for truly in-depth insights into our consciousness, experience and human existential condition in general. Perhaps we should start this line of research by an in-depth critical study of the experience of people, who have dedicated their lives to the training of diverse techniques of mindfulness (in his work, Varela hinted at this step). Basing on that, we should then search for methodologically sound ways of tracking and recording the process of self-observation.

Besides this, it is essential to explore the backgrounds of selected methods of self-observation. It is well known that the answer to any question depends on the way of posing it. Any observation is to a certain degree also a construction, depending on the presuppositions, intentions etc. of the researcher. This cannot be avoided. But it is perhaps not impossible to capture this usually unreflected part into the observation itself.

The final step would thus be to offer space for systematic, recorded and, above all, existentially binding scientific self-observation. By this I aim at physical as well as social and scientific space. I hope for this paper to be a small contribution in this direction.

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PROBLEMI I MOGUĆNOSTI ISTRAŽIVANJA U PRVOM LICU

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SAŽETAK

Cilj ovog rada je dvojak. Prvo, radu daje pregled aktualnih empirijskih metoda u području istraživanja u prvom licu. Takav pregled ne može previdjeti epistemološka i ontološka pitanja, ali istovremeno mora razmatrati na umu metodološku i gotovo tehničku prirodu problema. Empirijsko istraživanje iskustva smješteno je u okviru kognitivne znanosti. Dan je pregled pristupa i tehnika empirijske fenomenologije zajedno s epistemološkim razmatranjima. Kao drugo, rad se bavi budućnošću istraživanja u razmatranom području. Rad upućuje da dubinska, egzistencijalno odgovorna introspekcija i preispitivanje nas samih treba smatrati alatima ozbiljnih znanstvenih istraživanja.

KLJUČNE RIJEČI

empirijska fenomenologija, metode prvog lica, kognitivna znanost, pomnost

WHY SHOULD WE STUDY EXPERIENCE MORE SYSTEMATICALLY: NEUROPHENOMENOLOGY AND MODERN COGNITIVE SCIENCE

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ABSTRACT

In the article I will defend the view that cognitive science needs to use first- and second-person methods more systematically, as part of everyday research practice, if it wants to understand the human mind in its full scope. Neurophenomenological programme proposed by Varela as a remedy for the hard problem of consciousness (i.e. the problem of experience) does not solve it on the ontological level. Nevertheless, it represents a good starting point of how to tackle the phenomenon of experience in a more systematic, methodologically sound way. On the other hand, Varela's criterion of phenomenological reduction as a necessary condition for systematic investigation of experience is too strong. Regardless of that and some other problems that research of experience faces (e.g. the problem of training, the question of what kind of participants we want to study), it is becoming clear that investigating experience seriously – from first- and second-person perspective – is a necessary step cognitive science must take. This holds especially when researching phenomena that involve consciousness and/or where differentiation between conscious and unconscious processing is crucial. Furthermore, gathering experiential data is essential for interpreting experimental results gained purely by quantitative methods – especially when we are implicitly or explicitly referring to experience in our conclusions and interpretations. To support these claims some examples from the broader area of decision making will be given (the effect of deliberation-without-attention, cognitive reflection test).

KEY WORDS

CLASSIFICATION

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INTRODUCTION: THE HARD PROBLEM OF CONSCIOUSNESS

"Consciousness is a word worn smooth by a million tongues. Depending upon the figure of speech chosen it is a state of being, a substance, a process, a place, an epiphenomenon, an emergent aspect of matter, or the only true reality." (G. Miller as quoted in [1; p.32]). The quote of George Miller nicely describes our bafflement when we are faced with the question of what consciousness is. Even though there are many different answers to this question we seem not to be able to avoid conscious experience in explaining consciousness and human mind in general.

In his article *Facing Up to the Problem of Consciousness* Chalmers [2] divides problems of consciousness into easy and hard problems. Easy problems are those that seem to be at least in principle solvable by standard methods of cognitive science – methods that are suitable for generating computational and neurophysiological explanations of mental phenomena. If for example we want to explain the difference between sleep and wakefulness we need to explain neurophysiological mechanisms responsible for generating these two distinct states. If we are to explain different functionalities of various kinds of attention, we need to describe mechanism that makes possible these different functionalities. Or so the story goes … But even if we were to describe mechanisms and processes that generate various cognitive functions we could, according to Chalmers (with whom I agree), still ask ourselves "[w]hy does not all this information-processing go on "in the dark", free of any inner feel?" [2; p.203], without any conscious experience. We have come to the problem of consciousness which seems to be insolvable using standard methods of cognitive science – we have stumbled upon a hard problem indeed. According to Chalmers [2] (similarly Varela [3]) we have not and will never be able to explain *what is it like to be* [4] a human being that feels, thinks, has a body that interacts with its environment, etc., only by explaining information processes and mechanisms. Besides information processing that goes on in the brain, there also exists a subjective aspekt of consciousness (and mind) – a certain subjective way in which the world presents itself to the one experiencing and interacting with it. The following question remains unanswered: "It is undeniable that some organisms are subjects of experience. But the question of how it is that these systems are subjects of experience is perplexing. … It is widely agreed that experience arises from a physical basis, but we have no good explanation of why and how it so arises. Why should physical processing give rise to a rich inner life at all? It seems objectively unreasonable that it should, and yet it does. … If any problem qualifies as *the* problem of consciousness, it is this one." [2; p.201].

The hard problem of consciousness, as put forward by Chalmers almost twenty years ago, still haunts cognitive science in its goal of understanding the human mind. Experience remains to be at the core of what it means to be a human being, but at the same time it seems we lack any good explanations and descriptions of the phenomenon. In this regard, the critique of the traditional computational-representational theory of mind (which and one could argue is still mainstream[1] in cognitive science nowadays) as a form of behaviourism is still pertinent today: "Although the information-processing paradigm was already well on its way in 1965, it had not brought much relief from behaviorism's stranglehold on consciousness, the historical, true subject matter of psychology. The mental processes with which the newly emerging cognitive scientists began filling the "black box" were the observer's abstractions rather than the individual's conscious experiences. It was the study of the mind from the point of view of the "third" person, and in that sense did not differ greatly from the basic orienting attitudes of behaviorists." [8; p.viii].

In his article *Neurophenomenology: A Methodological Remedy for the Hard Problem* Varela [3] proposes an interesting solution to the hard problem of consciousness, namely that of neurophenomenology[2]. The neurophenomenological programme is based on three essential claims: the irreducibility of conscious experience, the necessity of using first-person approaches in studying consciousness and human mind (phenomenology[3]) and combining first- and third-person methods in studying consciousness and human mind (neurophenomenology).

In the first part of the article[4] (*What kind of irreducibility are we talking about: Did Varela solve the hard problem of consciousness?)* I will discuss different types of reduction and argue that Varela actually advocates methodological and epistemological irreducibility of consciousness. I will further explain some consequences this has for the proposed "remedy" of the hard problem of consciousness. Than (second part, *Neurophenomenology and phenomenological reduction*) I will briefly present Varela's programme of (neuro)phenomenology and its core element of phenomenological reduction which for Varela represents a necessary condition for systematic research of experience. In the third part (*Some problems of researching experience; Does Varela demand too much?*) I will argue that requirements for systematic exploration of experience made by phenomenological reduction are too strong. I will also explicate some other problems with which we are faced when researching experience: the problem of the "right" training, the problem criteria by which we could decide whether the "right" state for observing experience and reporting on it was achieved, and the problem of the difference between trained versus untrained participants[5]. Nevertheless, I will conclude that avoiding researching experience brings more problems that solutions and that contemporary cognitive science is in the need to take researching experience more seriously. I will support this claim in the last part of the article (*Dubious interpretations: Do we really want to avoid first-person data?*) by discussing some empirical examples from the broader area of decision making, where it is relatively obvious that not looking into the experiential part of the mind is especially unsatisfying and problematic. More specifically, I will address the effect of deliberation-without-attention and the cognitive reflection test in the context of dual process theories of cognition.

WHAT KIND OF IRREDUCIBILITY ARE WE TALKING ABOUT: DID VARELA SOLVE THE HARD PROBLEM OF CONSCIOUSNESS?

According to Chalmers [2] and Varela [3] reductionistic explanations will always fail to explain the "what is it like to be" – the essence of what it means to experience something. Varela claims that if we are to explain and understand experience at least to a certain degree, we need to avail ourselves of a different research approach – we need to start using first- and second-person methods and take studying experience seriously. If we stick with reductionistic explanations we will never bridge the explanatory gap [10] between objective and subjective. With the goal of bridging this gap, Varela [3] proposes a methodological solution (neurophenomenology) which strives to combine first- and second-person methods for studying consciousness and human mind, and argues for the irreducibility of experience to some "lower" level (be it quantum or neurophysiological). But before we introduce and discuss Varela's suggestion in more detail, we have to clarify what kind of irreducibility Varela actually has in mind.

Within the context of the question of reducibility of experience Lutz and Thompson [11] differentiate the hard problem of consciousness from the explanatory gap. They argue that the hard problem of consciousness is in fact a metaphysical question about the place of experience in nature, whereas the problem of explanatory gap is an "epistemological and methodological problem of how to relate first-person phenomenological accounts of

experience to third-person cognitive-neuroscientific accounts." [11; p.47] Under this "weaker" interpretation of Varela [3] we have to understand the remedy for the hard problem of consciousness as an attempt of a methodological and epistemological solution and not as an answer to the metaphysical question of the ontological status of consciousness.

Lutz and Thompson also claim that Varela in fact tried to show that Chalmers' question of "[w]hy should physical processing give rise to a rich inner life at all?" [3; p.201] originates from a false assumption about the world and the nature of cognition. Chalmers' question presupposes a strict differentiation between physical (objective) and experiential (subjective), which is denied by Varela's enactivist view [3, 5]. Modern phenomenology is thus many times blamed as being unscientific (unobjective, not studying the "objective" world), but according to Varela, this criticism is unwarranted, since it derives from an illusory view of science. Similarly as Kuhn [12] criticizes the thesis of objectivity of science, claiming that science is always a social endeavour, the phenomenological tradition [3, 5, 13] rejects the strict separation and opposition of objective and subjective, that objectivist science many times takes for granted[6] (for the discussion of these problems in the context of enactivism and neurophenomenology also see Vörös [14]). The phenomenological tradition in my opinion correctly states that studying so called objective phenomena always entails a subjective component, even more so when studying the mind. For example, the scientific community chooses problems worth studying, scientific knowledge is always subjected to verification from the side of a scientific community consisting of individual subjects who decide what belongs to the corpus of scientific knowledge and what not, etc. Nonetheless, both "standard" science and empirical phenomenology (see e.g. [3, 15]) try to achieve a methodologically strict empirical approach to studying consciousness which is open to intersubjective verification of scientists forming the scientific community. From this perspective Varela [3] defends the view that studying experience should be brought back into science. Varela's proposal of the neurophenomenological programme can thus be interpreted as a methodological-epistemological solution of the hard problem of consciousness, but not as the solution to the problem of ontological status of consciousness. From this perspective I agree with Varela that experience is an irreducible phenomenon on the methodological and epistemological level – demanding the right methods (first- and second-person methods), level of knowledge and explanation. In what follows, I will try to explicate in more detail why experience is an irreducible phenomenon on the methodological and epistemological level.

In the context of researching experience, methodological reduction (for methodological reduction in biology see [16]) would mean that experience can be most fruitfully studied at the lowest possible level, e.g. at the electro-chemical level or the level of sub-atomic particles[7]. As is nicely shown by Varela [3], it is hard to imagine how one could study experience on electro-chemical or functional level of the brain and by that explain experiential, first-person perspective of the mind. Studying experience on the level of the brain using for example neuroscientific imaging techniques, and claiming that we have explained experience, is a false belief. If nothing else, when putting forward an explanation of experience, we are always referring to the experiential level about which we all have folk psychological beliefs derived from our own introspections. In this way, the thesis of methodological reduction of experience presupposes the thesis of epistemic reduction. Namely, it implies that we can explain experience using only third-person methods without stepping back to the level of experience in our explanations of data gathered by third-person methods. For the goal of studying a phenomenon is to gain knowledge and to explain the phenomenon.

In the context of researching experience, epistemic reduction (for epistemic reduction in biology see [16]) would mean that we can reduce knowledge about experience gained in the domain of phenomenology, to knowledge gained at some lower level, for example to

knowledge gained in the domain of neuroscience. Even if we had all the knowledge about experience that neuroscience can provide with its methods, our explanation of experience at this level would lack first-person experiential descriptions/explanations, which are an essential part of what we call experience. An especially tenacious problem here is the question of explanatory reduction (a sub-class of epistemic reduction). The thesis of explanatory reduction states that properties of some higher level can be explained by properties of some lower level. Even though we claimed we had explained all properties of the experiential by properties of the brain, our explanation would still not include the first-person perspective. Leaving out the experiential, first-person perspective, would render our explanation of experience incomplete, since an explanation makes sense only if it entails understanding of the phenomenon to be explained. Leaving out the first-person perspective, at least a part of the phenomenon (i.e. experience) would remain unexplained and the reduction would fail. Let us imagine we were able to give a mathematical explanation of experience and that we understood (also on the experiential level?) such an explanation, at least after we got used to the language of mathematics for describing experience. But such an explanation would always, at least implicitly, refer to our own first-person experience which is already knowledge and understanding at a "higher" level. Using concepts such as feeling, consciousness, deliberation, etc., and pretending they have nothing to do with our own (or socially shared) experiential states, is similar to pretending for example there is no such thing as environment (however we conceive of it). Similarly, neurophysiological explanations of mental phenomena as feelings, conscious deliberation, understanding, etc., necessarily include (even though many times implicitly, intuitively) our folk psychological knowledge (and understanding) of the experiential, which does not only come from studying neurophysiological substrates of the mind, but also from our own introspections.

As a result, if we are only studying experience with third-person methods, and based on that try to explain experience, it could easily happen that our conclusions and interpretations of empirical results would be false or inaccurate (as we will see on the example of attention-without-deliberation effect in the last chapter). Hence, I see no reason why we would not avail ourselves of first- and second-person methods phenomenology is offering, and at least try to say more about the experiential part of the mind.

NEUROPHENOMENOLOGY AND PHENOMENOLOGICAL REDUCTION

NEUROPHENOMENOLOGY

Neurophenomenology [3] is a research programme which advocates combining third-person methods of cognitive science and first-person methods of phenomenology: "…only a balanced and disciplined account of both the external and experiential side of an issue can make us move one step closer to bridging the biological mind-experiential mind gap. … The key point here is that by emphasizing a co-determination of both accounts one can explore the bridges, challenges, insights and contradictions between them. This means that both domains of phenomena have equal status in demanding a full attention and respect for their specificity." [3; p.343].

We must strive to create a dialogue between the third- and the first-person view of the human mind. In neurophenomenological studies of Varela's school we gather data on the dynamics of experience and or instance data on the dynamics of global bran activity. After that we can start establishing correlates and bridges between the dynamics of experience and the dynamics of brain activity. This enables us to get a better insight into mutual constraints, contradictions and co-determination of both perspectives. A good example of such research is the study done by Petitmengin et al. [17]. Studying epileptic seizures and the possibility of

their anticipation, researchers nicely showed how it is possible to connect, correlate and reveal co-determinations of the "pheno-dynamic" structure (first-person perspective) and the "neuro-dynamic" structure (third-person perspective) in interictal, preictal and seizure phases. Furthermore, they showed that most subjects learn to anticipate seizures by learning to be aware of their own experience (through the process of second-person interview techniques) opening up the space for developing countermeasures and transformations. Using precise and systematic first- and second-person methods – such as interview techniques used by Petitmengin [15, 17] – and combining them with precise and systematic third-person measuring techniques, we can discover a richer and a more accurate image of consciousness and mind in general.

But because first- and second-person methods are not as developed as methods of third-person cognitive science, we need to put more resources into developing new and improving already existing tools for studying experience. "The so-called hard problem … can only be addressed productively by gathering a research community armed with new pragmatic tools enabling them to develop a science of consciousness. I will claim that no piecemeal empirical correlates, nor purely theoretical principles, will really help us at this stage. We need to turn to a systematic exploration of the only link between mind and consciousness that seems both obvious and natural: the structure of human experience itself." [3; p. 330].

PHENOMENOLOGY AND PHENOMENOLOGICAL REDUCTION

For Varela the foundation of phenomenology "is the re-discovery of the primacy of human experience and its direct, lived quality that is phenomenology's foundational project." [3; p.335]. Phenomenology argues for a methodological path which does not – contrary to the objectivistic, external approach of science – reject experience, but takes it seriously with all the consequences subjectivity brings. Varela describes phenomenology as a "special type of reflection or attitude about our capacity for being conscious." [3; p.335] Even though reflection always uncovers various conscious contents, this naïve or natural attitude which we are used to, contains and unknowingly presupposes "a number of received claims about both the nature of the experiencer and its intended objects." [3; p.336] and by doing that veils our insight into the experiential. "The Archimedean point of phenomenology is to suspend such habitual claims and to catalyse a fresh examination." [3; p.336].

The core of Varela's phenomenology is phenomenological reduction (PhR) which enables a different, more open look into the experiential and its structure. PhR is an embodiment of a special manner of how to be conscious, a special way of how to approach experience and the world. It consists of four main elements: attitude of reduction, intimacy with experience (intuition), invariants (forming intersubjectively valid descriptions of experience) and training (which enables stability necessary for self-observation). In the present article I will describe briefly the first and the last element of PhR – the attitude of reduction and the necessity of training – since my critique of PhR mainly concern the first and the last.

The first element of PhR is the ability to change our attitude from our naïve, habitual natural attitude to that of reduction. "The point is to turn the direction of the movement of thinking from its habitual content-oriented direction backwards towards the arising of thoughts themselves. This is neither more nor less than the very human capacity for reflexivity, and the life-blood of reduction. To engage in reduction is to cultivate a systematic capacity for reflection on the spot thus opening new possibilities within our habitual mind stream. For instance, right now the reader is very likely making some internal remarks concerning what reduction is, what it reminds her of, and so on. To mobilize an attitude of reduction would begin by noticing those automatic thought-patterns, let them flow away, and turn reflection

towards their source." [3; p.337] By bracketing our habitual structuring of experience and suspending our beliefs about how one should experience, the attitude of reduction enables a richer and "deeper" insight into the experiential. Such attitude is fundamentally different to uncritical (unreflective) introspection, which, according to Varela, presupposes that observing experience is simply "looking inwards". Phenomenology, on the other hand claims, that human beings are able to shift from pre-reflective to reflective consciousness [15] in their self-observation which allows the field of experience to remain open and un-smudged by underlying theories and beliefs. "Becoming aware of the pre-reflective part of our experience involves a break with our customary attitude, which tends to be – as we saw earlier – to act without being conscious of the way we are going about it, without even being conscious of this lack of consciousness. We need to divert our attention from 'what', which usually absorbs it entirely, towards 'how'." [15; p.240] For phenomenology this shift in our attitude towards the experiential is essential for researching experience "as it is" and not "as it should be".

But as this shift in our attitude towards the experiential does not come naturally, training and learning are of utmost importance. According to Varela [3], there is a large difference between casual observation of consciousness and disciplined cultivation of PhR. Since the state of PhR is a fragile, unstable state which is not easily attainable, one has to "cultivate the skill to stabilize and deepen one's capacity for attentive bracketing and intuition, as well as the skill for illuminating descriptions ..." [3; pp.337-338] if one wants to achieve systematic study of experience. PhR thus represents a necessary condition for systematic study of experience – according to Varela, there is no other way than to follow the path of PhR. On one hand, the proposal of PhR as an enabling "tool" for studying experience is a well imagined ideal, but on the other hand, I believe it demands too much. If we were to accept his ideal (PhR) as a necessary condition for being able to study experience systematically, his and other first- and second-person methods would be faced with insurmountable problems and rigorous study of experience would seize to be possible.

SOME PROBLEMS OF RESEARCHING EXPERIENCE: DOES VARELA DEMAND TOO MUCH?

If we take Varela's neurophenomenological programme [3] seriously, we have to ascertain that persons researching and reporting on experience are skilled in achieving the phenomenological reduction. The first question that comes to mind, is how do we actually know the person who is self-observing is skilled enough in reaching the state of reduction repeatedly and systematically. Secondly, how do we know whether the state of reduction is stable enough to ensure satisfactory observation and reporting on what is experienced? It might seem obvious to some what it means to shift from the pre-reflective to reflective attitude, but by what criteria should we go by when judging whether this shift really occurred or not? In Varela's and other proposals it is not quite clear how strongly should phenomenological reduction be stabilized to yield a state that would enable acquiring "right" type of data from self-observational reports. A possible answer to this problem would state that subjects only need enough training and learning in PhR. But such an answer is not satisfactory – it does not tell us what kind and how much training is necessary. For one thing, if it is possible to reach a stable state of reduction repeatedly, phenomenology should specify criteria that would help us judge whether this was indeed the case or not (Petitmengin [15] does specify these criteria to a certain degree).

In its search for an answer many phenomenologists stress the importance of studying and integrating various meditative[8] practices with phenomenology [15, 20]. Techniques for developing the state of mindfulness are an example [21] of "tools" for cultivating the attitude towards the experiential similar to that of reduction. Even though such methods hold much

promise in enabling better study of experience, it is not clear, how could we ascertain that a person trained in mindfulness meditation can consistently achieve the attitude of reduction and follow the path of PhR. Also, we should take into account the differences between novice and advanced meditators [22, 23]. I do not claim it is a priori impossible to follow Varela [3] in his methodological proposition. But I do claim this is partly a theoretical question of setting criteria, and partly an empirical question which is in need of a thorough investigation.

On the other hand, it seems that some methods already used in today's phenomenology can give us insights into human experience. But, if we take Varela and rigorousness of training he proposes seriously, we have to admit that today's phenomenological methods do not enable us to study experience systematically. For they mainly do not include such training[9], and are in this way not so different from naïve introspection. It is questionable for example, whether the method of descriptive experience sampling (DES) proposed by Hurlburt [24] is really a good method for researching experience. Subjects get very little training (a few days) in experience sampling, self-observing and describing their own experience. Also, as criticised by Petitmengin [15], DES does not enable subjects to direct their attention to the process of constructing what is found in the field of experience (changing the attitude from "what" to "how"), DES does not lead subjects through various dimensions of experience and DES does not enable increasing the precision of self-observation. Hurlburt and Heavey themselves admit that "DES is not interested in the obscure or the hard to detect. It is interested only in the obvious, the easily apprehensible." [25; p.119].

DES might bring different data than the method prescribed by Varela, but this does not mean it cannot be fruitfully used in researching experience. It has for example already broadened our understanding of different kinds od experiential phenomena [26], it has deepened our understanding of thinking [27, 28] and feelings [29], etc. On the contrary, I believe that the use of diverse rigorous methods is in fact advantageous, even necessary, since it enables comparison of results obtained on different levels and enables mutual constraining already among different first- and second-person methods[10]. From this perspective Varela's requirement of phenomenological reduction – which I think DES for example does not even try to achieve – as a necessary condition for systematic research of experience is too strong and even unacceptable.

Second-person methods (interview techniques) – also partly used in the context of DES – on the other hand enable subjects to a certain degree (or so its proponents claim [15]) to move beyond the problem of training in phenomenological reduction by guiding them through the process of self-observation and reporting on experience. Even though the interview techniques described by Petitmengin [15] are well developed, the question of whether subjects actually attain the state of phenomenological reduction as described by Varela [3] or the state of mindfulness as described by meditative traditions, remains open. I strongly doubt that directing subjects alone can overcome the problem of subjects being relatively unskilled in sef-observing and reporting on experience. It is an empirically open question whether second-person methods lead to experiential reports (data) similar or different to those gathered from subjects that underwent long-term and rigorous training in techniques of self-observation[11]. (Markič [30] discusses similar problems in the context of comparing heterophenomenology and phenomenology).

Furthermore, it seems that if we wish to study mistakes made by untrained subjects (or just how untrained subjects introspect) in tasks that include self-observation, self-awareness and subjective reports, trained subjects are not really an option. An example where we might get different results from trained vs. untrained subjects are Johansson et al.'s [31] experiments on choice blindness. They found out that untrained – the "usual" subjects – in fact do not notice

the change in chosen images of faces and proceed to state reasons for choices they did not make (unbeknownst to subjects, the experimenters switched the images). Even when faces on images were not alike and when subjects had unlimited time for making their choices, approximately 60 % of them still did not notice the switch[12]. The choice blindness phenomenon was also shown in other choice scenarios, from choosing jam [32], to voting choices [33]. These experiments nicely show how we act without being aware of how we act and report of our experience without being aware of what we actually report about.

If phenomenology is right and the right kind of training in self-observation would enable us to confabulate less (since our self-observations would not be as laden by our preconceptions, beliefs and theories about our experience), it would be interesting to do the same experiments with subjects trained in self-observation (e.g. in phenomenological reduction). If phenomenology is right in its assumptions, than results should be different at least in some regards. If this turned out to be true, it would mean that trained subjects cannot be used in experiments where we wanted to study self-observation, self-awareness, subjective reports, etc., i.e. the experience of "average", everyday subjects.

But despite many problems with which studying experience is faced, today's phenomenological methods described above are elaborate and rigorous enough that we could start using them more widely. This would enable the comparison of data obtained by a number of different researchers and comparison of data obtained in similar studies. It is not the use of first- and second-person methods that is problematic. The challenge lies in developing better and better methods for researching experience without which our picture of the mind will remain incomplete or even false.

DUBIOUS INTERPRETATIONS: DO WE REALLY WANT TO AVOID FIRST-PERSON DATA?

Not taking into account first-person, experiential data can lead to false conclusions and interpretations of results. A good example is the deliberation-without-attention effect[13] (DWA) which was "discovered" in the context of the unconscious thought theory (UTT) [35] by Dijksterhuis et al. [36]. Their experiments supposedly showed that unconscious decision making in the context of complex choices leads to better choices that conscious, deliberate decision making. In one of the experiments participants had to choose between four cars. In the first condition they read the description of cars with four characteristics (simple choice scenario) in the other twelve (complex choice scenario). After reading description of cars participants were divided into further two conditions: one group was instructed to think for four minutes about their choice (the condition of conscious thinking with attention on choice (CT)), the other group was instructed to solve anagrams for those four minutes (the condition of unconscious thinking without attention to choice (UT)). After four minutes both groups were instructed to choose the best car (the car having most positive characteristics[14]). In the context of the complex choice scenario results showed that participants in the UT condition chose better cars than participants in CT condition. Authors conclude the article with the following sentence: "Although we investigated choices among consumer products in our studies, there is no a priori reason to assume that the deliberation- without-attention effect does not generalize to other types of choices—political, managerial, or otherwise. In such cases, it should benefit the individual to think consciously about simple matters and to delegate thinking about more complex matters to the unconscious." [36; p.1007].

Even though the question of generalizability of results of the described study to other types of choices (political, managerial, etc.) is not as relevant for the present article, it is worth mentioning, since it shows how naïve and unimaginably overgeneralised the statement

actually is. Choices they studied do not include strong emotional factors, they are done in a safe environment of a laboratory, they are relatively simple, do not include other people and interactions with them, etc., which are all characteristic of more "social" choices (such as political and managerial). Such overgeneralization can potentially have harmful influence on approaching various social issues and decisions.

This experiment is strictly speaking, questionable already at the level of defining positive and negative properties of cars, since the experimenters did not study (also first-person), a) how much properties are comparable and secondly, whether and how they are perceived by participants. Furthermore, Waroquier et al. [37], in later studies of the phenomenon of DWA, showed that approximately 70% of participants (they asked them) chose the best car already in the phase when they were presented with descriptions of cars, i.e. even before they were divided into the CT and UT condition. This means that the statement "unconscious thinking leads to better choices in complex choice scenarios" is simply false[15]. The experiment of Dijksterhuis et al. [36] did not study what it intended to. Moreover, Waroquier et al. [37] showed that deliberate, conscious thinking led to better choices if participants were instructed to remember descriptions instead of being instructed to form impressions about products, which is contrary to predictions of UTT. Last but not least, Waroquier et al. did repeat results of Dijksterhuis et al. showing that participants were less satisfied with their choice in the CT condition [36, 37]. But in Waroquier et al.'s study [37] that only turned out to be true for participants with low level of indecisiveness[16]. On the other hand, participants who showed higher level of indecisiveness were more satisfied with their choices in the CT condition [37]. As has been shown many times in the past, the picture of mental phenomena and mind in general is in fact much more complex than sometimes believed.

In cases of empirical research where differentiating between conscious and unconscious (thinking, etc.) is important, and where we have to know whether subjects are conscious of something or not, we need to avail ourselves of methods that allow us to actually study this – considering subjective reports is necessary. This would shield us, at least to a certain degree, from putting forward ungrounded statements and interpretations of phenomena that are partly unavoidably experiential (see chapter on methodological and epistemic irreducibility of experience). Even though Waroquier et al. [37] did not use any rigorous methods for studying the experiential part of thinking processes in decision making, first- and-second-person methods described in the previous chapter – even though not ideal – seem to be well fitted for such research.

A similar example is the cognitive reflection test (CRT) developed by Frederick which consists of three simple questions: "1) A bat and a ball cost 1,10 US$ in total. The bat costs 1,00 US$ more than the ball. How many cents does the ball cost? _____ cents; 2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes; 3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days." [39, p.27] The CRT is on purpose designed so as to elicit wrong, fast, intuitive and impulsive answers[17]. Frederick – in the line with dual process/system theories of cognition (e.g. [40-42]) – tries to infer that participants who get most answers wrong accept these intuitive answers without further (conscious) deliberation, whereas participants that get more answers correct use more reflective processes[18] (conscious and deliberate processes). His hypothesis might turn out to be correct, but the inference from this simple test to the mode of thinking participants use to solve questions on the test is only indirect. The step from the fact that CRT is solved more correctly by some than others, to the statement that those that solve the test better, use more conscious, reflective "mode" of thinking, is rather large. We could come closer to filling in this gap in our knowledge (not knowing how participants from their subjective perspective really are

solving the test; what kinds of modes of thinking they are using; how much is conscious deliberation involved) by studying the dynamics of experience in a more thorough manner, for example by using systematic second-person interview techniques.

CONCLUSION

In the article I tried to show that Varela's neurophenomenological programme [3] does not solve the hard problem of consciousness, but it does represent a good proposal of how to tackle the hard problem on the methodological and epistemological level. Even though I believe his phenomenology (especially the requirements of phenomenological reduction) demands too much, his basic claim that we have to start studying experience, if we are to understand and explain consciousness and mind in general, is in place. I argued that we should not limit ourselves to one "right" method of studying experience. On the contrary, using many different well developed systematic methods (e.g. DES and various interviewing techniques) would in my opinion enrich our understanding of the mind, since different methods would give us insight into different aspects and levels of the experiential. If we are aware of limitations and assumptions of different first- and second-person methods (same of course holds for third-person methods) and if we invest into developing new and bettering already existing methods, we are on a good way of understanding what seems most intimate to humans – the phenomenon of conscious experience. In this way I agree with Varela that "[t]he nature of 'hard' becomes reframed in two senses: (1) it is hard work to train and stabilize a new methods to explore experience, (2) it is hard to change the habits of science in order for it to accept that new tools are needed for the transformation of what it means to conduct research on mind and for the training of succeeding generations." [3; p.347] Avoiding the subjective, first-person aspect could lead us to a simplistic, incomplete or even false understanding of the mind, which I tried to show on examples from the broader area of decision making. These considerations and examples should remind us that we in fact cannot avoid experience in studying the mind. If we will not at least try to study experience systematically, as part of everyday research practice, "the riddle of the place of experience in science and world will continue to come back, either to be explained away or to be re-claimed as too hard, given what we know." [3; p.347].

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REMARKS

[1]There are of course many theories of cognition that strongly criticise this classical view – most prominently the proponents of enactivism and other more radical theories of embodied cognition, see e.g. [5-7]. But looking more closely at mainstream neuroscientific or cognitive psychology's theories and experiments one hardly finds systematic consideration of experience.

[2]By neurophenomenology Varela is not only referring to the "neuro-part" of cognitive science but to all relevant scientific correlates of experience and approaches to studying the mind that are used in cognitive science.

[3]By phenomenology I refer to empirical, not Husserl's phenomenology, although the latter forms a theoretical basis of the former.

[4]This article is partly based on [9].

[5]Phenomenological tradition would call persons participating in phenomenological experiments co-researchers and not subjects or participants. An important difference which I will not delve into in the present article.

[6]It is not completely clear to which degree the difference between objective and subjective is eliminated in the phenomenological tradition – completely or just partly?

[7]One could of course argue that the lowest possible level for studying experience is actually the level of subjective experience but in fact in cognitive science it is many times implicitly implied that the appropriate level (and methodological tools that go with it) is some level of the brain.

[8]For comparison between traditional meditative practices and western views on meditation see e.g. Walsh and Shapiro [18] and Lutz, Dunne and Davidson [19].

[9]They include some training but not really much in comparison to years and years of training in self-observation of various meditation traditions.

[10]It would be interesting to see whether different systematic interview techniques would give us a similar "landscapes" of modalities of experience as described by Heavey and Hurlburt [25].

[11]A related question is how much (if at all) it is problematic if the mediation of the interviewer and/or being skilled in self-observation changes the experience being observed.

[12]Experimenters took into account all references to the switch in the post-experiment interviews.

[13]This example is also mentioned by Froese et al. [34].

[14]One had 75 % of positive characteristics, other two 50 %, and one 25 %.

[15]For a very relevant critique of the statement that unconscious decision making leads to better choices than conscious decision making see also Baumeister et al. [38]. Baumeister et al. stress the important difference between direct and indirect influences of conscious thoughts on our behaviours, where indirect influences of conscious thoughts are more prominent and stronger than direct ones. In my opinion this is a crucial difference researchers should take into account when studying the role consciousness in various cognitive processes and behaviour.

[16]Data about satisfaction and indecisiveness were gathered by a questionnaire.

[17]The intuitive, impulsive (and wrong) answers which are supposed to come to our minds quickly and are usually accepted without any further deliberation are: (1) 10 cents, (2) 100 minutes and (3) 24 days.

[18]Even top-end university students, such as students of MIT answered in average only 2,18 questions correctly, whereas low-end university students, such as students from the University of Toledo answered only 0,57 questions correctly. The idea is that top-end university students use more reflective, deliberate processes when solving such tasks.

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ZAŠTO TREBAMO JOŠ SUSTAVNIJE PROUČAVATI ISKUSTVO: NEUROFENOMENOLOGIJA I MODERNA KOGNITIVNA ZNANOST

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SAŽETAK

U radu zastupam gledište kako kognitivne znanosti trebaju sustavnije rabiti metode prvog i drugog lica, kao dio svakodnevne istraživačke prakse, ako žele razumjeti ljudski um u cjelosti. Neurofenomenološki program kojega je predložio Varela kao način rješavanja čvrstih problema svjesnosti (npr. problem iskustva) ne omogućava to razumijevanje na ontološkoj razini. No, taj program predstavlja primjereno polazište za sustavnije, metodološki potpunije razmatranje fenomena iskustva. S druge strane, Varelin kriterij fenomenološke redukcije kao nužnog uvjeta sustavnog istraživanja iskustva je prejak. Neovisno o tome i nekim drugim problemima na koje se nailazi prilikom istraživanja iskustva (npr. problem treniranja, pitanja koju vrstu sudionika želimo proučavati), postaje jasnije kako je ozbiljno istraživanje iskustva – iz perspektive prvog i drugog lica – korak kojeg kognitivna znanost mora napraviti. Ovo je posebno prisutno kod istraživanja pojava koje uključuju svjesnost i/ili kod kojih je razlikovanje svjesnog i nesvjesnog procesiranja presudno. Nadalje, prikupljanje iskustvenih podataka bitno je za interpretiranje eksperimentalnih rezultata prikupljenih kvantitativnim metodama, posebno ako se izravno ili neizravno pozivamo na iskustvo u zaključcima i interpretacijama. Za potvrdu ove tvrdnje navedeni su primjeri iz šireg područja odlučivanja (učinak rasprave bez pozornosti, test kognitivne refleksije).

KLJUČNE RIJEČI

iskustvo, (neuro)fenomenologija, redukcija, odlučivanje, svjesno promišljanje

DEMYSTIFYING CONSCIOUSNESS WITH MYSTICISM? COGNITIVE SCIENCE AND MYSTICAL TRADITIONS

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ABSTRACT

The article considers whether, and how, current scientific studies of consciousness might benefit from insights of mystical traditions. Although considerable effort has been expanded towards introducing mysticism into mainstream cognitive science, the topic is still controversial, not least because of the multifariousness of meaning associated with the term (from "illogical thinking" through "visions" and "raptures" to "paranormal" and "psychopathological phenomena"). In the context of the present article, mysticism is defined as a set of practices, beliefs, values etc. developed within a given religious tradition to help the practitioner realize the experiential and existential transformations associated with mystical experiences, i.e. experiences characterized by the breakdown of the subject-object dichotomy. It is then examined in which areas mysticism so defined might provide beneficial for consciousness studies; broadly, three such areas are identified: *phenomenological research* (mysticism as a repository of unique experiential material and practical know-how for rigorous phenomenological analyses), *the problem of the self* (mysticism as a repository of experiential-existential insights into one's fundamental selflessness), and the so-called *hard problem of consciousness* (mysticism as a unique experiential-existential answer to the mind-body problem). It is contended that, contrary to popular belief, cognitive science could benefit from insights and practices found in mystical traditions, especially by way of grounding its findings in the lived experience and thereby (potentially) demystifying some of its self-imposed abstract conundrums.

KEY WORDS

mysticism, philosophy of (cognitive) science, phenomenology, consciousness, epistemology

CLASSIFICATION

APA: 2340, 2380, 2630, 2920

JEL: D83, D89, Z12

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INTRODUCTION[1]

The main goal of this article is to consider whether current studies of consciousness, conducted under the aegis of cognitive science, might benefit from insights of mystical traditions. It is our contention that the answer to this question is in the affirmative, and we will try to substantiate this claim by briefly sketching why, where, and how this exchange between cognitive science and mysticism might take place. Before proceeding, however, it should be noted that this paper makes no pretence of being a comprehensive study of the suggested "points of contact", but is merely a preliminary sketch intended to provide food for additional thought (no more, no less).

Although considerable effort has been expanded towards introducing the insights of mystical traditions into mainstream cognitive science (cf. [1-3]) the topic is still likely to raise many a sceptical eyebrow. Since the term "mysticism" is frequently used as a synonym for "religious experience, mythology, miracles, schizophrenia, hallucinations, trances, altered states of consciousness, alleged psychic powers such as levitation, visions, parapsychology, and in general anything considered irrational, unintelligible, or occult" (e.g. [4]), some of the readers with a more "conventionally scientific bent" might feel ill at ease – and rightly so! – with the prospect of introducing such seemingly obscure topics into what is believed to be a rigorous scientific discipline. To alleviate these worries, however, we would like to point out that this ordinary or "folk" understanding of the term is in stark contrast to how it is normally used in academic circles, particularly in religious studies and philosophy of religion, where it *typically* refers to a particular *set of trans-confessional and trans-cultural experiences* that are said to possess a *unique set of phenomenological characteristics* and are capable of instigating *a profound existential transformation in the life of a mystic*[2]. In order to get a better understanding of what *mysticism* (in the proper sense of the word) stands for, it is therefore necessary to get a better understanding of what *mystical experience* stands for, i.e. to see whether it is possible to elucidate its main phenomenological features.

We will try to do this in two steps. Firstly, it is important to consider what mystical experiences *are not*. Some unusual experiences are frequently associated with mystical experiences, but should not be confused with them; these include: visions, auditions, locutions, trances, ecstasies, paranormal phenomena (telepathy, precognition, clairvoyance etc.) [5-7]. Although these experiences *can* and *do* occur on the "mystical path", they do not qualify as mystical in the strict sense. Different mystics tend to interpret such "accompanying experiences" differently: most frequently, they are perceived as hindrances and thus as something to be avoided or at least ignored; occasionally, however, they are depicted as helpful, but tricky and potentially dangerous guides on one's spiritual journey. Either way, they are normally delineated from mystical experiences *proper*. The words of Grace Jantzen on the status of visions, auditions etc. in Christian mysticism are instructive in this regard: Some of them, like John of the Cross or the author of *The Cloud of Unknowing* give grave warnings against all such experiences, advocating that we should treat them all as demonic in origin and saying caustically that they make people behave 'like sheep with the brain disease'. Others, like Teresa of Avila and Julian of Norwich, are grateful for the visions they have had, and recognize in them the source of much spiritual teaching. Yet even those who are most affirmative of the experiences they have had never see them as essential to spiritual growth, never advocate that others should try to have them too, and certainly never see them as central to what union with God is about [4; p.70].

But if mystical experiences are not to be confused with visions, auditions etc., then what *are* they? Several portrayals of mystical experiences have been proffered, and although they

differ in particularities, they tend to agree in generalities. The most prominent characteristic of "mystical experience proper" seems to be *the breakdown of the subject-object dichotomy*, i.e. of the sense of *my* being separated from *the world*. This breakdown, where both "the self" (interiority) and "the world" (exteriority) are extinguished or transcended, is normally associated with the experience of *oneness* and/or *nothingness*, and entails a *radical transformation* of one's state and manner of being.

For lack of space, I am unable to go into a more detailed phenomenological analysis of mystical experiences (see [8; Ch.1, 8; Ch.3] for a more detailed account), but suffice it to say that the term seems to be covering a *whole spectrum of experiences* distinguished by *how* this subject-object breakdown is realized. On the one end of the spectrum, there are experiences of absolute nothingness/oneness, i.e. experiences emptied of all phenomenological content (sensations, thoughts, volitions, emotions etc.) in which nothing but pure oneness/nothingness is present; and on the other end of the spectrum we find experiences where this nothingness/oneness is present *in* and *through* phenomenological content. Between these two extremes lie experiences in which nothingness/oneness is experientially/existentially realized to a lesser or greater degree. I will refer to the first type of experience as the (experience of) *transcendental (introvertive) Oneness-Nothingness* (TON; corresponding approximately to Forman's Pure Consciousness Event), and to the second type as the (experience of) *lived (extrovertive) Oneness-Nothingness* (LON; corresponding approximately to Forman's Unitive Mystical State), cf. [9, 10]. It seems that most mystical traditions (*contra* Stace, *pro* Forman) put greater value on LON, seeing it as the pinnacle of their spiritual/religious/existential striving.

Now that we have a general (albeit admittedly very sketchy) understanding of mystical experiences it is time to consider how they are related to mysticism in general. In the context of the present article, mysticism will be understood as the *general platform* where mystical experiences are developed, i.e. as a set of different practices, beliefs, values etc. (characteristic of a religious tradition in which the whole process takes place) that help the practitioner realize experiential and existential transformations associated with mystical experiences, cf. [11]. Although individual practices, beliefs etc. may differ from one religio-cultural context to another, they bring about the same type of experience. Particularly important, and in need of special mention in this context, are *meditative/contemplative practices* that are considered to play a particularly important role in the overall process.

POINTS OF CONTACT

Armed with the basic understanding of mysticism and mystical experience, we are now in a position to move on to the central part of our discussion and try to provide a tentative outline of the possibilities for establishing a potentially fruitful and mutually enriching dialogue between mysticism and cognitive science in the field of consciousness studies. This outline will consist of two major parts. In the first part, we will try to elucidate how experiential insights and practical know-how gained and developed by mystical traditions might contribute to current phenomenological research. In the second part, we will then go on to suggest how mysticism might help scientists confront two metaphysical conundrums that have been bedevilling modern cognitive science: the problem of the (unified) self and the so-called hard problem of consciousness. It will be argued that mysticism may provide interesting, if challenging and perhaps even controversial contributions to the study of consciousness, ones that should not be dismissed on *a priori* grounds but deserve full attention.

PHENOMENOLOGICAL RESEARCH

The first area where "mystical lore" might prove of great value is *phenomenological research*. In recent years, the importance of phenomenology in cognitive science has steadily increased, and it has now become generally acknowledged that phenomenology (*pace* cognitivism) is indispensible for the study of consciousness: "For consciousness is essentially an *interior* phenomenon, something we experience *as* subjectivity. Thus if we were not able to identify the subjective phenomena of consciousness directly, that is, subjectively, we would have no way to know which externally observable phenomena were relevant to what phenomena of consciousness, or in what ways" [3]. There are at least two possible ways in which mysticism could contribute to phenomenological research.

EXPERIENTIAL ASPECT

Mystical accounts (written and oral) abound in descriptions of unique experiential (i.e. mystical) states that are (i) normally not present in our ordinary lives and (ii) exhibit surprising phenomenological similarities across cultural and religious traditions. It would seem, then, that they provide precious material for the study of the utmost recesses of consciousness that are unreachable for most. But why should this, aside from sheer intellectual curiosity, matter? What, if anything, consequential can these experiences contribute to our understanding of the normal waking consciousness? There seem to be at least two good reasons for pursuing this type of research. The first reason is best exemplified by drawing a parallel with *pathological experiences*, i.e. experiences that accompany specific physiological or psychological abnormalities. It is an established fact that the scalpel of a disease, albeit usually limited to very few, can be extremely useful in revealing the normal functioning of our mind-body; and it seems plausible to assume that extraordinary experiential states that are *not* abnormal (there are actually good grounds for calling them *hyper*normal) would be equally if not even more revealing in that sense. In words of Robert Forman: From the *pathology* of a very few we have learned a great deal about the relationship of one side of the brain to the other, of two kinds of knowing, of information storage and retrieval, of impulse control etc. Indeed it is common practice to take data about a few unusual individuals and generalize it to the many. Here again we are studying the data of a few. But rather than the pathological, we will be studying people … who are not 'pathological' but unusually self-actualized [1; pp.363-364].

Another reason for the study of mystical experiences relates to the possibility of their being a more "fundamental" mode of experiencing, i.e. a mode that *underlies* our everyday (waking) consciousness. This is probably best seen in TON (also called "pure consciousness [event]"), a state of consciousness that is characterized by absolute absence of all phenomenological content. Just as biologists try to get a better understanding of a complex biological phenomenon (e.g. a living organism) by looking at its simplest form (e.g. *E. Coli*), so cognitive scientists might learn a lot about consciousness by looking at its most rudimentary representatives. And since TON, unlike our everyday consciousness, which is a "an enormously complex stew of thoughts, feelings, sensations, wants, snatches of song, pains, drives, daydreams", is characterized by a state of absolute stillness in which one "neither thinks nor perceives any mental or sensory content", and is therefore completely "perception- and thought-free" [1; pp.360-361], it seems to be the perfect candidate for the job. Moreover, mystics claim that mystical experiences lift an (experiential) veil and reveal that our ordinary (dual) way of perceiving things is actually *secondary and derivative*, i.e. superimposed on a more rudimentary (non-dual) experiential mode. If this were true – and it is a hypothesis that cannot be discarded on *a priori* grounds – it would mean that studying mystical experiences

(in all their guises) provides crucial insights into "the ground, structure and dynamics of consciousness" [3; p.190].

However, not only mystical experiences as such, but also *accompanying* experiences (visions, trances, raptures etc.) can prove immensely valuable. Brian Lancaster has argued convincingly that the study of Jewish, Taoist and Buddhist mysticism might provide useful insights into the nature of everyday consciousness, as these traditions contain rich phenomenological descriptions and practical means of experientially accessing what is normally referred to as "preconscious" or "preattentive" cognitive processes: Research in cognitive neuroscience and depth psychology indicates that normal, mundane, consciousness arises from a complex stage of information processing during which diverse associations to the stimulus (be it sensory, object, a memory or a thought) are accessed preconsciously. ... Put simply, mystical practice seems to entail a shift in the "leading edge" of consciousness such that elements previously obscured (preconscious) enter the clarity of consciousness [2; p.253].

Moreover, texts such as the Buddhist *Abhidharma* contain detailed phenomenological accounts of different conscious states and could therefore help us map the vast and rugged terrain of consciousness. Also, several authors (see e.g. [12, 13]) have pointed out phenomenological similarities between states encountered on a mystical journey and in certain psychopathological states (esp. psychosis). Since mystics seem to be able to successfully master phenomena that overwhelm psychotics (hallucinations, ego-death etc.) a better understanding of processes involved in meditative/contemplative life can have not only *theoretical* (i.e. providing a clearer understanding of how such phenomena occur), but also *practical* implications (i.e. illuminating ways and methods of preventing and/or alleviating such occurrences in psychotic patients).

PRACTICAL ASPECT

This last remark brings us to the next domain in which phenomenological research could be coupled, and thereby enriched, with insights from mystical traditions. Several authors have stressed the need for a skilful application of improved practical methods that would enable a more rigorous and systematic approach to the study of human experience. Shear and Jevning, for example, point to a "significant asymmetry" present in current neurophysiological approaches to consciousness: For while their objective side employs sophisticated scientific methodologies, capable of isolating and evaluating variables completely outside of ken of ordinary sense perception, their subjective side typically uses mere everyday sorts of introspection, capable of isolating only ordinary internal phenomena such as sense perception, imagining and verbal thought … The need for systematic first-person methodologies here is thus starkly apparent" [3; p.109].

Similarly, Francisco Varela calls out for "a systematic exploration of the only link between mind and consciousness that seems both obvious and natural: *the structure of human experience itself*", and emphasizes the need for investigating "the concrete possibilities of a disciplined examination of experience" [14; p.330, 14; p.335].

Rich and multifarious meditative/contemplative practices developed in different mystical traditions seem to be particularly useful in this regard as they provide "a repository of contemplative and phenomenological expertise" for obtaining "precise and detailed first-person accounts of experience". Contemplative mental training "cultivates a capacity for sustained, attentive awareness of the moment-to-moment flux of experience" and could thereby improve our overall understanding of the phenomenological domain [15; p.216, 15; pp.228-229]. Note that the diversity of approaches in different traditions is by no means a hindrance, but an added value, for it is possible that a given tradition "may have gleaned some valuable

knowledge or developed some practice that is not found elsewhere" [16; pp.498-499]. In other words, although meditative/contemplative practices may induce phenomenologically identical experiences, they may differ significantly in their inner dynamics, i.e. in ways how they bring these experiences about, and each tradition could therefore offer unique insights into the structure and dynamics of consciousness.

METAPHYSICAL DILEMMAS

In addition to phenomenological research, mysticism could also engage in a fruitful exchange with cognitive science in addressing certain theoretical puzzles that have persistently bedevilled consciousness studies. Although several such problems exist, we will focus on two that are particularly pressing, i.e. the problem of the (unified) self and the hard problem of consciousness.

THE PROBLEM OF THE (UNIFIED) SELF

It has long been recognized that the notion of a unified, discrete, (semi-)autonomous entity called "the self" is all but unproblematic: On the one hand, even a cursory attention to experience shows us that our experience is always changing and, furthermore, is always dependent on a particular situation. … Yet most of us are convinced of our identities: we have a personality, memories and recollections, and plans and anticipations, which seem to come together in a coherent point of view, a center from which we survey the world, the ground on which we stand [17; p.59].

The currently *predominant* attitude in cognitive science seems to be that this elusive "ego"/"self" is a *beneficial illusion*, a *useful construct* with no independent existence. In words of Daniel Dennett: But the strangest and most wonderful constructions in the whole animal world are the amazing, intricate constructions made by the primate, *Homo sapiens*. Each normal individual of this species makes a *self*. Out of its brain it spins a web of words and deeds, and, like the other creatures, it does not have to know what it is doing; it just does it [18; p.416].

The idea is that mental life in its entirety consists of nothing but *sub-personal* mental processes, and that the sense of self is merely a useful superimposition on this array of unconscious events. To quote Dennett again: So far as I can see, however, every cognitivist theory currently defended or envisaged, functionalist or not, is a theory of the sub-personal level. It is not at all clear to me, indeed, how a psychological theory – as distinct from a philosophical theory – could fail to be a sub-personal theory [19; pp.153-154].

The main problem with this view, however, is that it seems to contradict our everyday experience: although there might be good *scientific* reasons to claim that there are no egos/selves (i.e. that all there exists are unconscious mental [neural?] processes), there seem to be even more persuasive *phenomenological* reasons that such entities do in fact exist. In other words, despite the fact that recent scientific studies seem to indicate that there are no unified selves, *I* still have *the seemingly indelible feeling* of being such a *self* my-*self*.

Mystical traditions based on meditative/contemplative practices concur with scientific claims about the non-existence of unified selves, but do so on different grounds: they claim that "an untrained mind is inevitably deluded over the real nature of mind and consciousness" and that it takes strenuous mental discipline for the "elements previously obscured (preconscious) [to] enter the clarity of consciousness" [2; p.249, 2; p.253]. In other words, mystical traditions claim that it is not only possible to *think* (reflect) on the non-existence of the self, but to actually *make it a living experience*. TON and LON are examples of conscious ego-less states, i.e. experiential states not referring/belonging to any self, and thus provide a phenomenological counterpart to scientific findings with potentially valuable insights into the true nature and origin of the (sense of) self (how and why it emerges, is it possible to live without it etc.). This is the

reason why Varela, Thompson and Rosch felt the question of the self to be "the meeting ground" of (cognitive) science, philosophy and meditative/contemplative traditions: "[A]ll reflective traditions in human history … have challenged the naïve sense of the self" [17; p.59]. And it is our contention that they have done so in different, yet mutually enlightening ways.

THE HARD PROBLEM

Another important area where mystical traditions could prove of value is the so-called "hard problem of consciousness". Chalmers explains: The really hard problem of consciousness is the problem of experience. When we think and perceive, there is a whir of information-processing, but there is also a subjective aspect. … This subjective aspect is experience. … It is undeniable that some organisms are subjects of experience. But the question of how it is that these systems are subjects of experience is perplexing. Why is it that when our cognitive systems engage in visual and auditory information-processing, we have visual or auditory experience: the quality of deep blue, the sensation of middle C [20; p.201]?

At the bottom of the hard problem lies the notorious "explanatory gap" [21] between *subjective, phenomenal* and *objective, physiological* aspects of consciousness.

Several solutions have been proposed throughout the years, but none of them met with unanimous support and approval. One of the suggestions maintains that the problem cannot be solved by a set of conceptual/theoretical "fixes", but demands a radical (existential) reorientation of our attitude towards it. In other words, the hard problem is not so much an intellectual, as it is an *experiential-existential* question: it is dependent on a specific (dualistic) manner of experiencing. To put it more precisely: From Descartes on, the guiding question in Western philosophy has been whether body and mind are one or two distinct substances (properties, levels of description etc.) and what the ontological relationship between them is. … We are suggesting that Descartes' conclusion that he was a thinking thing was the product of his question, and that question was a product of specific practices – those of disembodied, unmindful [i.e. rational, abstract] reflection. … [But] theoretical reflection need not be mindless and disembodied … the mind-body relation or modality is not simply fixed and given but can be fundamentally changed [17; p.28].

In this view, the hard question is a *practical* question: by applying a set of skills/methods that can change our manner of experiencing it is possible to change ("answer away") the nature of the problem: the problem remains problematic only as long as it is *experientially* persuasive, as long as our way of experiencing presents it *as* a problem. "[T]he mind-body issue is not simply a theoretical speculation but is originally a practical, lived experience, involving the mustering of one's whole mind and body. The theoretical is only a reflection on this lived experience" [17; p.28].

It was mentioned that mystical traditions, by cultivating a specific set of practical know-how, can induce radical and long-lasting transformations in our general way of being and experiencing. This is especially prominent in LON where subjectivity and objectivity are experienced non-dualistically, i.e. as "oneness in duality, duality in oneness". In this state, the mind and the body are said to be working as an integrated whole, so the hard problem does not even arise. This, however, introduces an intriguing turn into our discussion. We started off by fearing that mysticism might be something *too obscure*, too out-of-worldly (not rooted in solid, verifiable facts) to be of interest to cognitive science; now, in the face of the hard problem, it seems that it is cognitive science that might be *too abstract*, too out-of-worldly (not rooted in concrete, lived experience) and thus incapable of realizing that some of the problems it struggles with are (perhaps) the creations of (abstract, disembodied) premises it endorses, premises that are derivative on and secondary to the (non-dual, integrated) lived

experience. Could it be that the greatest gift that mysticism could give to cognitive science is to save it from some of its own metaphysical spectres that haunt it – and thus help demystify it?

REMARKS

[1]A more in-depth analysis of interrelations between cognitive science and mysticism is given in [8].
[2]I am fully aware that such a claim is all but trivial. In the academic study of mysticism two general positions have been established: *perennialism* claiming that there exists a phenomenological core of mystical experiences that is identical across cultures, traditions etc., and *constructivism* claiming that no such core exists and that all experiences are culturally constructed. Limited space prevents me from engaging in this interesting and multilayered debate, so I will simply *assume* the validity of a weak perennialist position, a position that I have argued for at length elsewhere (cf. [8], especially Ch.1).

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DEMISTIFICIRANJE SVJESNOSTI MISTICIZMOM? KOGNITIVNA ZNANOST I TRADICIJA MISTICIZMA

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SAŽETAK

Rad razmatra mogu li se, i kako, sadašnja istraživanja svjesnosti unaprijediti uvidima u tradicije misticizma. Iako je znatan napor uložen za uvođenje misticizma u vodeći tok kognitivne znanosti, ova je tema i dalje kontroverzna, ne samo zbog višeznačnosti tog pojma (koja obuhvaćaju značenja od „nelogičnog razmišljanja", preko „vizija" i „ushita" do „paranormalnog" i „psihopatoloških pojava"). U kontekstu ovog rada, misticizam je definiran kao skup radnji, vjerovanja, vrijednosti i sl. razvijenih u okviru dane religijske tradicije kao pomoć praktičarima za provođenje iskustvenih i egzistencijalnih transformacija u skladu s mističnim iskustvima, tj. iskustvima koje karakterizira uklanjanje podvojenosti subjekta i objekta. Zatim je razmotreno u kojim se područjima može ovako definiran misticizam pokazati korisnim za proučavanje svjesnosti. U glavnim crtama, tri takva područja su izdvojena: fenomenološka istraživanja (misticizam kao repozitorij jedinstvenog iskustva i praktičnih tehnika za rigorozne fenomenološke analize), problem suštine ličnosti (misticizam kao repozitorij iskustveno-egzistencijalnih uvida u vlastitu fundamentalnu nesebičnost) i takozvani tvrdi problemi svjesnosti (misticizam kao jedinstveno iskustveno-egzistencijalni odgovor problema duha i tijela). Utvrđeno je kako, suprotno uvriježenom stavu, kognitivnoj znanosti mogu koristiti uvidi i prakse mističkih tradicija, posebno za uklapanje njenih zaključaka u proživljena iskustva a time i (potencijalno) demistificiranje nekih postavljenih apstraktnih problema.

KLJUČNE RIJEČI

misticizam, filozofija (kognitivne) znanosti, fenomenologija, svjesnost, epistemiologija

FLAVOURS OF THOUGHT:
TOWARDS A PHENOMENOLOGY OF
FOOD-RELATED EXPERIENCES

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ABSTRACT

Phenomenology, as the study of structures of subjective experiences and consciousness, finds itself in the persistent struggle to claim its rightful place in contemporary research. Accordingly, this article will point out the relevance of first person reports for interdisciplinary investigations of the brain and mind. This is done by exploring the multidisciplinary field of food studies as a novel *platform* for discussion. The phenomenological inquiry is thus proposed as the *vehicle* and method to access food-related experience. By highlighting the important surplus, essential to grasping the *process* of pristine inner experience we adjoin a new perspective to the common focus on the *content* of experience. Consequently, this will extend the current insights pertinent to food-related research and moreover, give vital implications to our overall construction of concepts in science.

KEY WORDS

CLASSIFICATION

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THE MIND, THE BODY AND THINKING OF PIECRUST

Juxtaposing cognitive sciences and food studies may seem peculiar, but on second thought, commonalities are evident. Both are multidisciplinary fields of research that require a successful collaboration in order to attain comprehensive understanding of cognition-related phenomena of interest. An under-representation of food in academic study seems manifest and potential causes have been detailed by Belasco [1]. Among them, we find the dualistic tradition that prizes the mind over the body. This Western philosophy poses the dilemma whether it is appropriate at all to assign superiority to the mind. Correspondingly, I would like to contrast this disproportionate cognizing aspect, by asserting that the "need for food is our primarily biological drive. Without it, without enough of it, or with the wrong food, we die. Food's importance to our bodies makes it important elsewhere" [2; p.6].

The cognitive sciences concern themselves likewise with highlighting the different understandings of the mind and the centrality of the body and world, as elementary concepts [3]. But contrarily, with a head start, since it 'pays heed' to the 'embodied mind', as Andy Clarke wrote in remark to Merleau-Ponty's work *The Phenomenology of Perception*. By deploying the hitherto existing phenomenological contributions to the study of cognition, what is thus offered is a resulting challenge for balancing out the seeming prevalence of bodily traditions in researching the account of food.

Nevertheless, what does 'thinking of piecrust' have to do with all of this? Let us take a look at it from the distance first. In contemporary scientific research, it seems that it is much about posing problems, identifying and operationalizing concepts or applying techniques, such as functional Magnetic Resonance Imaging (fMRI). Literally, it aims for the *big picture* of i.e. showing the activation of similar brain regions in response to food and drug cues, which they connected to the concepts of *hunger* and *craving* [4]. Ultimately, this leads to the question of *how* we actually construct our understanding of such phenomena; of concepts such as *food cravings*, that are clearly hypothetical constructs and far from directly measurable or observable. When adopting this focus on food, we find studies that integrate those concepts by means of arbitrary rating scales [5], specific foods craved for [6] or even physiological data [7]. These so-called *objective* measures have fortunately been widely criticized for being unspecific [7] in the recent years, yet a prevalence of mechanical approaches to the human body [8] crystalizes. Only on the periphery we will find studies that integrate the human experience.

However, even when studies on food do integrate qualitative research methods, they usually consider only the *content* of experience, i.e. by validating questionnaires [9]. This is where this paper posits the need for a turning point, i.e. for a shift that would integrate the *process* of experience as well. The decisive difference between these two classes of *content* and *process* lies in the first one questioning 'what', which results in interpretations, psychological origins or causal explanations, whereas asking 'how' aims at direct descriptions of lived experience. That is to say, instead of exclusively asking *what* is present in our experience when reporting on a state of *hunger*, we are interested in a direct description of *how* it is experienced. This might reveal 'thinking of piecrust' in inner speech, as mental image or as a memory of e.g. taste, smell or crunchiness. Apparelled by the use of phenomenological methods, it is about revealing the subjective constructs and the conscious integration of food in our daily life, because to my opinion it does matter great *how* something is experience.

The, indisputable, most famous example of involuntary memory elicited by food, is Proust's episode of the madeleine in *Remembrance of Things Past*: "And suddenly the memory revealed itself. The taste was that of the little piece of madeleine which on Sunday mornings

at Combray (because on those mornings I did not go out before mass), when I went to say good morning to her in her bedroom, my aunt Léonie used to give me, dipping it first in her own cup of tea or tisane. The sight of the little madeleine had recalled nothing to my mind before I tasted it; perhaps because I had so often seen such things in the meantime, without tasting them, on the trays in pastry-cooks' windows, that their image had dissociated itself from those Combray days to take its place among others more recent; perhaps because of those memories, so long abandoned and put out of mind, nothing now survived, everything was scattered; the shapes of things, including that of the little scallop-shell of pastry, so richly sensual under its severe, religious folds, were either obliterated or had been so long dormant as to have lost the power of expansion which would have allowed them to resume their place in my consciousness. But when from a long-distant past nothing subsists, after the people are dead, after the things are broken and scattered, taste and smell alone, more fragile but more enduring, more unsubstantial, more persistent, more faithful, remain poised a long time, like souls, remembering, waiting, hoping, amid the ruins of all the rest; and bear unflinchingly, in the tiny and almost impalpable drop of their essence, the vast structure of recollection." [10].

What Proust's exuberant writing does, is skilfully relating description of food directly to memory. Successively, it illustrates how memory is at the core of what we take to be essential for understanding the distinctive capacities of the human mind and cognition. Keep in mind though, that memories are experience-dependent internal representations [11] that do not exist separately from the various *acts* of recall [12]. Such acts are, in fact, the ones we try to capture by means of phenomenological methods (even if not in such an elegant literal manner).

Important to point out is that this paper does not focus on a pure theoretical review or critique on the use of phenomenology in the cognitive sciences, but instead, aspires to connect to areas of food studies by suggesting a methodological design and its potential advances for understanding food-related experiences. Furthermore, a brief overview of selected theories and concepts will be given, for both, the state of the art research in food studies and the study of phenomenology. This will establish a common ground, from which we set off to exploring a phenomenological method for collecting empirical phenomenal data of food-related lived experience. A short excerpt of empirical data acquisition, performed for the purposes of the author's M.Sc. Thesis, will give a feeling for the phenomenal constructs targeted. In line with the metaphor of *flavours of thought*, used in the title of this paper, I adopt the common equalization of taste and flavour as a common misconception, which will be at the forefront of the final discussion. By adjoining the *process* of experience, in an accordingly phenomenological fashion, I promote a novel way of accessing experiences to reveal new nuances for our understanding of the subjective experience of food-related thought. A concluding suggestion on how to methodically address the rich pool of acquired experiential data, will prospect a more systematic approach for the future.

THE PLATFORM: HUMAN EXPERIENCE IN FOOD STUDIES

Before we can discuss how to use food studies as a discourse platform, we first have to consider what it is, and respectively, what it is not. Miller & Deutsch introduced it in their book *Food Studies* as following, "There are many fields that study food itself – its production (agricultural sciences, meat and poultry science, aquaculture); its chemical, physical or biological properties (food science, biochemistry); its physiology when consumed (nutrition); and its preparation (culinary arts). … Food study, then, is not the study of food itself but rather the study of the relationships between food and the human experience." [2; p.1].

Accordingly, contemporary research that is dealing with the phenomena of food, paints a thousands pictures, but mostly about food itself [2; p.1]. What locks into your gaze most

probable will be the frequent motif depicting a love for erroneous detail, i.e. when identifying obesogens (environmental chemicals that are linked to obesity) [13] or connecting the body mass index to the energy balance model in nutritional science [14, 15]. Phenomena related to food, seem to be a topic of increasing attention, descending from simple intake covered by nutrition knowledge [16], to food safety [17] up to public health policies [18]. Food as a figurehead of culture and heritage is likewise nothing new, thus studies on the topic of food are abound. However, reviewing the core of approaches adopted causes a feeling of being in between two minds. On the one hand we encounter a growing appetite for qualitative research in studies of obesity [19-22] and eating disorders [23, 24], as dominant public health issue. But on the other hand, attempts to include qualitative aspects in a descriptive manner as proposed by this paper, remain on the periphery.

As we shift to the study of the relationships between food and the human experience, we are confronted with exemplary phenomena such as *food-cravings*. Clearly, these are normative everyday experiences [25, 26] and yet food-related experiences are predominantly investigated in their potential maladaptive nature [27]. Tiggeman and Kemps likewise criticised this negative construction of *food-cravings*, "For example, food cravings have been associated with binge eating [28, 29], which in turn contributes to both obesity [30] and eating disorders [23, 28]. Food cravings are also associated with guilt [31] and depression [28] and have been shown to impair cognitive performance [32]." [27].

"I think way too much about food." This statement is just one of a manifold you might hear from individuals that are e.g. upset about their attributed 'unhealthy' relation to food. They, or people from their surrounding might label them as a 'foodie' or characterize them in a way that they come to the conclusion that the might experience food in a different, sometimes even erroneous way. Consequently, even more pressing is the need to engage into research of the subjective human experience of food. Suspending the preconceptions that highlight the potential maladaptive nature, and thus delimiting ourselves from prior hypotheses, is vital to our understanding of 'what it is in fact for us', following the words of Merleau-Ponty. It is suggested that *how* we experience food, can give a vibrant insight to our cognitive integration of sensations, perceptions, thoughts and feelings, and such.

THE MINDSET: PHENOMENOLOGY AS A 'STYLE OF THINKING'

Phenomenology, in the most basic sense, is the philosophical study of structures of subjective experiences and consciousness. It is derived from the Greek *phainómenon,* which means 'that which appears'. Phenomenology therefore tries to elucidate the importance of using methods that accesses people's experience of the world.

Founded in the studies of the philosopher Edmund Husserl, together with substantial contributions from others, such as Sartre, Heidegger, Merleau-Ponty, Schütz, de Beauvoir, Bourdieu, Ricoeur, Derrida and Habermas (to only name a few), it is suggested that "it is futile to attempt to identify one single doctrine in phenomenology; rather, it is better to see it as a movement united by a common core" [33]. Drawing from Merleau-Ponty's assertion of a responsible philosopher I act in place that "phenomenology can be practised and identified as a manner or style of thinking, that it existed as a movement before arriving at complete awareness of itself as a philosophy" [3; p.viii]. This 'style of thinking' serves the purpose of the study of human experiences in this paper.

But how is this study of human experiences and consciousness practiced? Phenomenology is the overarching study of essences, but our experience is only accessible through a phenomenological method, according to Merleau-Ponty [3; p.viii]. However, before elaborating the specific phenomenological method proposed (see chapter: *The Vehicle:*

Access Experience Through a Phenomenological Method), it is necessary to clarify some concepts fundamental to the study of phenomenology.

PHENOMENOLOGY IS NOT EQUAL TO INTROSPECTION

It is a common misconception that introspection equalizes phenomenology. A long tradition of studies on introspection focuses on the self-examination of one's own conscious thoughts and feelings [34]. However, in the authors' opinion, it is a misleading equalization. One such argument that supports this stance, was made by Gallagher & Zahavi, in their book *The Phenomenological Mind*: "We are aware of what we experience without using introspection precisely because we have an implicit, non-objectifying, pre-reflective awareness of our own experience as we live it through. At the same time that I see the light, I am aware that I see the light. The awareness in question is not based on reflectively or introspectively turning our attention to our own experience. It is, rather, built into our experience as an essential part of it, and it is precisely this which defines our experience as conscious experience" [35; p.15].

They continued arguing in sense of 'my' and 'other' people's consciousness of the world, that often surrounds the question on whether we understand the concepts and use of other peoples words. Introspection, in this sense, is an important approach for phenomenology, but has no exclusive character for an access to our mind.

OUR DEPENDANCE ON 'WORTBEDEUTUNGEN'

Our means of communication, and thus also the phenomenological method of access, is unsurprisingly dependent on 'Wortbedeutungen' (from German: denoting meanings of words) and 'things said' in verbalized language.

"Seeking the essence of consciousness will therefore not consist in developing the *Wortbedeutung* of consciousness and escaping from existence into the universe of things said; it will consist in rediscovering my actual presence to myself, the fact of my consciousness which is in the last resort what the word and the concept of consciousness mean. Looking for the world's essence is not looking for what it is as an idea once it has been reduced to a theme of discourse; it is looking for what it is as a fact for us, before any thematization." [3; p.xvii].

Evidently, linguistic examination and ideas reduced to themes of discourse are inevitable. To give an example, a reported experience of *hunger* might reflect a preconception of a bodily need for food. But after elaborating on this concept of *hunger* and asking 'what it is in fact for us', something very different might reveal itself. It could have been the sole appetite, triggered by the favourite restaurant we just passed by, or seeing a clock, which rendered this moment to be an appropriate time to eat[1]. Of course, just because our linguistic descriptions may be preconceptions, does not necessarily mean they are misconceptions [36].

Our intuition of conceptual material may include implicit judgements, of whether something is good or bad, healthy or unhealthy, or in the case of food, what's a craving and what's not. However, accessing experience with a phenomenological method means to step back and look at the subjective construction first. We try to suspend the explanation of 'what', and therefore the 'thematized' content for a moment, and ask *how* something was experienced in order to reveal the subjective constructs of the process[2].

This notion is close to a reduction, which Eugen Fink formulated as 'wonder'. The according *reflection*, in Merleau-Ponty's sense "does not withdraw from the world towards the unity of consciousness as the worlds basis, it steps back to watch the forms of transcendence fly up like sparks from fire" [3; p.xv]. This way of 'stepping back' tries to bracket out[3] biases and to

avoid prior theories that confabulate our reflection of experience, and that tempt us to reflect pre-constructed structures[4].

DEBATING PHENOMENOLOGICAL RESEARCH METHODS

It is challenged, that there might be as many kinds of phenomenology as there exists phenomenologists. Looking into the work of a number of phenomenological researchers reveals that they were "extraordinarily diverse in their interests, in their interpretation of the central issues of phenomenology, in their application of what they understood to be the phenomenological method, and in their development of what they took to be the phenomenological programme for the future of philosophy" as posed by Moran [37]. A sceptical tone is thus basal to the historical discourse between interpretations, applications, terminologies and schools.

While restraining from going into details about the long tradition in phenomenology following Husserl, I need to emphasize the importance of his first directive, which advocates to 'return to the things themselves' as the essential matter of *describing*, rather than explaining or analysing. Resuming the previous question of whether we understand the concepts and use of other people's words, the meaning of the 'things said', is the point of divergence (cf. chapter *Phenomenology Is Not Equal To Introspection*)[5]. Therefore, this research is constructing against the grain and delimits itself from prior hypothesis. Instead of locating gaps in existent theories, a phenomenological approach to food-related experiences intends to *problematize* the account of food in science. Doing this, includes investigating 'what it is for us' when someone gives an account of one's experience of *hunger*, *desire*, or a *food craving*[6]. This *problematization*, as advocated by Freire [38], sets the general methodological proposal of posing questions to challenge assumptions and deconstruct the phenomena.

THE VEHICLE: A PHENOMENOLOGICAL METHOD TO ACCESS EXPERIENCE

To avoid any potential misunderstandings and illinterpretations, the aim of this article is neither to give a detailed review of the data analysis, nor the verbal case descriptions and related illustrations of idiographic maps, since this would clearly exceed the scope of this article. Therefore, I will confine to elaborate the framework of the phenomenological method and only provide some empirical examples, drawn from the phenomenological inquiry of the authors' M.Sc. Thesis[7] to give a feeling for the phenomenal constructs targeted in the following chapter.

As mentioned before, phenomenology as the study of essences is only accessible through a phenomenological method according to Merleau-Ponty [3; p.viii]. After setting the general methodological proposal of *problematization* [38] we take a closer look at the specific method suggested for investigation of food-related experiences.

The approach advocated corresponds to empirical phenomenology. According to Aspers, this proceeds from the assumption "that scientific explanation must be grounded in the first-order construction of the actors; that is, in their own meanings. These constructions are then related to the second-order constructions of the scientist" [33].

The basic framework for phenomenological inquiry is drawn from Descriptive Experience Sampling (DES) by Russell Hurlburt [39], a method for investigating random samples of inner experience in participants' natural environments. The usual setting is as follows: "DES subjects carry a random beeper in natural environments; when the beep sounds, they capture their inner experience, jot down notes about it, and report it to an investigator in a subsequent

expositional interview" [39]. A vital modification was implemented by setting an a priori focus on food-related experiences.

Nevertheless, the phenomenological inquiry consists of a procedure[8], which needs to be delimited beyond the mere method description of DES as follows:

> 1) The co-researcher is introduced into the philosophical perspectives and attitudes behind the approach, especially the concept of studying *how* people experience a phenomenon.

> 2) The co-researcher is trained to collect and give descriptive reports according to DES. The following explicatory interviews of this training sampling serve to clarify uncertainties about the method on concrete examples from the everyday lived experience. (This training is excluded from the later data analysis.)

> 3) The actual data acquisition integrates an a priori focus (that is a variant to the former randomly triggered training sampling). The co-researcher is asked to jot down notes, whenever an onset of a food-related experience is noticed. The sampling period is set to 24 hours prior to the scheduled explicatory interview, in which the samples are discussed for a maximum duration of 90 minutes (due to reasons of concentration and accuracy of reports).

> 4) The collected phenomenal data is then analysed and coded by the investigator.

What is vital to note here, is that the chosen phenomenological method does not construe particular concepts such as *food cravings* or *hunger*, by explicitly asking or eliciting them. The phenomenological inquiry solely investigates concepts related to food that arise from the lived experience of co-researchers. Pre-understandings are to be suspended during this process, in order to allow for the revealing of novel nuances that are distinct for the subjective structure of the phenomenon. Observations show that this is well facilitated by questioning *how* something was experienced, since preconceptions are rarely available and usually constrain to content prejudices.

SELECTION OF CO-RESEARCHERS

The fundamental difference in qualitative phenomenological approaches is that we disregard the aspect of representativeness (common to quantitative approaches), until a general knowledge of a phenomenon is available. Thus the only vital question and condition when selecting participants is whether they have specific experiences for the investigated phenomena. A vague idea of expected aspects of the phenomena and interest in participation is necessary.

DATA ANALYSIS

The explicatory interviews are transcribed and then analysed using open coding in grounded theory, by abstracting codes (i.e. statements) and transforming these units into clusters of categories. This can be done in a textual and visual manner for each co-researcher, in which verbalized statements are structured into visual maps of codes that form a general description of the experience. These structured illustrations serve as *idiographic* maps, depicting food-related concepts significant to a co-researcher's experience.

IDIOGRAPHIC MAPS

The core driving-force of this phenomenological underpinning lies in the conducted empirical research itself. The results of this process are designed in an idiographic manner (within-person,

as advocated by Allport [40]) and serve as the basis for case discussions, consisting of three parts[9]:

1) Content categories: individual themes, concepts and descriptions

2) Process categories: modality-specific descriptions (i.e. inner speech, imagery, ...)

3) Discussion: of the subjects' construction of food-related experiences by integrating both content and process categories.

The phenomenological inquiry results in a verbalized and visual illustration for each case, which shall reveal novel nuances of the essential structures underlying the co-researchers discussed experience.

THE DATA: EMPIRICAL PHENOMENOLOGICAL INQUIRY

A food-related experience can occur in numerous distinct ways. It might arise in form of abstract concepts and thoughts, as words present in inner speech [41], as images or memories in mental imagery [42], as bodily feelings, guiding moods or concrete emotions and affect [23]. It can be either externally triggered by perceptual cues, internally triggered due to a feeling or sound signalling hunger or simply a product of our very cognition. The possibilities are abundant and I shall, therefore, provide two more specific examples, taken from the phenomenological inquiry of the author's M.Sc. Thesis.

WHAT IT IS LIKE TO DECIDE WHAT TO BUY IN THE SUPERMARKET

Jake C. reported on the situation when deciding which fruits to buy, with the initial explanation that he decided not to buy oranges. But *how* did this process of pondering and deciding, on whether to buy oranges, was experienced? He reported, "I imagined the whole scene that I am trying to peel off the orange. And then I just gave up. … It's too much." It happened in mental imagery, as a mix of visual imagery and bodily simulation, accompanied by a feeling he described as a 'cutting off', a 'termination' and 'sudden stop'.

WHAT IT IS LIKE TO DRINK TEA[10]

Ima G. reported the emotional shifts when sipping her sweet tea. "I feel the weight, that I'm going down with my feelings and when I have a sip it just goes up again". Her heavy, tired state shifted with every mouthful, from sadness to a satisfaction that her taste buds felt "like jumping from heaven". The overall situation was experienced as a clear blend of feelings and perceptions as her descriptions where very abstract, yet vivid and colourful. "Yea, I felt exactly like that pattern of fabric, as if everything would fit super to the music, a little bit romantic, fragile but at the end deep blue, deep colours".

A significant difference between the two examples is evident. Whereas the first experience shows to be a bodily and cognitive simulation involving imagery, the second one was coined by its emotional feelings and perceptions.

Hurlburt's work *Sampling Inner Experience in Disturbed Affect* included a description of inner experience of bulimia (a feeding and eating disorder according to the Diagnostic and Statistical Manual of Mental Disorders, DSM-5). Though, evidently, in a very specific context, he criticized that aspects of the *process* of thinking and feeling are "in sharp contrast to most modern cognitive theories of psychiatric disorder, which posit content categories as the cause of disorder. For example, Beck held that thoughts whose content is about loss lead to depression (e.g. [43]); and Ellis proposed that thoughts whose content includes 'and that would be awful' lead to emotional upset [44]" [45]. In this sense, he disagreed with the sole reduction of disorders of affect to the reported *content* of diagnosed patients. And rather

emphasized the importance of the overall integration, signified by the *process*, as engaged in, in the descriptions above.

THE DISCUSSION: FLAVOURS OF THOUGHT

This research on food-related experiences explores a phenomenological method, drawn from my training in the field of cognitive science, as well as theory from humanities and social sciences, for practicing interdisciplinary food studies. As introduced, it is sought to adjoin the *process* of experience, to promote a novel way to access experiences and to reveal novel nuances essential for our understanding of the subjective experience of food-related thought.

In line with the metaphor of 'flavours of thought', used in the title of this article, I adopt the common equalization of taste and flavour. This is a common misconception, since the sensation of taste is just one vital component to the integrated experience of flavour in the brain. The incorporation of various segregated information from the taste receptors, olfactory receptors, thermal nociceptors, photoreceptors and hair cells in the ear, is thus combined into one single perceived stimuli we call *flavour* [46]. One might assert at this point, that the *content* of experience denotes only the *taste* of a cognitive system. Consequently, it takes much more than just to look at the *content* reports of *what* happened, to make sense of the *flavour* of experience.

As Hurlburt points at the shortcoming of the sole reduction to the reported content (in disorders of affect, cf. previous chapter *The Data: Empirical Phenomenological Inquiry*), I similarly advance the need for a holistic engagement with the *gestalt* of human experience, by adjoining the *process* as a vital part.

Drawing from the example of lived experience of drinking tea (see chapter *The Data: Empirical Phenomenological Inquiry*), Ima G. reported on an everyday task, to her 'it was nothing special'. Nevertheless, her reports revealed an emotional indecisiveness that showed to be significant for her overall experience of food-related thought. Her described excitement with every mouthful of tea was marked by subsequent switch in mood, where she would feel as if falling into a 'bucket of sadness' after swallowing. Here again, we can identify the *content* as isolated *taste* of experience that only builds up to a comprehensive *flavour* when integrating the lived experience of sensations, perceptions, thoughts and feelings.

I'm confident that this level and qualia[11] of descriptions would have remained hidden, without our engagement into this phenomenological inquiry. Our ways of accessing experience are crucial to our understanding of the subjective construction of food-related experiences. Consequently, in my opinion, a phenomenological approach poses the most promising way to obtain subtle but highly significant nuances. By and large, we have to realize that first-person reports are not plain add-ons to research (or i.e. empirical studies), but moreover, they are at the very core of our findings.

FUTURE OUTLOOK: THE PIE IN THE SKY

My, and the aim of this article, was to provide the wider audience with a first glimpse on the immense potential of a phenomenology of food-related experiences, which reveals characteristics of inner experience that would supposable remain hidden with the current methodologies adopted in the field of food studies.

Nevertheless, intentions to draw clear conclusions from the empirical phenomenal data require further extensive research. The anecdotes of content and process categories outlined, gave only a very small fraction of the empirical data acquired for the M.Sc. Thesis of the author. However, it illustrates insights critical to our understanding of *how* people experience and conceptualize food.

Let us thus finish with some interesting observations and questions that arise from this research. From the aforementioned examples it seems quite likely that individual experiences have a certain significance of modality involved, i.e. in our case, a food-related experience predominantly consisted of emotional hues, bodily perceptions or mental imagery. Now let us assume that each subject shows profound characteristics that identifies a set of modalities, certain patterns and combinations of content and process categories. This particular construction, which we denoted as idiographic approach, gives a within-person map of the subjective construction of lived food-related experience. Subsequently, we thus investigate *flavours* of their personal experiences and acquire insights into the sensations, perceptions, thoughts and feelings of specific subjects.

This idiographic mapping is a strong and legitimate aim on its own right, and may or may not offer general insights. Nevertheless, at some point we might acquire a sufficient phenomenal data set, which allows us to consider new perspectives, such as concerning ourselves with common themes, specific to particular phenomena. To name a potential example, this could be the attempt to identify a more general description that defines the nature of *hunger*, from a data-driven point of view.

This movement between experience, reflection and abstraction poses a very intriguing idea of being able to identify significances that are decisive to certain types of experience. Having said that, there is the need for further engagement in both collecting experiential data and finding novel approaches to analyze the data, when aspiring such a nomothetic understanding of food-related experiences. Vital to point out here is the strong explorative character of this research. Facing the need and great potential of interdisciplinary work, I see promising collaborations with researchers coming from anthropology, etiology, ecology, gestaltism or aesthethics, to only name a very few, and I remain with the uttermost hope for much more research to come.

Lastly, to facilitate an anchor for redrawing the connections between the discussed propositions and chapters, a schematic overview of this article's composition is illustrated in Figure 1. It shows the main components of argument with their corresponding chapter headings as discussed.

REMARKS

[1]These examples have been taken from the author's phenomenological inquiry that was undertaken for her M.Sc. Thesis *Delicate Thoughts: A Phenomenology of Food Cravings*.

[2]From the theoretical and historical development in phenomenology, the chosen differentiation between process and content might be counterintuitive from a position following Husserl. According to his work in *Ideas*, the content of consciousness is equivalent to the act of consciousness. Our reflection on an act of consciousness renders this act to become an intentional object. Consequently our experience of content is only accessible through the act of content (and I posit this equivalent to process). In this sense I do not foster to differentiate those two aspects as concrete entities, i.e. where the process might precede the content, but rather identify the potential of changing the consciousness of access in the process of phenomenological inquiry. By asking 'how', I offer an extraordinary way to our common access to conscious content of experience.

[3]The concept was developed by Edmund Husserl, though a list of renowned scientists have elaborated further on bracketing out the world and presuppositions to identifiy experience in its pure and uncontaminated form. See [47, 48] for phenomenological reduction or [49] for steps of bracketing out.
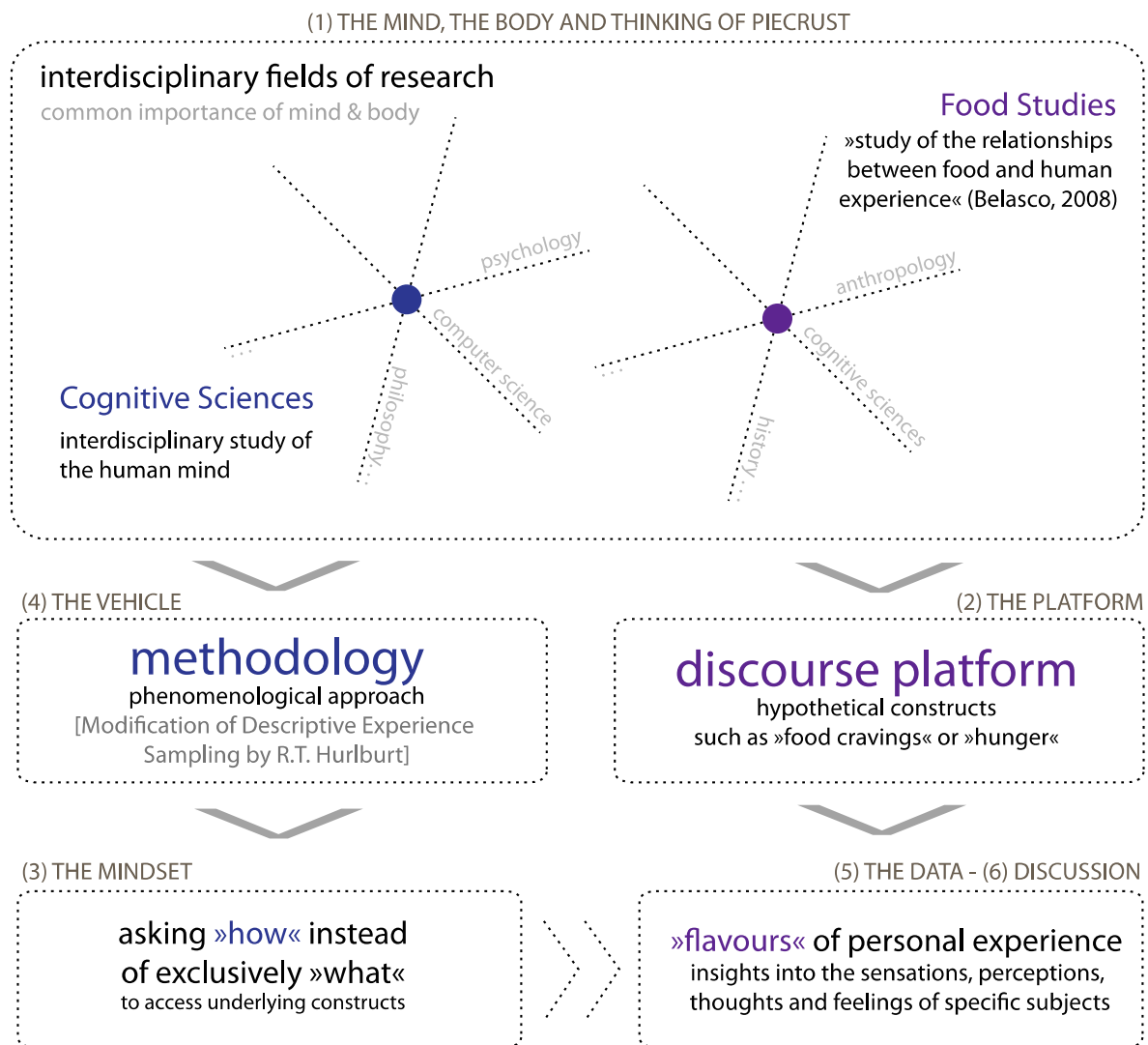
Figure 1. Illustration of this article's composition.

[4]The intention to 'bracket out' the prejudgement and experiences of the investigator will inevitably trace us back to the impossibility to detach personal interpretation. The awareness of the investigators experience being infused into the explicatory interviews as well as the analysis of the data, even if actively limited to a certain degree, is therefore a vital precondition.

[5]The indeterminacy of linguistic reference opens a very own discourse. An inclusion of this would exceed the scope of this article. For reference see literature on the Philosophy of Language, such as [50, 51].

[6]Vital to this note is that the phenomenological method chosen does not construe particular concepts such as *food cravings* or *hunger*, by explicitly asking or eliciting them. The phenomenological inquiry only investigates concepts that arise out of the lived experience of co-researchers.

[7]The empirical examples are drawn from the phenomenological inquiry of the author's M.Sc. Thesis, while for further reviews consult [52, 53].

[8]For similar research designs consult an overview of traditions proposed in [48].

[9]The wording of *content* and *process* was chosen for this research. Differing notations, such as 'textural description' for content and 'structural description' for process are used by Creswell [48] (see 2nd remark for a similar argument).

[10]The inclusion of drinking tea as food-related experience might be counterintuitive to the wider audience. Nevertheless, we have to keep in mind that we investigate samples and concepts as they are lived by the co-researcher. This particular awareness might seem more reasonable, if one accounts for the high appreciation and rooting of tea in Eastern cultures, although it does not coincide with the Slovenian origin of this co-researchers example.

[11]The term 'qualia' is here used as phenomenal character, and thus in its broadest sense of describing a quality or property as it is perceived or experienced by a person. Therefore, I delimit the use of 'qualia' in this article from more restricted uses of the term.

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OKUSI MISLI: PREMA FENOMENOLOGIJI ISKUSTAVA VEZANIH UZ HRANU

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SAŽETAK

Fenomenologija, kao proučavanje struktura subjektivnih iskustava i svjesnosti, stalno nastoji zauzeti mjesto koje joj pripada u suvremenim istraživanjima. Slijedom navedenoga, ovaj rad prvo ističe značaj izvješća u prvom licu za interdisciplinarna istraživanja mozga i uma. To je ostvareno pristupom multidisciplinarnom području istraživanja hrane kao novoj platformi za diskusiju. Fenomenološko propitivanje predloženo je kao metoda dohvata iskustava vezanih za hranu. Isticanjem značajnog viška, esencijalnog za obuhvaćanje procesa istinskog unutarnjeg iskustva, pridodajemo novu perspektivu zajedničkom fokusiranju na sadržaj iskustva. To će proširiti postojeće uvide vezane uz istraživanja hrane te, dodatno, pružiti vitalne posljedice našoj općenitoj konstrukciji koncepta u znanosti.

KLJUČNE RIJEČI

fenomenološko propitivanje, proučavanje hrane, iskustvo, idiografski

EXPLORING PSYCHOLOGICAL FACTORS INFLUENCING DELIBERATION

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ABSTRACT

In contemporary societies there is a growing need to coordinate and legitimize different perspectives. Instead of a dialogical search for consensus polarizing communication still prevails. The legitimacy of formal political institutions and conventional forms of political participation is in decline; increasingly publicly expressed people's need for a greater influence on social developments reveals a deficit in approaches how to include them more actively in discussions on complex social problems. There has been a growing number of theoretical and empirical appeals to advance deliberation within governmental bodies and public institutions, as well as in a form of direct citizen involvement in (organized) face-to-face meetings. Yet, no radical shift has been made (so far), largely due to poor understanding of subjective and intersubjective (psychological) aspects of deliberation – the exploration of these aspects is the aim of this article. The case is being made for using till now unstudied influence of attachment style on the quality of deliberation and on the readiness to transform and coordinate attitudes with others in a deliberative process.

KEY WORDS
deliberation, democracy, attachment style, attitudes, group

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INTRODUCTION

In pluralist fragmented societies there is a growing need to coordinate divided perspectives on issues of public concern in order to reach more legitimate solutions. The increase in information flow and communication channels, enabled by the advance in information and communication technologies, has not (yet) improved proportionally the quality of public discourse. The historically important role of rational argument and debate in the western public sphere instead of a dialogical search for consensus led to the prevalence of polarizing communication preventing efficient cooperation when seeking solutions to accumulated problems [1-3]. The legitimacy of formal political institutions and conventional forms of political participation is in decline [4-6]. Various authors have indeed pointed out the trends such as a withdrawal from public life into privatism, individualism [7, 8], the decline in social capital in terms of the reduction of organizational and associational ties outside the home and workplace [9], but at the same time, we almost daily witness the emergence of new movements, protests, strikes, networks and associations working towards community cooperation (the Arab Spring, 1000 Round Tables in Israel, protests in Greece and Spain, the Occupy Movement, Subversive forum Zagreb, Imagine Chicago, Imagine Nepal etc.). This points toward people's need for a greater influence on social developments, revealing a deficit in approaches how to include people more actively in discussions on complex social problems.

The theoretical, empirical and practical interest in participatory approaches, which promise to revitalize democracy, and improvement of the accountability, legitimacy and responsiveness of decision-making, has been growing rapidly in the West ever since the mid-1980s. There is increasing number of programs, organizations and initiatives undertaken with the aim to increase the quality of the public's opinions or concrete political decisions through face-to-face deliberation on pressing policy issues (among best known and established are Deliberative Polls, National Issues Forums, Citizens Juries, Study Circles, Planning Cells, Consensus Conferences, Scenario Workshops, and there are plenty other citizens' panels, citizens' summits, town meetings etc.). Many deliberations are also run via the Internet (for example convened by meetup.org, moveon.org, e-thepeople.org; and even software such as UnChat has been designed to facilitate deliberations). There has been a growing number of academic appeals to boost the significance of deliberation within governmental bodies and public institutions (i.e., as a feature of representative democracy), as well as in a form of direct citizen involvement in (organized) face-to-face meetings (see e.g. [10-16]).

More than ten years ago, Dryzek [17] has announced the "deliberative turn" in the theoretical investigation of democracy. The significance of that concept is also reflected in an immense growth of empirical approaches to the study of deliberation during the last years (including the so-called empirical turn in studies of deliberative democracy). However, there is no consensus on the definition of deliberation, on how quality deliberation should look or how it should be measured. What is common, though, to all the existing, albeit heterogeneous, theoretical-empirical conceptualizations and practical applications of deliberation, is the understanding that it is a careful and respectful consideration of information and diverse points of view on the issue that affects diverse stakeholders and has relevance on societal level. Deliberation implies that actors listen to each other, reasonably justify their policy positions, show mutual respect and reflect upon and evaluate their interests and needs from the point of view of their generalizability [18].

The majority of the existing literature on democratic deliberation still has a philosophical orientation with an emphasis on the crucial role of rational argumentation and impartiality on the part of the participants. However, in line with more recent emphasis [19, 20] on the

necessity of moving from abstract ideals to conceptualizations considering human psychology, institutional frameworks, and patterns of social inequality, recent years have seen ever louder calls for a broader conceptualization of deliberation (also called dialogical or relational) which includes in the conceptualization and analysis of deliberative processes the emotional, identity, value and interpersonal aspects and alternative communication forms (e.g., story-telling, bargaining, rhetorics, humour, personal experiences sharing) [21-27].

For example, the Discourse Quality Index (DQI) [28, 29], presently the most elaborate approach to the analysis of deliberation in different spheres, originally derived from Habermas' notion of discourse ethics, consists of the following deliberative standards: openness to participation, justification of assertions, consideration of the common good, respect for all participants, counterarguments and others' demands, interactivity, constructive politics, authenticity or honesty (or type I deliberative standards) [28] and in the recent years also story-telling and bargaining (type II deliberative standards) [30, 31].

Even if we consider the socio-emotional and some other "irrational" discursive forms (e.g. self-interest) as deliberative, empirical research shows that participants in discussions do not function deliberatively most of the times [31]. The disillusionment regarding the implementation of well-argumented and just discourse in deliberative processes may, on the one hand, lead to the disillusion of the deliberative ideal; on the other, it calls for a more comprehensive analysis of the factors that foster or hinder deliberation.

Research is especially lacking in the area of subjective and intersubjective (psychological) aspects, both in institutional contexts and in small-group public deliberations [20, 32]. As Elster [33; p.14], vividly argues: "theories of deliberative democracy mostly neglect elementary facts of human psychology." Several authors [19, 20] have pointed out the absence of exploration on the influence of intersubjective orientations on deliberation quality, i.e. how participants in a deliberative process perceive other participants and how they interpret other participants' 2 of themselves. Participants in deliberative processes have usually been classified only on the basis of their demographic characteristics and social background [34, 35].

Deliberation is enacted through discourse; the quality of deliberative outcomes thus varies with the discursive quality [36]. One of the criteria for assessing the success of deliberation is transformation of attitudes on the subject in question at the individual level and resulting convergence at the group level. This shift is far from being achieved very often [31, 37]. Factors that influence it are diverse and also under-researched so far [38, 39], as are psychological factors that affect the transformational potential of attitudes and readiness to harmonize own attitudes with those of others [40, 37].

Therefore, there have been quite some calls to investigate of individual, psychological factors stimulating or hindering deliberation, not only cognitive ones, but also personality [37], affective [41, 42], and motivational factors [43], and also interpersonal and group dynamics in deliberative processes [20, 32, 44]. Black et al. [39], giving the most exhaustive review of the existing methods of measuring various aspects of deliberative processes, expect "that future studies will refine considerably the measures", especially regarding the psychological factors influencing quality of deliberation and outcomes of deliberative processes [39; p.4].

What follows in this article, is firstly a short overview of the existing findings about intrapersonal factors influencing deliberation. Secondly, argument is made for the influence of attachment styles on the quality of deliberation in terms of process and the outcomes – (the readiness for) transformation and coordination of attitudes with others in a deliberative process. Namely, besides being a prominent theory of interpersonal relationships in recent

decades, in recent years the attachment theory proved to be extraordinarily useful in enhancing the understanding of individual differences in group-related performance [45, 46], and characteristics and transformational potentials of attitudes [47-49]. And finally, a proposal for empirical work is made.

ATTITUDINAL AND PERSONALITY FACTORS INFLUENCING DELIBERATION

By definition, deliberation requires from participants to be motivated to debate and to be informed about the topic under discussion (these are two items that are in themselves difficult to achieve in contemporary democracies). In addition, a number of psychological factors have influence on individual's and group's ability to deliberate well and (consequently) on their readiness to change their attitudes; these are not solely cognitive factors which received most attention so far [50], but primarily affective and personality factors. The emphasis on the latter is connected with acknowledging the significance of these factors for successful deliberation in recent years [41, 42].

Psychological factors influencing deliberation can be interpreted in two different ways: in dispositional terms implying that the observed ways of psychological functioning originate in the more or less permanent traits of people; and in functional terms, implying that cognitive and personality functioning depends, to a major degree, on situational factors – i.e., in a large proportion of people these characteristics are malleable to a significant degree [32]. There are good theoretical and empirical arguments on behalf of the functional approach.

The existing research [37, 40] suggests that participants' **ideological bias** has negative impact on deliberation and the likelihood of attitude change in general and changes in the direction of group convergence in particular, while certain personality traits have positive impact. In deliberations, liberal and conservative participants [51] usually move apart from one another attitudinally, with the former more strongly endorsing liberal beliefs and more clearly rejecting conservative ones, and vice versa. Ideologically moderate participants develop more favorable views of liberal beliefs when in predominantly liberal groups, and shift toward conservative view in relatively conservative groups [51]. Wojcieszak [52, 53] arrived at a similar conclusion, emphasizing that **strong attitudes** are very resistant to change and affect the ways in which people process messages, and consequently, their ways of deliberation. Furthermore, she argues that attitude strength is a multi-dimensional construct with many components, for example importance, intensity, certainty, extremity, which, in turn, exert differential effects in the context of deliberation. Especially attitude extremity and intensity which are emotionally based seem to present a hindrance for the reconsideration of biases [52].

As regards the **personalities** of deliberation participants, it has been shown that a move toward common ground or consensus is facilitated by relatively extraverted and conscientious groups respectively by open, expressive, careful participants [37]. Another relevant finding of this study is that the group-level shifts in opinion are related to self-reported deliberativeness, not to observer ratings [37]. It has also been shown that deliberativeness and readiness to transform and harmonize attitudes with those of other participants in deliberative forums are influenced by social value orientations (i.e., cooperation vs. competition and self-interest), high vs. low need for achieving a stable and secure knowledge (need for cognitive closure – i.e. consensus vs. dissent seekers), and a tendency to undertake complex and demanding cognitive tasks (need for cognition, i.e. persuasive and assertive vs. uncertain and ineffective citizens) [54].

The research studies on the psychological factors that influence the attitudes formation and personal ideologies are gaining currency outside the context of deliberative process research

as well [55, 56, 51, 57, 58]. One finding that should be highlighted is the substantial influence of (dispositional or/and situational) (in)security on human functioning. Generally, when people feel insecure, they tend to be more defensive, rigid, aggressive and sensitive to (perceived) emotional threats. Conversely, when people feel secure, they tend to be more open, flexible, pro-social and resilient. And there are more and more proofs showing that individuals' attitudes move in one direction or another as a function of individuals' sense of security or insecurity. At the same time, there are also proofs that situational factors that increase psychological security may override dispositional insecurity.

DELIBERATION AND ATTACHMENT STYLES

Until now, attachment styles have not been taken into account in theoretical-empirical studies of deliberation, although they seem to be highly relevant given their obvious and significant influence on the functioning of individuals within groups and on the shaping of ideologies and attitudes.

Conceptually and methodologically, two approaches to attachment styles can be distinguished: the categorical which assigns each individual to one (pre-defined) attachment style, and the dimensional which measures individuals with regard to anxiety and avoidance. Individuals are then categorized on this basis (the categories' names vary from one author to another). Measuring instruments are also diverse; researchers use either qualitative interviews that require complex qualitative interpretation or self-evaluation questionnaires.

Generally speaking, attachment style is determined by the cumulative experience of attachment to important others in interpersonal relations, can be conceptualized as the combination of two basic continuous dimensions: avoidance and anxiety [59]. Persons scoring low in interpersonal anxiety and avoidance dimensions correspond to the secure style and are characterized by a history of reliable, predictable, and stable interactions with significant others, self-confidence, confidence in others' availability and trustworthiness, and comfort with closeness. Persons with high levels of attachment anxiety in social interactions and interpersonal relationships compulsively desire closeness, have intense needs to be accepted, supported, and admired, and at the same time fear potential rejection. They view others as inconsistent and appraise themselves negatively. Their primary relational goal is to reach security. Persons scoring high on interpersonal attachment avoidance are uncomfortable with intimacy, self-disclosure, interdependence, closeness. They perceive others as untrustworthy, and view themselves as autonomous (avoid relationships, deny the need for closeness) or as undeserving of closeness with control over others as their primary relationship goal [60, 61].

The results from different national samples involving various population categories show that from approximately half to two thirds respondents at the most are securely attached [62]. This implies that we can expect that one third to one half of individuals in deliberative groups will be highly anxious and/or avoidant.

Importantly, research evidence suggests that attachment styles tend to be rather stable from infancy to adulthood [63], nevertheless some authors see them more prone to change, especially with the individual's conscious efforts such as through therapy and mindfulness [64]. Also across relationships, it has been shown that people hold multiple working models organised as a hierarchy [65]. A general, global model is most accessible and is applied when interacting with new people, whereas more specific models concerning types of relationship and particular relationships are activated and applied when interacting with relevant others [66].

Attachment styles have recently begun to be studied in relation to groups as well. Group attachment styles were first postulated by Smith, Murphy and Coats [45]. Using their respondents' most important social group, they showed that individuals' attachment to group construct accurately predicts emotions concerning the group, time and activities shared with a group, social support, collective self-esteem and ways of resolving conflict in the context of a group. In line with Bowlby's [67] notion about the generalization of attachment styles to new interactions and relationships, Rom and Mikulincer [46] showed that in functional, task-oriented small groups interpersonal attachment anxiety contributes to the experience of group attachment anxiety, and interpersonal attachment avoidance contributes to the formation of group attachment avoidance. Given the proven high correlation between attachment styles in interpersonal and group contexts, we will measure only group attachment styles.

More concretely, group attachment anxiety was, for example, characterized by a sense of being unworthy, vulnerable, helpless as a group member, by worries regarding acceptance by a group, appraisal of group interactions as a threat, negative emotional reaction toward them, lower appraisal of group-related self-efficacy. Group attachment avoidance was characterized by the appraisal of closeness to groups as unnecessary and the tendency to avoid dependence on groups or group interdependency. The higher the attachment avoidance, the lower the appraisal of group as a challenge, the higher the negative emotions that group elicits, the more negative the representation of other group members, and the higher the endorsement of distance/self-reliance goals [46]. In terms of individual's contribution to group outcomes, attachment anxiety is associated with impaired instrumental functioning; and attachment avoidance with impaired socio-emotional functioning. Namely, anxiously attached persons' hyperactivating strategies lead them to be more focused on maintaining the positive emotional tone of group interactions than on contributing to task completion. Because desire to be accepted and loved and desire to feel close to others, supported by them is their main preoccupation, they direct psychological resources mainly to the promotion of an atmosphere of acceptance and support among group members and the resolution of any intragroup conflict that could damage this atmosphere. As a result, these hyperactivating strategies draw resources away from task-oriented goals [46]. On the other hand, avoidant persons' deactivating strategies foster a search for emotional and social distance which leads to a dismissal of the socio-emotional realm of group interactions and leads avoidant persons to invest time and energy in the completion of group tasks that do not require any emotional involvement with the group. Their contribution to the promotion of closeness and consensus among group members is poor; in their wish to distance themselves from the group they often even create overt conflicts with other group members [46].

As regards the links between (interpersonal) attachment styles and personal political ideologies (defined and measured as different covariates of unidimensional category – liberalism vs. conservatism), the majority of research evidence links secure attachment to liberalism or covariates of liberalism, and both insecure attachment styles to conservatism or covariates of conservatism. For example, Weber and Federico [47] demonstrated the connection between insecure attachment (avoidant or anxious-ambivalent) and right wing authoritarianism and social dominance orientation.

Many research findings also point out that the readiness or the lack of readiness to change attitudes depends on a particular attachment dimension. For example, securely attached individuals exhibit greater curiosity and information-seeking; lower levels of cognitive closure, mental rigidity, and ethnic stereotyping [68]; greater openness toward outgroup members [69]; a reduced tendency toward worldview defense [70]. Anxious and avoidant attachment have been linked with covariates of (mental) conservatism, including preference for order and predictability, intolerance of ambiguity, dogmatism, and mental rigidity [68];

severe judgments of social transgressions [70]; reliance on stable (and negative) stereotypes when evaluating outgroup members [68, 69]; and an unwillingness to interact with outgroup members [69].

CONCLUSIONS

Taking into account existing theoretical-empirical findings, it seems that (group) attachment styles are a theoretical and empirical construct that promises to reduce the lacking understanding of psychological factors influencing deliberation process. This construct seems especially valuable since it comprises intra-, interpersonal and group functioning; and at the same time cognitive and affective level. Attachment styles seem to be significantly and directly connected with the initial attitudes, and also with the transformation and convergence of attitudes in individuals and group as a whole in a deliberation process. Furthermore, they seem to influence significantly quality of deliberation of both individuals and groups.

Therefore I propose that further research should test the relation between the levels of anxiety and avoidance in individuals and (deliberation) groups, and their attitudes at the beginning of the deliberation process, the changeability of these attitudes in terms of group convergence, and also the relation of these two attachment dimensions with meeting deliberative standards from the communication viewpoint.

A deeper understanding of conditions potentially hindering successful deliberation would help developing more effective deliberation processes, strengthening deliberative competence of all (potential) actors in the public formal and informal public sphere and establishing/building trust in deliberation processes.

This is particularly challenging in Slovenia as a post-transition country with a relatively short democratic tradition, a history of unique Yugoslav system of self-management (that turned into a kind of formal rituals that had no significance in the decision-making process), ideologically polarized (also due to the war and post-war trauma) and underdeveloped deliberative theory and practice.

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ISTRAŽIVANJE PSIHOLOŠKIH FAKTORA KOJI UTJEČU NA NAMJERU

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SAŽETAK

U suvremenim društvima rastuća je potreba koordiniranja i ozakonjenja različitih perspektiva. Umjesto dijaloške potrage za konsenzusom i nadalje prevladava polarizirajuća komunikacija. Legitimnost formalnih političkih institucija i konvencionalnih oblika političkog sudjelovanja je u opadanju; rastuće i javno iskazivane potrebe ljudi za većim utjecajem na društveni razvoj ukazuju na nedostatnost pristupa njihovog aktivnijeg uključivanja u

diskusije o kompleksnim društvenim problemima. Rastući je broj teorijskih i eksperimentalnih poziva za unaprijeđivanje promišljanja unutar vladinih tijela i institucija, kao i u obliku izravnog uključivanja građana na (organiziranim) izravnim skupovima. Ipak, (do sada) nije bilo radikalne promjene, većim dijelom zbog slabog razumijevanja subjektivnih i intersubjektivnih (psiholoških) vidova promišljanja. Istraživanje tih vidova cilj je ovog rada. Upotrijebljen je do sada nerazmatran utjecaj stila privrženosti na kvalitetu prosuđivanja i na spremnost za promjenu i koordiniranje stavova s drugima tijekom procesa prosuđivanja.

KLJUČNE RIJEČI

promišljanja, demokracija, stil privrženosti, stavovi, grupa

NEUROANTHROPOLOGICAL UNDERSTANDING OF COMPLEX COGNITION – NUMEROSITY AND ARITHMETICS

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ABSTRACT

Humankind has a long evolutionary history. When we are trying to understand human complex cognition, it is as well important to look back to entire evolution. I will present the thesis that our biological predispositions and culture, together with natural and social environment, are tightly connected. During ontogenetically development we are shaped by various factors, and they enabled humans to develop some aspects of complex cognition, such as mathematics.

In the beginning of the article I present the importance of natural and cultural evolution in other animals. In the following part, I briefly examine the field of mathematics – numerosity and arithmetic. Presentation of comparative animal studies, mainly made on primates, provides some interesting examples in animals' abilities to separate between different quantities. From abilities for numerosity in animals I continue to neuroscientific studies of humans and our ability to solve simple arithmetic tasks. I also mention cross-cultural studies of arithmetic skills. In the final part of the text I present the field neuroanthropology as a possible new pillar of cognitive science. Finally, it is important to connect human evolution and development with animal cognition studies, but as well with cross-cultural studies in shaping of human ability for numerosity and arithmetic.

KEY WORDS

evolution, cognition, mathematics, numerosity, arithmetic

CLASSIFICATION

APA: 2340, 2400, 2520, 2630, 3040
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INTRODUCTION

Throughout the history of anthropology, the question of humanity and what shapes human beings remains its essential challenge. Some researchers argued that human biology can be analytically separated from culture and that it is meaningful to study only human biological evolution [1]. Nevertheless, scholars [1-5] stress the importance of culture and human history for emergence and development of humanity as a species.

If we separate human biology from environment and culture, it can lead us to deterministic view of human beings. This deterministic assumption implies that we could explain everything with understanding the very beginnings of the species *Homo sapiens*, as well as its other preceding species.

However, is it really possible to understand animals with explanation of their basic behavioural operations? Studies done in natural environment prove the complexity of animal behaviour. The complexity observed in animals is not necessarily internal to the biological frame of the animals' organisms. Behaviour often emerges from the interaction between the animal and the surrounding complex environment [6].

Population-specificity can be observed in humans as well as in populations of, e.g., chimpanzees (*Pan troglodytes*). Let us take for example the use of tools in different populations of chimpanzees. Boesch and Tomassello [7] wrote about their specific behaviours, like ant dipping and leaf clipping, which differ in form and function among many different populations of chimpanzees. Sapolsky and Share [8] reported the emergence of a unique culture in a troop of olive baboons (*Papio anubis*), related to the overall structure and social atmosphere of the troop. This example shows, how can change within the group interaction pattern initiate biological change in its members [9]. Social interactions among animals can thus have profound effects on biology. The latter example shows us the importance of studies in animal cognition and their observations in natural environment, where we can observe how living creatures adapt their behaviour. It is clear that at least social animals do not act just as it is determined by innate fixed rules.

COMPLEXITIES IN BEHAVIOUR – BRAIN EVOLUTION

Examples from animal cognition show clear complexities in behaviour [10]. Behaviour shows higher levels of action in the environment. Growing number of evidence support the thesis that human actions are wired in our brains [3; p.23]. One of the reasons that this is possible is the prematurity of human children. Somewhere in human evolution, there has been a significant extension of the period of dependency, affected by slowing down the rate of maturity. Long period of dependency on parents in humans enabled young to learn to communicate, to adapt to their surroundings, and to participate successfully in a social group [5; p.171]. Therefore, the important questions arise – what are innate properties of brain enabling these processes, and how can we relate brain wiring during the lifespan of a subject to her/his environment and culture.

The humans are well known for the development of a specific social-cognitive niche [1]. According to Whiten and Erdal [11] the main components of the latter are cooperation, egalitarianism, mindreading (theory of mind), language and cultural transmission. The important parts of humankind are also collaboration, teaching and imitation [2, 13, 13]. However, all listed components primarily enabled human to become unique and highly competitive predatory organisms. It is important to note that almost all forms of niche creation are unintentional.

Humans are hyper-social and have access to complex cognitive skills. One of them is also our capability to compute and use of mathematics. Our brain did not develop just to solve mathematical mysteries. We solely developed complex nervous system to survive and reproduce within a given environment. Our basic capabilities, such as spatial orientation and innate computation, which help us finding our way in the surrounding environment, are as important for us as for any other animal species.

Computers are obviously much better in computing than we are. However, the machines are not able to recognize objects, obstacles and they cannot find a way around the world as easy as we do. The important distinction is that humanity developed from other ancestral beings through millions of years of evolution to do these tasks successfully.

One of the main reasons for our success lies in our well-developed and complex nervous system. The first nervous system was developed in animals that had to move and change environment where they lived. The reason why we have the nervous system is the interaction of living creatures with the surroundings and perception of the environment.

On the other hand, we have some abilities that no other animal possesses. The main objective of this paper is actually to argue that complex cognitive skills, such as mathematical reasoning, i.e. numerosity and arithmetic, are an addition achieved as a side-product of the development of specific human culture.

All specific ways of acting, perceiving and knowing, we are accustomed to call cultural, are incorporated, in the course of ontogenetic development, into the neurology, musculature and anatomy of the human organism; thus they are equally facts of biology and culture [3; p.40, 4]. Ingold [4; p.16] suggests that "development thinking allows us to recognize that we are not dealing with separate but parallel systems, respectively biological or cultural, but rather that the biological process of development, of the living human organism in its environment, is precisely the process by which cultural knowledge and skills are inculcated and embodied."

NUMEROSITY AND ARITHMETICS

From the perspective of human evolution, it is thus obvious that the development of mathematical skills was important part of the prospect of our species. In searching for the roots of cognitive grounds for the development of quantification, I will begin with presentation of some animals' capacities to recognize quantity up to number four.

The ability to make consistent rough estimates of the number of objects in a group is called numerosity [14; p.51]. Many animals (pigeons, parrots, raccoons, rats, chimpanzees) have innate capacity for numerosity. Deheane [15] writes about a part of the brain specialized for a sense of quantity. This is inferior parietal cortex, especially angular cortex [14; p.24]. Following Tobias Danzig, Deheane [15; p.xviii] refers to it as number sense. Region active in number processing in humans is the intraparietal sulcus [15; p.239].

Recognizing the quantity leads to very basic arithmetic. Arithmetic uses following capabilities: subitizing, perception of simple arithmetic relationships, the ability to estimate numerosity with close approximation and the ability to calculate and memorize short tables [14; p.26]. Most basic literal aspects of arithmetic are subitizing, instantly recognizing small numbers of items, and a capacity for the simplest forms of adding and subtracting small numbers [14; p.51]. Addition, subtraction, multiplication and division are basic arithmetic operations. More sophisticated mathematics is a lot more than solely arithmetic. Mathematics extends the use of numbers to many other ideas: the numerical study of angle (trigonometry), the numerical study of change (calculus), the numerical study of geometrical forms (analytic geometry) and so on [14; p.47].

STUDIES IN ANIMAL QUANTIFICATION ABILITIES

Researchers in the field of animal cognition stress the importance of mental continuity [16]. Continuity led to the development of humankind. We developed in parallel with other animal species. We share some of the main universal characteristics with other animals. However, unique traits developed in different animal species. For researching the universal traits among different animals we use comparative animal studies.

Comparative studies show that animals are able to count. Experiments with raccoons, canaries, some monkeys and other animals showed that some form of the sense for numbers is widely shared [15]. Studies with rhesus macaques (*Macaca mulatta*) showed that they can distinguish between small numbers (smaller than 4); but when numbers are larger, the ability to distinguish precisely between amounts becomes more difficult [17].

Research done with chimpanzees showed also an ability of abstract addition. The researchers [18] designed two experiments. In the first experiment chimpanzees (*Pan troglodytes*) had to select between two objects (three-quarters of an apple and half an apple), physically more similar to a third one (half-filled glass). The second experiment showed that chimpanzees could mentally combine two fractions. For example, sample stimulus was made of one-quarter apple and half-full glass, and the choice was full disc or three-quarters disc. Chimpanzees chose the latter more often than chance alone would predict. This proved that chimpanzees are able to base theirs responses on conceptual similarity and that they have an intuitive grasp of how these proportions should combine [15; p.14].

It seems that chimpanzees can even do simple addition quite successfully. In an experiment, chimpanzees (*Pan troglodytes*) were introduced with two trays of chocolate chips [19]. The first tray contained two piles. On the first pile there were four chocolate chips, the second pile contained three chocolate chips; altogether that made seven chocolates. The second tray also had two piles. First pile had five chocolate chips and the second pile had one chocolate chip; altogether six. Chimpanzees were successfully selecting the tray with more chocolate chips on it even without training. To achieve the result, they had to preform two additions and the final comparison between sums [15; p.15].

However, animals also make mistakes in comparison of quantity and computations. They are prone to distance effect and magnitude effect [15; p.16]. When comparing two numbers that are closer together, the error rate is higher. This is the distance effect. Magnitude effect happens when compared numbers have equal distances, but compared numbers are larger. Recognizing this fallacies, distance and magnitude effect, demonstrates that animals do not posses a discrete representation of numbers [15; p.16].

Research on animals show we have to take the sense of number [15, 20] as something that exists prior and external to language. Then perhaps, basic arithmetic may also exist without language.

NUMEROSITY AND ARITHMETIC IN HUMANS

The latter example can be observed in studies of patients with damaged language centres of the brain, but can still solve simple arithmetic tasks. Varley and colleagues [21] studied patients with large left-hemisphere perisylvian lesions that led to severe grammatical impairment and some difficulties in processing phonological and orthographic number words. The patients did not have any problem with solving mathematical problems, involving recursiveness and structure-dependent operations. The results demonstrate the independence of mathematical calculations from language grammar in the mature cognitive system [21].

Moreover, the way in which we are solving simple mathematical tasks does not depend on our language per se [21]. The way of solving simple mathematical operations depends on the environment and other cultural factors, such as mathematics' learning strategies and education systems.

Studies connecting experimental and natural conditions in numerical processing shed a light on the parts of the brain connected with numerosity. Research [22] on three subjects used electrocorticography. The controlled part of the experiment used simple arithmetic task, where subjects had to judge the accuracy of complete arithmetic equations (one single digit added to double-digit number) and non-arithmetic memory statements (memory statements without any numerical content). Natural condition was subject normal interaction with environment. They labelled natural events from simultaneous video and intracranial EEG (electroencephalography). Reviewers of the videos had to evaluate the behavioural content of the video; especially whether it had or had not a numerical content; this included numerals, ordinals and quantifiers ('some', 'all' and 'every') when they were combined with quantities and numbers ('some sleep'). Study showed activity in intraparietal sulcus (IPS) in both conditions. This shows towards the importance of connecting numerosity to arithmetic.

Electrophysiological studies with patients show where in brain lays the ability for numerosity and arithmetic. Behavioural studies across different cultures present us with differences in arithmetic.

Comparison across cultures in cognitive arithmetic [23] presented different performance success between students with different origin. Canadian university students – Chinese origin (CC), non-Asian origin (NAC) and Chinese university students educated in Asia (AC) – solved simple arithmetic problems with four basic operations. ACs outperformed CCs and NACs in complex arithmetic task. In simple arithmetic task ACs and CCs were equal, both groups performed better than NACs. Results imply that differences in formal education together with extracurricular culture-specific factors and social environment have an affect on solving arithmetic tasks.

Tang and colleagues [24] did a study with native Chinese and native English speakers. Using functional MRI, they demonstrated different cortical representations of numbers between Chinese and English speakers. Native Chinese speakers engage a visuo-premotor association network for simple task in addition. In comparison, native English speakers largely employ a language process and rely on left perisylvian cortices for the same tasks. Additional observations were done. There was a functional distinction among the brain networks involved in the task for numerical quantity comparison between Chinese and English groups. The interpretation of the difference between Asian and Western performance of addition lies in the neurodynamic differences during mental arithmetic as resulting from habitual use of abacus in primary school, which results in ability of Asians to use visual-spatial simulation for mental calculations. On the other hand, Western subjects used only verbal processing systems [3; p.48].

The latter example represents the important skill-like dimension of culture. The Asians learn or train to use visual-spatial domain of cognition to calculate more efficiently. The presented differences prove that culture and environments, where the humans developed, played much more important role in specific human abilities and manners in task solving. The presented study as well supports Ingold's idea that biological process of development is the process by which cultural knowledge and skills are inculcated and embodied [4].

NEUROANTHROPOLOGY

In the final part of the paper, I present the idea that neuroanthropology represents a very good approach to combine all previously presented examples. We have to understand that

mathematics in humans does not develop because of natural evolution, but is a product of cultural evolution. When we understand it in that kind of manner, we can understand also the biological properties of our ontogenetically developed mind that enable us to compute and solve complex mathematical tasks.

Firstly, we can gain important views on human cognitive abilities from patients and their experiences; as for example does Oliver Sacks who actually called himself a neuroanthropologist [3; p.27]. A study of patients with damaged language centres shows the important fact that mathematical reasoning does not depend only on language. It is, basically, an additional and independent part of our cognition. Furthermore, with cross-cultural studies of mathematics, the so-called ethno-mathematics [25], we gain the knowledge about how our development in specific environment shapes our cognition. For further investigation it would be interesting also to study patients with same lesions raised in different environment. Presented research and views on human mind and cognition also provide new views on education. Further findings in the presented field might also change our educational systems and bring some novel ideas into it.

Neuroanthropology does not focus on broad-based concepts, like habitus and cognitive structure; instead, it focuses on how social and cultural phenomena actually achieve the impact they have on people in material terms [3; p.31]. It is important to take into consideration structural inequalities and differences between people from various places and cultural background. The paper presented such difference between the Asians and the Westerns, which became apparent because of their exposure to different social and cultural environments. Neuroanthropology, with taking such differences in consideration and with linking neuroscience and anthropology, should provide another important pillar of cognitive science [3; p.31].

CONCLUSIONS

When trying to explain some characteristics of human complex cognition – numerosity and arithmetics – we need to take into account our evolution. Firstly, we have to start with simple animals and understand whether it is important for them to know the quantity of predators and conspecifics. This may not necessarily be the knowledge of separate organisms, it may actually be a property of the interactions with and within the ecosystem. From this we can base our understanding of higher animals – mammals and specifically primates. As presented above, we can learn from primate studies that they posess some kind of sense for quantity, and they can even combine the quantities [18-20]. This is from where basic arithmetic is most likely derived.

For now we only know that humans posess more complex understanding of mathematics. We do not know how it developed. The important aspect of human cognition is cumulative culture [2]. In my opinion, one of the most important predispositions for the emergence of accumulation of knowledge and practices in humans is prolonged period of ontogenetical development (childhood period). During this period we are particularly susceptible to the environment, natural and social, and to outside stimulus. Since we can communicate our ideas, imitate and learn [5, 12, 13], our brain shape in the way that we do things; similarly as others in our natural and social environment. These processes also lead from simple quality recognition towards concept of numbers and arithmetics.

Presented examples and studies show possible ways in development of more complex mathematics, which is important skill that shaped humankind. Therefore, it is important to study and combine studies from neuroscience, case studies of patients with damages of certain brain areas and cross-cultural studies. They have a great potential to lead to more

general understanding of the rise of complex human cognition. They also contribute to better understanding of human mind. It may not lead us to universal understanding; however, it will provide solid foundations to the importance of the environment – natural and social – for the wiring of the brain and also our behaviour.

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NEUROANTROPOLOŠKO RAZUMIJEVANJE KOMPLEKSNE KOGNICIJE – BROJNOST I ARITMETIKA

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SAŽETAK

Ljudska vrsta ima dugotrajnu evolucijsku prošlost. U nastojanjima za razumijevanje kompleksne kognicije ljudi važno je imati u vidu cjelokupnu evoluciju. Izložit ću tezu da su naše biološke predispozicije i kultura čvrsto

vezane s našom prirodnom i društvenom okolinom. Tijekom ontogenetskoga razvoja oblikovani smo različitim faktorima. Ti faktori omogućili su ljudima razviti neke vidove kompleksne kognicije, poput matematike.

Na početku rada izlažem važnost prirodne i kulturne evolucije kod drugih životinja. U sljedećem dijelu ukratko izlažem područja matematike – brojnost i aritmetiku. Predstavljanja komparativnih studija životinja, prvenstveno provedenih na primatima, pruža zanimljive primjere o sposobnostima životinja da razluče različite iznose. Od sposobnosti za uočavanje brojnosti kod životinja nastavljam do neuroznanstvenim studija ljudi i naših sposobnosti za rješavanje jednostavnih aritmetičkih zadataka. Također navodim interkulturalna proučavanja aritmetičkih vještina. U zadnjem dijelu rada predstavljam područje neuroantropologije kao mogući novi stub kognitivne znanosti. Na kraju, važno je povezati ljudsku evoluciju i razvoj sa studijama kognicije kod životinja, ali također i s interkulturalnim studijama oblikovanja ljudskih sposobnosti vezanih uz brojnost i aritmetiku.

KLJUČNE RIJEČI

evolucija, kognicija, matematika, brojnost, aritmetika

APPROACHES IN SYNESTHESIA RESEARCH: NEUROCOGNITIVE ASPECTS AND DIAGNOSTIC CRITERIA

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ABSTRACT

Synesthesia is a fairly rare phenomenon in which the subject in contact with certain stimulus in one modality experiences unusual extra sensations in other modalities, such as seeing or feeling colours while listening to music or personifying of letters and numbers. The phenomenon was long perceived to be merely a product of imagination and associations. Latest research, however, is based on a multidisciplinary approach, which includes first-hand synesthetic reports, neuroimaging and behavioural tests used in confirming and explaining the phenomenon's presence as well as its neurophysiological foundations. This article presents an overview of such investigations through the lens of cognitive and psychophysical paradigms, neural models and genetic studies of synesthesia.

KEY WORDS

synesthesia, research methods, cognitive, introspective reports, neural

CLASSIFICATION

APA: 2320, 2340, 2380, 2510, 2520, 2630
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INTRODUCTION

Synesthesia is a phenomenon in which an otherwise normal person, while being stimulated in one modality experiences an emergence of sensations in other modalities. The original ancient Greek meaning is composed from two words: *syn* (joining) and *aisthēsis* (sensation).

Although it is only for the last 200 years that synesthesia has been scientifically defined, it has for a long time been very well known to the mankind through arts. What distinguishes it from the other mental states are its unvoluntarity and automacy.

Synesthesia was first described by Francis Galton, in "Visualized Numerals" [1], where he presented the types of synesthetic experience accompanying mathematical reasoning or the variations of polymodal experience of mathematical concepts, space and time.

As a proof of their distinctive eidetic memory, the synesthetes state their parallel feelings (for example "I know the result is 2, because it is blue."). Synesthesia can include the spatial dimension. This is particularly noticable in the case of so-called "number forms", where the spatial, formal and colour perceptions get synesthetically merged with semantically organized concepts such as alphabet, temperature, months etc. [2, 3].

In the past synesthesia was often dismissed as being exotic and unreliable simply because the state of synesthetic experience could be verified only via subject's first-hand mental state reports [3, 4]. Since there are no direct tests for synesthesia, everything else are mere interpretive tools. Current studies rely on indirect methods of recording brain activity as well as on some of the newer methods of synesthesia 'verification', which employ the observed 'typical features' characteristic of 'synesthetic' experience as their diagnostic criteria.

Probably the most common form is graphem-colour synesthesia. Particularly due to the availability of comparisons and combining of various methodological approaches, most of the studies and experiments are being adjusted to and focused on this type and its subtypes. The key areas of synesthesia research in the last 20 years are: cognitive and psychophysical studies/theories; neural models/ theories; gene studies and studies of localisation of the phenomena by fMRI and other neuroimaging techniques (MR, CT, etc.) [5].

COGNITIVE AND PSYCHOPHYSICAL PARADIGMS

The cognitive and the psychophysical paradigms in synesthesia research are similar in their approaches. They differ mostly in terms of openness and applicability. The behaviouristically grounded approaches have some problems with processing and verifying the synesthetes' introspective reports, as well as with the conclusions derived from them. Reliability of the reports, for example the ones about synesthetic colours, is sought to be confirmed by means of various experiments.

The most common one is the so-called *Revised Test of Genuineness*. It focuses on verifying or rejecting the assumptions that synesthetic associations differ from ordinary associations and that (perhaps also for that reason) the synesthetes possess a much better memory than non-synesthetes do. The test is based on verifying the automatic mnemonic capabilities or consistent ability of retrieving information (of words, sentences, colours). For synesthetes, this specific "information" acts also as a stimulus for the emergence of synesthetic sensations, which could be crucial for absolute remembrance [3, 5].

One of the oldest approaches is Stroop Color-Word Test of Interference. By manipulating the representations of graphems (words or numbers) it checks the reaction time of subjects over the specific stimulus and identifies the presence of automatic sensory response.

The subjects are tested with a list of colour names printed in coloured ink. For example, the word BLUE is printed in congruent (blue) or incongruent (some other) colour [6]. The response time needed for naming the colour and reading the word is much slower in the incongruent conditions, than in the congruent ones. The Stroop test for synesthesia is conducted in the same way as the classical Stroop test, except that the combinations are adjusted to the synesthetes in the group. For a synesthete who sees the number 2 as blue, a 2 represented in blue would appear as congruent, whereas a 2 presented in any other color would appear to him or her as incongruent. The findings are similar: in case of inconsistency between the graphemes and synesthetic colours, the response times of synesthetes are also slower than in the congruent condition, which leads us to believe that the formation of synesthetic colours takes place automatically and involuntary [3, 6].

Albeit exposing the automacy of sensory perception in synesthesia, both of the tests do not contribute to answering the question, whether the synesthetic perceptions are of conceptual or sensory nature. In the last decade new paradigms are seeking to determine what exactly makes the difference between the perceptions of a synesthete and a non-synesthete.

Ten years ago, neuroscientist Ramachandran designed a popular experiment "pop-out" test, in which he presented to subjects the matrices with different graphemes, measuring afterwards the response time needed for recognizing the positions and numbers of specific graphemes in the matrix. Usually a matrix with number 5's is used, in the middle of which a triangle composed of 2's is situated. The control subjects have difficulties in recognising the difference and finding the triangle, whereas to the synesthetes this presents no problem [4, 5, 7].

GENETIC BASIS OF SYNESTHESIA

In his research Galton noticed that significant number of his subjects had relatives who were also synesthetic [1]. Later on nearly all the studies have been mentioning the hypothesis that synesthesia is hereditary. However up to 1990's only few studies have attempted to determine the frequency of occurrence of synesthesia within a given population or to analyse the synesthetes' family history [3]. There are major discrepancies in assessing the frequency of synesthesia, as well as in determining its connection to the family pedigree.

Galton, for example recorded high frequency of the phenomenon in a 1:30 ratio in men and 1:15 in women [1]. Studies that were made four decades later reported exactly the opposite. Synesthesia is estimated to be rather rare with the ability for such experiencing ranging to one person in 25 000 [3]. Due to significant variations, the latter mentioned studies possess a merely general informative value. One of the main reasons for their unreliability is inadequacy of the rated groups, which had been put together on the basis of reactions to an newspaper ad. The tests of last ten years estimate the frequency of synesthesia to be as high as 1 in 200 [4]. In spite of methodological rigidity all the past investigations have been confirming important information: there are two additional parameters within the frequency of synesthesia: the sex of the respondents and their family ties.

Modern research techniques have confirmed the assumption that synesthesia has a close genetic linkage. Up to 40 % of the synesthetes have at least one close relative (parent, sibling, offspring) with the same type of synesthesia, whereas in some families even more different types are present [8, 9]. It is estimated that synesthesia is more common in females than in males, however the direct linkage to X chromosome is not yet fully confirmed.

The two main arguments against the abovementioned assumption are imprecision of past methods as well as the comparative studies of monozygotic twins. Cognitive tests in the 80's and 90's of the 20th century were namely not focused on precise determination of the genetic

locus and were not considering the possibility of population often being unevenly represented in favour of women. The claim of X-chromosome dominance is being challenged also by some of the latest comparative studies of monozygotic twins, that were not both consistent for synesthesia, and by data which shows that the phenomenon may occasionally skip generations or can be inherited through male line [3]. High rate of synesthesia among family members points to inherited abilities, and may at the same time serve as an affirmative argument for physiological or neurological basis of synesthesia.

Genotype does indeed support and to a certain extent influence predisposition of an individual towards specific talents or personality traits. In a similar manner it also influences one's physical attributes.

Let us take as an example a case of simple, yet specific inheritance of a sensory ability such as the ability to taste the PTC substance (present in pickles) as either bitter or tasteless. The proportion of non-tasters ranges from 20 % in African population up to 30 % in European descendants. The ability to taste PTC as bitter is highly specific in that the substance can be recognised by the "taster" only when dissolved in his own saliva and it is therefore not related to overall taste acuity [3]. Cytowic claims that it is not naive to seek a single-gene determinant for synesthetic ability. The argument for such an assumption are current cases, in which a specific gene determines the occurrence of a complex mental phenomenon, as for instance in Tourette's syndrome, in types of X-linked mental deficits, colour blindness and inherited deafness. Results of the tests done on twins suggest the high influence of the hereditary components on susceptibility for certain visual illusions, eidetic (photographic) memory, various optical illusions (afterimages), spatial orientation and for flicker fusion frequency [3]. Similar examples are certain strongly expressed talents. One of the talents that are supposed to be inherited is the musical ability. The family trees of world's famous musicians such as Bach, Mozart and Beethoven speak in favour of such claims. For this kind of inherited ability it is characteristic to emerge early in life, to improve steadily, and persevere among the gifted, independently from the circumstances. A similar development may be spotted in synesthetes as well in terms of possessing a memory of their trait that goes way back into early childhood and is perceived as a natural part of their perception (the latter applies to the developmental synesthesia but not to the acquired one) [3].

At this point we may establish an analogy between synesthesia and the perfect pitch. The latter phenomenon namely also shows high familial incidence, occurring more often in females and invariably manifesting itself at a very early age. Developmental synesthesia and perfect pitch share some further similarities as well, such as the absolute presence of phenomenon. In both cases the skill emerges naturally without the necessity to develop it trough practice [3, 10].

From neurological point of view the perfect pitch is believed to be located in the left planum temporale, more precisely in the auditory cortex [3, 10]. We shall see later on, the neural models of synesthetic perceptions point to the increased activity taking place exactly in the area of planum temporale during synesthetic experience.

NEURAL MODELS OF SYNESTHESIA

In the 19th century, the popular theories of undifferentiated neural activity suggested that synesthesia was caused by an immature nervous system. They linked synesthesia with the normal syn-kinesis (the joining of voluntary movements with involuntary ones), that can be observed in babies. When baby reaches for a toy, he exhibits a flow of involuntary movements of the body and extremities. With the maturity of corticospinal and cerebellar motor pathways and with acquired myelin insulation, a human being is capable of performing

the fine movements separately without transferring them over to other muscle groups. As synesthesia was for a long time considered to be essentially a mental impairment and an accidental perceptual response, the phenomenon was mistaken for some form of atavism or "sensory incontinence" [3].

Two broader theories of neural basis for synesthesia have been developed. They both derive from the confirmed assumption that synesthesia is a neurophysiologically localised phenomenon.

LOCAL CROSSACTIVATION

On the neurophysiological level the models of synesthesia differ according to their initial questions. The two basic questions from which they begin are namely whether synesthetic experience arises from and is conditioned by failed neural pruning or may there be some kind of inability of reducing the long-range disinhibited feedback from the visual system.

The regions that participate in letter and number recognition (the areas of parietal and central lobe) also lie close to the area that participates in colour processing (V4). Due to the close location of both areas there is a high probability of reinforced linking between the two, which can lead to the so-called crossactivation between the area for the grapheme recognition and V4. We may conclude that the extra-colour experience while seeing graphemes is indeed a consequence of crossactivation of V4 area [2]. As the main reason for crossactivation the pruning model points out failed development of synaptic pruning. The development process of pruning is one of the most important mechanisms of synaptic plasticity in which the connections between brain regions are partially curtailed and eliminated during the development. This insufficient pruning is suggested to be the cause of intensive activation of neural pathways between the brain areas, which in the case of a synesthete leads to increased entry of information and therefore to perceptual cross-wiring [5].

The same model might be applied to other forms of synesthesia. Lexical-Gustatory synesthesia, for instance, could emerge due to increased pathways between areas in the depths of lateral sulcus which participates in processing of taste information and is located next to the frontal lobe and thus next to the areas in charge of processing the auditory information [5, 7]. However, it is crucial to point out that the crossactivation model is a hypothetical one which cannot explain all the forms of synesthesia.

LONG-RANGE DISINHIBITED FEEDBACK

The second theory is based on studies which defend the hypothesis that the causes of synesthesia may be attributed to the disinhibited feedback from a "multisensory nexus", such as temporo-parietal-occipital junction [2]. The principle of disinhibited feedback has been established for a long time already. Its main idea is that the information does not only travel from the primary sensory areas to association areas (i.e. the parietal lobe), but that it also travels in the reverse direction, therefore from "high ordered" cortical regions to basic sensory areas. In cases of ordinary responses there is a balance of excitatory and inhibitory postsynaptic potentials. When, however, the response is not appropriately inhibited, the signals from later stages of processing might influence the earlier processing stages [3].

This process might possibly explain why the activation of visual cortical areas in synesthetes is more intense than in non-synesthetes, when listening to sound tones, for example.

The reports about temporary synesthetic-like experiences as a result of psychedelic drug consumption, also speak in favour of this model [3].

DIAGNOSTIC CRITERIA FOR SYNESTHESIA

Synesthesia has a lot of different combinations and types, which differ in the way of development, as well as in their nature and intensity. Due to the heterogeneity and subjective experiences, it is hard to verify synesthesia in the individual. Research is further complicated by the fact that most synesthetes do not even know that their sensory experience is a surveyed and named phenomenon. A scale of certain common general properties that are said to be characteristic for the experience of individuals with so-called idiopathic synesthesia was developed during the 1980's on the basis of the earlier discussed clinical methods and tests. The table describes following characteristics:

SYNESTHESIA IS INVOLUNTARY AND AUTOMATIC

Synesthetes claim that synesthesia can not be hold back or prevented, neither it can be imagined by using humour. Synesthetic response occurs immediately, regardless of their readiness, as an automatic response to an appropriate stimulus [2, 3, 11]. Thus, for example, even if the presented numbers are masked and poorly visible, they still will provoke synesthetic experience. Strong focus of the tested person's mind on something results in weakening of synesthesia. If, however, the person is consciously aware of the stimulus and is at the same time in a relaxed state, the synesthetic perceptions may become more vivid.

Many synesthetes also report their ability of "going back" to a perception or a particular part of the perception that attracts their attention. In this respect we can speak of a kind of manipulation of attention, which can direct the intensity of synesthesia, however this is not the creation of the phenomenon as such. The automatic synesthetic response to stimulus is characterized by the already mentioned phenomenon of perceptual grouping and "pop-out". Individuals with the same type of synesthesia seldom agree on features of their perceptions (number 2 can be for one synesthete yellow and blue for the other), but what they all have in common is the auto-response to the present stimulus in the appropriate conditions.

SYNESTHETIC PERCEPTIONS ARE CONSISTENT AND SIMPLE

One of the key features of synesthesia, allowing for the authenticity of the phenomenon at the individual level to be easily checked, is continuity of synesthetic responses. Associations are established in childhood and remain constantly present throughout life.

These characteristics are also the basis for the aforementioned Baron–Cohen's **Revised Test of Genuineness**, a clinical method that has been in use for two decades now and requires direct involvement of the test person. The test is commonly drawn as a questionnaire with 130 examples of letters and words. It involves nine synesthetes and nine control subjects who have to describe the colour associations by means of a given word list. The entire test group is homogeneous in terms of IQ, memory skills, gender and age. Control subjects reconsider the cases of a word list a week later and the testing of the entire group is repeated after about one year. Matching of the two tests can confirm or rule out the condition of synesthesia in individuals. The level of matching responses between the control group and the whole group stands at 92 % and it can thus be assumed that synesthetic associations are not merely result of memorization, but a memory of a different kind, since the memorized words remain stable even after such a long time as a period of one year [5].

Of course, the stability of the association does not necessarily mean the bringing up of the same associations, as these differ from synesthete to synesthete. The subjective report of Baron-Cohen and other authors of 'genuineness test' also show that synesthetic colour associations are not random. For example, the option that letter A is red, is generally much higher than the same letter in blue or golden colour. Although such descriptions are not new, we

do not have explanations for them [4, 9]. There is also a connection between the continuity and automacy of synesthetic performances. They represent the most important criterion for the authenticity of the phenomenon and go together hand in hand. Synesthetes often label their colours as "strange", ones that we ourselves would not have deliberately chosen [11].

A part of the second criterion is the simplicity of synesthetic perceptions that is connected to the latter's non-obtrusive character. In such associations simplicity means that in various tasks synesthetes are "making a choice" within narrowly limited set of associations. A set of synesthetic responses is limited and simple at the same time, because such response is not a complex perception, but rather an unspecified discernible shape.

Synesthetic perceptions always consist of simple flat shapes, because if they went beyond basic shapes, they would become similar to figurative hallucinations [2].

Unobtrusiveness of synesthetic associations refers to a characteristic of a particular stimulus. This means that the association is never separated from the perception of the stimulus, nor does it completely overshadow it. We recognize the sound of the violin because of its distinctive sound, which is different from, for example, the sound of a drilling machine [3, 11]. Forms which a synesthete sensea are part of synesthetic perception itself, meaning that in our case the violin produces a sound of certain shape.

SYNESTHESIA IS MEMORABLE

We have already mentioned that many synesthetes have very good, and sometimes even a 'photographic' memory. Both, the continuity of synesthetic association, as well as a strong ability of their visualization, contribute to this trait. If one asked synesthetes about the positive traits of synesthesia, they would certainly mention that synesthesia helps them "to remember". "Remembrance" as one of the criteria for authenticating synesthesia, is of course here not meant merely as a generally exceptional memory, but it also means ways for retrieving the stimulus. Synesthetic perceptions are in fact semantically empty and do not bear the emotional content by themselves, which might be the reason why they are easier and more vividly memorable, sometimes even more than the original stimulus [3, 4, 7, 10].

Hypermnesia (exceptionally increased capacity for remembering) and synesthesia are mutually connected, since precisely the additional (synesthetic) information is said to enable the precise remembering and recollection of the sequences such as telephone numbers, names, letters, as well as faces and situations. These memories are clear and "vivid" and to the synesthete appear as equally true as the things directly perceived from the environment.

SYNESTHESIA IS SPATIALLY EXTENDED

Synesthetic associations also differ from the imaginary (imagined) ones in the "projection". "The projection" of synesthetic perception means that percept is assumed to actually exists "out there", and not in the imagination. We have already mentioned that the synesthetes visualize the perception, whereby the synesthesia gets "projected" in front of the person as if it was played on a "screen" put in front of the face or body [3, 11].

The main feature of experiencing projected synesthesia is also the "closeness" of performance itself. Synesthetes are often accompanied by a feeling that the association is very close, "at his/her fingertips", so to speak.

The same is also typical for the "weak synesthetes", i.e. those who are sensing synesthesia with their "inner eye". Again, here the synesthetic association also differs from an ordinary illusion or imagination by the presence of a Euclidean space. Therefore, in synesthesia a strong sense of the physical space of the performance itself is present and exposed [3].

The spatial dimension of synesthesia is particularly outstanding and unusual in the perception of the so-called "number forms" in which there is a synesthetic joining of perceptual qualities of spaciousness, shapes, sounds and colours with different semantically regulated entities such as numbers, months, parts of the day, the amount of voice, temperature, alphabet and so on [3].

The most famous are examples of "mental maps" for time, where each day of the week or month of the year associated with the specified colour and shape (corresponding to the synesthete) while experiencing spatially embedded forms. Of course, the colour-design-space forms are unique for every synesthete. These "numeric forms" are often coloured and create simpler forms such as circles, spirals, twists, as well as a variety of curved schemes.

SYNESTHESIA IS IMBUED BY EMOTIONS

While experiencing synesthesia, synesthetes are accompanied by a feeling of authenticity, a kind of "Heureka!" feeling and with a sense of knowledge, with a firm conviction that what they perceive is true. They rely on their synesthetic perceptions and usually find them pleasant (in rare cases, the feeling is physically uncomfortable) [11, 12].

Everyday assignments (for example, calculating, counting, remembering phone numbers or reading) are imbued by brief, but strong emotions, and are experienced either as "very nice" or seem – when being inconsistent with perceptions – "like biting a rusty metal". Let us take for example a synesthete, who associates days of the week and months of the year with colour-form schemes that include tactile experience. Images of the synesthetic nature contain not only colour but also affects. Synesthetic mental scheme is also required to bear specific emotions and feelings of physical and mental comfort or discomfort [12]. In the discussed case this manifests itself by the units in the represented temporal system each having its own colour and emotion, as for instance:

"…Tuesday is a bluish-grey, sky-colour like diluted copper-sulphate solution. Wednesday is a "soft" shade of brown like that of high-grade chocolate. Thursday is coloured similar to Tuesday, but is more highly saturated. Friday consists of shades of red, blue and yellow. The colours are opaque and pigmented. Saturday is brown, like allspice, with a strong tint of yellow" [12].

In other words, Sunday and Friday stand out in the form and therefore represent more emotional experience to the synesthete than do the other days of the week.

CONCLUSIONS

During the early development of scientific thought synesthesia stood mostly in the focus of humanities and only partially within the domain of natural science. Research was being based above all from the theories on metaphors and associations. Another path of development was opened much later when neuroscience was formed.

Due to its inherently subjective nature, synesthesia was for a long time being pushed aside on part of behaviorists and the interest for the phenomenon was thus to be rekindled only in the last two decades of the previous century. During the past two decades it has become possible to speak of a trend of increased interest in synesthesia, that was fostered by increasingly popular focusing on sensoric experience established in cases of synthetic drugs use, rapid development of informational science, growing interest in methodic brain research by means of mesuring devices and – last but not least – by the invention and development of widely avaliable diagnostics in brain research.

One thing is clear: synesthesia is very heterogeneous phenomenon, with multiple causes and varieties of experience. Therefore understanding of synesthesia can provide us a better insight

into cognitive theories in awareness, automaticity, crossmodality, the role of emotions and numerical cognition.

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PRISTUPI ISTRAŽIVANJU SINESTEZIJE: NEUROKOGNITIVNI ASPEKTI I DIJAGNOSTIČKI KRITERIJI

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SAŽETAK

Sinestezija je rijetka pojava u kojoj subjekt, u kontaktu s određenim stimulusima koji djeluju na jedan način, doživljava neuobičajene dodatne osjete, poput vida ili osjeta boja tijekom slušanja muzike ili personificiranja slova i brojki. Ta je pojava dugo bila smatrana samo posljedicom imaginacije i asocijacija. Međutim, zadnja istraživanja temeljena su na multidisciplinarnom pristupu, koji uključuje izvješća u prvom licu o sinesteziji, oslikavanju neuroloških procesa i testovima ponašanja korištenima za potvrđivanje i objašnjavanje prisutnosti pojave sinestezije i njenih neurofizioloških temelja. Rad analizira takva istraživanja sa stajališta kognitivne i psihofizičke paradigme, neuralnih modela i genetskih studija sinestezije.

KLJUČNE RIJEČI

sinestezija, metode istraživanja, kognitivno, introspektivna izvješća, neuralno

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