Dialogues in Philosophy, Mental and Neuro Sciences

NEW IDEAS

The Cross-Validation in the Dialogue of Mental and Neuroscience

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The aim of the Validation Theory (VT) as a meta-empirical construct is to introduce a new vista in the reorganization of the neuroscience, in its role of a science of the Mind-and-Brain unification. The present study focuses on existing discrepancies and contradictions between the methods of basic neurosciences and those prescribed by the psychological science. Our view is that these discrepancies are based on a high ***penetration*** *of traditional neuroscience methods into the biological processes, coupled with low* ***extrapolation*** *(experimenting with animal models) and vice versa for the psychological and psychopathological methods. A novel epistemological model for integrating psychological and neuroscientific knowledge is proposed. It is represented as a simultaneous investigation of the brain activity with penetrating high resolution functional Magnetic Resonance Imaging and in extenso application of set of psychological tests for exploring correspondence (cross-validation) between their compounds. The proposed approach leads to a revision of the neuroscientific and psychological terms, methods and data, followed by a revision of their relative interplay. This would make possible a practical exchange of expensive but objective fMRI with the lower costing psychological instruments (effect of "minimization"). The approaches proceeding from VT will infiltrate diagnostics and prevention in psychiatry. On a further stage the pharmaco-psychological monitoring will uncover new opportunities. This proofs–based research and practice represents an integral counterpart of the values-based mental health care. In conclusion VT is an evolutionary corner stone in order to traverse the stage of a Brain-Brain paradigm and to reach the point of development of the Mind-Brain paradigm.*

Key words: validation, neuroscience, psychology, psychopathology

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INTRODUCTION: OVERVIEW AND AIM

At the end of XIX century J.W. von Goethe formulated his famous "*was Mann weiss, Mann sieht*" as an antithesis of classical Empiricism. As far as this statement became a valid rule for the traditional medicine, now it comes to be a methodological "doctrine" for the mental health disciplines. On a wide degree this is due to the fact that most of the phenomena, relationships and rules in the area of psychopathology are significantly influenced by the preliminary, "anticipative" attitudes to diagnosis and therapy.

In contrast with the pure pragmatism, Mental Health Care requires, above all, a fundamental theoretical knowledge accordingly the practical experience. On the contrary, a risk of chaotic use of both terms and notions as well as of therapeutic methods exists.

Currently the nowadays established practice in psychiatry is defined as the only measurement for truth. There are to be considered a number of post-positivistic theories in the analysis of the explanatory causal models in psychiatry and neuroscience, such as Popper's progress through trial and error and Feyerabend's (1987) "*anything goes*".

It is precisely the absence of unified standards in psychiatry that makes it very close to Feyerabend's definition.

The different paradigms and schools keep reproducing quite antagonistic explanatory concepts about the mental life in health and disease. For example a number of contradictory and incompatible views about the mental structure and organization were established. Some of them are listed below:

- Mental spheres
- Gestalt-theory
- Freudian topographic and structural hypothesis
- Functional psychic blocks

It goes without saying that any of these paradigms constructs its own explanation about mental reality and then applies it to the explanation of the psychopathological events. The attempt for achieving coherence of these as well as of many other cognitive constructs in psychiatry reaches the edge of instrumental compilation in the multi-axial assessment systems. Unfortunately this does not lead to synonymous co-notation of identical events in the different elements of notification systems.

For instance, the definition of the schizophrenic catastrophe conceals quite heterogenic description and explanation constructs. The prefrontal hypodopaminergy is minded from the neurobiological position, the frontal lobe apathy symptoms and emotional alignment in clinical psychopathology, personality regress and cognitive deficits in the system and methods of clinical psychology, and psychiatric invalidity is meant in the public health disciplines system. Andreasen (2001) made an attempt to summarize all these phenomena under the '*cognitive dismetry'* concept.

This case illustrates an area of the interdisciplinary dialog, where a relative coherence of the common used terms and categories is achieved, although some *double entendres* are emerging in the interpretations concerning the psychological and psychopathological aspects of the phenomenon. However, if there are some contradictions in the "psychosocial catastrophe construct" then they reach the "*scientific anarchy*" proportions in the theories about etiology and pathogenesis of schizophrenia. For instance it is quite evident that the ultra-paradox phase reactivity (used by Pavlov's behaviorist school as a universal explanatory mechanism in psychopathology) is incomparable to the "regress to primary narcissism" and the de-differentiation of "Ego" from "Id" in the Freudian theory, developed together with E. Bleuler, for the pathogenesis of psychosis. In this case it is not only a matter of different formal discipline languages, psychological on one hand and neurophysiologic on the other, but mainly of incongruity between the causal and the descriptive aspects of one and the same phenomenon.

What happens in the usual mental health practice is the persistent attempt for rational integration of these different approaches, most recently from the position of the problem-based learning. Thus the further aim of this paper is to create theoretical model for a conformable interdisciplinary dialog between the Mental Health Service operators and neuroscientists as a premise for better understanding mental disorder and more effective case management.

ARGUMENT AND DISCUSSION

Numerous models for assessment of the human mental functioning based on different informational approaches have been intro-

duced. These models bring to light the distinction between intentional and non-intentional causality and are directed towards the convergence of the extensive knowledge about causation of the mental disorder (Bolton and Hill, 2003). Other recent studies explore patterns for bridging neuroscience and phenomenology (den Boer et al., 2008). Moreover, the comprehensive "values-based assessment" as a complementary construct of the evidence-based approach was proposed (Fulford et al., 2006).

Considering the formulation of an integrative language is taking a long historical piece of time and is conditioned by an adequate and intensive dialog between the different branches of the science it is convenient for the present to enhance the "*conformable dialog*". So far the premises for standardization and unification of the methodology in the mental-neuroscience dialog shall be outlined:

(a) ***Make uniform the criteria for significance of the method and thus the distinction between evidence and proof in neuroscience.***

(b) ***Establishing the bridging laws that are connecting the correspondent notions in neuroscience and psychological sciences according to the supervenience principle (Kim, 1993), using a new model for validation.***

For this purpose it is important to assume a predominant project ***- solution of the Mind-Brain problem*** that can extend the subject of neuroscience towards the psychological and psychopathological subjects. We propose such a solution (Stoyanov, 2001, 2008a) in the next synthetic formulation:

(a) Mental events are derived from neurobiological events;
(b) Some of the mental processes are liable to inter-theoretic reduction (Churchland, 1990);
(c) The other irreducible mental phenomena are interpreted according to the **supervenience formula** (Kim, 1993): "*The mental events relate to the brain events in the same mode as the sculpture to a stone";*
(d) The psychopathological events could be explained via the organo-dynamic theory (Ey et al.., 1973).

As it was discussed above, the project-solution of the Mind-Brain problem is shifting psychology and psychopathology to the neuroscience orbit through a novel conceptual route. It includes the consequent rules for significance of the methods that differ from the traditional statistical rules for significance.

The following criteria are introduced:

- for **penetration** (marking off the penetration into the cellular, molecular and quantum substrate of the psychic events);
- for **extrapolation** (admission of the results from animal models to humans);
- for specific **objectivity** (associated with the direct access and visualization of the method).

The same indicators define the category of ***"proof"*** in neuroscience and its difference form the traditional "evidence".

This issue is developed in the Special Theory of Neuroscience (Stoyanov, 2001). Our further study of the problem (Stoyanov, 2007) indicated that these criteria are satisfied by the methods of in vivo neuro-imaging: positron-emission tomography and functional Magnetic Resonance Imaging (fMRI).

Therefore we propose that these precise methods refer to the tangential regions of the interdisciplinary dialog between neuroscience and psychopathology.

Consequently this comes to be a possible approach for collecting empirical data to establish the **minimum satisfaction bridging laws by Nagel.** On the other hand these laws represent the mandatory condition for the integration of mental and neurosciences.

One of the most felicitous attempts in this direction was made by H.J. Eysenck (1981). Particularly, Eysenck found the correlation between the activation (originally arousal in Eysenck) of the reticular formation and extra-version and between neuroticism (emotional liability) and the function of the limbic

system. These facts were studied with EEG and biochemical blood analysis of the concentrations of substances, e.g. adrenalin and cortisol,

There are some methodological limits in Eysenck's approach:

- The EEG study is not enough penetrating;
- The same concerns the plasma concentrations, besides their questionable objectivity in the reasons of the Special Theory of Neuroscience. (The biological material comes from the peripheral veins that are quite remote from the object – the brain).
- Both methods (psychological and neuroscientific) are applied in different time and places. It makes their corresponding constructs incomplete.

This is one of the reasons for the programming of the integrative bio-psychological dialog via the so called **cross-validation** (Stoyanov, 2007, 2008b).

It suggests the development of the above mentioned approach in the next directions:

- Use of significant neuroscience method according to the criteria of extrapolation, i.e. fMRI and PET;
- Technological design, obtaining maximum direct but non invasive visualization of the brain (specific objectivity);
- High resolution in time and space software programs for scanning the brain activity (penetration);
- In this context whole scales, series or/and tests for psychodiagnostics are correlated. As already mentioned psychological tests are beyond any doubt "objective" instruments but not relevant scientific "proofs";
- The correlation is investigated simultaneously and thus the results are correspondent and equable in next studies;
- This will underlie the interplay ability of the expensive but significant fMRI with the less expensive but irrelevant psychodiagnostic method - *the effect of minimization;*
- The minimization will uncover an opportunity for *pharmaco-psychological* monitoring of the treatment of mental disorders, significant on an equal degree with the pharmaco-dynamical analysis. This is why we named it pharmaco-dynamical psychology.

CONCLUSION

Using the cross-validation concept we can achieve a significant unification of the psychiatric qualification and nomenclature via neuroscience. It represents a model for "*scientification*" (Machamer & Stoyanov, 2009) in this sense and thus sets a prerequisite in the formulation of the meta-language in the mental health and neuroscience dialogue.

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