



The «System 3+3» in a Problem of Searching of a New Paradigm in Psychiatry



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Abstract

In article are presented possibilities of a unique method of diagnosis of mental diseases - the dispersion of amplitude-frequency characteristics of an alpha rhythm (DAFCAR) from positions of paradigm shift of the psychiatry based on the dimensions research techniques.

Keywords: Dispersion of amplitude-frequency characteristics of an alpha rhythm; Diagnosis of mental diseases; Paradigm shift of psychiatry

Abbreviations: DAFCAR: Dispersion of Amplitude-Frequency Characteristics of the Alpha Rhythm EEG; NGNB: Neuron-Glial Network of the Brain; HVT: Hyperventilation Test; CD α 1: Coefficient of Dispersion of Alpha-Rhythm EEG-1 (the quotient of the modal values of power of alpha rhythm to his total power in the range of 7-13Hz); CD α 2: Coefficient of Dispersion of the Alpha-Rhythm EEG-2 (the quotient of the power of the alpha rhythm in the range of "a modal value \pm 0.5Hz" to his total power in the range of 7-13Hz); Mof: Value of the Modal Frequencies; IIDA: Integral Index of Dispersion of the Alpha Rhythm EEG (Value of the Kurtosis of the Normal Distribution CD α 1 in the Occipital Electrodes); ADA: Asymmetry Distribution of the Alpha Rhythm EEG (Value of the Asymmetry Distribution CD α 1 in the Occipital Electrodes); IH: Value of the Index Hypofrontality (Kurtosis of the Normal Distribution CD α 1 in the Frontal Electrodes); AH: Value of the Asymmetry of CD α 1 in the Frontal Electrodes

Introduction

In the conditions of the informational revolution which is taking place now in the world, the problem of mental diseases gains prime value. And business even not that load of mentality of people with introduction of new informational technologies and attempts of impact on mentality for the purpose of strengthening of ability to perception of information amplified. The matter is that we need to reconsider in general the relation to a substance of information per se. Without pressing deeply in philosophical aspects of this problem, in relation to psychiatry it is possible to tell that it has to replace the paradigm. Need of it is shown in many scientific publications lighting a condition of the modern psychiatry.

Unfortunately, achievements of the modern science in this area very modest - still it was not succeeded to coordinate patho-psychological effects to organic violations in a brain. The simple fact is the main reason of it that still there are no objective methods of researches of neuron and glial network of a brain (NGSB) which data would correlate with clinic of mental diseases [1].

Therefore still the psychiatry and psychology remain syndrome-based sciences, despite attempts to present methods

of testing and creation of expert rating scales as methods of dimensions approach to diagnostics of mental diseases. The World Psychiatry [2] magazine outlined this problem as need of searching of the new paradigm which is the cornerstone of ideas of how the brain works. It is naive to assume that some research technique, without comparison to other methods and a clinical picture, can apply for a role of a marker of a mental disease. However, creation of such research is capable to lay the foundation in the theory of ideas of interrelation between psychopathology and violations in NGSB.

Within the last decade attempts of creation of such research on the basis of long ago known method - an electroencephalography (EEG) [3,4], the brain which is traditionally considered as a nonspecific method of assessment of activity were made. The problem of an EEG was that only existence of epileptiform elements was recognized pathognomonic particular pathology of epilepsy. Other elements of a range of an EEG did not show such properties, differing in so big variability that it did not allow to create the system of normative indexes. Only the alpha-rhythm of the EEG spectrum showed certain regularity in changing its frequency in the ontogenetic development of the organism and in psychopathology [4].

Based on these properties an alpha of a rhythm the new research technique of dispersion of its amplitude-frequency characteristics (DAFCAR) was created. Idea that the deviation of distribution of an alpha rhythm on its frequency in a range from normal and an exit of its modal value for limits of norm is a marker of violation of the functional capacity of NGSGM became the main idea of this concept. Modal value of frequency of an alpha rhythm it is considered to be that frequency with which

the power of a range is maximal (on graphics of a range it is the frequency corresponding to the maximal peak). At inspection of 2235 patients it was established that the relation of the maximal power of an alpha rhythm to cooperative power in the range of 7-13Hz (Kda1) can be an indicator of a disintegration of an alpha rhythm and correlates about severity of organic damage of a brain (Figure 1) [5].

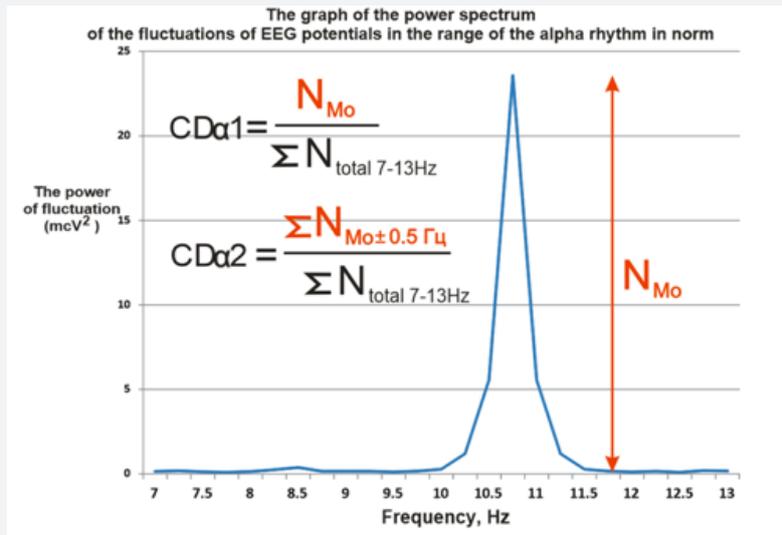


Figure 1: Calculation of CDα2 and CDα1i values for each assignment for each value of frequency of an alpha rhythm: CDα1 - the relation of the maximal power (with a modal frequency) an alpha rhythm (the central modal value) to its cooperative power in this assignment in the range of 7-13Hz; CDα2 - the alpha rhythm power relation in an interval “the frequency of modal power of ±0,5Hz” to cooperative power in this assignment.

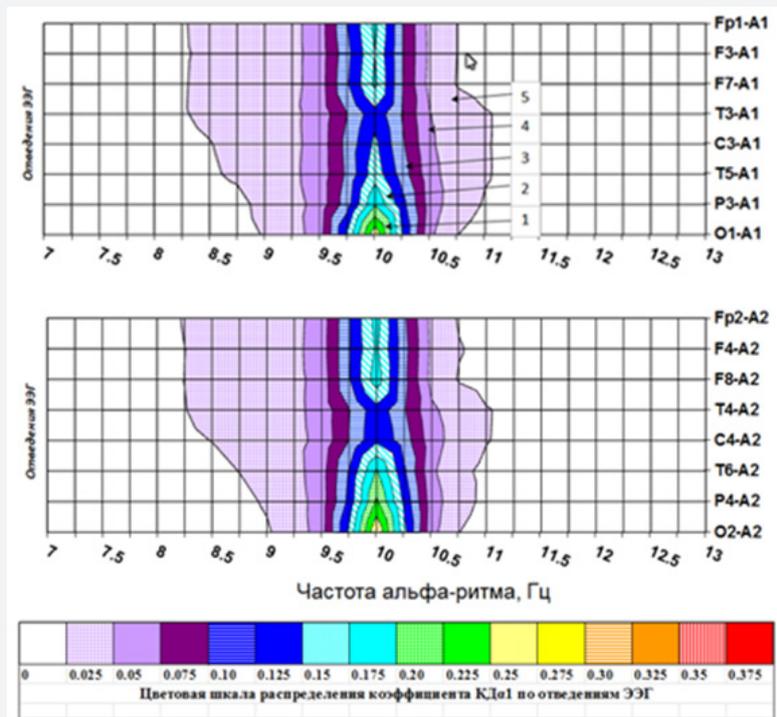


Figure 2: The average dispersion index in normal (top – left hemisphere, bottom – right hemisphere).

Table 1: The contingent of patients with mental diseases studied by means of the DAFCAR method.

Diagnostic groups (ICD-10)	Gender		Total
	m	w	
F00 Alzheimer's disease	4	13	17
F01 Vascular dementia...	61	99	160
F02 Dementia of various genesis ...	528	233	761
F00-F09 Organic mental disorders...	641	225	866
F10-F19 Mental and behavioral disorders due to psychoactive substance use (alcohol)	587	129	716
F10-F19 Mental and behavioral disorders due to psychoactive substance use (drugs)	50	13	63
F20 Schizophrenia ...	747	437	1184
F21-F25 Shizotypical and crazy disorder	121	78	199
F30-F39 Mood (affective) disorders	12	36	48
F40-F48 Neurotic, stress-related and somatoform disorders	22	18	40
F60 Personal disorders	954	37	991
F70 Mental retardation mild	917	102	1019
F71 Mental retardation moderate	129	41	170
F72 Mental retardation heavy	16	7	23
F8x-F9x of Disorder of psychological development and behavior...	83	40	123
Total	4872	1508	6380

Table 2: Distribution on an age of the contingent of the patients with mental diseases studied by means of the DAFCAR method.

Age (according to the WHO classification)	Gender		Total
	m	w	
Children's	439	125	564
Young	2349	307	2656
Mature	938	349	1287
Average	781	437	1218
Elderly	314	226	540
Senile	51	64	115
TOTAL	4872	1508	6380

If in a graphic look to imagine value distribution $CD\alpha_1$ on the surface of a brain and to develop them on representation of frequencies of a range of an alpha rhythm, then we will receive a dispersion cartogram of DAFCAR [6] (Figure 2). Mathematical expression of distribution $CD\alpha_1$ in each assignment are the DAFCAR indexes which are coefficients of a normal distribution - an excess (IIDA and IIG) and asymmetry (ADA and AH) [7]. About the help of a technique of DAFCAR correlative researches of compliance of indexes of DAFCAR in various psychopathology are conducted (Tables 1 & 2). The following regularities are revealed:

a) Increase of degree of expressiveness of psychopathology

is directly bound to decrease in frequency of an alpha rhythm - common or regional.

b) Emergence of psychopathology at the common or local deviation of distribution $K\alpha_1$ was observed from normal (an alpha rhythm desintegration) even if the modal value of an alpha rhythm was normal.

c) Variety of combinations of the violations reflected by dispersion cartograms and the DAFCAR indexes allow establishing statistical probability of category of a mental disease at surveyed.

Dependence of degree of expressiveness of psychopathology

on decrease in the DAFCAR index it is presented in Figure 3. Summary ideas of correlation the patopsikhologicheskikh of phenomena and indexes of DAFCAR are presented in Table 3. Private results on separate are presented to categories of psychopathology in the published articles [8-12]. Why the representations which are the cornerstone of a new paradigm

of psychiatry and psychology are called “system 3+3”? The main thing in it are 3 main actions which are the cornerstone of the informational exchange which is the cornerstone of mentality of the person. On the basis of a regularity of interaction of these principles 3 criteria of a mental condition of the person are created.

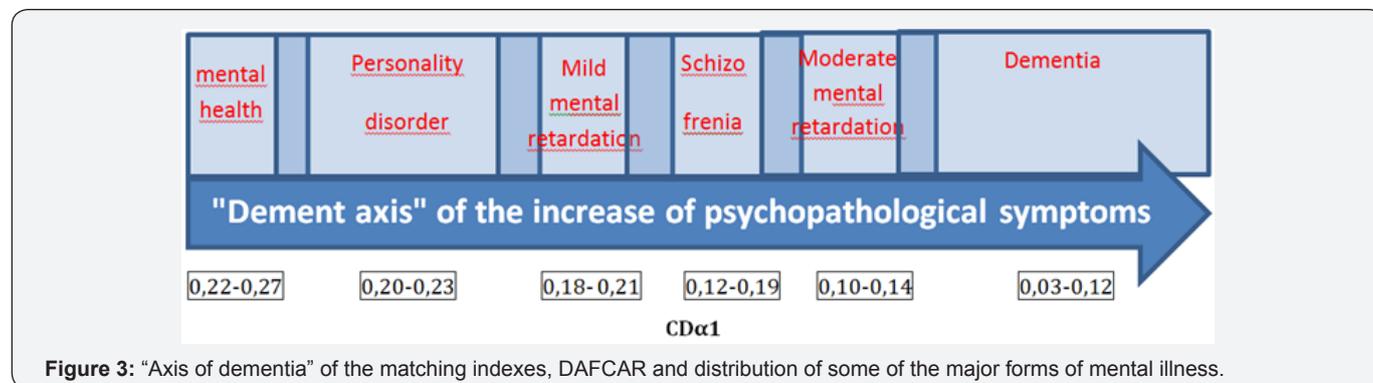
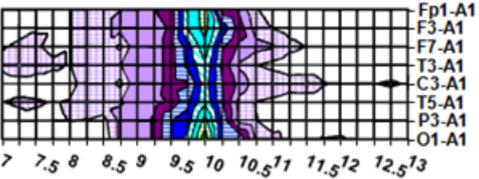
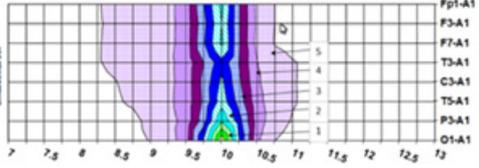


Figure 3: “Axis of dementia” of the matching indexes, DAFCAR and distribution of some of the major forms of mental illness.

Table 3: Compliance of the DAFCAR parameters of expressiveness pathopsychological phenomena.

N	Dispersion Cartogram	Frequenciest and Modal Characteristic on Assignments	CDα1	CDα2	Indexes DAFCAR	Type of HVT; Clinic
						or
1		$f_{F3(4)}$ and (or) $f_{01(2)}$ less 8.5 Hz; $f_{01}-f_{F3}$ and (or) $f_{02}-f_{F4}>0$, more frequent >0.75 Hz	0-0.15 (not main)	0.3-0.5 (not main)	<1 (not main)	Exogenic and the mixed; it is inadequate, deranged, incapacitated
2A		During aggravation - item 1, during the remission period - $f_{F3(4)}$ and (or) $f_{01(2)}>9.5$ Hz; $f_{01}-f_{F3}$ and (or) $f_{02}-f_{F4}>0.75$ Hz	0.15-0.20	0.5-0.6	IIDA, IIH <5, ADA,AH<2	Any is more often endogenic; the same that item 1, but with a possibility of remission and return of adequacy, sanity and capacity under doubt
2B	 Same, but with clinical remission	$f_{F3(4)}$ and(or) $f_{01(2)}>9.5$ Hz; $f_{01}-f_{F3}$ and(or); $f_{02}-f_{F4}>0.75$ Hz	0.15-0.20	0.5-0.6	IIDA, IIH <5, ADA,AH<2	Any is more often endogenic; restrictedly it is adequate, we impute, he is capable
3A1		$f_{F3(4)}$ and(or) $f_{01(2)}>9.5$ Hz; $f_{01}-f_{F3}$ and(or) $f_{02}-f_{F4}>0.5$ Hz	0.2-0.3	0.6-0.8	IIDA, IIH near 5, ADA,AH near 2	endogenic; it is adequate, we impute, he is capable; deviant behavior

3A2		$f_{F3(4)}$ and (or) $f_{O1(2)} > 9.75\text{Hz}$; $f_{O1}-f_{F3}$ and (or) $f_{O2}-f_{F4} > 0.25\text{Hz}$	0.2-0.3	0.6-0.8	IIDA, IIH >5, ADA,AH>2	Neutral, exogenic; it is adequate, we impute, he is capable; deviant behavior
3B		$f_{F3(4)}$ and (or) $f_{O1(2)} > 9.75\text{Hz}$; $f_{O1}-f_{F3}$ and (or) $f_{O2}-f_{F4} < 0.25\text{Hz}$	0.25-0.35	0.65-0.85	IIDA, IIH >5, ADA,AH>2	Neutral; adequate behavior

Informational Bases of Formation of Mentality of the Person

- a) Process of afferent synthesis of the entering information - internalization of information
- b) Creation on the basis of afferent synthesis of system of semantic images of an environmental real
- c) Formation on the basis of the system of semantic images of socially acceptable behavior models in the form of the efferent answer

Main Criteria of a Mental Condition of the Person

- a) The normal state of mentality - on the basis of reference afferent synthesis is created the system of semantic images of an environmental real, congruent for this look, on the basis of which socially acceptable behavior models of an individual are created
- b) The psychopathology - violation of normal process of afferent synthesis, in result of what is created pathological polysemantic of images of an environmental real on the basis of which socially unacceptable behavior models of an individual are formed

c) A marker of process of violation of afferent synthesis is the degree of an entropy of NGSB, which is shown in DAFCAR.

What can give us broad application of the DAFCAR method, naturally, after versatile clinical check?

- a) Change of fundamental ideas of an essence of informational process in a brain and development of a fractal neurophysiology
- b) Obtaining the objective data explaining a genesis of behavioral features of the person
- c) Early diagnostics of level of neurophysiological maturing of a brain at children for the purpose of early correction of deviations in this process and developments of optimum tactics of biotic strategy of patients
- d) Monitoring in the course of development of new "physiologic" methods of correction of violations in NGSB

e) Early diagnostics of probability of deviant behavior in population for the purpose of early prophylaxis of illegal violent acts

f) Screening among the contingent of applicants for work in the conditions of high public risk (pilots, dispatching service, drivers of public motor transport, military personnel, employees of law enforcement agencies)

g) Early diagnosis of mental diseases and behavioral violations; dynamic control of pathological process and the carried-out therapy; objective control of development of new methods of treatment of psychopathological violations.

It is thought that it is necessary to pass from condolences to the victims of people with inadequate behavior to the fissile objective identification of psychopathology into population populations for prophylaxis of similar incidents. The technique of DAFCAR is rather simple and does not demand the long-lived preparation for assessment of results therefore it can be easily applied in screening inspections.

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