



## A LINKAGE OF MIND AND BRAIN: TOWARDS TRANSLATIONAL VALIDITY BETWEEN NEUROBIOLOGY AND PSYCHIATRY

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*Aim: There are prominent discrepancies in the general approaches of psychology and psychiatry, many of them due to diverse and incompatible tacit positions on the mind-brain debate (MBD). For this reason we need to enhance the dialogue with neurosciences and other human sciences relevant to the problems of psychopathology. To achieve such goal we can reduce the level of diversity of mind-brain problem project-solutions as implied in different theoretical models and practices.*

*Arguments: I shall trace the MBD to the one of the most relevant for the modern psychopathology areas: the group of neurosciences. We seek the interference of the philosophical assumptions, the evidence of neuroscience and the development of psychopathology. We prove by a post rem analysis that the reduced group of predominant project-solutions of MBD excludes genuine forms of dualism and extreme forms of physicalism (like epiphenomenalism or eliminative materialism).*

*Conclusion: A predominant group of project-solutions is adopted including complementary combination of contemporary forms of physicalism: identity theory of mind applied to mental events and brain processes; supervenience principle applied to other mental phenomena. **Biomed Rev 2011; 22: 65-76.***

**Key words:** translation, neurobiology, psychiatry, validity

### INTRODUCTION

#### *What are we concerned about?*

I shall attempt to raise two conceptual issues in this *Dance round*. The first of them is how a tacit position in the mind-brain debate reflects the actual knowledge in disciplines concerned in mental health (psychology, psychiatry, and neuroscience). The second issue is that of connectivity or translation between

levels/domains of determination in respect the explanation of mental disorder. Both issues are antecedent or *ante rem* to a greater extent because an „anticipative“ position in the mind-brain debate is implied in any kind of research or practice in mental health as inextricable though sometimes tacit predisposition. However it is also *post rem* or consequent, because the

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translation between levels of determination of psyche is a result of further interpretation of data, acquired in certain disciplinary domains and under different paradigmatic frameworks. The data of psychology, neuroscience etc. related fields is liable or not to transdisciplinary translation depending not on the evidence as it is but on the cognitive attitude to it. This is to say that similar as a cognitive content scientific data depend on the interpretation „angle“ which, in turn is determined by the previously mentioned „preliminary“ position in the mind-brain debate (MBD). Given data along with its theoretical rationale is incorporated in a ‚patchy way‘ into the disciplinary matrices of psychology, psychiatry and neurosciences. Then in a kind of circularity data post rem presupposes a philosophical position and also might justify / criticize it.

Such divergent and incoherent ‘piecemeal’ mental health knowledge fails to meet the criteria of scientific discipline, prescribed by the normative functions of psychiatry and psychology (1). That is why there is desperate need for transdisciplinary convergence of the views in the arena of mental health in order to facilitate the empirical convergence of the data emerging in different disciplinary domains. For instance, modern psychoanalysis makes an effort to develop non-classical dualist position; the gestalt psychology holds some peculiar variation of quasi-materialism, called “psycho physical isomorphism”; biological psychiatry is governed by eliminative materialism and so forth, as different traditions in respect to MBD imply contradictory approaches the diagnostic assessment and treatment in mental health, such as biological medication or psychoanalytic psychotherapy. So when they define a term like ‘paranoia’ or ‘depression’ or ‘anxiety’ they practically imply diverse and incompatible theoretical backgrounds. This was actually the reason for Carl Gustav Hempel and Robert Spitzer’s escape into instrumental and operational taxonomy of DSM proclaimed to be ‘atheoretical’.

I intend to present another resolution to the translational issue driven from more conformable and pragmatic approach to MBD. Eventually my claim will be that once we establish translational bridge laws between the domains of mentality and neural processes without specific polarization towards reduction or emergence, it may facilitate the cross-validation of the terms, notions and methods across different levels of explanation. In this context my intention is to state that this kind of inter-level vertical relationships is actually undermining the possibility of the conformable dialogue and will propose a kind of ‘horizontal’ complementary model which in my perspective is predisposed by a revised form of the identity theory of mind.

### ***Historical background of MBD: a non-conventional epistemological perspective***

In this section I shall apply the divergent-convergent method of Polikarov to the subject of MBD (2,3). There are several reasons for me to believe it is relevant to the topics posed herein: (i) as it will be demonstrated herewith MBD has evolved according to the divergent-convergent model, similarly to many other major problems in history of science, (ii) if considered in the context of convergence of the field of possible project solutions, the data of neuroscience (though sometimes controversial) delineate one major trend: towards formulation of a predominant group of materialist monism views (solutions of the MBP), and (iii) according to the empirical as well as meta-empirical evidence, the metamorphoses of dualism are false as well as some radical forms of the reductive physicalism (e.g. eliminative materialism or epiphenomenalism), and one plausible position might be outlined in a revised form of the identity theory of mind.

Azarya Polikarov (1921-2000) was an eminent philosopher of science in the XX century. One of the most significant and enduring of Polikarov’s contributions is the introduction of the divergent-convergent method (DCM). It was published in 1973 in the Boston Studies in the Philosophy of Science, formulated as the “heuristic approach to problem-solving”. According to DCM scientific problems are penetrated on two stages. At the first an extensive (divergent) “field of possible solutions” is formulated, some of them only hypothetical, others better supported by available data. At the second stage the field is “reduced” (or converged) to a more restricted area of “predominant group of project-solutions”. The mechanism of convergence is usually logical and meta-empirical, i.e. based on scientific evidence. Polikarov defines two variations of predominant project solution: ultimate and alternative. The alternative type is subdivided into combined solutions with higher level of diversity (including radically alternative), and respectively lower level of diversity. DCM is still respected as a methodology of scientific pluralism (though the genuine focus of Polikarov was on heuristics) and its features of critical appraisal make it relevant to meta-empirical, theoretical and meta-theoretical studies.

Divergent-convergent method was recently adopted in the study of the mind-brain problem in psychology and psychiatry. I decided to combine the method of historical reconstruction and DCM in the analysis of the evolution of the mind brain debate. It is well known that a large number of diverse and sometimes radically alternative solutions of the mind - brain problem have been proposed in many scientific traditions:

psychoanalysis, behaviorism, neurophysiology, cognitive neuroscience, philosophy of language and mind. Some of these formulations are pure theoretical constructs; others are more empirical, i.e. supported by observable experimental or clinical data. Nevertheless the incoherence of the whole field, or the dominance of certain “monopolistic” solutions of the mind-brain problem, turned out to be a major source of shortcomings and controversies arising in the real practice and expertise in many professional areas concerned with neuroscience and mental health.

I aimed at reconstructing the debate at two historical and epistemological stages. In the stage of diversification (XVII-XIX century) the preliminary field of possible solutions was spanning from materialist monism to the different prototypes of dualism: Cartesian interactionism, psycho-physical parallelism and other minor bifurcations. My further analysis indicated that during the historical period of the most extensive mind-brain debate (end of XIX - beginning of XX century) a number of revolutionary changes of paradigms emerged, both in mental sciences and neurosciences. Worth mentioning are the neuronal doctrine of Ramon-y-Cajal, chemical neuro-mediation, functional and experimental neurosurgery synaptic ultra-structure and functional plasticity, behaviorist discoveries neuro-psychoanalysis, etc. These trends delivered evidence which made possible the “program integration” agenda of neuroscience and the medical branches of psychology, respectively psychopathology. This integration was promoted in Francis Crick’s doctrine (4). I regarded this process as *ipso facto* convergence of the initial field of possible solutions of the mind brain problem to a reduced field of actually physicalist predominant group of project solutions. I have delineated two combined predominant groups according to the method of Polikarov. The one with higher level of diversity includes all contemporary variations of the materialist monism. The other, with lower level of diversity focuses on two influential types of physicalism: reductive and non-reductive. The main representatives of the reductive trend are the Australian Identity Group, eliminative materialism and epiphenomenalism. The non-reductive physicalism is represented in the supervenience theory, anomalous monism, and partly in the dual-aspect monism (see 20).

## ARGUMENT

My core argument is divided into two counterparts. In the first I shall delineate the state-of-the-art in the area of the predomi-

nant group of project-solutions of MBP as configured in the DCM analysis from the first section of this essay. The second counterpart will engage with the story of the bridging laws as moderators in the MBD in respect to the utmost necessity in translational dialogue across disciplines in mental health (5).

### ***Rendering dualism as significant: metaphysical vs. empirical significance***

I shall adopt here the argumentation against modern dualism as elaborated by Kenneth Kendler in his fundamental paper for *American Journal of Psychiatry* (6). Kendler asserts that:

“We need to reject definitively the belief that mind and brain reflect two fundamentally different and ultimately incommensurable kinds of “stuff.” Rather, in accord with an overwhelming degree of clinical and scientific evidence, we should conclude that the human firstperson world of subjective experience emerges from and is entirely dependent upon brain functioning. The mental world does not exist independently of its physical instantiation in the brain. To reject Cartesian dualism ... means to no longer consider the mental (or functional) to be fundamentally different thing from the biological (or organic). Rather, the mental and the biological become different ways of viewing and/or different levels of analysis of the mind-brain system”

Most of the other forms of the dualistic attempts have been falsified by natural evidence and are no more than intellectual speculations in respect to the scientific effort to explain and manage mental disorders. In this context my claim is that psychophysical dualism plays still an important metaphysical role *only* as a subject for meditations in both analytic and continental philosophy. On the other hand dualism is undeniably suspended with the data of neuroscience. It seems obvious that besides Sir John Eccles more than forty years ago, there is no other scientist from the field of empirical science to any more hold the position of dualism. At the same time dualism does not help to resolve and manage problems of the real people. And philosophy of psychiatry as it was conceived by Bill Fulford aims at the *philosophy-into-practice perspective*, i.e. a program to improve the mental health of the real people.

### ***The type identity theory of mind: challenges and prospects***

I shall ground my further arguments on the views of the British psychologist and philosopher of mind Ullin Thomas

Place (1920-2000). He states that empirical evidence is of critical importance for sustaining of a thesis in the MBD (7). Contrastingly to Davidson, Searle, Putnam, Kim or Churchlands, he used to be a practicing clinical psychologist for NHC throughout a period of 40 years. Hence Place had clear penetration into the obvious miss-understanding between the neuroscientists and the mental health care operators. They use theoretically diverse terms to indicate actually identical events in mental life corresponding to processes in the brain. I shall also refer to another critical construct for my analysis: the “perfect correlation” goal as stated elsewhere (8). So I believe that if patterns of “perfect correlation” are established at least for some of the mental-neural phenomena, this entails a type of identity, which may serve to improve the cooperation of the experts in the field of mental health.

I do not intend to construe a prior discussion as constituting an attempt to establish these forms of physicalism (type or token identity) as necessarily right. Rather I construe my prior analysis as determining these forms as plausible combined predominant group of project solutions of the mind brain problem. Briefly, I intend to set them as: (i) Relevant to the evidence of the modern neuroscience, and (ii) as feasible cognitive explanatory vehicle that can reinforce „*materialism as a scientific hypothesis*“ (7). In summary my goal is to demonstrate a cognitive ‘route’ for heuristic and pluralistic way of solution of the mind-brain problem in efficient dialogue with neuroscience.

Originally, the type identity theory of mind was grounded on a group of evidence from experimental and clinical neuroscience, the excitation of the c-fibers in the nervous system correlated with the psychic experience of pain, contrastingly to the excitation of the A delta fibers as a correlate of the mere reception of the pain. Moreover a variety of other considerations were raised from empirical material, such as the evidence of the ‘blind-sight’; prefrontal lobotomy; administration of Lysergic acid diethylamide and other biological agents inducing changes in experience and behavior.

As far as many authors define and understand the issue of psychophysical identity in their own manner, let me try to summarize my assumption for this subject of analysis. Mental states (processes and events) do correlate in time and space with brain processes (or events - dependent on the experimental paradigm). This assumption seems not to be challenged so far. One may find it appropriate to specify that these correlations are revealed in humans (and mammals) in one possible reality (world) to be assessed by certain methods. These limitations

as introduced by Putnam and other anti-reductionists actually serve to delineate some features of feasibility the identity or any other robust physicalist thesis. Still the implication of the anti-reductionists goes far beyond such denomination of ‘feasibility’. They use the idea that mental states might be composed of different elements in another possible reality as argument to undermine and deny the very foundations of the strict physicalism. There is made an attempt in this *Dance Round* to demonstrate how meta-empirical analysis may question this approach. This entails the conclusion that whilst materialism in some of its modern expressions still underpins the constructions of psychiatry and psychology as robust scientific disciplines, dualism and the radical forms of materialism remain of metaphysical significance without correspondence to the practical and scientific reality.

Another contested facet in the identity theory of mind is the role of causality. It is the causal implication made from brain processes to mental phenomena and backwards which delineates the distinctions between the different kinds of physicalist theories of mind. I consolidate these two points to argue why dualism and epiphenomenalism (6) and eliminative materialism (9) are false as well.

Further I shall define the range of the plausible pluralistic account of mind brain problem has been limited to identity theory of mind and supervenience. Finally I shall employ Thornton’s critical account on supervenience as incapable to capture the ‘interface problem’ to further converge the field of possible project solutions of the mind-body problem.

In his 1960 paper “Materialism as a scientific hypothesis” U.T. Place writes:

“What is important is that there must be some logical criteria which we use in deciding whether two sets of correlated observations refer to the same event or to two separate but causally related events. The problem of deciding what these criteria are is a logical problem which cannot be decided by experiment in any ordinary sense of the term; and since we cannot be certain that the criteria are satisfied in the case of sensations and brain-processes unless we know what the criteria are, the issue is to that extent a philosophical issue [...] ...but let us assume that the identity of things is established empirically, while the identity of concepts is established either deductively ... or empirically, as in the case of temperature and molecular motion, by the empirical verification of a scientific theory within which it is possible to define one concept in terms of the other. I prefer to regard the temperature, lightning,

and sensation-brain-process cases as examples of a special variety of the identity of things in which an identity is asserted between a state, process, or event and the micro-processes of which it is composed."

That is the precise original formulation of the type-type identity of mind-and-brain. In his earlier paper entitled "*Is consciousness a brain process?*" Place examines logical and meta-linguistic aspects of identity. He believes that compositional identity refers to the logical distinction introduced by Gilbert Ryle between the 'is' of definition and 'is' of composition. Place specifies that in his reflection of identity he actually refers to the *compositional identity*. Further Place introduces another cognitive limitation. He argues in his analysis, again in the sense of the Oxford School that there is substantial difference between events, states and processes and the type identity is valid only in the case of statements about mental events and brain processes. That means that identity thesis is applied to e.g. events of sensations and distributed processes in the brain. It is an important point to be emphasized. Historical predecessors of identity such as Pierre Cabanis in the late XIX century and some more radical reductionists of the XX century like Smart, Armstrong and Feysabend do not share any cognitive limitations to their convictions of reduction. Very often they are simply looking at anatomical loci of certain aspect of consciousness. This is the exact proposition that Place is arguing contra (7):

"...But the empirical problem is not, as Smart seems to think, simply a matter of determining the precise anatomical location of this physiological process. It is still an open question whether there is, even in this relatively circumscribed area, a process which satisfies the logical criteria required to establish its identity with the sensation process. Even assuming that we know what these criteria are and are satisfied that they are applicable in this case, we cannot regard the question as finally settled until a process satisfying the necessary criteria has been discovered or until we are sure that we know enough about the brain to be certain that no such process exists. Until such time as this issue is settled by further psycho-physiological research, materialism remains an empirical hypothesis – the hypothesis that there exists, presumably in the brain, a physiological process which satisfies the logical criteria required to establish its identity..." [1960 *ibid*]

Hence, Place assumes explanation of mental phenomena in

terms of biology in the same way as lightning is seen as electric discharge or heat as a molecular motion. There is a crucial question raised besides the explanatory relation of the lower level models (brain processes) to construction of the psyche, which seems "self-evident" according to Place himself. Most philosophers of mind will not rule out some kind of emergence. The actual question addresses the ontological or translational reduction. If one may eventually agree that higher level (whole person) experiences are undoubtedly composed of lower level (neuronal) processes, most of the identity theory opponents disagree whether the person level is composed only and exclusively of neural processes. The position of the ontological reduction is that not only specific process in the brain causes certain experience or behavior on the personal level but more importantly the backwards implication, namely that every certain type of mental phenomenon to one and the same brain process. Therefore the claim of reduction is inextricably bound to the claim of the causal power. In the intuition of the theorists of mind-brain identity as well as of the other types of reductive materialism *mentality has no causal potential in itself at all*. This implies over-determination of the mental from physical. The configuration essentially excludes any potential causal capacity of the mental hence any autonomy of human behavior and consciousness in general. In my perspective this should be one genuine subject of the debate. As it has been outlined by Kenneth S. Kendler:

"That is, changes in the brain can directly affect mental functioning...we commit ourselves to the concept of mind-to-brain causality. In ways we can observe but not yet fully understand, subjective, first-person mental phenomena have causal efficacy in the world. They affect our brains and our bodies and through them the outside world." (Am J Psychiatry 2005; 162:433– 440)

It is also worth mentioning here that the 'classical' identity theory of mind as presented by Place does not take part in the debate of the causation at all. The assignment of causal power to the neural correlates of consciousness is an exclusive merit of the later identity theorists like David Armstrong. My own understanding is that we have not sufficient evidence to take a sound position on the causation of mentality and thus we should embrace the pragmatic bi-directional causation as proposed by Kendler and later supported with robust data from neuroscience.

The other genuine subject to debate should be the issue of translational vs. ontological reduction. One of the outstand-

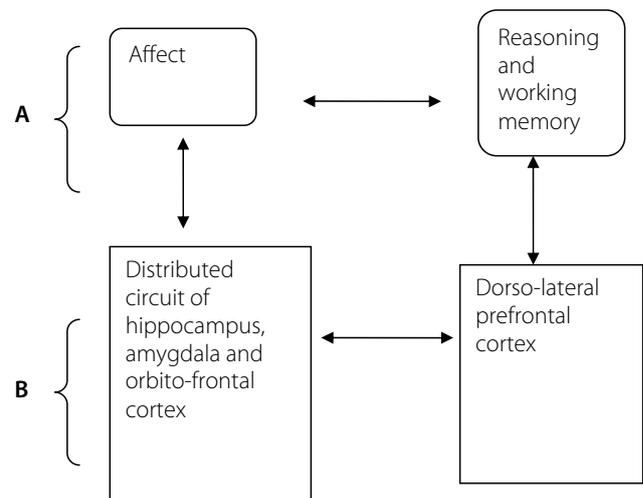
ing proponents of the identity theory Jack Smart is inclined to believe that the ontological reduction is an ultimate goal:

“...I should say that this is an ontological, not a translational physicalism. It would be absurd to try to translate sentences containing the word ‘brain’ or the word ‘sensation’ into sentences about electrons, protons and so on.” (10)

This is not however only way in which we understand or interpret the notion of translation. In some perspective ‘translational’ properties of given phenomena are seen not just as a *linguistic* issue, but mainly as *epistemological* one. When I say epistemological I imply the justification of the use of inter-disciplinary shared terms and notions. Now imagine that a term like “emotions” is frequently employed in many disciplinary systems, such as psychology, psychopathology, and neurosciences. Therefore “emotions” is a shared construct with all derivative terms which are used to describe human experiences in health and disease, e.g. “depression” or “anger”, “grief” and so forth. Disciplines which seem to employ this wide range of terminology are ascribed to explain different levels in mind-brain relationships, both vertical and horizontal. Vertical relations of biological properties and mental phenomena are subject to comprehensive interest and examination. My intuition is that there exists another kind of important *horizontal* structures in mental health knowledge which require consistent translation. We can define and understand the realm of mentality of its own right but any cognitive structure in it (regularity or notion representing certain aspects of consciousness) has to be underpinned with correspondent (identical in Boring’s sense of correlation) cognitive structure in the realm of neural processes

Let me try to illustrate this configuration. It is used one provisional example on the following picture with two different classes of mental and respective neural phenomena, where A stands for realm of mentality and B stands for realm of neural processes (Fig. 1).

My claim is that no connection at the level of mentality (*not* equivalent to intentional realm in McDowellian’s terminology) may exist if it is not underpinned by a corresponding connection at neural level or in the neural domain. In other words, in the rectangular structure as illustrated above not only its basic elements (the items in the separate angles) are connected with bridge laws, but the *very laws* (both vertical and horizontal) are ‘stabilized’ by homological bridges, say isomorphic lines of connection. This does not necessarily imply that anything in mind-brain relationships is governed under such rules. I



**Figure 1:** Interrelations of the neurobiological and mental domains

suggest this configuration just for the ‘scientific’ descriptions of observable phenomena which claim to be ‘evidence’ both in neuroscience and psychology and hence need to face the respective demands for scientific stability (reliability) and inter-disciplinary validity. In this sense I have no claim at such robust structures when it concerns the values and trans-personal relationships at the level of the whole person and intentionality. This is consistent with other similar views on the construction of mentality. This is to some extent the case with Psycho-biological theory of personality of Claude Robert Cloninger (11). He defines two integrative domains of personality. One of them is explicitly underpinned with neuro-biological and genetic mechanisms and is named *temperament*; it is connected closely to other biologically derived concepts such as Eysenck’s theory of personality (including e.g. neuroticism and extroversion as personality traits). The other domain is related to the character and specifically to ‘*humanistic and trans-personal style of communication and relating to others*’. The latter domain explores such aspects of personal profile Self-directedness, Cooperativeness and Self-transcendence which obviously belong to the intentional realm. Self-transcendence becomes later the basis of Cloninger’s ‘*science of well being*’. My intuition is that there is a variety of other mental phenomena besides the ‘temperament’ in the terms of Cloninger which correspond to causal substrate in the brain and thus are liable to translational reduction. Still there are a number of other irreducible intentional entities which transcend beyond my configuration and which are therefore outside the frontiers of this analysis. These entities belong to

the realm of socio-cultural values; whilst my deep concern as it has been outlined in the introduction is within the realm of facts (or evidence).

In the following section I shall further defend identity theory from two extreme forms of reductive physicalism as well as from some anti-reductionist responses.

### ***Eliminative materialism and epiphenomenalism are false***

Two more radical theories in the convergent field of project solutions of the mind-brain problem are regarded as influential in the past two decades. These are epiphenomenalism and eliminative materialism.

### ***Objections at eliminative materialism***

One of leading proponents of eliminative materialism Paul M. Churchland (9) asserts that:

“The identity theory was called into doubt not because the prospects for a materialist account of our mental capacities were thought to be poor, but because it seemed unlikely that the arrival of an adequate materialist theory would bring with it the nice one-to-one match-ups, between the concepts of folk psychology and the concepts of theoretical neuroscience, that intertheoretic reduction requires. The reason for that doubt was the great variety of quite different physical systems that could instantiate the required functional organization. Eliminative materialism also doubts that the correct neuroscientific account of human capacities will produce a neat reduction of our common-sense framework, but here the doubts arise from a quite different source.

As the eliminative materialists see it, the one-to-one match-ups will not be found, and our common-sense psychological framework will not enjoy an intertheoretic reduction, because our common-sense psychological framework is a false and radically misleading conception of the causes of human behavior and the nature of cognitive activity. On this view, folk psychology is not just an incomplete representation of our inner natures; it is an outright activities. Consequently, we cannot expect a truly adequate neuroscientific account of our inner lives to provide theoretical categories that match up nicely with the categories of our commonsense framework. Accordingly, we must expect that the older framework will simply be eliminated, rather than be reduced, by a matured neuroscience”.

My objections at Churchland’s vision are twofold. The first one is the subscription to the construct of fuzzy and indefinite construct of “folk” or “commonsense psychology”. This commitment is not unusual in philosophy of psychology and psychiatry even in contemporary pieces of research (12). Eliminative materialism regards “folk psychology” as fuzzy and indefinite and therefore hopes that ‘matured neuroscience’ complemented with computational technologies can eliminate it. Nonetheless I stress that the *very notion* of folk psychology is delineated in a fuzzy and indefinite way and we have not specific borderline between what is assumed as „folk psychology“ and what serves as „scientific psychology“ (cognitive, clinical etc) and that is not justified in Churchlands’ claim.

My worry however is also that such stipulation does not help to improve the standards for ‘scientific’ psychology and hence psychiatry. Although some authors assume the extrapolation of the issues from folk to cognitive psychology as possible and necessary (13) this is also a kind of ‘piecemeal’ approach to the constitution of evidence in areas of mental health knowledge claiming at scientific value of their data. Second, many branches of psychology and psychiatry (clinical, behavioral, cognitive etc.) insist on their commitment to positive science. There is collected considerable evidence in these frameworks. Although it is criticized for the limited trans-disciplinary capacity of the cognitive content (14, 15) it meets some ‘internal’ criteria for validity for different reasons like utility (16). This means that we are less concerned with the internal validity but the capacity for ‘translation’ of data between different disciplinary languages. Hence we are concerned more in patterns of identity therefore of correlations of mind-and-brain activities than in complete denial of all contemporary psychological knowledge as proposed by Churchland, regardless whether it is “commonsense” or “scientific”. Second, eliminative materialism is much more precise that the ultimate replacement of the overall “mental” vocabulary is on its way. They tend to believe without any hint at reservation that every single construct of psychology is to be replaced with neuro-computational categories. Whilst Place seems to be much more cautious in his predictions (emphasized and underlined in the quotations in this essay) that materialism is nothing but a ‘scientific hypothesis’ and that just a certain class of mental constructs are liable to reduction. He is inclined to accept that there is also a class of irreducible entities, a view I completely share with him. I have developed a couple of case studies to endorse this point herewith.

**Case study:**

**Thesis:** identity of the pain experience with the c-fibres activation : a claim for possibility of universal explanatory reduction.

**Anti-thesis:**

(a) "false" pain: many survivors after limb amputation report pain experience from the area of the the same limb that has been eliminated;

(b) Kandinsky-de Clerambault syndrome, sensory type: patients inform about sensaions (very often pain sensations) without any activation of c-fibers. Two worries emerge: what determines the pain experience in De Clerambault s-me and where is the causal connection of the mind-and-brain complexity?

**Case report 1: Sasho V., 50 years old**

Hospitalization (July 2007) of a patient with depressive-paranoid syndrome, basically assessed a recurrent depression with elements oh hypochondria.

Extraction from the narrative from the last interview (Oct 30<sup>th</sup>, 2007):

*"I felt aches...initially I thought I've got a cancer. When the pains begin (puts his arms around the epigastria and the lateral abdominal area)...it is just something glowing, sometimes very hard and embarrassing, than gradually faded...eventually I felt pain in the chest on the left side...like a heartache. It pressed and released, usually in the evening. Maybe it was caused by some kind of exterior power, influence from outside, like magic."*

The numerous instrumental explorations, including EMG did not prove any organic cause for Sasho's complaints as well as there were revealed no data, associated with C-fibers excitation. On the other hand he responded to antipsychotic treatment.

**Case report 2: Stefan S., 55 years old**

Serial hospitalization in the clinic; this particular one - by the reason of a legal expertise.

According to the morbid anamnesis it refers a case of schizophrenia in a stage of evolution of a paraphernia syndrome.

The latter is presented with pseudo-hallucinatory phenomena as well as with confabulatory megalomania signs and inventory delusions.

The further analysis of the pseudo-hallucinatory component shows that the patient shared experiences like aches in the internal organs.

Extract form the interview:

*"...I am a great inventor, I created inventions for billions dollars. The foreign intelligence services prosecute me and want to destroy me... three men follow me with little machines implanted into my organs. They intend to hurt me – inducing undefined internal and of the left hand pain ", caused by "extra-sensorial equipment".*

The investigation of the periphery segment of the pain sensor with EEG and EMG did not prove any excitation in the extra-lemniscal system.

Imaging techniques are not available in order to explore the CNS pain-related structures and function.

**Synthesis:**

(a) central, not peripheral activity of the neural system causes the pain sesnsation; pragmatic reductionism; bi-directional causation according to Kendler (2005) and Korf (2009)

(b) distributed functional systems involved, not local structure interactions,

(c) organo-dynamic dissolution of the higher mental functions, "liberation" of the archaic ones: e.g. automatism in the sensory modality (pain perception).

**In conclusion:** (a) explanatory pluralism is necessary in the case, in combination with (b) token identity, applied to mental phenomena, already explored by the neuroscience and (c) supervenience to the ones, which nature is not clarified yet. (d) Psychopathological phenomena might be explained through organo-dynamic theory (H.Ey, 1962).

Last but not least in my revision of the identity theory, as indicated above. I attempt to say that identity has a ‘horizontal’ meaning besides the obvious ‘vertical’ implication. In this horizontal perspective there is no such demand at replacement of the vocabulary. Each of the languages in question is a nomothetic system of its own right, mental and physical, but we are aware of their correspondence (Bohring’s) perfect correlation, and each expert operating with these languages is prepared for the inter-playability of the terminology employed in his discipline. Put in other words the upgrade of identity theory of mind is a prototype of a ,*manual for translation*’.

### ***Ruling out epiphenomenalism***

The other radical theory of mind advocating a heavy reductionist program is epiphenomenalism. I am inclined to rule it out as well. As it has been articulated by Ken Kendler (6):

“The core assertion of epiphenomenalism is that the mental world is without causal efficacy, our mental life being simply froth on the wave or steam from the engine. Thoughts, feelings, and impulses occur within our subjective experience, but they do nothing. All the causal action occurs at the level of brain function. For the present purposes, I wish to simply assert its falsity and argue that thoughts, feelings, and impulses matter not only because they are responsible for huge amounts of human suffering but because they do things.”

In later studies this point has been confirmed empirically in the continuous contributions of Jacob Korf, who demonstrated experimentally that mental experience, though generated by electric activity of the brain, can also affect brain function by top-down causation. Korf has illuminated that the signal detected via neuro-imaging techniques (like PET or fMRI) is actually the restorative *iso-energetic* response of the neural networks after performance of certain mental activity, i.e. it comes as an effect from, not as a cause for the psychic phenomena (17, 18).

### ***Commentary on some anti-reductionism assumptions***

I shall try to explain herewith why a large body of criticism of the identity theory of mind is inappropriate in the context of philosophy of psychiatry. Three critical objections targeted: presented by Davidsson, Putnam and Kripke (e.g. 19). The ‘multiple reliability’ or ‘Twin Earth’ arguments are among the most cited anti-reductionist points along with the anomalous monism of Davidsson and Kripke’s argument. All

three critical assertions are well known in the philosophy of psychiatry literature and have been exposed in an extensive analysis (and still there is discarded the critical role of the identity theory of mind). This is why I shall not go in-depth with their reproduction but present just a brief disagreement. It is precisely that any of these anti-reductionist accounts is inevitably leading into *metaphysical confusion*. If unfold the most common anti-reductionist statements lead either into some form of psychophysical dualism or directly into idealistic monism. These two specific positions in MBD, though perhaps significant in themselves for philosophy are not relevant to the modern evidence of neuroscience and can not contribute to the “philosophy-into-practice” perspective as mentioned earlier. In fact they are grounded on completely speculative assumptions such as the possibility of the existence of another parallel reality in the “Twin Earth” thinking experiment by Hillary Putnam. In my understanding philosophy of psychiatry (including philosophy of mind in the same context) have not to consider ‘multiple’ realities and mental organizations. It is implied by the very subject of the mental disorder as something concerning *human* mentality in *this* world. This does not mean that I am rejecting the significance of these arguments in general philosophy of mind and analytic philosophy.

### ***Toward a revised identity theory of mind***

In previous sections I have *danced round* my view that there is a “horizontal” aspect of the identity thesis which is not that committed to the reduction vs. emergence debate as is the “vertical” identity. My implication for the update of the identity theory of mind looks like that: “*we have two measures, e.g. clinical assessment depression rating scale and neurobiological measurement of some brain process, e.g. binding potential for some causally efficient for depression brain protein. If we explore them simultaneously we shall reveal unquestionable convergence between the two scores: depression scale will correspond to some equipotent value of the brain measure.*” (20) Identity thesis as defined by Boring seems to be consistent:

„... a perfect correlation is identity. Two events that always occur together at the same time in the same place, without any temporal or spatial differentiation at all, are not two events but the same event. The mind-body correlations as formulated at present do not admit of spatial correlation, so they reduce to matters of simple correlation in time. The need for identification is no less urgent in this case” (8).

My tentative argument is that the modern neuroscience disre-

gards the critical importance of the concordance of the time correlation (currently the brain scans are performed in different time and in different space from the clinical evaluation) and so to claim that improvement of the methodological framework and protocols will possibly help us to demonstrate at least *some patterns* (or ‘*patchy reduction*’ in the terms of Kendler) of mind-brain identity. There is positive predicative evidence that we shall succeed at least in part of this program.

If we do then the issue is raised what will be the impact of the established models of identity. Modern mental and neuroscience hold respectively implicit transactionist dualism and eliminative materialism positions. Eventually we shall discover that such terribly diverse constructs in modern neuropsychiatry as paranoia in psychoanalysis (tacit dualism) and neuro-physiology (tacit eliminativism) are in fact identical. I.e. we have different implications of one term in diverse branches of mental health knowledge (diverse in the sense of their tacit position in the MBD which proves to be in fact identical in different disciplinary languages, if bridged with cross-validity law-like translational structures. In turn this may facilitate the reconciliation of the paradigms in the field.

### ***Is there any room left for supervenience?***

Further we need to address one more query. Namely whether there is any room left for the supervenience theory of mind. I need supervenience applied to other mental phenomena, because of two reasons. The one is that, as it is stated specifically by Place (7) type identity refers to mental events and neural processes in the terms of Gilbert Ryle. I still need some explanatory framework for the mental processes and states, respectively neural events and states. Because of the higher level of complexity, which characterizes these kinds of relationships, type identity is not appropriate as explanatory model. However supervenience delivers some, let me say broader „*periphrasis*“ of the reductive physicalism, which is feasible to fill in these gaps, so that they may remain protected against the speculations of the dualism or even of the epiphenomenalism. At the same time we need to be cautious in subscribing to supervenience. In his recent study of the interface problem as defined by Bermudez Thornton (21) for instance argues that:

“... non-reductionist supervenience is not a stable middle point between a form of dualism that eschews supervenience or a reductionist physicalism that can also explain supervenience. That in turn suggests that supervenience cannot... provide a deflationary resolution of the interface problem”.

In other words supervenience seems not to offer comprehensive ontological resolution of the mind-brain problem. This is why I prefer to operationally employ supervenience as well as the weak forms of reductive physicalism (e.g. token identity and ‘*patchy reductionism*’) in order to deliver pluralistic explanatory account of the more sophisticated and complex phenomena of the mental life as exemplified in the case studies in the previous section.

### ***On the role of connectivity or the “bridge laws” in science as applied to the connections between neuroscience and psychiatry***

Identity theory of mind as well as any form of reduction in science is inextricably bound to the construct of the so called bi-conditional Nagelian laws. Ernest Nagel (22) gives a specific definition for the role of reduction:

“...Reduction, in the sense in which the word is here employed, is the explanation of a theory or a set of experimental laws established in one area of inquiry, by a theory usually though not invariably formulated for some or other domain.”

Nagel distinguishes two types of reductions: (i) Homogeneous reductions: relations between two sets of statements that employ a homogeneous vocabulary, and (ii) Inhomogeneous reductions, where the subject matter of the primary science appears to be qualitatively discontinuous with the materials studied by the secondary science.

By all evidence wherever there exist psychophysical reductions bolstered by an updated identity theory of mind as exposed above, they should be a type of inhomogeneous connections between mental and physical terms and law-like structures (see 2.2. and 2.5.) According to the Nagelian concept, the nature of *bridge-laws* (the assumptions that assure connect ability) might be construed in three different ways: logical connections (ruled out by Nagel himself); conventions and factual or material connections (empirical connections). As we are aware since Hempel and Spitzer the logical connections along with conventions delineate the modern ‘scientific psychiatry’.

Many studies have demonstrated that in practice this approach is to a great extent misleading and proto-scientific. My claim is that the bridge laws between psychiatry and neuroscience should be underpinned with factual connections based on real findings of clinical sciences and neuro-biology in health and disorder. Last but not least, a reservation in the adoption of

the Nagelian concept should be made. On one hand it seems to me inevitable to adopt bridge psychophysical laws where we have sufficient evidence to sustain them in order to establish patterns of identity and thus predispose reconciliation between paradigms in mental health. On the other I do not embrace Nagel's demand for ontological elimination of the reduced entities besides the most basic sciences (neuro-biochemistry in our case). I see no sensible need in this ultimate reduction from the angle of the cognitive pluralism. Also in the light of my previous arguments a program for ultimate reduction (like those proposed by the eliminative materialism and epiphenomenalism) is predestinated to failure due to a number of meta-empirical reasons.

### CONCLUSION

Psychiatry definitely must focus on the personal experience and values. The person centered comprehensive assessment however needs to be the superstructure over a more robust scientific basis. The individual assessment is always unstable as it is unique for every person. That's why I regard it is a kind of superstructure, which should be grounded on a preliminary fundamental transdisciplinary structure of knowledge, stabilized with cross-validity "bridging" connections in the network of the basic explanatory sciences about mind-and-brain.

As an interdiscipline, psychiatry should meet the criteria for internal validity but also for independent external validity. This is why it needs cross-validation of its shared terms and methods with neuroscience. At the same time neuroscience is not likely to deliver evidence about the validity of the contemporary narrow categories in mental health. It is more likely that neurobiology can further validate broad diagnostic prototypes. Once stable prototypes are validated via explanatory connections from psychology (the group of 'mind' or 'mental' sciences) and neurobiology (the group of 'brain' or 'neurosciences') we can superstructure them with the personal narratives.

In summary, I propose a frame shift from mind-brain opposition (controversy) to mind-and-brain unity *without the eliminativist claim* for ultimate reduction and with due respect to the personal experience and values.

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### REFERENCES

1. Stoyanov DS. Why a logical-pragmatic perspective on validity in mental health is not sufficient: introduction to the principle of convergent trans-disciplinary cross-validity. *Dial Phil Ment Neuro Sci* 2003; 3: 25-26.
2. Polikarov A. The Divergent-Convergent Method, In: RS Cohen, M Wartofsky, editors. *Methodical and Historical Essays in the Natural and Social Sciences*. Boston Studies in the Philosophy of Science, Vol. XIV. Dordrecht 1974; 213-233.
3. Crick FH. Thinking about the brain. *Sci Am* 1979; 241:219-232.
4. Stoyanov D. On the epistemological legacy of Azarya Polikarov (1921-2000). *Epistemologia* 2010; 33:135-138.
5. Stoyanov DS. The converging validity of the methods for assessment and diagnosis in psychiatry, *Philosophical Communications, University of Gothenburg Philosophy, Linguistics & Theory of Science*. Web Series 2011; 57: 26-27.
6. Kendler K. Toward a philosophical structure of psychiatry. *Am J Psychiatry* 2005; 162: 433-440.
7. Place UT. Identifying the mind. Selected papers by UT Place, G Graham and E Valentine, editors. OUP 2004
8. Boring EG. *Physical Dimensions of Consciousness*, 1933, Century.
9. Churchland PM Eliminative materialism and the propositional attitudes. *J Philos* 1981; 78: 67-90.
10. Smart, JJC, The Brain in a Vat, *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*. 2004; 35: 237 - 247.
11. Cloninger CR. A psychobiological model of temperament and character, In: J. Richter et al, editors. *The development of psychiatry and its complexity*. Berlin, Waxmann: 1998.
12. Broome MR, Bortolotti L, editors. *Psychiatry as cognitive neuroscience, philosophical perspectives*. OUP: 2009.
13. Murphy D. *Psychiatry in a scientific image*. MIT Press: 2006
14. Stoyanov DS, Machamer PK, Schaffner KF. In quest for scientific status of psychiatry: towards bridging the explanatory gap, In: *Traditions and Innovations in Psychiatry*. WPA, St Petersburg 2010: 44-45.
15. Stoyanov DS, Machamer PK, Schaffner KF. Rendering clinical psychology as evidence-based scientific discipline: a case study. *J Evalu Clin Pract* 2010; 18: 149-154.
16. Kendell R, Jablensky A. Distinguishing between the valid-

- ity and utility of psychiatric diagnoses. *Am J Psychiatry* 2003;160:4-12
17. Korf J. Brain serotonin, recovery from depression and causality. *Arch Phil Ment Health, UCPMH & BAPPP*, 2008/2009: 11-18
  18. Stojanov D, Korf J, De Jonge P, Popov G. The possibility of evidence-based psychiatry: depression as a case. *Clin Epigenet* 2011; 2: 7-15.
  19. Putnam H. „The meaning of „meaning““. In *Philosophical Papers, Vol. 2: Mind, Language and Reality*. Cambridge University Press (1975/1985).
  20. Stoyanov D. *Neuroscience and the Challenge of Psychological Medicine*. East-West Publishing House, Sofia. 2008; 72-96.
  21. Thornton T, On the interface problem in philosophy of psychiatry, In: MR Broome, L Bortolotti, editors. *Psychiatry as cognitive neuroscience, philosophical perspectives*. OUP 2009: 121-137.
  22. Nagel E. *The Structure of Science: Problems in the Logic of Scientific Explanation*. Routledge, London, 1961.