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Leonid Spivak

Human Brain Institute Russian Academy of Sciences

Natalia Bechtereva

Human Brain Institute Russian Academy of Sciences

Dimitri Spivak

Human Brain Institute Russian Academy of Sciences

Sergei Danko

Human Brain Institute Russian Academy of Sciences

Kersti Wistrand

International Association for Near-Death Studies (IANDS Norden)

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Gender-Specific Altered States of Consciousness

Leonid Spivak, Natalia Bechtereva, Dmitri Spivak, Sergei Danko

Human Brain Institute
Russian Academy of Sciences
St. Petersburg, Russia

Kersti Wistrand

International Association for Near-Death Studies (IANDS Norden)
Stockholm, Sweden

The psychological state and neural correlates of 19 women undergoing normal childbirth were studied. Frequent occurrence of nonordinary psychological phenomena was traced back in 6 subjects, occurring in active and passive alertness, as well as hypnagogic/hypnopompic periods, and in dreaming, during the late period of pregnancy, giving birth, and the period of 2-4 days post partum. The brain activity of the aforementioned subgroup during this time was characterized primarily by general activation of the right hemisphere in the bandpass of infraslow electrical processes and by more localized (left frontal) EEG activation. The implications of the data for research on gender-specific altered states of consciousness are discussed.

IN 1991, a research program on altered states of consciousness (ASC) was begun at the the Human Brain Institute of the Russian Academy of Sciences in St. Petersburg. The program has centered upon the clinical study of states conditioned by psychoactive drugs and procedures. It has also included studies in ethnic and historical aspects of ASC. This program was the first within the framework of the Russian Academy of Sciences to be centered upon systematic research in ASC, including their humanistic and transpersonal aspects. Since 1997, it has been supported by the major Russian foundations for fundamental research in life sciences and humanities.

This short report presents some promising results obtained within the aforementioned program. Its specific objective is to introduce and discuss new data on gender-specific ASC acquired as a result of studying communicative and cognitive activity of normal women who successfully cope with psychological and physiological stress related to childbirth.

❧ Problems ❧

THE MAIN practical problem initially for our research in general was that 50 to 70% of women giving birth in present-day industrialized countries experience more or less pronounced

depression during the first 10 days postpartum (i.e., immediately following childbirth), according to a recent report of the World Health Organization (Gulbrandsen, 1992). This state has not been formally described in terms of symptoms and syndromes (Cooper, Murray, & Stein, 1991). Nevertheless, it is regarded in present-day clinical psychology as irrelevant or undesirable. As a result, it tends to be either disregarded in contemporary clinical practice (often labeled under the slightly pejorative term of "maternity blues"), or treated by means of antidepressive pharmacological drugs, usually without obvious effect (Kumar, 1990). Our basic idea has been that this state of consciousness (or a cluster of states), being absolutely natural (unlike those conditioned by psychoactive drugs or even psychotherapy), and at the same time definitely nonordinary, could provide a constructive model for the systematic study of ASC and for the elaboration of new psychotherapeutic technologies.

❧ Methodology ❧

THE STUDY was conducted through the facilities of the State Institute of Obstetrics and Gynaecology in St. Petersburg. Nineteen cases were studied: 14 younger women, age 17 to 24,

and 5 older women, age 30 to 39. The subjects were selected on the basis of two criteria: (a) no psychopathological episodes were traced back either in preceding life or in the course of this particular pregnancy, and (b) delivery proved to be normal and timely. Neither obstetrical complications nor considerable (exceeding 150 to 200 g) blood loss was registered. Traces of typical "maternity blues" were noticeable in most cases, but mild and short enough not to necessitate administering either pharmacological or other kinds of special treatment. Low quantities of psychoactive substances were administered in the course of labor for purposes of anaesthesia (see Table 1). Each participant was studied twice, the first time, 1 to 23 days before giving birth, the second time, 2-4 days after. Each round included a case history, a medical examination, and registration of electrical activity of the brain. The latter comprised simultaneous recording of the EEG and infraslow electrical scalp (ISEP) activity in bandpass 0.05-0.5 Hz, from 16 zones ("10-20 system"), the participants remaining in relaxed states, eyes closed. ISEP are electrical processes derived from the head surface, in a way similar to the EEG, but using nonpolarizable electrodes, and amplifiers with a bandpass extended to lower frequencies, sometimes up to DC (see Hashke, Speckmann, & Roitbak, 1992). The registrations were performed by a research group led by S. Danko (Ph.D.) and which included V. Bolotskikh (M.D.) and E. Boyarskaya (M.D.).

In the second round, a simple psychological questionnaire was also included. Its basic objective consisted in using latent cognitive models applied by normal women in coping with stress related to giving birth. In order to implement it, we collected set phrases and pragmatic clichés having to do with the situation of giving birth frequently used by contemporary female urban dwellers in Russia in sharing their feelings or experiences with one another (for an introductory essay on this particular subculture, see Shchepanskaya, 1994); its main traits seem to reveal reasonable correspondence to similar Western subcultures (Brudal, 1985). Set phrases, with different subjects, were collected in the course of informal talks in an initial stage of our study. The most frequent of these set phrases formed our questionnaire, formulated as ques-

tions concerning the period of giving birth, and the immediately following period of time (see Table 1). The psychometric properties of this questionnaire are currently the subject of a different study. Consequently, we tend to regard this paper as presenting our preliminary findings. However, the rates of occurrence of phenomena included into Table 1 correspond roughly to those obtained on a group of 132 subjects studied with the same methodology and in similar conditions (Spivak et al., 1993, p. 241; also cf. Spivak et al., 1994). The most frequent of these set phrases formed the core of our questionnaire, formulated as questions concerning the period of giving birth and the period of time immediately after (Table 1).

The women were instructed to give either a "yes" or a "no" answer, or to give no answer at all. The verbal testing was implemented orally, in Russian, by female psychologists.

Table 1

Nonordinary Psychological Phenomena Related to Giving Birth

Item Number	Subject Number																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1		✓				✓					✓	✓	✓	✓	✓				✓	
2	✓		✓			✓					✓	✓	✓	✓	✓				✓	
3		✓			✓	✓		✓		✓		✓								
4																				
5						✓														
6	✓		✓																	
7		✓		✓		✓														
8	✓		✓		✓	✓				✓										
9																				
10					✓											✓				
A		3	3	3	2	2	6	0	1	0	2	2	2	1	2	2	0	0	1	0
11		✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓					✓
12																				
13									✓											
14				✓			✓		✓											
15																				✓
16		✓				✓									✓	✓	✓			✓
17																				
18		✓			✓	✓	✓			✓							✓	✓		
19							✓													
20																				✓
21																				
22																				
23		✓	✓		✓		✓													
24			✓		✓		✓													
25			✓		✓		✓													
26				✓																
B		4	3	3	5	3	6	1	2	1	1	1	1	1	1	2	1	2	1	2
C			K	P		S				P		P							P	

✓ = affirmative answer.
 blank = negative answer or no answer at all.
 A = Sum of affirmative answers; items 1-10
 B = Sum of affirmative answers; items 11-26
 C = Application of psychoactive substances (anaesthetics and/or relaxants) in dosages, standard for modern obstetrics ("K" = ketamine; "P" = phentanyl; "S" = seduxen and ketamine); blank = no psychoactive drugs applied.
 Subjects Nos. 1-6 = Subgroup I; Subjects Nos. 7-19 = Subgroup II

Items 1–10 start with the statement:
“In giving birth I...”

- (1) ...had a state of consciousness which is quite unusual for me;
- (2) ...felt unusual grief;
- (3) ...felt unusual happiness;
- (4) ...heard unusual music (singing, voices);
- (5) ...saw unusual lights (glimpses, colors);
- (6) ...saw a “rapid playback” of my life;
- (7) ...had an almost telepathic contact with my baby;
- (8) ...had an almost telepathic contact with my (absent) relatives;
- (9) ...had an out-of-body experience;
- (10) ...had other sensations, being unusual for me;

Items 10–26 start with the statement:
“From the moment immediately following giving birth until the present time I...”

- (11) ...had a state of consciousness which is quite unusual for me;
- (12) ...had unusually many “color dreams”;
- (13) ...had unusually many “flight dreams”;
- (14) ...had unusually many nightmares;
- (15) ...had unusually many “foreboding dreams”;
- (16) ...had unusual experiences in falling asleep;
- (17) ...had unusual experiences in waking up;
- (18) ...felt unusual grief;
- (19) ...felt unusual happiness;
- (20) ...heard unusual music (singing, voices);
- (21) ...saw unusual lights (glimpses, colors);
- (22) ...saw a “rapid playback” of my life;
- (23) ...had an almost telepathic contact with my baby;
- (24) ...had an almost telepathic contact with my (absent) relatives;
- (25) ...had an out-of-body experience;
- (26) ...had other sensations, being unusual for me.

• Results •

THE RESULTS of the psychological testing are presented in Table 1. Factor analysis was not performed due to statistical limitations on the data. However, the structure of Table 1 provides an initial insight into the constellation of different sensations by each subject in the study. Without attempting any interpretation at this point, we divided the group into two subgroups, based on a simple formal criterion. The first (I) subgroup (subject Nos. 1-6) was formed by those subjects revealing a high rate of nonordinary psychological sensations (2-6 in giving birth together with 3-6 post partum). The second (II) subgroup (subject Nos. 7-19) was formed by those subjects revealing their low occurrence (0-2 in giving birth together with 1-2 post partum).

The sensations included in Table 1 were tentatively labeled by us as nonordinary, based on the fact that they were regarded as either “unusual,” or occurring at an unusually high rate by our subjects.

Based on this dichotomy, means of the main electrophysiological parameters were calculated for both subgroups. In several important aspects, the difference between subgroups I and II proved to be statistically significant. More specifically, the right hemisphere ISEP and the left-hemisphere EEG parameters proved to be the most constructive for this purpose. Prelabor differences tend to be more marked than postpartum ones (see Tables 2 and 3). As to other regularities not represented in the tables, distributed slight changes prevail over the local ones; and if there are local changes they tend to prevail in the frontal lobe.

Table 2

Spatiotemporal Relations (STR) of EEG and ISEP
Before and After Giving Birth
Linear Discriminant Analysis

STR	Group	%	K	M Dist.	F Ratio	<i>p</i>
EEG-L before	I	100	7	32.4	10.6	0.00027
	II	100				
EEG-L after	I	100	10	57.1	9.5	0.0012
	II	100				
ISEP-R before	I	100	2	16.1	22.7	0.00002
	II	100				
ISEP-R after	I	100	10	26.3	4.4	0.018
	II	100				
ISEP-C before	I	80	8	9.5	2.0	0.16
	II	92				
ISEP-C after	I	100	3	5.9	5.2	0.01
	II	92				
ISEP-C all	I	100	6	26.9	9.26	0.0006
	II	100				

Note -L, -R, -C relations in left, right hemispheres, and cross-hemispherical relations accordingly;
I – subgroup with a high rate of unusual psychological sensations;
II – subgroup with low occurrence of these sensations;
K – minimal number of variables in the classification function, yielding the results of classification presented in % column;
M – squared Mahalanobis distance between centroids of the subgroups in multivariable space (cf. Huberty, 1994);
F – ratio of the between-group variance over the within-group pooled variance;
p – probability of getting the F-ratio by chance while operating with samples from a homogeneous distribution.

Table 3

Local Parameters of EEG and ISEP Before and After Giving Birth
Linear Discriminant Analysis

Param.	Group	%	K	M Dist.	F Ratio	<i>p</i>
EEG-MACF before	I	100	5	17.8	9.6	0.0004
	II	100				
EEG-MACF after	I	17	1	-	-	-
	II	92				
EEG-WACF before	I	100	7	15.3	5.0	0.007
	II	100				
EEG-WACF after	I	67	1	1.4	5.0	0.04
	II	100				
ISEP-MACF before	I	60	3	2.7	2.3	0.11
	II	100				
ISEP-MACF after	I	67	2	3.3	5.4	0.02
	II	83				
ISEP-WACF before	I	80	4	7.1	4.3	0.02
	II	92				
ISEP-WACF after	I	83	6	7.5	2.9	0.06
	II	100				

Note MACF – value of the main minimum of an autocorrelation function; WACF – half-width of autocorrelation function on .5 level; for other abbreviations, see Table 2.

Discussion

INFRA-SLOW electrical brain activity is regarded in contemporary neurophysiology as providing the neural basis for relatively stable functional states of the organism. Consequently, the pattern of ISEP processes registered by us could be tentatively regarded as forming the neural basis of a specific functional state formed by women related to the situation of giving birth. Bioelectrical activity in the EEG bandpass, especially localized in the frontal left lobe, is regarded as supporting specific modes of perception and cognition essential for human adaptive activity in general (Bechtereva, 1997; cf. Ilyukhina, 1986, pp. 11-16). This regularity could be regarded as testifying to the emergence of specific cognitive modes, being a part of the specific functional state related to the situation of giving birth.

Taking into account the prevalence of distributed changes, one may suppose that this state is formed by a general restructuring of brain subsystems. Considering the fact that prelabor differences are more distinct, one may suppose that this state is being formed in advance, tending to fade more or less rapidly after giving birth. The regularities cited are characteristic for subgroups divided by the probability of emergence of nonordinary psychological phenomena arising in the waking state, in hypnagogic and hypnopompic periods, and in the course of dreaming. This result corroborates the supposition that there exists a specific altered state of consciousness related to giving birth and provided by a special brain mechanism. The fact that other divisions based on traditional psychological tests do not demonstrate the existence of similar brain correlates (cf. Kastrubin et al., 1990), allows us to suppose that basing our work on latent cognitive models of relevant subcultures of ASC and taking into account notions elaborated in the framework of humanistic and transpersonal psychology is fruitful and constructive.

The plausibility of a specific state of consciousness related to giving birth has now and then been discussed in the psychological literature (a good example is D. Winnicott's arguments in favor of "primary maternal preoccupation" as the dominating process related to giving birth; cf. Brudal, 1985, pp. 18-19). However, it has not been formally elaborated and supported by experimental data.

One might suppose that if consciousness states tend to form a well-ordered complex system (which seems plausible to some serious authors, and has frequently been discussed in terms of "taxonomies" or "cartographies of ASC" [Dittrich, von Arx, & Staub, 1981, p. 192; Grof, 1985, pp. 92-137; Martindale, 1981, pp. 311-338; Tart, 1983, pp. 228-285]), then even the latent existence of a separate state, characteristic for only one gender, could bring about qualitative change in the overall structure of its ASC.

Prospects

IN THE neurophysiological aspect, it would be most expedient to amplify the results presented above by means of applying other methodologies

which tend to reveal traces of gender-specific strategies used in processing information by the human brain (Shaywitz et al., 1995). In the psychological aspect, it would be promising to extend our research by observing participants belonging to a traditional society, which would have a strong tradition of enhancing gender-specific ASC especially related to giving birth. (One such study has already been initiated in the framework of our research by means of testing female inhabitants of remote Tatar villages in the Udmurt Republic.) In general terms, it seems constructive to take fully into account novel ideas elaborated in the framework of the contemporary "postpatriarchal" paradigm (Keller, 1988).

• Conclusions •

1. The communicative and cognitive activity of normal women successfully coping with psychological and physiological stress related to giving childbirth may be provided by a specific functional state, including the perceptive and cognitive levels, which could thus be tentatively labeled as a gender-specific ASC.

2. The neural mechanism of this state implies primarily general activation of the right hemisphere in the bandpass of infraslow electrical processes, as well as more localized (left frontal) activation in the bandpass of EEG.

3. Transpersonal notions and conceptual schemata are most constructive for psychological testing of gender-specific ASC and for the elaboration of general strategies for their study.

Notes

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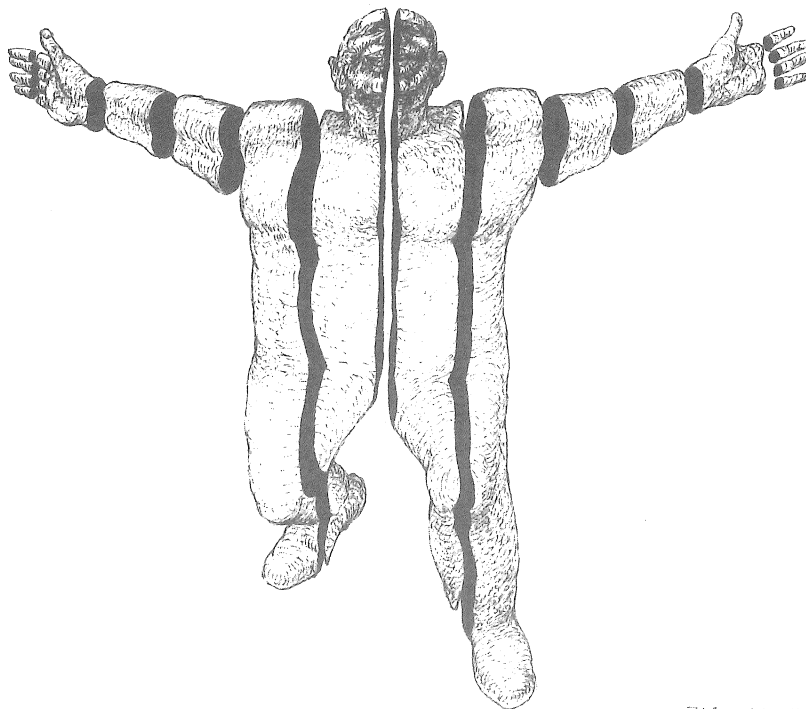
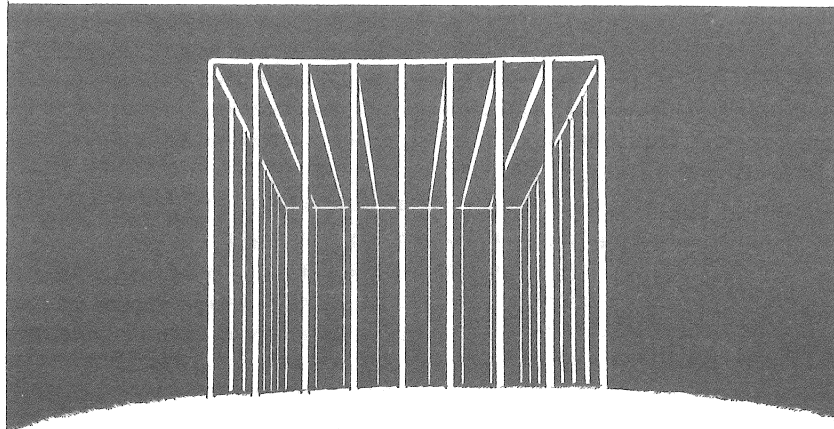
Editors' note: We are sad to report that Dr. Leonid Spivak died as this issue was going to press.

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The Complementary Principle
Mikhail Zlatkovsky