

ТАНАТОС И КУЛЬТУРА / THANATOS AND CULTURE

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| Психологические закономерности восприятия традиционной / нетрадиционной музыки и их мозговые корреляты. Статья 1. Психологические закономерности / Psychological Effects of Perception of Traditional / Non-traditional Music and their Brain Correlates. Article 1: Psychological Effects |

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**ПСИХОЛОГИЧЕСКИЕ ЗАКОНОМЕРНОСТИ ВОСПРИЯТИЯ ТРАДИЦИОННОЙ / НЕТРАДИЦИОННОЙ МУЗЫКИ И ИХ МОЗГОВЫЕ КОРРЕЛЯТЫ.
 СТАТЬЯ 1. ПСИХОЛОГИЧЕСКИЕ ЗАКОНОМЕРНОСТИ**

Изучены психологические процессы и состояния при восприятии музыки 63 нормальными молодыми русскими городскими жителями. Установлено, что в первую очередь затрагиваются примитивные в структурно-функциональном и онтогенетическом отношении стратегии совладания со стрессом (конфронтация, бегство-избегание), а также базовые психологические защиты (подавление). Прослежены также различия в восприятии музыки, традиционной для данного контингента (легкой классической европейской) и нетрадиционной для него (дизайнер-музыки), в первую очередь по линии общего психологического напряжения (невротизации).

Ключевые слова: психологические процессы и состояния, копинг-стратегии, психологические защиты, восприятие музыки, традиционное и нетрадиционное искусство, культурное наследование.

PSYCHOLOGICAL EFFECTS OF PERCEPTION OF TRADITIONAL / NON-TRADITIONAL MUSIC AND THEIR BRAIN CORRELATES.*

ARTICLE 1: PSYCHOLOGICAL EFFECTS

Psychological effects of perception of music by 63 normal young Russian city dwellers were studied. Stress coping strategies, primitive in functional and ontogenetic terms (confrontation, avoidance) were demonstrated to be primarily affected, as well as such basic psychological defense mechanisms, as suppression. Differences in the effects of perception of the traditional (light European classical) music and the non-traditional (contemporary designer) one were traced back, primarily at the level of general psychological tension. As a result, possible psychological mechanisms supporting the adaptive function of culture, are discussed.

Key words: psychological states and processes, stress coping strategies, psychological defense mechanisms, perception of music, traditional and non-traditional art, cultural inheritance.

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Culture is regulated by its immanent laws, both in statics and dynamics. Studying its psychological factors or, brain mechanisms is no more useful for understanding its inner regularities, than studying the substance the chess-desk or, chess-men are made of, in order to understand the essence of the game of chess¹. Nevertheless, human psychology is a product of a long evolutionary development, in the course of which lower levels of psyche, as well as of organism as a whole, have been actively involved into the construction of new, higher levels. Latent links and connections between lower levels and the higher ones are still present and in some cases, quite active, imposing their limitations or, giving an impetus to the functioning of the psyche as a whole. Even practicing the loftiest forms of cultural activities, humans still remain psychosomatic entities². Thus study of psychological effects of

cultural activities and their brain correlates forms an integral part of the general realm of cultural research.

The basic assumption of our research was that conducting cultural activities contributes to the well-being of humans, in the most literal sense of the word. This means that acknowledging the importance of such complex functions of culture, as the cognitive and the communicative one, we have entirely concentrated upon its most basic function, the adaptive (or, vital) one³. Thus the set of psychological questionnaires applied by us, was directed at measurement of the level of neuroticization and psychological tension of our subjects, and of the level of tension and structure of stress coping strategies, applied by them in the service of the ego.

Cultural practices, observed by us, were limited in the present, preliminary research by the auditory perception of music. Two types of music were used, one being traditional for present-day young Rus-

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¹ This aspect of culture has always been strongly emphasized in Russian cultural studies, for classics see: Lotman Yu.M. On semiosphere // Lotman Yu.M. Selected Papers in three Volumes. Vol.1. Tallinn, Aleksandra, 1993, p.13-14 (in Russian); Kagan M.S. Culture // Theoretical Culturology. Moscow-Ekaterinburg, Akademicheskiiy Proekt / Delovaya Kniga, Russian Institute of Cultural Research, 2005, P. 361-364. (in Russian). In the Western scientific tradition, this viewpoint is associated primarily with the classical works of F.Boas and his scientific school of cultural anthropology. To cite one of his students, culture is a “domain with ordering principles and laws that could not be explained by or reduced to biology”, (Kroeber A.L. The Superorganic // American Anthropologist, New Series, 1917, Vol. 19, No.2, P.163–213).

² This notion of psychosomatic (mind-body) entity, and its implications are discussed in contemporary science predominantly in the context of the so-called psychophysiological problem, cf.: Maryutina T.M., Ermolaev O.Yu. Introduction into Psychophysiology. Moscow, Moscow Sociopsychological Institute, Flinta, 2001, P. 10-11 (in Russian) (in context of psychophysiology); Gippenreiter Yu.B. Introduction into General Psychology. Moscow, CheRo, 1996, P. 234-235 (in Russian) (in context of general psychology); Goryainova O.I. Structural-functional models in applied culturology:

Sources of applied science // Culturology: Basic Foundations of Applied Research. Moscow, Smysl, 2010, P. 87-108 (in Russian) (in context of applied cultural research); cf. Young R.M. The mind-body problem // Companion to the History of Modern Science. London / NY, Taylor and Francis, 1996, pp. 702–711 (in context of the modern scientific paradigm).

³ In theoretical terms, this paradigm implies concentration upon the adaptive properties of culture instead of those symbolic ones. In doing so, we follow an influential trend in cultural studies, initiated by Leslie White in the later period of his works (White, L.A. Energy and the Evolution of Culture // American Anthropologist, 1943, Vol.45, No.3, P. 335-356). For structural parallels in present-day Russian theoretical thought, cf. Danilenko O.I. Individuality in Context of Culture. Psychology of Mental Health. St.Petersburg, St.Petersburg State Universiy, 2008, P. 126-128 (in Russian); Fundamentals in Culturology / Ed. by I.M.Bychovskaya. Moscow, Editorial URSS, 2005, P. 443-444 (in Russian). For parallels in the Western tradition, see a most constructive review: Croom A. Music, neuroscience, and the psychology of well-being: a précis // Frontiers in Psychology, 2012 // <http://dx.doi.org/10.3389/fpsyg.2011.00393>.



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sian urban dwellers, who served as respondents in our research; another one being non-traditional for them. As a result, we obtained possibility of checking another assumption of ours, i.e. that perceiving and processing traditional or, innovative art, brings about different psychological effects, even on the level of such vital characteristics as the general psychological agility, feeling of inner comfort or, the ability to cope with stress. This part of our research belongs to the long-term program of studies in psychophysiological mechanisms of cultural inheritance, which forms part of the works of D.S.Likhachev Russian Institute of Cultural and Natural Heritage⁴.

A group of 63 young (aged 24±5), normal, Russian-speaking subjects, young urban dwellers, mostly students in St.Petersburg, Russia, were studied. All of them went through a routine medical investigation, filled in the usual form of informed consent, and a set of psychological questionnaires. Following this, a psychophysiological study was conducted. After that, the subjects were divided in a random way into three subgroups, each one consisting of 20 to 22 subjects. Members of each of these subgroups listened to music of their own, specific type for 14 days, 90 minutes every day. After the musical course was completed, i.e. in 14 days, all subjects went through similar proce-

dures of psychological study, and the electrophysiological one⁵.

No professional musicians became subjects of our research. The majority had not graduated from even a musical college, which is a quite common form of secondary complementary education in Russia: there were 16 subjects of this kind in subgroup 1, 15 in subgroup 2, and 16 in subgroup 3. Those who had graduated from a musical college were 3 in subgroup 1, 3 in subgroup 2, and 4 in subgroup 3. At the same time, the majority of our respondents reported that they were feeling quite positive to music. Many of them listened to some kind of musical recordings in the course of their everyday life: there were 12 such respondents in subgroup 1, 5 in subgroup 2, and 19 in subgroup 3. Thus our respondents seem to be quite representative of the population in general. This aspect seems to be fairly important for our study, as, for instance, the brain of professional musicians tends to function in the course of listening to musics in a different way than that of ordinary people⁶.

Subgroup 2 listened to light classical music. The recordings we used were officially recommended by the Centre of Rehabilitation Medicine of the Ministry of Health of the Russian Federation, for means of 'stress reduction, relaxation, and healing'⁷.

Subgroup 3 listened to music which was sharply different in both key and timbre from that of subgroup 2. The recordings applied in this case, were syn-

⁴ In theoretical terms, this part of our research program was formulated, taking into account the long Russian tradition of studies in theoretical aspects of cultural inheritance, cf.: Lotman Yu.M., Uspenskiy B.A. On semiotic mechanism of culture // Lotman Yu.M. Selected Papers in three Volumes. Vol. 3. Tallinn, Aleksandra, 1993, P. 328-329 (in Russian); Markarian E.S. Theory of Culture and Contemporary Science. An Inquiry in Logic and Methodology. Moscow, Mysl, 1983, P.172 (in Russian). For general context, see: A Companion to Cultural Memory Studies / Eds. Erll A., Nuenning A. Berlin / Boston, W. de Gruyter, 2010.

⁵ Field coordination and logistics of our study were provided by psychologist O.I.Yurevich, St.Petersburg State University, together with specialist in cultural studies M.A.Stepanov, D.S.Likhachev Heritage Institute. The work of both specialists was directed by D.S.Spivak.

⁶ Gaser C., Schlaug G. Brain structures differ between musicians and non-musicians // The Journal of Neuroscience, 2003, Vol.23, No.27, P. 9240-9245.

⁷ Ocean of Love. An MP3 collection / © «Healing Music». Moscow, Diskart RU, s.a. (audiorecordings certified by the Russian Academy of Pedagogy in 2007, in Russian).



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thesized by iAwake Technologies in the USA, basing on the concept of an outstanding expert in this field, E.Thompson⁸. Recurring to different traditions and techniques, recordings provided by iAwake Technologies attempted to activate healing mechanisms of the human body and psyche; they could be either relaxing or, activating or, both⁹. Thus subgroup 2 listened to music belonging to the realm of their cultural heritage in the most general sense of this word; as to subgroup 3, the situation was opposite.

Subgroup 1 was envisaged to serve for control. Thus it had to listen to sounds which would preferably be not music (singing, recitative), and which would be neutral to the dichotomy 'cultural tradition – cultural innovation'. At the same time, they had to sound fairly common for every member of the subgroup 1. We have chosen sounds of living nature, as they complied to all of these requirements¹⁰. This choice of ours has been quite novel for studies of this kind¹¹.

The focal points of our study belong to the general trend of contemporary studies of art perception. Thus perception of music is regarded at present as able to deeply influence the general state of human

mind, and of brain which serves as its substrate¹². Discerning between traditional and non-traditional musical texts may also be found in some of contemporary studies of perception patterns¹³.

At the same time, linking perception of definite aspects of the musical text (like pitch, rhythm or, timbre) to modes of functioning of definite structures of the brain seems to form the main trend of the present-day systematic research, especially the neuropsychological and neurophysiological one. One should connect it primarily to the fact that while there exists ample technical possibility of registering alterations in the state of a vast set of brain structures, up to the level of a single neuron, there is no way for now to link these structures directly with such overall notions as well-being, life quality or, personal growth¹⁴.

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⁸ The authors are grateful to E.Thompson for having provided recordings for this part of our research.

⁹ For more detailed information, see the web site of the iAwake Technologies: <http://www.iawaketechnologies.com>.

¹⁰ Recordings recommended by the aforementioned centre of the federal Ministry of Health were applied in our research, cf. Sounds of Nature. Collection / © 'Healing Music'. Moscow, CD Club, s.a. (audiocassette, copyright of 2007); A Walk in the Forest / © 'Healing Music'. Moscow, CD Club, s.a. (audiocassette, copyright of 2007) (both in Russian).

¹¹ Environmental sounds are now and then used in studies of music perception, especially the neurophysiological ones. However they don't tend to serve as the reference point, as in the case of our study, cf. Altenmüller E., Schuermann K., Lim V., Parlitz D. Hits to the left, flops to the right: different emotions during listening to music are reflected in cortical lateralisation patterns. // *Neuropsychologia*, 2002, Vol.40, P. 2245.

¹² Clift S. Creative arts as a public health resource: Moving from practice-based research to evidence-based practice // *Perspectives in Public Health*, 2012, Vol.132, No.3, P.120-127; Koelsch S. Brain correlates of music-evoked emotions // *Nature Reviews Neuroscience*. 2014, Vol.15, P. 170-180; McCraty R., Barrios-Choplin B., Atkinson M., Tomasino D. The effects of different types of music on mood, tension, and mental clarity // *Alternative Therapies in Health and Medicine*, 1998, Vol. 4, No.1, P.75-84, cf. Zharinov G.M., Anisimov V.N. Music and longevity // *Advances in Gerontology*, 2014. Vol. 27, No.2, P. 284-290 (in Russian).

¹³ Discussion tends however to be conducted in terms of the general theory of systems or, semiology, cf. the way in which the term 'Western tonal idiom' is applied in the following study: Blood A., Zatorre R., Bermudez P., Evans A. Emotional responses to pleasant and unpleasant music correlate with activity in paralimbic brain regions // *Nature Neuroscience*, 1999, Vol.2, No.4, p.382-387, cf. Gomez P., Danuser B. Relationships between musical structure and psychophysiological measures of emotion // *Emotion*, 2007, Vol.7, No.2, P. 377-387.

¹⁴ For more detailed accounts, see: Cervellin G., Lippi G. From music-beat to heart-beat: a journey in the complex interactions between music, brain and heart // *European Journal of Internal Medicine*, 2011, Vol. 22, No. 4, P. 371-374, cf. Chanda M., Levitin D. The neurochemistry of music. // *Trends in Cognitive Sciences*. 2013, Vol. 17, No. 4, P. 179-193.



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Our study, aimed at filling up the aforementioned gap, has been designed just in order to find out and to link some most general characteristics of the music text (at the level of ‘tradition – innovation’), on the one hand, and some most general characteristics in functioning of the human psyche (e.g. at the level of ‘gaining long-term adaptive potential or, losing it’), on the other one. It follows thus an alternative way of approach to such focal issues of present-day science as perception of art or, enhancement of well-being, striving to link them to one another, while retaining due level of methodological correctness.

The psychological part of our study consisted in six questionnaires which may be divided into three blocks: psychological tension (a), psychological defenses (b), and hidden reserves (3).

Block (a) comprised two questionnaires, one of which consisted of 20 items, and provided assessment of the levels of psychological activation, tension, comfort, interest, and emotional activation¹⁵. Another questionnaire consisted of 45 items and measured the level of neuroticization¹⁶. The former of these inventories measured predominantly reactive (short-term) aspects of the psychological state of the subjects, the latter one measured its personal (long-term) aspects. Being combined, they became, so to say, complementary, providing us with a reasonably accurate assessment of the psychological state of the Ss, both in its short-term and long-term aspects. Both questionnaires were conducted in Russian, as all of our study, as Russian was

the native tongue of all of our respondents. Both belong to the set of standard instruments of psychological investigation and diagnostics, applied currently in this country.

Block (b) comprised two questionnaires, one of which consisted of 50 items, and provided assessment of the level of activation of each of the eight major coping strategies, i.e. confrontation, estrangement, self-control, searching for social support, assuming responsibility, avoidance, planning of problem resolving, positive reassessment¹⁷. Another questionnaire consisted of 97 items, and measured the level of activation of each of the eight basic strategies of psychological defense, i.e. negation, suppression, regression, compensation, projection, substitution, intellectualization, and reactive formation¹⁸. The former of these inventories measured mostly conscious mechanisms of psychological defense, formed in the course of one’s life; the latter ones, measured the mechanisms which were mostly subconscious, and formed in the course of early ontogenesis. Being combined in our study, they became, so to say, complementary, providing us with a reasonable assessment of different aspects of psychological defense mechanisms, both conscious and subconscious.

Both questionnaires of block (b) belonged to the standard set of psychological inventories, applied in present-day Russian science. However both were based upon serious approaches, elaborated in the Western psychological tradition. In the case of the coping strategies, it was the transactional model of adaptation to stress constructed by R.S.Lazarus, with some valuable additions concerning the guidelines of coping

¹⁵ For details, see: Kurgansky N.A., Nemchin T.A. Assessment of psychological activation, interest, emotional activation, tension, and comfort // Practical Manual in General, Experimental, and Applied Psychology. St/Petersburg, Piter, 2006, P. 309-314 (in Russian).

¹⁶ Iovlev B.V., Karpova E.B., Vuks A.Ya. Scale for Psychological Express Diagnostics of Neuroticization Level (NL). St.Petersburg, V.M.Bekhterev Psychoneurological Institute, 1999, P. 19-34 (in Russian).

¹⁷ For details, see: Wasserman L.I., Ababkov V.A., Trifonova E.A. Stress Coping: Theory and Psychodiagnostics. St.Petersburg, Rech, 2010, P. 128-138 (in Russian).

¹⁸ Romanova E.S. Psychodiagnostics. St.Petersburg, Piter, 2006, P. 369-375 (in Russian).



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behavior, by S.Folkman¹⁹; in the case of basic defense mechanisms, it was the psychoevolutionary theory by R.Plutchik²⁰, complemented by some bright intuitions from the structural theory of personality by H.Kellermann²¹.

Block (c) comprised two questionnaires, one of which consisted of items, and provided assessment of the level of intrinsic religiosity (that is, inner religiosity, as opposed to the extrinsic, outer one). This part of our study was based upon a well-known questionnaire elaborated by a prominent American psychologist of religion, professor J.Kass²². It was earlier adapted by us, in order to be applied in surveys of Russian speakers²³.

Another questionnaire consisted of 15 items, and provided assessment of presence of features of short-term altered states of consciousness, often self-induced in stressful or unusual conditions in order to cope with psychological stress²⁴. The 15 items were divided into five scales, giving assessment of presence

of features of qualitative alterations of consciousness on the levels of perception patterns, emotional functioning, cognitive functioning, communicative patterns, dream contents. This part of our study was based upon the concept of altered states of consciousness, elaborated by us as part of the scientific research program of the Human Brain Institute, Russian Academy of Sciences²⁵. Questionnaires elaborated by R. van Quekelberghe and A.Dittrich, served as the nearest context of our inventory²⁶. Including these two questionnaires into our research, we supposed that both of them were dealing with a vast realm, which could be tentatively called spirituality. In the case of extrinsic religiosity, we were dealing with its religious side (the so-called core religious experiences, to speak in strict terms of religious psychology); in the case of the altered states of consciousness, with its non-religious one. Thus both inventories were regarded by us as, so to say, complementary, i.e. presenting two different aspects of spirituality, which was regarded by us as a possible hidden reserve, recurred to in stressful or, unusual conditions in the service of the ego.

All of the psychological inventories applied in this study, belonged to the standard set of psychodiagnostic methodologies (with the obvious exception of

¹⁹ Lazarus R. Psychological stress and the coping process. New York, McGraw-Hill, 1966; Folkman S., Lazarus R.S. Manual for the Ways of Coping Questionnaire. Palo Alto (CA), Consulting Psychologist Press, 1988.

²⁰ Plutchik R. A general psychoevolutionary theory of emotions // Emotion: theory, research, and experience: Vol. 1. NY, Academic Press, 1980; Kellerman H., Plutchik R. Emotion-trait interrelations and the measurement of personality // Psychological Reports, 1968, No.23, P.1107-1114.

²¹ Kellerman H., Plutchik R. Emotion-trait interrelations and the measurement of personality // Psychological Reports, 1968, No.23, P.1107-1114.

²² Kass J.D., Friedman R., Lesserman J., Zuttermeister P., Benson H. Health outcomes and a new index of spiritual experiences // Journal for the Scientific Study of Religion, 1991, Vol.30, No.2, P. 203-211.

²³ Spivak D.L., Gruzdev N.V. Core religious experiences in cross-religious research. // Pluralisme et reconnaissance: Défis des particularismes et des minorités Paris, IIT France, 2008, P. 373-387

²⁴ For classical definitions, cf.: Ludwig A. Altered States of Consciousness // Altered States of Consciousness. NY, Anchor Books, 1969, P.12-24.

²⁵ For our earlier publications, see: Gruzdev N.V., Spivak D.L.. An exploratory investigation into the association of neuroticization, cognitive style, and spirituality to reported altered states of consciousness // The International Journal of Transpersonal Studies, 2006, Vol. 25, P. 56-61; Spivak L.I, Bechtereva N.P., Spivak D.L, Danko S.G., Wistrand K. Gender-specific altered states of consciousness // The International Journal of Transpersonal Studies, 1998, Vol.17, No.2, P.181-185.

²⁶ Dittrich A. The standardized psychometric assessment of altered states of consciousness (ASCs) in humans // Pharmacopsychiatry, 1998, Vol. 31. Suppl.2. No.7, P. 80-84; Quekelberghe R.van, Altstoetter-Gleich G., Hertweck E. Assessment schedule for altered states of consciousness: a brief report // Journal of Parapsychology, 1991, Vol. 55, No.12, P. 377-390.



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the questionnaire of features of altered states of consciousness). It had been earlier successfully applied in our research of different psychological processes and states, by different groups of subjects²⁷.

Organization of our experiment did not foresee either too loud sound or, application of headphones. Our respondents were not closely monitored in the course of listening: the sat in a dark room in relaxed postures and could easily have a nap. The reason was that we were interested not in effects of being exposed to excessive sound or other aggressive sound technologies, but rather in fundamental mechanisms, applied by normal people on everyday basis. In this way, we were looking for not striking effects, but basic trends. The results that we got were in line with this initial intuition of ours.

Thus conducting block (a), we did not register any features of considerable dynamics on the levels of psychological tension, activation, comfort, interest or, emotional activation; however, some basic trends were quite visible. The former, i.e. psychological tension, could serve as a plausible example; the corresponding data are explicitly presented in Table 1. Regarding it, we see that mean values of the index before the start of the course are between 11.85, and 12.30; after the course, they are between 12.05, and 13.25. Taking into account that mean values of this index for present-day

normal Russian urban dwellers lie between 9 and 15, according to the results of the authors of this methodology, we have to say that we see here nothing more than shift in the normal zone.

However applying standard statistical methods, i.e. the criteria of Kruskal-Wallis and Friedman, we see that the index regarded has shifted quite seriously in the direction of excessive psychological tension²⁸. This shift shows us the most possible direction of changes in case if/when the sound technology would become more aggressive. We came to similar conclusions regarding dynamics and structure of the other four indices forming this part of our research (psychological activation, comfort, interest, emotional activation); they would not be cited explicitly.

²⁷ For examples, see: Gruzdev N.V., Spivak D.L. Basic factors of induction of altered states of consciousness // *Psikhologicheskii Zhurnal*, 2006, Vol. 27, No. 3, P. 78-85 (in Russian); Gruzdev N.V., Spivak D.L. An exploratory investigation into the association of neuroticization, cognitive style, and spirituality to reported altered states of consciousness // *The International Journal of Transpersonal Studies*, 2006, Vol. 25, P. 56-61; Spivak D.L., Zakharchuk A.G., Pavlov A.E., Spivak I.M. Religious psychological aspects of ageing // *Religiovedenie*, 2007, No.4, P. 104-110 (in Russian); Spivak I.M., Khesina A.A., Spivak D.L. Ageing and Longevity at Cellular and Organismiv Levels: Impact of Psychological Factors. Saarbruecken, LAP Lambert Academic Publishing, 2015, P. 118-123 (in Russian).

²⁸ Statistical data processing was done by Dr. N.P.Alekseyeva, St.Petersburg State University, in contact with D.L.Spivak. Two non-parametric criteria were applied, as one of them (Friedman criterion) is applicable in case of dependent samples, while the other one (Kruskal-Wallis criterion), in the case of the independent ones.



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Table 1. Level of psychological tension before passing an audiocourse of music of different types, and after it.

Subgroup / Index	M.1	Sd1	M.2	Sd2	n	p.FC
1	11.85	1.45	13.25	2.05	20	0.01
2	12.30	2.13	12.65	2.64	20	0.62
3	11.95	2.24	12.05	3.20	22	0.81
p.KWC	0.82		0.18			

Abbreviations: M1 – mean value of the index of psychological tension for the given group before passing the audiocourse, M2 – mean value of the index of psychological tension for the given group after passing the audiocourse, Sd1 - standard deviation before the course, Sd2 - standard deviation after the course, n – sample size, p.FC - probability confidence level by the Friedman criterion, p.KWC - probability confidence level by the Kruskal-Wallis criterion.

The data concerning neuroticization are presented in Table 2. Mean levels of neuroticization for men in subgroups 1, 2, and 3 was 15.63; 15.80, and 22.00, respectively²⁹. Taken into account that moderate level of neuroticization for this methodology lies in the interval between 11 and 20 points, while the low level is between 21 to 40, we have to admit that the level of neuroticization of men was more or less normal in the course of our experiment.

For women, the corresponding levels were 33.08; 21.50 и 56.75. Moderate level of neuroticization lies for them roughly between 11 and 40, while low level is between 40 and 80 points. This means that the female part of the group studied did not reveal any major differences from the male one.

Application of non-parametric criteria points at a hidden regularity, which is not clearly seen otherwise. Looking at its lowest line, we see that, to speak in terms of non-parametric statistics, there was no real difference between our three subgroups prior to pass-

²⁹ Mean levels of neuroticization are quite similar by normal Russian-speaking urban men and women. However the authors of the methodology, applied in this case, found it expedient to define standard levels for each gender separately, cf. Iovlev B.V., Karpova E.B., Vuks A.Ya. Op. cit., P. 15-16.

ing the musical course, but there appeared a difference, in fact very pronounced one, after it³⁰. Looking at data in column M.2, we see that this was the effect of two simultaneous processes. As clearly shown by Table 2, mean values of the neuroticization index somewhat diminished for subgroups 1 and 2. At the same time, they rose for subgroup 3.

Small as these two shifts might be, they followed opposite directions; as a result, difference between subgroups 1,2, on the one hand, and subgroup 3, on the other hand, became statistically significant, and in fact quite sharp. Interpretation of the two trends is quite obvious: as a result of listening to traditional music (and sounds of nature), our respondents moved towards higher level of neuroticization. The opposite was true for those who listened to non-traditional music. Both trends took place in the framework of normal level of neuroticization. However they clearly showed the tendencies that would take place when more aggressive sound technologies would be applied. This is the kind of trends that we expected to find in the framework of our study, and in fact have succeeded to a certain degree.

³⁰ For reasons of brevity, data for both men and women are cited in Table 2 jointly.



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Table 2. Level of neuroticization before passing an audiocourse of music of different types, and after it.

Subgroup / Index	M.1	Sd1	M.2	Sd2	n	p.FC
1	32.50	47.05	23.65	46.43	20	0.16
2	23.95	40.91	18.10	42.29	20	0.37
3	46.91	48.84	51.50	38.26	22	1.00
p.KWC	0.27		0.03			

For abbreviations, see notes to Table 1.

Application of other types of data processing, primarily, factor analysis, and discriminant analysis, somewhat elaborated on this picture, but did not yield any qualitatively different results. For the sake of brevity, they would not be cited here explicitly.

To conclude our remarks concerning the index of neuroticization, we wish to remind that it belongs to the set of the so-called personal indices, formed in the course of early ontogenesis and, consequently, unlikely to react to minor stimuli. The list of such stimuli is now being elaborated. As it was noticed by the authors of this methodology, the index of neuroticization proves to be rather dynamic in the course of pharmacological treatment of neurotic patients³¹. One has to suppose that the effect of music is in fact quite profound, if it brings about changes which are comparable to the effects of applying psychoactive drugs, at least when we apply the index of neuroticization.

Passing to block (b), we find the most vivid dynamics by two kinds of the eight basic coping strategies, i.e. confrontation, and avoidance. Both belong to the list of the most primitive ones, in term of both onto- and philogenesis: fighting or fleeing from the most simple forms of behavior in stressful conditions. This means that music tends to affect rather deep layers of psyche, which is absolutely true.

³¹ Iovlev B.V., Karpova E.B., Vuks A.Ya. Op. cit., P.17.

Data on the confrontation strategy do not differ much by different subgroups prior to passing a musical course (see column M.1, Table 3). Differences that occur after and, as we suppose, due to passing it, are not great at all. However, they are directed differently: in case of listening to music of any type (subgroups 2, 3), the level of tension of the confrontation strategy seems to wane; the opposite is true for the control group. As a result, difference between them reaches the level of statistical relevance.

All of the data presented in Table 3 (columns M.1, M.2) present a coping strategy which is only slightly altered. In fact, the authors of the methodology that we follow define the interval between 40 and 60 points as moderately altered³². However mean value for the control group (line 1) belong to the upper part of this interval, and would most likely leave it if/when a more aggressive sound technology would be used. Subgroup 2, listening to classical music, is likely to join it, while mean values for subgroup 3 would most probably continue falling. These processes have not yet taken place; however Table 3 allows to trace back their onset.

³² Wasserman L.I., Ababkov V.A., Trifonova E.A. Op.cit, P.137



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Table 3. Level of tension of confrontation strategy in stress coping, before passing an audiocourse of music of different types, and after it.

Subgroup / Index	M.1	Sd.1	M.2	Sd.2	n	p. FC
1	52.75	7.33	53.95	8.41	20	0.13
2	49.40	10.65	48.20	11.75	20	0.32
3	49.05	11.55	47.73	10.39	22	0.83
p. KWC	0.54		0.06			

For abbreviations, see notes to Table 1.

Table 4. Level of tension of avoidance strategy in stress coping, before passing an audiocourse of music of different types, and after it.

Subgroup / Index	M.1	Sd.1	M.2	Sd.2	n	p.FC
1	55.45	8.21	56.35	9.22	20	0.64
2	50.40	12.09	48.15	11.60	20	0.47
3	51.23	6.80	49.18	9.19	22	0.25
p. KWC	0.29		0.03			

For abbreviations, see notes to Table 1.

Passing to the avoidance strategy in coping behavior (see Table 4), we come to quite similar conclusions. Our audiocourse proved to be strong enough to sharply differ both musical subgroups (2 and 3), on the one hand, and the control subgroup (1), on the other (for data, see column M.2 in Table 4). It proved nevertheless not strong enough to differ between subgroups 2 and 3, listening to traditional music and to the non-traditional one, respectively. As we have already pointed out, we regard bringing the difference between them to the level of statistical relevance as a purely technical task.

Basing upon the data of Tables 3 and 4, we wish to note that listening to music of any type, whether traditional or, non-traditional, seems to affect the most primitive, basic coping strategies. As a result,

they tend to become less tense and, consequently, less probable to be applied in stressful conditions. The opposite is true for the control group, which listened not to music, but to nature sounds. Thus our approach has proved to be rather constructive; to trace back more subtle results, one would have to intensify the sound technology.

Study of the dynamics of psychological defense mechanisms formed another part of the block (b). It proved to be rather moderate, most probably due to the fact that the aforementioned mechanisms are formed in the course of early ontogenesis, to remain mostly subconscious and too rigid to react to external stimuli, even quite strong ones. However we managed to find some promising trends here to be analyzed. Thus the level of tension of the suppression defense



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mechanism tended to either remain static at a rather low level (subgroup 3) or, to rise sharply (subgroup 2) /stay at a high level (subgroup 1) (for data, see Table 5).

This means that the level of tension of the suppression defense mechanism proved to be strongly affected by listening to music of various types. This mechanism was activated and, consequently, more probable to be used, as a result of listening to traditional mu-

sic; the opposite was true for the non-traditional music course. This difference somewhat exceeded the level of 0.05 which served as the threshold of statistical relevance in this study: this is why we can speak here not of a regularity, but of a tendency, however a rather strong one.

Control subgroup tended to be much nearer to the traditional music subgroup, than the non-traditional one.

Table 5. Level of tension of suppression as a psychological defense mechanism, before passing an audiocourse of music of different types, and after it.

Subgroup / Index	M.1	Sd.1	M.2	Sd.2	n	p.FC
1	3.11	2.05	3.11	1.76	19	0.78
2	3.70	2.41	4.25	2.29	20	0.17
3	2.86	1.55	2.86	2.21	22	0.62
p.KWC	0.62		0.06			

For abbreviations, see notes to Table 1.

Finding this set of tendencies seems to be highly constructive for our research. Suppression is one of the most primitive defense mechanisms. “Defensive suppression limits the fear by means of forgetting conditions which have provoked it”, - emphasized E.Romanova³³. In fact, what can be simpler than to hide, both physically and psychologically, from a danger. As a result, suppression is a fundamental mechanism, that is, belonging to deep layers of psyche and often inbuilt into subtler forms of the psychological defense. A structurally similar mechanism called repression (Verdraengung) by S.Freud, was regarded by him as basic for personality, as well as for various types of its diseases³⁴.

³³ Romanova E.S. Op.cit., P. 372-373.

³⁴ For details, see: Kruzhkova O.V., Shakhmatova O.N. Psychological Defenses of Personality. Ekaterinburg, Russian State Professional Pedagogical University, 2006 (in

Level of activation of hidden reserves and human potentials was studied in block (c). The first type of psychological states and processes analyzed here was short-term induction of qualitative alteration of perception, emotion, cognitive functioning, communicative functioning, and of the contents of dreams, aggregated into a single index. A 15-item questionnaire was applied, elaborated by us at Human Brain Institute, Russian Academy of Sciences. Studying the data obtained, we are feeling authorized to state that all of the three subgroups were strongly influenced by passing the musical course (for details, see columns M.1 and M.2 in Table 6). In each case, the fall of the corresponding index was considerable, ranging from approximately 10 to 40 percent. At the same time, this massive shift was unidirectional, i.e. all of the indices

Russian); Boag S. Freudian Repression, the Unconscious, and the Dynamics of Inhibition, London, Karnac, 2012.



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shifted in the same descending direction. This is why no further differences between our subgroups were detected.

The conclusion is obvious here: listening to music prepared by us did not overstrain our subjects in any way. As a result, no psychological hidden defense mechanisms were activated. At the same time, music

tended to act as a really strong factor of relaxation, and possibly healing, at least in some cases (we state it basing on informal discussions with the members of our subgroups). As a result, probability of occurrence of features of altered states of consciousness, normally linked to episodes of stress, fell sharply.

Table 6. Index of features of altered states of consciousness, before passing an audiocourse of music of different types, and after it.

Subgroup / Index	M.1	Sd.1	M.2	Sd.2	n	p.FC
1	89.10	37.56	80.55	45.39	20	0.65
2	91.57	55.80	74.24	46.25	21	0.83
3	98.36	53.03	88.95	61.16	22	0.03
p. KWC	0.82		0.85			

For abbreviations, see notes to Table 1.

A similar set of regularities was found in the case of intrinsic religiosity, which formed another type of hidden reserves and human potentials. These data will not be cited here explicitly.

Having reviewed main results of conducting the three blocks of the psychological part of our research, we are feeling authorized to formulate the preliminary conclusions:

1. Sound technology of various types exerts considerable influence upon psychological processes and states of normal people, affecting not only reactive indices, but also personal ones;

2. Sound technology induces different types of alteration of the psychological states and processes, depending on the type of sound / music. Thus level of neuroticization rises by members of control group, while primitive types of stress coping strategies (confrontation, avoidance) are activated. This trend is interpreted by us as surfacing of hidden per-

sonal tensions, and their processing by means of coping mechanisms, primarily primitive in terms of structure and ontogenesis;

3. The opposite was proper for subgroup who listened to non-traditional (designer) music. Such deep levels of psychological functioning as stress coping strategies, and basic psychological defense mechanisms were mostly deactivated here, providing most probably rather deep relaxation;

4. The group who listened to traditional (light classical) music remained in between the control group, and the 'non-traditional' one, depending on the type of the psychological process regarded. Thus tracing back influence of music of various types upon the dynamics of such overall psychological characteristics, as levels of psychological tension or, stress coping strategies, forming integral part of study of fundamental mechanisms of cultural inheritance, seems to be possible and constructive;



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5. Sound technology has to be made more intensive to induce greater alterations of the psychological processes and states studied by us, primarily by increasing sound volume, and using personal ear-phones. In this case, the trends detected in this study are likely to grow in volume, and widen their scope;

6. Rather deep layers of psychological functioning being affected by the perception of music of various kinds, study of their brain mechanisms seems to be most timely and constructive. Some of the promising results obtained in such study will be presented in the next article.

