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CONTENTS

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A Longitudinal Study of the Dynamics of Giftedness

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Abstract

Introduction. The paper presents a longitudinal study nearly a half-century long of the dynamics of giftedness from adolescence to maturity. Giftedness is an individual's ability for creativity. The current study postulates that personal creative achievements can be predicted and that individuals' ability to develop activities on their own initiative is the unit of such analysis of creativity. The concept of creativity is revealed through this ability as its mechanism. The ultimate forms of creativity are actions that lose the form of response.

Methods. For the purpose of the study, the authors developed a Creative Field technique. This diagnostic tool has certain advantages over other existing tests, as it also measures intelligence according to the learnability criteria. The study was originated in 1970 with a sample comprised of 60 10th grade students of physico-mathematical school № 2 in Moscow. The second stage of the experiment took place in 1976. It employed the new Creative Field technique developed with the use of mathematical content. The third stage of the experiment was conducted during 2002–2003, at which point in time the sample was somewhat reduced due to inaccessibility of a portion of the original participants. The fourth stage of the study of the genesis of giftedness is currently underway (2018–2019).

Results and Discussion. The study produced reliable measures of giftedness in adolescence and maturity and analyzed achievements in participants' professional activities. These results create an objective framework for analyzing the role of the major life events and personality structure in the realization, and either development or regression of giftedness. The results of the experiments confirmed the relevance of the technique and the validity of the method itself. Students, who reached the highest levels of cognition in the experiment, also made significant discoveries in their professional activities.

Conclusion. The main conclusions are as follows: (a) The method of Creative Field has predictive value, (b) The theory developed by authors is productive.

Keywords

giftedness, creativity, genesis, personality, spiritual values, method, validity, predictive value, development, regression

Highlights

► The study confirms that the personality structure with predominance of spiritual values and cognitive orientation determines individuals' creative potential. This kind of personality structure tends to remain stable even under global changes in society.
► The study, which has unfolded throughout nearly fifty years, confirmed the positive dynamics in the development of the respondents' professional activity.
► The study findings confirm the theory behind its framework and speak in favor of predictive value of the developed method.

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Introduction

The study of the nature of any phenomenon involves first and foremost determining its function and disclosure of its structure. We consider giftedness as an ability to create, which corresponds to the growing relevance of its identification and development [1, 2, 3]. In our works, creativity is revealed as a result of the development of activity by the subject on his own initiative [4, 5]. (This is the disclosure of the concept of "intellectual activity" (IA) used in our earlier works [4]. The structure of this ability is given in the "unit of analysis" (according to L. S. Vygotsky), in which "affect meets intelligence" [6, p. 34]. Intelligence provides mastery of the activity, and in case cognitive orientation is dominant in the personality organization, he develops it further on his own initiative.

The next step in the study of the nature of a phenomenon is the study of its formation and development. A wide range of studies of the origins of giftedness, the ratio of its genetic and environmental conditioning (the role of genetic and environmental factors in the formation of individual differences) showed that the environmental factors are predominant in its formation [7].

The analysis of our results demonstrated that the systematic environmental factors affecting the manifestation of intellectual activity in members of the same family are the effects that reflect the nature of social relations in the society at large [7].

To identify the factors influencing the dynamics of IA during a certain age period, we conducted a series of longitudinal studies, starting from preschool age, of different duration up to 17 years [8, 9, 10, 11, 12; 13]. To identify the impact of social factors that reflect different stages in the life of the country,

we currently conduct a longitudinal study at the very school where it was also done in the 90s [8].

Before proceeding to the description of the ongoing longitudinal study of the dynamics of giftedness and substantiation of the method of its identification, it is necessary, at least briefly, to present a palette of foreign longitudinal studies of this problem. Having recognized their priority, we would be able to present the productivity of our approach more clearly.

The handbook collected by R. F. Subotnik [14] presents the most well-known works demonstrating the correspondence between the methodology of the longitudinal studies and the central issues of the work with gifted ones. Taken together, these studies examine early indicators of later academic and career achievements and creativity using a variety of detection methods.

The works presented can be differentiated as follows.

1. These are a number of research works based on people who are considered gifted on the basis of previously demonstrated achievements in different fields.

L. M. Terman [15] is a pioneer in the large–scale study of the conditions that determine success of the gifted children in adult life. He made an important conclusion for understanding the phenomenon of giftedness, which states that not only high intelligence, but also personal factors are important for achievements.

According to the results of the 22 years long observation of a sample of 220 students, E. P. Torrance [16] concludes that the presence of a steady interest in the profession and in the mentor are among the five conditions of creative achievements.

He also presented 2 examples of 30 years long study of "Beyonders". A list of the main characteristics that make "Beyonders" unique is compiled, of which the key ones are highlighted: taking pleasure in deep reflection, the love of one's work, the clarity of purpose, taking pleasure in one's work, understanding of one's mission, the courage to be creative [17].

In the article by C. P. Benbow, O. Arjmand [18] which analyzed educational experience of a cohort of 1247 mathematically gifted young men identified in grades 7–8, after graduation from school and college, identified factors affecting academic achievement: curriculum studied before the college, marital status, attitude to science, differences in the level of talent.

2. These are the results of research on the sample, the participants of which were considered as intellectually gifted based on their test results, forms of leisure or performance on creative tasks. This includes the Munich study, conducted on 26,000 students from 1986–1988 to 1993 [19].

M. A. Runco [20] presented a 20 years long longitudinal study on 2 samples of the gifted ones, equal in ability, but different in the sphere of the talent

application (average IQ = 155) which allowed to establish a high correlation between the level of divergent thinking and self-sufficiency.

In the Fullerton study [21], children (starting from when they were 1 year olds) and their families were observed every six months in preschool age and annually at the age from 5 to 17 years old. The follow up was conducted at the age of 24 years.

A study of the gifted adolescents from the age from 13 to 33 [22] was conducted by J. Wai, D. Lubinski and C. P. Benbow. During the first phase (sample of 1,243 boys, 732 girls), the possibility of future achievements is assessed. In the second phase (sample of 323 men, 188 women), data from the age 13 are correlated with the level of education at age 23 to predict achievement by the age of 33. These same authors conducted another 2 studies [23]. In the first study they observed 1467 adolescents aged 13 gifted in the field of mathematics during 25 years. The second study retrospectively describes the adolescence of the 714 best graduate students (average age 25 years), and their achievements up to 35 years. In both studies, participants with significant achievements in science, etc., in the past had a more advanced secondary education in these areas.

3. These are longitudinal observations of the gifted people, according to the concepts of giftedness, or multidimensional processes of talent identification not directly related to the accepted theory of giftedness.

The study by K. A. Heller [24, 26] is based on a multidimensional concept of giftedness. It considers academic achievements, leisure time, cognitive and motivational factors as well as school and family socialization conditions. The second phase presents an analysis of the results of gifted and other students aged from 6 to 18 years. C. Perleth, W. Sierwald, K. A. Heller [25] have shown that intellectually and creatively gifted people are very different from each other in their achievements.

The review of longitudinal studies of gifted children with the aim of being able to predict their achievements in professional work in the future is based, at best, on their real achievements or the evaluation of their general or special abilities. An adequate level of ability and "achievement motivation" actually can provide insights into the possibility of achievement at the level of common sense without any research. However, the whole practice of testing intelligence has shown that such tests do not reveal the creative ability. A critical analysis of the concept of "creative giftedness", measured by creativity tests, is described in detail in our works [5, pp. 93–150]. The motives are the love for the profession and the understanding the beauty of regularities. However, they are considered at the level of particularities, among many other success factors. The decisive role of the structure of their relationship and contributions is not clear.

Methods

Since 1971 we have described the "creative field" method in our works more than once. But today it is the only method built outside the framework of the "stimulus-reaction" model. Due to this reason, it allows real-time experiment identify the inherent ability of a person to develop activities on their own initiative. In fact, as part of the laboratory experiment, it simulates human research activities within a system of similar tasks, which provides a two-layer model of activity. The first – the surface – layer is a given activity aimed at solving specific problems. The results obtained at this level allow us to assess the level of intelligence in all parameters of learning. The second – the deepest – layer, disguised by the "outer" layer and not obvious to the subject, represents the activity of identifying hidden patterns, which constitute the entire system of problems, the discovery of which is not required to solve the given tasks. The presence of this layer makes it possible to record the process of development of the activity conducted on the subject's initiative [5, 26, 27].

On the basis of the obtained results of diagnostics we created the typology of creative abilities based on the levels of knowledge:

1. Work within the framework of a given activity, with all its possible success, belongs to the stimuli-productive level.

2. The discovery of new regularities, as "the explosion of the layers of existence" by S. L. Rubinstein [29], being a manifestation of creativity, refers to the heuristic level.

3. The theoretical proof of the open pattern belongs to the highest level of creativity – creative (to avoid repetition, the next creative level is named in Latin. The term is not linked with divergence in any way).

Results and Discussion

The first stage of the experiment

The experiment was conducted in 1970 with the use of one of the variants of the "Creative field" method – "Fabulous chess" [5] on a sample of students of 10th grade from the Moscow school no. 2 which specializes on Physics and Math. All the members passed a serious selection for admission. This was important because testing of the method showed that the ability to develop activities on their own initiative is manifested only in those people who have successfully mastered the proposed activities (approbation of the method took place on samples of 10 students and teachers from 12 MSU departments, the experiment with their participation was conducted weekly for 3 months in 1969). The difficulties in performing the tasks stimulate the search for workarounds. Therefore, one of the principles of the "Creative field" method requires the absence of not only external, but also internal (evaluative) stimuli.

About 50 % of our students have not only successfully mastered new activities, but also have reached creative levels. Moreover, one of the students surprised us not only with the highest results in our entire sample of students and scientists, but with the modesty of reaction to his achievements. M. G. "worked" in the experiment calmly, on the third problem, slightly slowing down the pace, he explained that he proved the theorem of its solution. Hearing: "Thank you, the experience is over", he pointed to the blank forms. When it was explained to him that many people need more tasks, he was surprised: "Can it really be so? That's what we are taught. If you find a new pattern, you must prove it before you can use it". He was simply bewildered, without a shadow of the triumphant feelings, without a sense of superiority. The rare modesty of a strong student along with a brilliant entry to the highest level in the experiment allowed us to expect extraordinary results from him in the future.

The second stage of the experiment

The second stage of the experiment took place 5 years later, when the boys graduated from high school. The experiment on this sample was repeated to check the relevance of the new method "coordinate system" by the method of "Creative field" on the mathematical material [28]. And, of course, we included this sample along into the study along with other samples (students of mathematical boarding school at MSU and researchers of IFHT AS of the USSR).

38 out of 60 subjects of the school sample participated in the second stage of the experiment. Other graduates of the school went to universities in different cities and countries.

During the second experiment, we were afraid that 5 years was a short period of time and we would not get "clean" results. Therefore, the experiment was conducted by my graduate student, and I wrote my prognosis of the result before the experiment and sealed it in an envelope, which was opened only after the analysis of the results of each test subject.

The results not only confirmed the new method's compliance with the principles of the "Creative field" method, but also exceeded our expectations. The data obtained actually fully corresponded to our prognosis of the dynamics of IA (development or regression), made on the basis of the data obtained during the 1st stage.

We did not doubt the stability of M. G.'s data. He came on the first call, explaining that as a graduate student he can make use of his time as he finds best. According to the new method gave the same, the highest result. I made another prognosis about the results of A. B. His constant interest in the results of other guys made us worried. According to teachers, he is asserting himself because he lost the status of a leader in the classroom. Sadly, but the forecast

was confirmed. His results decreased. His anxiety was also manifested in the fact that he did not immediately agree to participate in the second experiment.

"Five years later, when we found M. G., he was already a graduate student, he learned about our desire to repeat the experiment based on a new technique, and said with some humour: "I am now a theorist and I have a lot of time". On the first appointed day he came to the experiment, and demonstrated the same high level as five years ago, but now with the use of the another variant of the method".

Another student of the same class had a slightly different personality organisation in his school years. It seems that in the middle school, the not-quite-established character of this beautiful and very capable teenager has undergone a serious test of universal worship. But in high school he was "eclipsed" by other guys, and the self-centered "leader" began to form the egocentric complex, which, in particular, prevented him from reaching the highest level of results in the experiment. Each time discovering a new pattern, he inquired: "And what about the others?". The request to repeat the experiment did not meet his warm welcome: "I am now engaged in scientific work", – he said, – so I have no time (he, like M. G., got enrolled in graduate school). But after learning that the entire former class is involved, he agreed: "However, you may come and see me in my place for a while". During the experiment, he expressed the same concern: "Have others been tested by the new method? What are their results?". I predicted that there would be a regression in his results of the second experiment, and it turned out to be true.

An example of progress in the dynamics of giftedness we see in the work of G. M., who behaved inconsistently in the experiment at school (she was inhibited by self-doubt). In a situation of the University studies in her chosen major she had settled in her aspirations and abilities, and appeared to enter the heuristic level in a solid manner.

We have confirmed that the experiment shows well which of the subjects can become higher than the prestigious goals, whose cognitive interest becomes the leading motive, suppressing the side motives that we call "human weaknesses".

The third stage of the experiment

The opportunity for the third stage of the experiment appeared only a quarter of a century later, in 2002–2003. It was Important to find out how the impact of social change on the fate and identity of our participants (now academicians, professors in mathematics, physics, chemistry, business). The experiment was conducted on the basis of their institutions. The number of subjects decreased due to migration.

In general, we got the same result for the whole sample. The stability of this result for a quarter of a century speaks to its durability. However, in an era of social

change non-assimilated system of values leads to a change of life orientations, leaving the science for the sake of higher salaries and so on. As a rule, it is also associated with the doubts about one's scientific mission. It is no accident that most of the participants with a stimuli-productive level work as teachers at universities, and only every sixth of them defended their theses.

On the contrary, heurists are more interested in their work. Many went to universities where it would be more interesting for them to study without thinking about their future careers and salaries. In this regard, a good example is F. D. "Professor, who invented a number of things for the development of science. He was in love with his topic and he was sure that by working in an elite Institute, he simply satisfied his interest".

"In the initial sample of girls who took part in the experiment, only two reached the heuristic level at the beginning of the experiment. They repeated it in the second round. M. M. is the "brain" of the laboratory in the Research Institute of the Russian Academy of education. E. K. is still the "star of the class". She was one of the first among her cohort to defend the doctorate. She is a good scientist, works successfully on topical issues at the research Institute, carrying out a number of foreign grants. G. M. reached the heuristic level after graduation. Currently, she is a well-known scientist in the field of medicine, who made an important discovery in the cardiology field".

M. G., who demonstrated the best results at the first stage, easily repeated the exit to the highest level and at our third meeting. Naturally, the data obtained in 2003, as the results of the planned work of my laboratory, were to be published, and therefore all cannot be reproduced today in every detail. But in order to appreciate a young scientist's talent not with the help of numbers that fix the importance of correlations (which you understand, but you do not feel struck by), but with the help of emotional experience, it is necessary to compare it with the phenomenon of similar significance. It is impossible to evaluate scientific achievements without knowing this field of science. But we can understand their significance by comparing them with other achievements that we already have some idea of. We want to emphasize again that the longitudinal study we conducted with the aim of testing the prognosticality of the diagnostic method used, which was based on the developed theory of creativity. Therefore, we need the text of prominent physicist's review on the book written by M. G. 10 years after the graduate school on the topic of his dissertation, to be used as a "sentence". Let's limit ourselves to one of the excerpts from the review: "A lot of books have been written on theoretical Physics. There is a recognized example of such literature. This is the book of Landau and Lifshitz. It's not that this course consists of ten thick volumes - and it seems incredible that it could be written by two or three authors. And not even that the course covers all theoretical physics – nowadays

there are no such universal experts in the world of theoretical physics. The reason that makes you admire this amazing accomplishment is the stunning beauty of the written. When the author began to write his book, Landau-Lifshitz did not yet have the chapter on the subject that is now included in it. And, however blasphemous it may sound, this chapter has something to compare... the author wrote a book, which is impossible to do without for any researcher in this field".

Later, I learned from his cohort mates that M. G. is a corresponding member of the USSR Academy of Sciences and that at the request of the staff he was chosen as the Director of the Institute.

The fourth stage of the experiment

The comparison of the data obtained earlier with the data obtained half a century later, as well as the analysis of the achievements of our subjects in different areas of their activities, allow us to make some judgements concerning the decisive role of life circumstances or, on the contrary, the decisive role of the individual's perseverance.

The central task of the fourth stage, of the ongoing longitudinal study is to analyze the role of the personality organisation in the manifestation of giftedness and check the prognosticality of the method of its detection.

"Half of the sample of heurists continues to work in the Institute, supporting their families with the money from overseas projects. More than half of the sample has a doctorate, and only one-seventh (those who work in firms) do not have a degree. One quarter of the sample works at Universities and only a tenth in firms".

Long-term observation of E. B. helps us understand that the decision to leave the University for the firm is not always associated with the dominance of material values, but with the complexity of society, the inability to protect the work which is a product of emotional investments and a number of year's work, because one is working in a closed system.

Asking M. G. for a meeting – at that point he already occupied the post of Director of the RAS Institute, I was sure that he had already long been an academician of RAS. That is why I didn't ask about it at the meeting. I learned that he was only a corresponding member from the Internet when I specified the list of his scientific problems. For him it is natural: the Director himself cannot nominate his candidacy. He once again convinced me in his natural modesty, when during the conversation I told him about the review of his book. He laughed: "Don't you say so, I wrote it as a young man, it should have been done in quite a different way". When I asked him questions related to his subject, he answered that there are many problems and the subject has become more complicated in connection

with another kind of "soft matter", i.e. he has moved from the study of solids to the study of "living" matter. Then he initiated a shift in the conversation to the discussions of the issues that I am extremely interested in and that constitute his current concerns. I was shocked by the qualitative leap over the past 15 years in his development as a scientist – he did not only reached some progress in scientific issues, but also turned into a scientist thinking about the future of science. His observations on the further development of young people in science led to the conclusion that often students with brilliant abilities remain futile, and those who are persistently, constantly absorbed in their topic, come to discoveries. He concluded: "We should have not the teachers but scientists teaching at our Universities". As the Director of the leading Institute of RAS, he opened the department for the implementation of this system of training. One thing remains unclear: how can one combine successful solving of such a variety of issues in the field of theory, if not for the fact that illustrates its capabilities. He immediately formulated the problem in the very form it was presented to him only as far as in 1970, when he saw a blank testing sheet.

In a recent meeting, F. D. a respectable Professor of the Institute, told me about his work as an integral part of the work of the Institute, where new devices are designed, which allow him to discover new patterns, and cited as the reason why he loves being a part of the Institute. His face showed how much he cared about it. When I reminded him his words: "Top marks when you are interested and low marks when you are not", he laughed: "Sometimes I also got the lowest when I was interested".

T. B. was one of the first participants who immediately responded to my call. He solves a number of problems in a calm and modest way, and in the same manner he talks about his progress in science. He is not quick to say that he has not only defended his doctorate and works as a Professor at leading universities and institutes of the Academy of Sciences. He does not look like the hero of the anniversary, the recording of which I received from his friends on the Internet. The path to becoming a hero was not easy. Being a "star" of his class, he was not immediately admitted to the MSU. In the '90s he tried to work abroad but soon returned. He graduated from the graduate school of Moscow State University in 2003 and defended the candidate's thesis. The fact that today he is among the leading mathematicians of the world, those few scientists whose works shape the contemporary theory of modalities, is an evidence and an example of considerable courage and great love for science.

The meeting with R. K. took place at her workplace at the Institute. Our attempt to see her at the third stage of experiment – she was a doctor of physical and mathematical sciences and a busy person – failed: regular business trips and children's ailments prevented her from seeing us. She does not remember the

formulation of the first stage's problem, she finds the solutions slowly, drawing the line, and it takes her time. Sometimes it takes a few minutes. However, she shows her professionalism in Math in the analysis of provocative arrangements of a problem. Young men keep entering the rom, and I dared to ask her about the nature of her work in this Institute. She emphasizes the administrative aspect of the work, but notes that it is interesting because it is associated with mathematics, and she experiences moments of joy being here, because mathematics is the science of beauty.

The time of our visit was limited and I asked her to write something about it briefly. This woman is 64 years old and she recently lost an adult daughter. But only by reading the entire text can we understand what "commitment" to one's field is and why both such individuals and their creativity are evolving. "What is it where the beauty of mathematics reveals itself? It lies in simple solutions to difficult problems, in establishing unexpected connections, but the main thing is that the essence of things is revealed. I would say that mathematicians, like Pasternak said, "*want to get to the bottom of the matters*"... I must say that the feelings that I experience in my professional activity remain exactly the same as they were in childhood when I was solving problems in the books. Quite often it happens that I read someone's article and I more or less understand the formal form of what is written in it, but I do not understand the essence. I have a question then about *what is really going on* there. This question in my head "itching". I want to understand it, and I probably feel subconsciously that I can understand it. I ask questions to other people, I think, I look at examples, I can count something. And then something clicks in my head, and everything falls into place. And at this moment I want to say to myself: "Yes, I'm good. I succeeded". So, recently my colleague sent me an article in which he and his students described two procedures for obtaining objects of one nature from objects of another nature. And I once thought that it was very similar to two procedures from a completely different area.

However, in that field these two procedures gave *all the objects* of the second nature. Then I thought that maybe here, too, these procedures resulted in all the objects of the second nature. Then I began to think how it could be proved. And, in the end, I managed to prove it. And I was very happy about it.

It should be noted that all participants of the experiment mentioned the beauty of mathematics. Thus, E. B., whose life path abruptly changed its direction in the direction due to his temperament, argued that whatever he did in his life, mathematics was always in the background, because mathematics is beauty. Currently, he writes stories and is passionate about poetry: "It is impossible to explain the experience of beauty – how to convey harmony? How to convey the feeling of the beauty of one's beloved girlfriend? A goal scored? Gaudí's

buildings? I cannot say that it started with the 7th grade, but as early as when I was in school, at the sight of solving problems, I was proud of humanity who were able to create such an unexpected beauty. Something similar occurs in the reading of poetry. Like poetry, mathematics is a virtual reality, a departure from everyday reality, an opportunity to go into the world of absolute incorporeal and intangible harmony".

H. Selye astutely pointed out that the determinants of becoming a scientist are curiosity and admiration for the beauty of patterns [30].

We see how the values that are the product of being a part of a particular school culture are a determining factor in the development of the individuals throughout their lives, and become stored as an unconscious understanding of importance of these values: "No one has changed in our class".

Fifteen-year interval in the 4th stage of the experiment allowed to identify qualitative jumps in the personal and professional development of our subjects. The expansion of the sphere of professional realization took place, first of all, in those subjects who belonged to the heuristic and creative levels in 1970.

Conclusion

Our understanding of creativity is related to the personality organization, the formation of which depends on the influence of life circumstances that affect its development or deformation. It determined the acmeological aspect of ongoing research. Let us emphasize that the longitudinal nature of the study to a greater extent allows to identify the personality organization which ensures its stability in different not only life, everyday, but also different social conditions.

The analysis of the life path and scientific achievements of our subjects proved the prognosis we composed at the beginning of this path. The definition of the highest form of creativity based on the ability to develop activities on one's own initiative, allows one to scientifically explain such discoveries, where the action loses its form of response. An example of this is "porism" as an unexpected exit to the "unbidden", which was observed by the ancient Greeks. And also an unexpected the discovery of a new fact, not being in search of an answer to the already posed problem, as J. Hadamard pointed out [31]. In this study, we found that the results obtained in the experiment not only received confirmation in the professional activities of our subjects, but also coincided with the nature and level of their professional achievements with the style of work in the experiment. This is very clearly demonstrated by the discovery of one of the most striking heurists – F. D., – where the regularities he discovered in his scientific field correspond to the level of regularities discovered in the experimental material.

References

1. Bogoyavlenskaya D. B., Bogoyavlenskaya M. E. *Odarennost': priroda i diagnostika* [Giftedness: Nature and diagnostics]. Moscow, Obrazovanie lichnosti Publ., 2018. 240 p.
2. Bogoyavlenskaya D. B. Creativity and giftedness concepts once again: A methodological approach. In: L. I. Larionova, A. I. Savenkov (eds.) *Psikhologiya odarennosti i tvorchestva* [Psychology of giftedness and creativity]. Moscow, Nestor-Istoriya Publ., 2017, pp. 21–36.
3. Bogoyavlenskaya D. B., Shadrikov V. D. (eds.) *Rabochaya kontseptsiya odarennosti* [Working concept of giftedness]. Moscow, 2003. 94 p.
4. Bogoyavlenskaya D. B. The nature of creativity without mysticism. In: *Filosofiya tvorchestva* [Philosophy of creativity]. Moscow, RAS Institute of Philosophy Publ., 2015, pp. 116–134.
5. Bogoyavlenskaya D. B. *Psikhologiya tvorcheskikh sposobnostei* [Psychology of creative abilities]. Samara, Izdatel'skii dom Fedorov Publ., 2009. 416 p.
6. Vygotskii L. S. *Myshlenie i rech': psikhologicheskie issledovaniya* [Thinking and speech: Psychological investigations]. Moscow, Natsional'noe obrazovanie Publ., 2016. 368 p.
7. Susokolova I. A. An experience of a psychogenetic study of intellectual activity. *Voprosy psikhologii*, 1985, no. 3, pp. 154–158 (in Russian).
8. Bogoyavlenskaya D. B., Zhukova E. S. Longitudinal study of the development of creative abilities during junior and early adolescence. *Obrazovanie lichnosti – Personality Formation*, 2017, no. 3, pp. 80–89 (in Russian).
9. Zhukova E. S. Longityudnoe issledovanie tvorcheskikh sposobnostei [Longitudinal study of creative abilities]. *Materialy VI S"ezda RPO* [Proc. the 6th Congress of the RPO]. Kazan, 2017, Vol. 2, pp. 268–270.
10. Zhukova E. S. Longityudnoe issledovanie stanovleniya tvorcheskoi lichnosti [A longitudinal study of the development of creative personality]. *Materialy Mezhdunarodnoi nauchnoi konferentsii: Vospitanie i razvitie lichnosti* [Proc. the International Scientific Conference "Education and development of personality"]. Moscow, IRL RAO Publ., 1997, pp. 55–57.
11. Banzelyuk E. I. *Pokazateli kreativnosti i ikh dinamika* [Indicators of creativity and their dynamics]. Diss. Cand. Sci. (Psych.). Moscow, 2008. 213 p.
12. Banzelyuk E. I. Age dynamics in creativity indicators. *Voprosy psikhologii*, 2008, no. 3, pp. 55–61 (in Russian).
13. Danyushevskaya T. I., Bogoyavlenskaya M. E. Studying the dynamics of development of creative abilities. In: *Ezhegodnik Rossiiskogo psikhologicheskogo obshchestva: Psikhologiya segodnya* [Yearbook of the Russian psychological society: Psychology today]. Moscow, 1996, Vol. 2, Issue 1, pp. 139–140.

14. Subotnik R. F., Arnold K. D. (ed.). Beyond Terman: Contemporary longitudinal studies of giftedness and talent. Greenwood Publishing Group, 1994. 461 p.
15. Terman L. M., Oden L. N. The gifted group at mid-life: 35 years follow up of a superior child. *Genetic studies of genius*, 1959, Vol. V. Stanford (CA): Stanford University Press. 950 p.
16. Torrance E. P. Growing Up Creatively Gifted: A 22-Year Longitudinal Study. *Creative child and adult quarterly*,1980, no. 3, pp. 148–158.
17. Torrance E. P. The beyonders in a thirty-year longitudinal study of creative achievement. *Roeper review*, 1993, no. 3, pp. 131–135.
18. Benbow C. P., Arjmand O. Predictors of high academic achievement in mathematics and science by mathematically talented students: A longitudinal study. *Journal of Educational Psychology*, 1990, no. 3, pp. 430–441.
19. Perleth C., Heller K. A. The Munich longitudinal study of giftedness. In: R. F. Subotnik & K. D. Arnold (eds.), Beyond Terman: *Contemporary longitudinal studies of giftedness and talent* (pp. 77–114). Norwood, NJ: Ablex, 1994.
20. Runco M. A. A longitudinal study of exceptional giftedness and creativity. *Creativity Research Journal*, 1999, no. 2, pp. 161–164.
21. Gottfried A. W., Gottfried A. E., Guerin D. W. The Fullerton Longitudinal Study: A long-term investigation of intellectual and motivational giftedness. *Journal for the Education of the Gifted*, 2006. Vol. 29. no. 4, pp. 430–450.
22. Wai J., Lubinski D., Benbow C. P. Creativity and Occupational Accomplishments Among Intellectually Precocious Youths: An Age 13 to Age 33 Longitudinal Study. *Journal of Educational Psychology*, 2005, no. 3, pp. 484–492.
23. Wai J., Lubinski D., Benbow C. Pl. Accomplishment in science, technology, engineering, and mathematics (STEM) and its relation to STEM educational dose: A 25-year longitudinal study. *Journal of Educational Psychology*, 2010, no. 4, pp. 860–871.
24. Heller K. A. The nature and development of giftedness: A longitudinal study. *European journal for high ability*, 1991, no. 2, pp. 174–188.
25. Perleth C., Sierwald W., Heller K. A. Selected results of the Munich longitudinal study of giftedness: The multidimensional/typological giftedness model. *Roeper Review*, 1993, no. 3, pp. 149–155.
26. Bogoyavlenskaya D. B. Subject and method of research on creative abilities. *Psikhologicheskii zhurnal*, 1995, no. 5, pp. 49–58 (in Russian).
27. Kalmykova Z. I. *Produktivnoe myshlenie kak osnova obuchaemosti* [Productive thinking as a basis for learning]. Moscow, 1981. 200 p.

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Being a *droog* vs. being a *friend:* A qualitative investigation of friendship models in Russia vs. Canada

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Abstract

Introduction. A substantial body of work has established that friendship is an important non-kin interpersonal relationship, with many positive outcomes. An issue with this literature is that it originated primarily in anglocentric Euro-American societies, when several studies have shown that the meaning of friendship varies across cultural settings. In particular, linguistic analyses advance that the meaning of friendship in Russian is quite different from that in English. The goal of this study was to seek psychological evidence of these linguistic findings by documenting similarities and differences in people's understanding of friendship in both cultural contexts.

Methods. The research consisted of a qualitative investigation of friendship cultural models among Russian migrants to Canada, through semi-structured interviews that were analysed using an inductive thematic analysis, whereby data segments are coded and codes are gradually refined and streamlined in order to identify the main themes that emerge from the data.

Results. Participants' depictions of friendship in Russian vs. Canadian contexts were largely in line with semantic analyses of friendship in Russian vs. English, with friendship being described as a stronger and deeper bond, but also more demanding in Russia than in Canada.

Discussion. The findings support Wierzbicka's proposal that key terms in a language encapsulate cultural models prevalent among its speakers. The results are also consistent with the existence of close parallels between people's cultural models and the linguistic ecologies in which they live.

Keywords

friendship, friend, droog, cross-cultural psychology, qualitative research, thematic analysis, cultural models, immigration, Russia, Canada

Highlights

► People's cultural models of friendship differ between Russian and Canadian cultural contexts.

► Russian-Canadian biculturals describe friendship in Russia as a stronger and deeper, but also more demanding relationship than in Canada.

► Cultural models of friendship in Russian and Canadian cultural contexts largely reflect Wierbicka's semantic analyses of differences between the terms friend and droog.

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Introduction

There is nothing on this earth to be more prized than friendship

Thomas Aquinas (1225–1274)

Heeding the famous theologian's words, psychologists have extensively documented the characteristics and numerous benefits of friendship. One issue with this academic literature on friendship is that it was generated almost exclusively in North-American/European, primarily English-Speaking, societies (hereafter, anglocentric Euro-American), thus reflecting culturally specific values and ways of conceiving relationships. This is problematic, as several studies have shown that friendship can look and function very differently in other cultural settings [1–3]. Practically, relying on the wrong understanding of friendship can also increase loneliness among migrants who try to form new relationships in their new society.

Linguistic evidence suggests that the meaning of friendship in Russian cultural contexts may also be quite different from that in anglocentric Euro-American settings [4], but very little empirical work has focused on whether these linguistic distinctions are reflected in actual psychological differences in how people understand friendship in both contexts [5–7]. The present work targets this issue. We document cross-cultural differences and similarities in the meaning of friendship in Russia vs. Canada by conducting a qualitative study of Russian migrants to Canada, who have experienced friendship in both cultural contexts.

Friendship: A mostly anglocentric Euro-American field of research. Psychologists define friendship as an informal and voluntary interpersonal relationship, not bounded by institutional ties, formal rules, and tasks [8]. For example, if

two colleagues become friends, their friendship stems from their mutual interests and wishes, rather than work obligations or pressures. Essential features of friendship include enjoyment of being together, sharing activities and interests, and the mutual provision of personal growth [9]. Intimacy, self-disclosure, practical aid, and reciprocity – which involves emotional support, loyalty, affiliation, and acceptance – are also defining characteristics of friendship [9]. Specific informal rules exist to help maintain a friendship, such as voluntary assistance in times of need, or respect for each other's privacy [2].

This unique relationship plays a multitude of beneficial roles in everyday life, allowing us to engage in enjoyable activities and helping us through loss and misfortune. Friendship also facilitates transition through life stages, for example by fostering social adjustment during adolescence [10], by alleviating the negative impacts of physiological changes and losses during old age [11], and by lessening stress associated with widowhood [12]. Friendship can also be a protective factor against both physical and mental health problems [13–18]. Overall, friendship contributes to our happiness and life satisfaction [19] by satisfying our basic psychological needs [20].

One caveat associated with this definition and these positive findings is that the vast majority of theoretical and empirical work on friendship has been conducted in English-speaking Euro-American countries, thus reflecting culturally specific conceptions of what relationships and life more generally should be. Yet, a few studies have shown that people's friendship models – i.e., their understanding of what it means to be a friend, what to expect from a friend, how to behave with a friend, etc. – differ across cultural contexts. For example, Argyle and Anderson found people in the U.K. tend to give priority to emotional support and intimacy but that these characteristics are less central among Japanese [2]. Another study showed that in a Japanese cultural context, friendship originates from mutual sympathy, compassion and support [21]. Also in East Asia, Chen found that the Chinese friendship model tends to neglect the notion of self-disclosure and places more emphasis on the implicit transmission of personal experience and on the ability to identify each other's needs and emotions without verbal communication [3]. In Ghana, Adams and Plaut demonstrated that people expect and value friends' provision of material support more than emotional support [1]. This body of work, although admittedly limited, cautions against blindly generalizing anglocentric Euro-American friendship research findings to other cultural contexts. Actually, it is even unclear to what extent this friendship research applies to non-English-speaking European countries. Unfortunately, there is not enough research to determine how widely applicable is the anglocentric Euro-American model of friendship, and whether it would be meaningful in countries such as say, Italy or Hungary.

Not only would generalizing this model to all cultural contexts be theoretically inappropriate, it might also have negative practical implications in the context of migration. Upon settlement in a new society, migrants need to reconstruct their social network [22], and their friendship models are likely to influence how they go about forming new social relationships. Gaps between friendship models culturally dominant in the new society and their own models may hinder the formation of close interpersonal relationships and increase the risk of loneliness among migrants [23].

Friendship in Russian vs. English. Wierzbicka's influential linguistic work suggests that people's understanding of friendship in Russian cultural contexts may also differ from the dominant anglocentric Euro-American friendship model. She argues that key terms in a language come to encapsulate what is believed, valued, or promoted in the cultural context where that language is dominant [4]. In other words, terms such as *friend* or *друг (droog)* become shorthands for entire cultural models of friendships that are understood and meaningful for English and Russian speakers. Based on these ideas, Wierzbicka used linguistic methods to characterize the cultural models underlying friendship words in Russian vs. English [4]. By examining words' synonyms, antonyms, collocations, and their contexts, she drew a semantic map of friendship in these two languages. She concluded that the Russian language has more words to describe friendship than English and that friendship models vary on several dimensions (help/support, obligation in adversity, trust, intense positive emotion, enjoyment/pleasure and self-disclosure). Specifically, she determined that for Russian speakers, friendship implies complete trust, almost boundless support and readiness to assist in difficult times, positive feelings and regard for one's friend, and a great deal of self-disclosure. On the other hand, for English speakers, friendship is characterized by enjoyment of spending time together ("fun"), sharing common interests and activities, as well as validation of each other's needs.

As persuasive as Wierzbicka's linguistic analyses are, whether her semantic conclusions reflect actual psychological differences between Russian and English speakers' friendship cultural models – i.e., cognitive structures organizing friendship related cultural knowledge and mediating our navigation of the social environment [24–26] – is a crucial question. We are aware of only three empirical studies that can be brought to bear on this question. They also have a number of limitations that we will review shortly. Searle-White found that Russian participants were more likely than American participants to allow friends to enter their personal sphere by accepting, e.g., advice, money [5]. Also using samples in both countries, Sheets and Lugar found that Russians were less tolerant of violations in their friendships: i.e., a more extensive range of issues would prompt them to end a friendship compared to Americans. Russians were particularly sensitive to betrayal in a friendship, whereas Americans found keeping secrets from a friend

more problematic [6]. In a different study (using the same participants), the same research team focused on gender and self-disclosure, showing that Russians had fewer friends and tended to self-disclose less than Americans [7].

These studies are essential first steps, but they all focused on a single aspect of friendship using simplistic quantitative indices rather than on whole friendship models. Also, comparing Russian and American samples would have required testing measurement equivalence and controlling for potential cross-cultural response biases in order for the results to be dependable [27] – which were absent from these studies. Sheets and Lugar's studies were particularly vulnerable to reference effects [6, 7]. They measured self-disclosure with a single Likert-type item ranging from "sharing nothing" to "sharing everything," which are very subjective anchor points. If disclosing a lot about oneself is the norm, if it is valued and promoted in my context, if everyone around me shares very private information with their friends, my responding "sharing a little" is likely to index higher levels of self-disclosure than in a context where people are normatively and typically very private in their interpersonal relationships. To use a visual analogy, "being tall" means something very different in Sweden and Japan. These potential reference effect problems may explain why their results on self-disclosure seemed at odd with Searle-White findings that Russians are less sensitive to interpersonal boundary crossing than Americans. We seek to address these issues here.

The present study. This study documents cross-cultural differences and similarities in friendship cultural models in Canadian vs. Russian contexts, thus building upon the preliminary work reviewed above (although it should be noted that Canada is a different Euro-American context that the U.S., where the research reported above took place). With the goal of addressing some of this work's shortcomings, three features of our research are noteworthy. First, we seek to characterize friendship cultural models in general, rather than focus on specific friendship features predetermined by the researchers. To do so, we adopt a qualitative approach, which is particularly well-suited to yield rich data about sparsely documented cultural models. Second, to address issues of cultural equivalence such as reference effects, we concentrate on people who have lived and experienced friendship in both Russian and Canadian contexts, rather than inquiring from separate samples in both countries. Third, in order to gather information about culturally prevalent friendship models, we investigate people's perception of generic friends rather than their own friends. This approach is consistent with an inter-subjective perspective on culture [28]. To summarize, we seek psychological evidence for Wierzbicka's semantic analysis of friendship models in Russian and English by asking whether people who have had experience with both models spontaneously describe them as different.

Epistemologically, we adopted a pragmatic perspective, whereby we see cultural meanings of friendship as based on the reality of the cultural contexts that participants experience and navigate, and as verbally emerging in the context of participants' interactions with the researchers [29]. Our approach to qualitative inquiry was also phenomenological, as we seek to understand the cultural meanings of friendship from the lived experience of participants.

Methods

Participants and procedure. The sample included 8 Russian native speakers (7 females), who were born in Russia or the former Soviet Union, and who had immigrated to Canada as adults. The study was conducted in English, so participants had to be sufficiently proficient in that language. Although small, this sample size allowed us to reach a reasonable level of saturation in our qualitative analyses [30]. Participants were all highly educated, with highest degree completed ranging from college degree to PhD. Except for one participant who was single, all were either married or in a stable relationship. Two participants were students, and the rest were employed in a variety of professions (e.g., research associate, chemist, instructional designer, daycare provider). We did not obtain participants' exact ages, but most were in their thirties (one participant was in his fifties, and two participants were in their late twenties). Regarding origins, three participants came from Russia, three from the eastern (more Russotropic) part of Ukraine, one from Belarus, and one from Uzbekistan. Their length of stay in Canada ranged from 1.5 to 19 years, with an average of 10 years. Information about the study was disseminated through websites for classifieds and the personal network of the first author. Interested and eligible participants took part in audio-recorded semi-structured interviews that lasted one hour on average. Participants received 20CAD as compensation for their time, and both universities' ethical review board approved the study.

Materials. Our semi-structured interview protocol comprised open-ended questions on how participants understood the meaning of friendship. We asked participants to describe briefly their own friendship circle, and then to describe key characteristics of friendship in Canada and Russia (or their country of origin). They were also asked to comment on similarities and differences in what it means to be a friend in Canada vs. Russia. The interviewer stressed the importance of participants' perspective as they had had the opportunity to experience friendship in both cultural contexts, and used probing questions such as "*could you expand on that point", "do you have further examples of this?", or "could you say more about that?" to facilitate the interview.*

Analysis. We conducted an inductive thematic analysis of the data [31], with the goal of identifying similarities and differences in friendship meaning

that are grounded in the data. As such, our analysis bears some resemblance to grounded theory [32], both in emphasis and steps. The analysis proceeded as follows, with all steps (except transcription) conducted by the first author. During (1) *transcription*, audio recordings were first transcribed by research assistants, with instructions adapted from Hsiung's conventions for transcribing interviews [33]. (2) *Familiarization with the data* involved the careful reading of the transcripts, with note taking on the side. The goal was to obtain a first sense of the topics and themes discussed by participants. (3) *Open coding* consisted of going through the data segment-by-segment and assigning a brief label describing what participants talked about to each segment. (4) *Revising code* involved modifying and/or rewording the initial codes generated in the previous step by merging similar codes or clarifying ambiguous ones. This process created focused codes that were more conceptual and less descriptive than initial codes. (5) *Focused coding* consisted of assigning one of the revised focused codes to all data segments. Finally, (6) *categories and themes generation* involved examining how focused codes would fit into broader conceptual categories, by looking for links between codes and common themes across codes. The goal was to identify coherent themes with high internal homogeneity (consistency across codes within themes) and external heterogeneity (clear differences between themes). The analysis iterated between steps (2) and (6), using the method of constant comparison, whereby segments being coded are compared to other segments, and codes are constantly compared to other codes in order to refine them [34]. This process also allows codes to gradually become less literal and more conceptual [35].

Results

We identified five broad themes in our data that provide a narrative of how friendship shares common characteristics, but at the same time differs between Russian and Canadian contexts. These themes are: (1) commonalities; (2) Russian friendship is deeper; (3) Russian friendship is more demanding; (4) Canadian relationships are "friendlier"; and (5) critical stance and explanations.

Commonalities. Participants described friendship as something common and similar across cultural contexts: "I think it is the same, like, it doesn't matter where you are" (female, 3 years in Canada). In this view, personal rather than cultural considerations influence friendship: "My strong belief is that perception of friendship is rather personal than cultural defined" (male, 17 years in Canada). Participants describe friendship as sharing time and experiences – "from my personal experience it's sharing some experiences" (male, 17 years in Canada) – and as being on the same wavelength "it's like people you're comfortable to be quiet with" (female, 19 years in Canada). Trust is also an important component

of friendship in general, as a friend "cannot turn his or her back at you, and/or babble your secrets away" (female, 17 years in Canada). Participants also recognize friendship as a relationship that may not last permanently:

> friendship may just fade away [...], because of the distance, because of much less frequent contacts. And people acquire more and more other relationships, and obligations, and duties, so that with time, unless something happens, you just lose it. Because it's a natural process of drifting apart (male, 17 years in Canada).

Thus, participants describe friendship as a universal, intentional, close, positive, and potentially transient interpersonal relationship.

Russian friendship is deeper. While they mentioned commonalities across contexts, several codes reflected participants' perception that friendship is deeper in Russian than in Canadian contexts: *droog* has obviously a stronger meaning [than *friend*]; its kind of deeper inside (female, 17 years in Canada). Russian friendship is described as a very close and intimate relationship, compared to friendship in Canada. A participant pointed out:

> I'm not sure if in Canada people, like, keep friends. I didn't see, like, real examples about that. [...] They will not talk about really something personal stuff. Really, for me, friendship in Canada and Russia is absolutely different. Like, I cannot talk to my friend here everything that happens in my life (female, 1.5 years in Canada).

> In a similar vein, another participant highlighted differences in emotional investment in friendship. Describing friendships in Canadian contexts, she said: "I don't know how much intimacy and supporting is going on inside of it, this relationship you can call friendship. [...] I think they spend a lot of time together. Going out, you know. [...] I think it's more like investment in time than emotional. (female, 3 years in Canada). Another participant elaborates on this "fun" aspect of friendship in Canadian contexts: "I would say that Canadian people are friends who have a lot of fun together. Probably what would end a friendship, if it gets not fun. Like, it stops being pleasant and fun, probably that would stop a friendship" (female, 3 years in Canada).

This description of friendship as "light and fun" contrasts with this elaboration on emotional investment in the Russian model of friendship: "For [Russian friends], you're invited, like, into the most intimate depths of everything [...] We tend to open our souls, [...] there's a very deep connection. Crazy. Crazy I mean, the level of openness. Like, like your soul is open." She then wonders whether some Canadian friendships should really be called friendship: "Here I can contact them, or they can contact me, we be glad to have drink together. But I still not sure if I should call that friendship or just very good relationship" (female, 19 years in Canada). Another way to illustrate this difference in depth and closeness is

by comparing Russian friendship to family ties: "if I say friend, it means that it's a part of the family" (female, 1.5 years in Canada).

In participants' accounts, concrete practices such as frequent communication contribute to the perception that Russian friendship is deeper. Talking about her Canadian friends, a participant laughingly reports "I'm not sure that they're waiting for my call", which she contrasts with how frequently she talked with her Russian friend: "usually, I call every day, and this person called me, like, at least, at least once per week" (female, 3 years in Canada). Another participant mentions differences in "mentality" between Russians and Canadians. He explains: "that's related to the frequency of meeting. I feel that here, I cannot come to someone's place as often as maybe I would want to" (male, 10 years in Canada). Other participants echoed this distinction in how frequently friends are expected to communicate: "it's different expectations, probably, yes. For someone it's enough to talk once a year, once a month, I don't know, like. But I don't think it's good. Like if you're friend, you should know, like, the news, what is happening in the life" (female, 1.5 years in Canada).

Hospitality and spontaneity in getting together are other concrete aspects that participants related to differences in friendship depth in Russian vs. Canadian contexts. With a certain bashfulness, a participant lowered his voice and explained:

> there [in Russia] you don't need, I don't know how to say that, I might be, you know, rude or something... There you don't need an appointment to see a friend. You don't need to discuss the best time, you just give a ring to the door: "Hi, how are you?" You have time, it's OK. Don't have time, it's more than OK. All right, I'll pass by maybe later today. [...] There it doesn't matter when you come to visit. You don't need to dress, somehow, you don't need to cook something special, or something like that (male, 10 years in Canada).

In parallel to informality and spontaneity, hospitality is also expected: "you have to be able to feed them [friends] when they need to eat. And expect the same from them. If you feed somebody, and you don't go with the visit to eat everything from their fridge, they'll be offended" (female, 19 years in Canada).

In short, participants describe friendship in Russian contexts as a very strong and very close relationship, which ideally achieves "the highest degree of mutual understanding" (male, 17 years in Canada). In contrast, they view Canadian friendship as more reserved, with people spending time together, but less open about their emotional world and their "soul". Different practices reflect these differences. Participants highlighted the importance of very frequent communication, of spontaneous getting together, and of outright hospitality among friends in a Russian context.

Russian friendship is more demanding. As a flip side to its intensity and depth, Russian friendship comes with more expectations and obligations than

Canadian friendship, in participants' view. A participant describes the main characteristic of friendship in Russian contexts as responsibility. Cause when you make friends with someone, your kind of take responsibility for that person. So when you say: 'that is my friend', that means that [...] you declare that you are ready to invest in that person. So you wouldn't say that easily that you can't do something. [...] Because you decided for yourself that this is the person you are going to invest in (female, 3 years in Canada).

In a related vein, another participant emphasized strong expectations:

> you have to be crazy enough. Again, to be expected to do crazy things for your friend if he or she asks you. [...] Most of Russian friends, they'll be expecting you to ask some crazy things from them (too), and if you don't, then, they will feel a little offended (female, 19 years in Canada).

These strong expectations and sense of responsibility in Russian friendship translate into a perceived obligation to help, to do what it takes for one's friend, as one participant sums up: "if someone asks you something that you don't like, as a Canadian friend, you refuse to do it. But as a Russian friend, you do it. And then you feel uncomfortable, but you do it" (female, 10 years in Canada). This perceived obligation applies in all cases, from mundane to severe situations. A participant illustrates the former:

> I had the situation that like, for example, I need to go. I just really need to go. I need to leave in ten minutes. And [that Russian friend] gives a call, and he or she says have a problem, like, with relationship or something like that. And ten minutes is definitely not enough to solve it by phone. If after ten minutes I say 'I really need to go', the person will feel offended, they are just simply disappointed. Even if we discuss, 'yea let me give you a call later or call me back later'. That probably wouldn't be (ok). Here [in Canada], if I say 'I need to leave in ten minutes, sorry let's talk later, call me let say at six', no problem (male, 10 years in Canada).

At the other end of the spectrum, participants underscore that friendship in Russian contexts entails unfaltering obligation to help in adversity, "to be with you when you are in trouble" (female, 3 years in Canada). As a friend in a Russian context, "you have to like, help anytime, like during the night, when, whatever" (female, 1.5 years in Canada). In other words, "from traditional point of view, you're ready to give your last T-shirt to the person" (female, 19 years in Canada). Another participant echoes the T-shirt image: "the [Russian] friend is somebody who will give you his or her last shirt when it comes to the difficult times" (male, 17 years in Canada). He adds that ideally, "in difficult times you can rely, and the response would be extreme degree of altruistic behaviour, at expense of, almost, friend's own life".

As a corollary to friendship in Russian contexts being more demanding and coming with many more strings attached, participants mention being more

selective: "year after year, I chose the friends with whom I created strong friendship. And we're friends for more than ten years. [...] I didn't take wrong people in my circle. [...] Maybe it was very selective." As a result, a participant notes differences in friendship circle sizes:

> even the average person from [Russia], like, not considering the extraversion/introversion thing, would not call as many people their friends as an average Canadian would. I wouldn't call them friends, I would call them acquaintances. [...] So yeah, I think that the number of people that you would call friends in Canada and [Russia], that's different (female, 3 years in Canada).

In short, participants describe friendship in Russian contexts as a responsibility, with strong expectations and obligation to help in all situations. As a result, people are very selective in whom they call friends, and their friendship circle is, therefore, smaller than in Canadian contexts [7].

Canadian relationships are "friendlier". While participants described Canadian friendship as less intense, both in terms of depth and responsibilities, they commented on the general openness and "friendliness" of relationships in the Canadian context. One participant noted:

> in Canada, like everybody is more open for communication. And it's not a problem even to talk to the persons staying and waiting for the bus, for example. [In Russia], it is like 'oh wow, what do you want from me?' and 'I don't wanna talk to you'. [...] Here it's completely different (female, 3 years in Canada).

Another participant expanded on that general "friendliness" in Canadian interactions:

> I find [Canadians] very friendly, very gentle to each other. Russians are not gentle, we don't love each other. You can actually see the difference right you (when) your plane is landing. [In Canada], you step out and custom officers, they are not *glad* to see you, but they don't mind. Right, they smile at you, they talk to you, they make you feel very easy. In Russia you land and you feel like... cause everybody is like... it's like Soviet face. Nobody smiling. [...] With people here [in Canada], I admire the gentleness and their kindness towards each other (female, 19 years in Canada).

As a result, it is very easy to approach new people:

> People [in Canada], they are very easy to make contact with strangers. Which is very hard for Russians, like, we're strangers, we're strangers. Here people are very open to any stranger, like anybody is approaching you. [...] Here people don't mind strangers. There [In Russia] people do. Stranger is some intruder (female, 19 years in Canada).

Interestingly, that same participant then points out that paradoxically, the flip-side of this Canadian openness is a greater reserve in friendship than among Russians:

> anybody is approaching you. [...] But the same time, there is some... I don't really know what to do, like which next step you have to make in order to become deeper friend. [...] You are in very good terms with everybody, but at the same time, I couldn't really find what to do in order to get a little bit deeper. I still don't know. That's a mystery to me. People [in Canada], they're so friendly, they're so nice, they're open. But there's some limit after which, I guess, it is getting too personal maybe to them. [...] For Canadians I think the private territory is very important thing. The private distance (female, 19 years in Canada).

Critical stance and explanations. As participants discuss the intensity of the general Russian friendship model, they also adopt a critical stance towards it. One participant notes that this ideal of "giving one's last shirt to a friend" is a:

> most widespread belief about friendship [that] I was hearing from early childhood [... and that is...] repeated throughout the literature, throughout movies, drama. [...] It's like ideal belief and maybe some people are lucky to have friends like this. [...] That's one of the basic labels, one of the basic stereotypes. [...] In reality, I wouldn't say this stereotype is met as often as it's depicted (male, 17 years in Canada).

Another participant describes the high Russian friendship expectations as "insane" and the Canadian model as more reasonable:

> [At a Russian friend's house], if there is one room, you'll be given the main sofa, and everyone is going to find another way, somehow. I mean it's a little bit crazy. I think it's a little bit obliging, right, cause you don't feel like the grandmother sleeping on the floor instead of you. [In Canada], if you have extra sofa, of course, I guess they accommodate you, like I had some Canadian like close friends. And I think it's normal, I don't think everybody should be completely insane and giving everything to everybody. I think Canadians are more normal in this matter (female, 19 years in Canada).

In a similar vein, another participant prefers some aspects of the Canadian friendship model:

> If you're really tired during the working week, just want to relax during weekend, so you just not want to see anyone. And that really works [in Canada], because none of the friends we have would come just spontaneously passing by. They would give us a call. And even during the call, for example if I'm really tired, I can easily say so 'yea I'm not feeling like talking too much now, so let's talk later'. And that's OK. [In Russia], such an ending of the conversation might

> lead to certain misunderstanding, because like, you're too tired to talk, so probably there's something wrong. [...] It's not what I meant, it's just I can be really tired. And that's what I like [in Canada], cause here, I really can be tired and say that. And no one will think something additional (male, 10 years in Canada).

Besides, another participant points out that these high expectations from friends might be changing in the Russian context:

> I feel it also depends on generation. Because for younger generation, for Russian friends, it is also easy to say no if you feel uncomfortable. Now we say 'if you feel uncomfortable, say no, it's ok.' In Soviet Union, it was a rule that you must think about community first, and about your personality last (female, 10 years in Canada).

Outside of Soviet influences, participants also make connections between features of Russian friendship models and low levels of residential mobility: "once you buy a house, then we stay and we live there all our lives. [...] So if you are living in the same place almost all your life, you have friends who are living together. So you have the same people around you" (female, 10 years in Canada). The stability in social relationships actually extends all the way to childhood:

> it's a very typical thing, we have many friends from even elementary school or those we grew up together with, like same apartment building. [...] So it's become quite uniform circle of connections, and we retain these relationships for many years. I would say it's very typical to have relationships friendship with old friends throughout the life [...] And it's related to low level of mobility in society (male, 17 years in Canada).

Although here too, things may be changing. As this participant points out, residential and social mobility may be on the rise in Russia:

> maybe not now, the population becomes a little bit more mobile. But it only applies to big cities, or it's like one-time life change in decision. People from small villages or small places decide to move to the capital, to the big city. And it changes for them a lot of stuff, including relationships with other people (male, 17 years in Canada).

Discussion

Our primary goal was to examine whether Wierzbicka's semantic analyses about friendship in Russian and English [4] were reflected in actual psychological differences in people's friendship cultural models. The results of our qualitative interview study of Russian-Canadian biculturals largely supported Wierzbicka's linguistic conclusions. Indeed, participants described friendship in Russian contexts as deep, very close, and a strong bond, with frequent communication and (almost unconditional) help in adversity as essential features. In contrast, they saw Canadian friendship as a lighter relationship, with greater emphasis on

congeniality and the sharing of pleasant activities, or "having fun." The importance of self-disclosure advanced by Wierzbicka featured in participants' testimonies as well, especially in the mention of "opening one's soul." This aspect of friendship also echoes Searle-White's finding that people's boundaries around the self were more permeable to friends among Russians than among Americans [5]. The notion of "open soul" runs counter to Sheets & Lugar's results on self-disclosure [7], but as mentioned earlier, cultural reference effects may account for this discrepancy.

In contrast, the importance of trust featured less prominently in participants' responses than Wierzbicka's analyses would have suggested. Trust was depicted as a friendship characteristic common to both Russian and Canadian contexts. As such, participants may have considered trust to be an implicit component of friendhsip, taken for granted to such an extent that it does not require further elaboration. The increasingly distant influence of the Soviet period is another possible explanation of these results. In contrast to a time when trust was a matter of life and death, it may have become a less critical friendship quality as the Soviet era recedes into distant collective memories.

As a side note, participants' drawing on Soviet history and societal changes in mobility to explain cross-cultural differences in friendship are important reminders that cultural meanings are situated not only in space, but also in time. This dimension of cultural variation is in line with a burgeoning body of work on cultural change phenomena and underlying mechanisms [36–38].

Interestingly, the theme of responsibility and the onerous nature of friendship emerged from participants' responses, but was not present in Wierzbicka's theorizing. Friendship in a Russian context was described as demanding, bordering on burdensome in the case of participants who mentioned preferring some aspects of the Canadian model. Such a reaction may actually be specific to migrants, reflecting their continuous engagement with two sets of cultural norms. In such life situations, people can compare and contrast different ways of being and behaving, and select those that fit best their personal preferences. This meta-perspective on one's cultural make up [39] may come less easily to people who are fully immersed into a single cultural setting.

Nevertheless, depicting friendship as demanding is consistent with Sheets and Lugar's findings that Russian friendship networks are smaller than American networks [7] (something participants also mentioned here) and that Russians have a lower tolerance for violations in their friendships [6]. To the extent that friendship represents a high emotional and practical investment, keep such an investment manageable requires that one chooses wisely and bestows one's friendship on a small and select group of people. To repeat the words of one participant, it is important to "be selective", and not "take the wrong persons" into one's circle. Interestingly, this notion of balance between investment and

size also appeared in Plaut and Adams' investigation of friendship in Ghana [1], a very different cultural context.

More broadly, beyond their immediate significance for friendship cultural models, the present results support Wierzbicka's theorizing on the existence of cultural models underlying key terms in a language. For speakers of English and Russian, the words *friend* and *droog* do seem to call to mind different mental models of what being a friend entails. People then rely on these culturally-specific intersubjective mental models [28] to guide how they interact with friends-to-be, what they expect from a friend, what behaviors they find offensive, etc. The fairly close correspondance between linguistic structure and people's cultural models of friendship is consistent with Semin's proposal that people may extract and internalize cultural meaning through repeated engagement with their linguistic ecology [40].

Beyond their theoretical import, cultural models also have practical implications, as suggested earlier. For migrants, insufficient knowledge of local friendship cultural models may translate into unrealistic expectations from relationships or awkward interactions. In turn, these violations of friendship cultural norms may hinder the formation of lasting and fulfilling close interpersonal relationships. One participant talked about her difficulties in making close friends in Canada, which she explained as follows: "I feel like I am getting too much for them, like I'm getting too close, I'm getting too open. Or like I try to insist to invite them too much. [...] I guess sometimes I have this feeling that I'm making them scared a little bit" (female, 19 years in Canada). Her struggles poignantly illustrates the negative consequences of using the wrong cultural model in daily interactions.

Limitations and future directions. This study was based on the introspections of a small bicultural sample, which limits the generalizability of the results. Confirming the present findings in larger scale quantitative investigations would be an essential next step. Future research would also need to estimate how consensual friendship models are in both cultural contexts. Questions such as "to what extent do people agree on a common friendship cultural model?", "are there one or several friendship models in each cultural context?" will need to be answered.

Relying on a bicultural sample addressed issues such as cultural reference effects, but also presented some limitations. Several participants mentioned having few Canadian friends, or difficulties forming closer and more lasting friendships with Canadians. In addition, participants' length of stay in Canada ranged between 1.5 and 19 years. This may have limited their experience with the Canadian friendship model and colored their responses. Future quantitative research could address this issue by controlling for participants length of stay in the country or acculturation to the mainstream cultural context.

Finally, this study was purely descriptive, which was appropriate as a first step, but future research should look into the mechanisms underlying the differences documented here. The Canadian reserve with friends vs. Russian opening of one's soul to friends that participants described parallels the distinction between independent vs. interdependent self-construals, where sharp boundaries are drawn around the self vs. around the ingroup, respectively. These findings, which also echo Searle-White's results on personal boundaries in friendhsip [5], suggest that self-construals may be an interesting mechanism to probe, in order to understand what mediates the relation between cultural context and friendship models. Meanwhile, this study provided initial evidence that people's models of friendship differ between Russian and Canadian cultural contexts, in ways that are largely consistent with Wierzbicka's semantic analyses. This work thus points to a close correspondance between people's psychological cultural models and the linguistic ecologies in which they live.

References

1. Adams G., Plaut V. C. The cultural grounding of personal relationship: Friendship in North American and West African worlds. *Personal Relationships*, 2003, Vol. 10, pp. 333–347. DOI: 10.1111/1475-6811.00053
2. Argyle M., Henderson M. The rules of friendship. *Journal of Social and Personal Relationships,* 1984, Vol. 1, no. 2, pp. 211–237. DOI: 10.1177/0265407584012005
3. Chen G. M. Differences in self-disclosure patterns among Americans versus Chinese: A comparative study. *Journal of Cross-Cultural Psychology*, 1995, Vol. 26, no. 1, pp. 84–91. DOI: 10.1177/0022022195261006
4. Wierzbicka A. *Understanding cultures through their key words English, Russian, Polish, German, and Japanese*. New York: Oxford University Press, 1997. 328 p.
5. Searle-White J. Personal boundaries among Russians and Americans: A Vygotskian approach. *Cross-Cultural Research*, 1996, Vol. 30, no. 2. DOI: 10.1177/106939719603000203
6. Sheets V. L., Lugar R. Sources of conflict between friends in Russia and the United States. *Cross-Cultural Research*, 2005, Vol. 39, no. 4, pp. 380–398. DOI: 10.1177/1069397105274833
7. Sheets V. L., Lugar R. Friendship and gender in Russia and the United States. *Sex Roles*, 2005, Vol. 52, pp. 131–40. DOI: 10.1007/s11199-005-1200-0
8. Wiseman J. P. Friendship: Bonds and binds in a voluntary relationship. *Journal of Social and Personal Relationships*, 1986, Vol. 3, no. 2, pp. 191–211. DOI: 10.1177/0265407586032005
9. Hall J. A. Friendship standards: The dimensions of ideal expectations. *Journal of Social and Personal Relationships*, 2012, Vol. 29, no. 7, pp. 884–907. DOI: 10.1177/0265407512448274

10. Waldrip A. M., Malcolm K. T., Jensen-Campbell L. A. With a little help from your friends: The importance of high-quality friendships on early adolescent adjustment. *Social Development*, 2008, Vol. 17, Issue 4. DOI: 10.1111/j.1467-9507.2008.00476.x
11. Jerrome D. Good company: the sociological implications of friendship. *Sociological Review*, 1984, Vol. 32, pp. 696–718. DOI: 10.1111/j.1467-954X.1984.tb00831.x
12. De Vries B., Utz R., Caserta M., Lund D. Friend and family contact and support in early widowhood. *Journals of Gerontology – Series B Psychological Sciences and Social Sciences,* 2014, Vol. 69, no. 1, pp. 75–84. DOI: 10.1093/geronb/gbt078
13. Knight G. P., Berkel C., Umaña-Taylor A. J., Gonzales N. A., Ettekal I., Jaconis M., et al. The familial socialization of culturally related values in Mexican American families. *Journal of Marriage and Family*, 2011, Vol. 73, pp. 913–925. DOI: 10.1111/j.1741-3737.2011.00856.x PMCID: PMC3196592
14. Lincoln K. D., Taylor R. J., Bullard K. M., Chatters L. M., Woodward A. T., Himle J. A., et al. Emotional support, negative interaction and DSM IV lifetime disorders among older African Americans: Findings from the national survey of American life (NSAL). *International Journal of Geriatric Psychiatry*, 2010, Vol. 25, pp. 612–621. DOI: 10.1002/gps.2383
15. Travis L. A., Lyness J. M., Shields C. G., King D. A., Cox C. Social support, depression, and functional disability in older adult primary-care patients. *The American Journal of Geriatric Psychiatry,* 2004, Vol. 12, Issue 3, pp. 265–271. DOI: 10.1176/appi.ajgp.12.3.265
16. Wethington E., Kessler R. C. Perceived support, received support, and adjustment to stressful life events. *Journal of Health and Social Behavior*, 1986, Vol. 27, no. 1, pp. 78–89. DOI: 10.2307/2136504
17. Mehta K. M., Simonsick E. M., Penninx B. W. J. H., Schulz R., Rubin S. M., Satterfield S., et al. Prevalence and correlates of anxiety symptoms in well-functioning older adults: Findings from the health aging and body composition study. *Journal of the American Geriatrics Society*, 2003, Vol. 51, no. 4, pp. 499–504. DOI: 10.1046/j.1532-5415.2003.51158.x
18. Brown S. C., Mason C. A., Spokane A. R., Cruza-Guet M. C., Lopez B., Szapocznik J. The relationship of neighborhood climate to perceived social support and mental health in older hispanic immigrants in Miami, Florida. *Journal of Aging and Health*, 2009, Vol. 21, Issue 3, pp. 431–459. DOI: 10.1177/0898264308328976
19. Gillespie B. J., Frederick D., Harari L., Grov C. Homophily, close Friendship, and life satisfaction among gay, lesbian, heterosexual, and bisexual men and women. *PLOS ONE*, 2015, Vol. 10, no. 6. DOI: 101371/journal.pone.0128900

20. Demir M., Davidson I. Toward a better understanding of the relationship between friendship and happiness: Perceived responses to capitalization attempts, feelings of mattering, and satisfaction of basic psychological needs in same-sex best friendships as predictors of happiness. *Journal of Happiness Studies*, 2013, Vol. 14, Issue 2, pp. 525–550. DOI: 10.1007/s10902-012-9341-7
21. Kitayama S., Markus H. R. The pursuit of happiness and the realization of sympathy: Cultural patterns of self, social relations, and well-being. In: Diener E., Suh E. M. (eds.) *Culture and Subjective Well-Being.* Cambridge, MA: The MIT Press, 2000, pp. 113–161.
22. Kuo W. H., Tsai Y.-M. Social networking, hardiness and immigrant's mental health. *Journai of Health and Social Behavior*, 1986, Vol. 27, pp. 133–149. DOI: 10.2307/2136312
23. Sawir E., Marginson S., Deumert A., Nyland C., Ramia G. Loneliness and international Students: An Australian study. *Journal of Studies in International Education,* 2008, Vol. 12, no. 2, pp. 148–180. DOI: 10.1177/1028315307299699
24. Casson R. W. Schemata in cognitive anthropology. *Annual Review of Anthropology*, 1983, Vol. 12, pp. 429–462.
25. D'Andrade R. G. Schemas and motivation. In: D'Andrade R. G., Strauss C. (eds.) *Human Motives and Cultural Models*. New York: Cambridge University Press, pp. 23–44. DOI: 10.1017/CBO9781139166515.003
26. Strauss C., Quinn N. *A cognitive theory of cultural meaning*. Cambridge, UK: Cambridge University Press, 1997. 323 p.
27. Fischer R. Standardization to account for cross-cultural response bias: A classification of score adjustment procedures and review of research in JCCP. *Journal of Cross-Cultural Psychology,* 2004, Vol. 35, Issue 3, pp. 263–282. DOI: 10.1177/0022022104264122
28. Chiu C.-Y., Gelfand M. J., Yamagishi T., Shteynberg G., Wan C. Intersubjective culture: The role of intersubjective perceptions in cross-cultural research. *Perspectives Psychological Science*, 2010, Vol. 5, Issue 4, pp. 482–493. DOI: 10.1177/1745691610375562
29. Johnson R. B., Onwuegbuzie A. J. Mixed methods research: A research paradigm whose time has come. *Educational Research*, 2004, Vol. 33, no. 7, pp. 14–26. DOI: 10.3102/0013189X033007014
30. Glaser B. G., Strauss A. L. The discovery of grounded theory: Strategies for qualitative research. Aldine Publ., 1977. 271 p.
31. Braun V., Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 2006, Vol. 3, no. 2, pp. 77–101. DOI: 10.1191/1478088706qp063oa
32. Charmaz K. *Constructing grounded theory: A practical guide through qualitative analysis*. New York: Sage Publications, 2006. 297 p.

33. Hsiung P.-C. Conventions for transcribing interviews. Lives Legacies Guide Qual Interviewing 2010. Available at: https://www.utsc.utoronto.ca/~pchsiung/LAL/interviewing/conventions (Accessed 15 September 2018).
34. Fowler F. Interview Schedule. In: Lewis-Beck M., Bryman A. and Liao T. (eds.) *Encyclopedia of Social Science Research Methods*. Sage Publication Inc., Thousand Oaks, 2004, pp. 519–520. DOI: 10.4135/9781412950589.n451
35. Gibbs G. Thematic coding and analyzing. In: *Analyzing Qualitative Data*. London, UK: Sage Publications, 2007, pp. 38–55. DOI: 10.4135/9781849208574
36. Sun J., Ryder A. G. The Chinese experience of rapid modernization: Sociocultural changes, psychological consequences? *Frontiers in Psychology,* 2016, Vol. 7, pp. 1–13.
37. Twenge J. M. *Generation me-revised and updated: Why today's young Americans are more confident, assertive, entitled–and more miserable than ever before*. New York: Simon and Schuster, 2014. 292 p.
38. Greenfield P. M. Cultural change over time: Why replicability should not be the gold standard in psychological science. *Perspectives Psychological Science*, 2017, Vol. 12, pp. 762–771. DOI: 10.1177/1745691617707314
39. Oyserman D. Culture three ways: Culture and subcultures within countries. *The Annual Review of Psychology*, 2017, Vol. 68, pp. 435–463.
40. Semin G. R. Culturally situated linguistic ecologies and language use: Cultural tools at the service of representing and shaping situated realities. In: Gelfand M. J., Chiu C., Hong Y. (eds.) *Advances in culture and psychology*. Oxford University Press, 2010, Vol. 1, pp. 217–249.

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Scale of Personal Problems in Everyday Life: Conceptual Justification and Psychometric Development

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Abstract

Introduction. Theoretical and methodological issues of psychology of personal problem solving in everyday life have been underrepresented in Russian research literature. For the first time, the authors develop, pilot-test, and validate a new technique for diagnosing personal problems of everyday life.

Methods. The sample was comprised of 506 individual participants (aged 17–67 years) from general population and of 43 patients of the psycho-neurological department and the department of borderline states (aged 18–50 years). The study used the following techniques for construct validation of the pilot version of the Scale: (a) Life Satisfaction Scale; (b) Positive and Negative Affect Scale; (c) Five-Factor Personality Inventory; (d) Life Orientation Test (Russian modification); and (e) Hardiness Survey (Russian modification).

Results and Discussion. This section (a) describes the procedure of developing the Scale and eliminating non-valid items, (b) examines the factor structure of the questionnaire, (c) determines its construct, structural, and differential validity, and (d) discusses the results of studying age, gender, social, and demographic differences in the general level of problematization of life and the manifestation of specific types of everyday problems. The authors compared the findings obtained in pilot testing with those described in previous studies and demonstrated their similarity. The study provides diagnostic norms for the Scale scores. The proposed technique has great potential for further research (collecting empirical data in various subject areas of psychology) and psychodiagnostic (supporting the consultative and psychotherapeutic process and clinical practice) applications.

Conclusion. The authors draw the conclusion that the developed technique manifests relevant measurement properties and can be recommended for use in psychological research and practice. Further psychometric development of the Scale will involve determining test-retest reliability, assessing the impact of social desirability on the results, as well as differentiating and specifying test norms on larger samples.

Keywords

personality, personal problems, dispositional determination, five-factor model, big five, psychology of everyday life, everyday problems, psychodiagnostics, questionnaire, validation

Highlights

► An original Russian technique for diagnosing the degree of personal problems in everyday life is developed.

► The technique is a multi-dimensional standardized questionnaire (scale) and manifests relevant psychometric properties – namely, high reliability and structural, convergent, differential, and criterion validity.

► The questionnaire can be recommended for further research (collecting empirical data in various subject areas of psychology) and psychodiagnostic (supporting the consultative and psychotherapeutic process and clinical practice) applications.

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Introduction

One of the actual trends characterizing the vector of social and humanitarian knowledge movement is expressed in the shift of research focus to ontology and phenomenology of everyday life as day-to-day current reality of human life [1, 2, 3]. The emphasis on everyday life in the field of psychological analysis suggests paying closer attention to such phenomena, which previously lied "in the shadow" of mental phenomena, arising in the mode of non-everyday human existence. In particular, this trend actualizes the request for the study of personal difficulties and problems woven into the "fabric" of everyday human life.

The methodological development of this problem is conducted in line with the dispositional approach and based on the five-factor model of personal traits ("Big five"), where everyday personal problems become the "units" of psychological analysis of personal dispositions. Theoretical prerequisites for such understanding of personal problems are formulated during the discussion of the criterion validity of the five-factor model of personality. Based on the idea that a particular disposition carries a predisposition to a specific form of maladjustment, personality disorders and disorders have traditionally been chosen as the criteria for validation [4, 5, 6, 7, 8].

Despite the productivity of this approach, there are doubts that the personal problems of the psychopathological level can be an adequate unit of analysis of the normal personality in everyday life. In this regard, the term "personality-related problems" was introduced relatively recently to refer to the psychological difficulties of a person in everyday life, which are generated by polar personal dispositions [7]. There are single studies aimed, firstly, at revealing the mechanisms and regularities of the relationship of personal problems with individual dispositions of personality [9, 10], and secondly, at building a taxonomy of personal problems and designing psychometrically verified methods of their diagnosis [8, 11, 12, 13, 11]. As part of solving the second task, the following methods were developed: Personal Problems Checklist for Adults (PPCA) and Children (PPCC) [11, 14], The Multi-Context Problems Checklist (MCPC) [13], Inventory of Interpersonal Problems (IIP) [15].

In Russian research literature there is absence of both studies and diagnostic tools on this subject. In this regard, *the aim* of the study was the development, testing and validation of a new method for assessing personal problems of everyday life.

Methods

The questionnaire was developed on a sample of 506 respondents aged from 17 to 67 years old (M = 34±9), 281 women, 225 men. The sample is characterized by high variability of socio-demographic and status-role characteristics of the subjects. It consists of people with different levels of education, marital status, parental and labor status.

In order to check the criteria validity, there was an additional examination of the clinical sample consisting of 43 patients (30 women and 13 men from 18 to 50 years old (M = 32±9 years) of the Psychoneurological Department and the Department of Borderline Neuropsychological States № 3 in Grodno. All respondents had diagnoses related to the category of borderline neuropsychiatric disorders (F4 – "Neurotic, stress – related and somatoform disorders", F5 – "Behavioral syndromes associated with physiological disturbances and physical factors", F6 – "Disorders of adult personality and behavior" according to ICD-10).

Pilot version of the questionnaire was presented to the subjects in a set of techniques for construct validation: "Satisfaction with Life Scale", SWLS, by E. Diener in the adaptation of E. N. Aspen and D. A. Leontiev [16], "Positive Affect and Negative Affect Scale", PANAS, in the adaptation of E. N. Aspen [17], "Five Personality Factors Questionnaire", 5PFQ, in the adaptation of A. B. Khromova [18], "Life Orientation Test", LOTm by M. Shayera and C. Carver in the adaptation of the E. O. Gordeeva [19], "Hardiness Survey» by S. Maddi in adaptation of D. Leontiev and E. I. Rasskazova [20].

Results and Discussion

The units of the stimulus material of the Scale are represented by the tasks that people set and solve in everyday life. The list of tasks was formed by inductive-deductive method: part of the tasks was extracted from the minutes of consultative conversations, the other part of the tasks was identified by analyzing the stimulus material of existing diagnostic techniques, primarily modern foreign analogues. The content validity of the questionnaire was ensured by the representativeness of the stimulus material in relation to the typical tasks of everyday life of the subjects. The primary version of the questionnaire covered 75 incentive tasks. In accordance with the instructions, the subject must assess the extent to which the solution of each problem is difficult for him, in accord with the four-point Likert scale.

Factor structure and structural validity of the questionnaire

The internal structure of the questionnaire was carried out with the help of factor analysis on a 75-point intercorrelation matrix. Factorization was carried out by the maximum likelihood estimation followed by oblique Promax-rotation of the factor structure; the critical value of the factor load was assumed to be 0.30. Of the possible alternatives, the most successful one was the seven-factor solution, which explains 64% of the variance of variables (Table 1) and, according to the results of confirmatory factor analysis, is characterized by a satisfactory level of structural compliance ($\chi^2 = 4260{,}08$, df = 2271, p = 0,001, χ^2/df = 1,87; RMSEA = 0,05, SRMR = 0,06, CFI = 0,95, TLI = 0,95).

Table 1. Results of factor analysis of the pilot version of the questionnaire

Factors (scales of the questionnaire)	**Point numbers and load**	**Points discriminativity coefficient**	**α-Cronbach**
Factor I "Problems of self-assertion in inter-personal relations"	15 (0,33), 17 (0,58), 22 (0,36), 26 (0,54), 36 (0,31), 40 (0,51), 42 (0,59), 48 (0,42), 53 (0,40)	0,37 – 0,63	0,81
Factor II "Problems of personal regulation of the life time"	1 (0,42), 3 (0,34), 7 (0,44), 11 (0,51), 14 (0,33), 16 (0,31), 30 (0,61), 31 (0,52), 33 (0,45), 45 (0,68), 46 (0,33), 56 (0,41)	0,40 – 0,64	0,83

Factors (scales of the questionnaire)	**Point numbers and load**	**Points discriminativity coefficient**	**a-Cronbach**
Factor III "Problems of self-consciousness"	2 (0,56), 5 (0,55), 21 (0,52), 25 (0,59), 37 (0,45), 43 (0,68), 51 (0,72), 54 (0,55)	0,32 – 0,57	0,77
Factor IV "Moral problems of personality"	6 (0,47), 8 (0,48), 12 (0,41), 13 (0,47), 24 (0,53), 28 (0,38), 32 (0,44), 34 (0,77), 41 (0,64), 44 (0,56)	0,32 – 0,55	0,78
Factor V "Problems of socio-psychological adaptation of personality"	19 (0,62), 38 (0,55), 39 (0,37), 52 (0,63)	0,55 – 0,67	0,80
Factor VI "Problems of coping and self-regulation in difficult life situations"	18 (0,31), 20 (0,38), 27 (0,55), 29 (0,45), 35 (0,43), 47 (0,46), 49 (0,39), 50 (0,41), 55 (0,50), 57 (0,54)	0,44 – 0,60	0,80
Factor VII "Cognitive problems of personality"	4 (0,54), 9 (0,37), 10 (0,40), 23 (0,57)	0,32 – 0,56	0,71

The first factor (21,1 % of variance), called *"Problems of self-assertion in interpersonal relations"*, is represented mainly by communicative tasks, the common feature of which is the need to develop and defend their own position in spite of the opposition of the social environment. The second factor (15,6 % of variance) is represented by the tasks of temporal organization of behavior and life activity both on a situational basis and in the course of the whole life and is defined as *"Problems of personal regulation of the life time"*. The third factor (11,3 % of variance) integrates items that reflect reflexive tasks aimed mainly at personal self-understanding, self-evaluation and self-change. It was called *"Problems of self-consciousness»*. The fourth factor (8 % of variance) encompasses the points reflecting the tasks of moral self-regulation — the way a person constructs their behavior, activity and communication in accordance with the norms of universal ethics and morality. This factor was designated as *"Moral problems of personality"*. The fifth factor (3,04 % of variance) is composed of items corresponding to the tasks of socio-psychological adaptation to changing social conditions, first of all, unfamiliar partners in communication and new membership groups, and is designated as *"Problems of socio-psychological adaptation of personality"*. The sixth factor (2,65 % of variance) is formed from the points describing the tasks of self-regulation of negative emotional and functional states in difficult life situations, and is called *"Problems of coping and self-regulation in difficult life situations"*. The seventh factor (2,31 % of variance) consists of points reflecting cognitive tasks solved in the course of everyday life: attentional, mnestic and mental. It received the name *"Cognitive problems of the personality»*. 18 points that did not gain sufficient load were eliminated. The final version of the tool contains 57 points divided into 7 sub-scales.

Further, the focus of the study shifted onto the question of the integral diagnostic index reflecting the general level of problematization of daily life of the respondent. To this end, a factor analysis was carried out using the maximum likelihood estimation on the subscale intercorrelation matrix (Table 2). Sub-scales of the questionnaire formed one factor explaining 59 % of variability of variables and significantly loaded with all types of personal problems of everyday life. Confirmatory factor analysis confirms the validity of the allocation of the total latent factor ($\chi^2 = 21,7$, df = 14, p = 0,01, $\chi^2/df = 1,55$; RMSEA = 0,046, SRMR = 0,05, CFI = 0,99, TLI = 0,985). The values of the point–integral scale correlations indicate an appropriate level of discrimination of points (0,27 – 0,61), and the scale as a whole is characterized by high consistency ($\alpha = 0,94$).

Table 2. Intercorrelation and the results of the secondary factorization of the questionnaire's subscales

Subscales of the questionnaire	SS 1	SS 2	SS 3	SS 4	SS 5	SS 6	**Factor loads**
SS 1: Problems of self-assertion in interpersonal relations							0,77
SS 2: Problems of personal regulation of the life time	0,51						0,79
SS 3: Problems of self-consciousness	0,57	0,61					0,82
SS 4: Moral problems of personality	0,41	0,50	0,62				0,74
SS 5: Problems of socio-psychological adaptation of personality	0,55	0,43	0,44	0,44			0,70
SS 6: Problems of coping and self-regulation in difficult life situations	0,58	0,59	0,58	0,53	0,53		0,80
SS 7: Cognitive problems of personality	0,48	0,53	0,51	0,48	0,42	0,46	0,72

Gender, age and socio-demographic differences.

Gender differences in the severity of personal problems of everyday life were assessed by the two-part Student's t-test. The revealed differences, however, are characterized by the small size of the effect (Cohen's $d < 0,50$) and in practice have no significant value. Also, the indicators of the questionnaire almost do not correlate with the age of the subjects. The only statistically significant trend is that with age people tend to solve the problem of self-regulation of life time easier ($r = -0,17$, $p < 0,001$).

With the help of univariate analysis of variance significant differences between subjects with different levels of education were found. They concern self-regulation of life time ($F = 3,34$, $p = 0,019$, $\eta^2 = 0,02$) and cognitive problems ($F = 3,84$, $p = 0,01$, $\eta^2 = 0,02$), as well as the general level of problematization of everyday life ($F = 2,68$, $p = 0,04$, $\eta^2 = 0,015$). With the growth of the educational level, the subjective difficulty of solving these types of everyday problems and the tendency to problematize everyday life decreases. Given the small size of the effect, these differences may not be pronounced. More accentuated differences can be seen in the comparison of respondents with different marital status: single and married. As follows from the Table 3 data, single people are characterized by a greater tension of self-assertion problems in interpersonal relationships, self-regulation of life time, social and psychological adaptation to new life circumstances, coping and self-control in difficult situations, and their daily life is generally perceived as more difficult and problematic. However, based on the effect size (Cohen's $d = 0,24 \sim 0,44$), statistically significant differences may not be as significant.

Table 3. The results of the analysis of difference related to marital status

Questionnaire indicators	Single		Married		t	d	η^2
	M	σ	M	σ			
Problems of self-assertion in interpersonal relations	16,49	4,94	15,42	3,94	2,04*	0,24	0,007
Problems of personal regulation of the life time	23,10	6,42	20,51	5,24	3,77***	0,44	0,025
Problems of self-consciousness	13,45	4,04	12,80	2,92	1,52	-	-
Moral problems of personality	16,13	4,50	15,40	3,51	1,53	-	-
Problems of socio-psychological adaptation of personality	7,43	2,94	6,65	2,18	2,50*	0,30	0,011
Problems of coping and self-regulation in different life situations	22,46	6,25	21,10	4,79	2,06*	0,24	0,007
Cognitive problems of personality	7,74	2,45	7,01	2,20	2,77**	0,31	0,014
General level of problematization of everyday life	106,80	24,80	98,89	16,86	3,05**	0,37	0,016

Based on the data in Table 4, it can be argued that active employment provides a person with resources to facilitate everyday tasks. Employed people have a tendency to cope with the tasks of personal regulation of life time, self-understanding and self-assessment easier. Students who are systematically involved in mental activity, report the greater difficulty of cognitive tasks, which are associated with the assimilation and processing of a large amount of new information.

Table 4. The results of the analysis of difference related to the employment status

Questionnaire indicators	**Employed participants**		**Students**		**T**	**d**	**η^2**
	M	**σ**	**M**	**σ**			
Problems of self-assertion in interpersonal relations	15,96	4,65	16,52	4,87	1,33	-	-
Problems of personal regulations of the life time	21,85	6,18	23,17	6,32	2,44*	0,21	0,010
Problems of self-consciousness	12,92	3,49	13,61	4,08	2,07*	0,18	0,007
Moral problems of personality	15,60	4,13	16,27	4,46	1,78	-	-
Problems of socio-psychological adaptation of personality	7,09	2,64	7,42	2,95	1,34	-	-
Problems of coping and self-regulation in difficult life situations	21,70	5,86	22,57	6,12	1,66	-	-
Cognitive problems of personality	7,32	2,30	7,80	2,48	2,30*	0,20	0,009
General level of problematization of everyday life	102,47	22,05	107,39	24,68	2,40*	0,21	0,010

The size of ETA-squared effect (η^2), describing the share of intergroup variance associated with an independent (grouping) status variable in the total variance of the trait, was calculated for comparative assessment of the magnitude of status differences. The differences related to gender and marital status are most

pronounced, accounting for 3,9 per cent and 2,5 per cent, respectively, of the diagnostic variance.

The General conclusion is that during adolescence and adulthood, as the social status and roles change, the individual acquires and accumulates a variety of resources that increase his competence in solving everyday life problems. This is manifested in a decrease in the level of subjective problematization of these tasks.

Construct validity of the questionnaire

The construct validization of the tool was carried out in the context of the assessment of convergent and discriminant validity. As criteria methods we used questionnaires diagnosing the intensity of individual psychological characteristics of the personality, which, as evidenced by the results of previous studies, serve as predictors of effective coping with both critical situations and with everyday life difficulties [20, 21, 22]. In addition, for validization the questionnaire we also employed the variables that represent negative consequences of the problematization of everyday life, i.e. subjective well-being of the individual and its components: life satisfaction, as well as positive and negative affect [23, 24, 25]. Validitation test of the hypotheses was carried out with the help of Pearson's (Tables 5 and 6):

Table 5. The results of the correlation analysis of the «Big Five» variables and components of subjective well-being

Subscales of the questionnaire	Subjective well-being			Dispositional optimism			Resilience				Big Five				
	L S	PA	NA	PE	NE	DO	I	C	RA	GR	E	A	C	N	O
Problems of self-assertion	-0,12	-0,23	0,16	-0,08	0,16	-0,15	-0,28	-0,33	-0,19	-0,34	-0,25	0,01	-0,25	0,29	-0,11
Problems of time regulation	-0,29	-0,27	0,19	-0,12	0,15	-0,20	-0,46	-0,46	-0,22	-0,48	-0,18	-0,22	-0,53	0,24	-0,05

Subscales of the questionnaire	**Subjective well-being**			**Dispositional optimism**			**Resilience**				**Big Five**				
	L S	**PA**	**NA**	**PE**	**NE**	**DO**	**I**	**C**	**RA**	**GR**	**E**	**A**	**C**	**N**	**O**
Problems of self-consciousness	-0,18	-0,26	0,18	-0,08	0,15	-0,27	-0,29	-0,27	-0,12	-0,27	-0,16	-0,24	-0,34	0,24	-0,17
Moral problems	-0,12	-0,20	0,15	-0,14	0,21	-0,31	-0,32	-0,29	-0,21	-0,32	-0,16	-0,44	-0,34	0,15	-0,21
Problems of S-P adaptation	-0,14	-0,23	0,11	-0,17	0,14	-0,23	-0,44	-0,42	-0,33	-0,47	-0,45	-0,20	-0,22	0,24	-0,15
Problems of coping and self-regulation in DLS	-0,30	-0,32	0,25	-0,32	0,15	-0,21	-0,43	-0,49	-0,36	-0,51	-0,27	-0,17	-0,30	0,54	-0,07

Sub-scales of the ques-tion-naire	Subjective well-being			Dispositional optimism			Resilience				Big Five				
	L S	PA	NA	PE	NE	DO	I	C	RA	GR	E	A	C	N	O
Cog-nitive prob-lems	-0,10	-0,20	0,09	-0,12	0,22	-0,22	-0,43	-0,35	-0,22	-0,41	-0,21	-0,18	-0,27	0,09	-0,15
Total score	-0,25	-0,33	0,23	-0,19	0,21	-0,28	-0,47	-0,47	-0,29	-0,50	-0,29	-0,27	-0,44	0,36	-0,15
Notes:	List of abbreviations: LS – life satisfaction; PA – positive affect; NA – negative affect; PE – positive expectations; NE - negative expectations; DO – dispositional optimism; I – involvment; C – control; RA – risk acceptance, GR – general resilience; E (Extraversion); A (Agreeableness); C (Conscientiousness); N (Neuroticism); O (Openness to experience); grey cells correspond to weak, moderate, and average correlations.														

Table 6. The results of the hypotheses validization test

Everyday life personal problems scale	Direct correlation	Inverse correlation
а) the severety of everyday life personal problems б) the degree of life problematization	- dispositional pessimism - neuroticism - negative affect	- resilience level - dispositional optimism - extraversion - conscientiousness - openness to experience - agreeableness - life satisfaction - positive affect

The observed pattern of correlations adequately fits into the theoretical understanding of everyday personal problems, which is why the design of the questionnaire can be considered valid.

Differential validity of the questionnaire was proved by comparing its metrics with the personal characteristics measured by the NEO-PI-R questionnaire. It was assumed that weak or strong manifestation of a particular disposition becomes a triggering factor for occurrence of a specific class of personal problems.

The estimation of this type of validity was carried out using multiple regression by the method of backward stepwise analysis, aimed at highlighting the strongest predictor of the predetermined list of independent variables. Predictors were the factors of The "Big Five", the dependent variable was alternately assigned indicators of severity of classes of personal problems. The results are presented in Table 7.

Table 7. The results of the questionnaire's differential validity test

Category of personal problems	**Predictors**					**R^2**
	E	**A**	**C**	**N**	**O**	
Problems of self-assertion	-0,23***	0,39***		0,25***		0,19***
Problems of time regulation Проблемы регуляции времени			-0,52***	0,21***		0,33***
Problems of self-consciousness			-0,29***	0,26***	-0,17***	0,19***
Moral problems		-0,40***	-0,14***	0,19***		0,25***
Problems of S-P adaptation	-0,44***			0,22***		0,25***
Problems of coping and self-regulation in DLS	-0,18***		-0,23***	0,52***		0,40***
Cognitive problems	-0,14***		-0,22***			0,09***

Notes:
1) list of abbreviations: E (Extraversion); A (Agreeableness); C (Conscientiousness); N (Neuroticism); O (Openness to experience); R^2 – multiple determination coefficient;
2) the numbers in the cells represent the values of standardized regression coefficients (β);
3) *** p<0,001

The obtained results allow us to assert that the weak or strong expression of a personal characteristic determines the emergence of specific personal problems that reflect the psychological originality of this personal property. This general pattern gets its concrete expression in the fact that: 1) a low level of extroversion is indicative of the problem of socio-psychological (communicative) adaptation; 2) a low level of agreeableness/cooperation is indicative of a problem with moral self-regulation of personal behavior; 3) a high level of agreeableness/cooperation is indicative of a problem with self-assertion in interpersonal relations; 4) a low level of conscientiousness is indicative of a problem with life time regulation; 5) a high level of neuroticism-self-regulation is indicative of the problems with handling negative emotional states in difficult situations; 6) a high level of neuroticism is indicative of all the classes of personal problems, except for cognitive problems. The discovered selectivity of connections between personality traits and classes of personal problems testifies to the high differential validity of the developed technique.

The criteria validity of the questionnaire was tested using a sample of patients from Grodno State Clinical Hospital № 3 (see the description of the sample). The variety of criteria validity checked in this way can be concretized as a complex current validity, since the discrepancy with everyday life difficulties plays a significant role in the etiopathogenesis of borderline mental health disorders [26]. Evaluation of this validity was carried out by comparing the parameters of the questionnaire in contrast groups – population (N = 506) and hospital (N = 43) ones. The results of the comparative analysis of the Student's t-test for independent samples are given in Table 8.

Table 8. The results of the criteria validity test

Points and values of the questionnaire	Mean Value		Standard Deviation		t $p<0,001$	Cohen`s d
	PS_{506}	CS_{43}	PS_{506}	CS_{43}		
Problems of self-assertion in interpersonal relations	15,66	23,70	4,18	5,34	11,82	1,68
Problems of personal regulation of the life time	21,70	33,53	5,56	3,76	13,70	2,49
Problems of self-consciousness	12,79	19,60	3,36	3,86	12,60	1,88
Moral problems of personality	15,31	24,05	3,65	3,68	15,07	2,39

Points and values of the questionnaire	Mean Value		Standard Deviation		t $p<0,001$	Cohen`s d
	PS_{506}	CS_{43}	PS_{506}	CS_{43}		
Problems of socio-psychological adaptation of personality	6,93	11,47	2,51	3,11	11,14	1,60
Problems of coping and self-regulation in difficult life situations	21,36	32,16	5,32	4,85	12,86	2,12
Cognitive problems of the personality	7,35	10,63	2,27	2,07	9,13	1,51
General level of problematization of everyday life	101,11	155,14	19,18	12,87	18,12	3,31

Notes:
1) list of symbols: PS_{506} – population sample of 506 individuals; CS_{43} – clinical sample of 43 individuals; t – empirical value of Student's criterion for independent groups; Cohen`s d – extent of Cohen's d effect

The data show significant differences between the groups: compared to the respondents in a state of relative norm, people with borderline mental disorders: 1) give higher estimation of the subjective difficulty in solving all types of the daily problems without exception; 2) have a higher level of expression of all the identified types of personal problems; 3) are prone to significant problematization of their daily activities as a whole.

The obtained results prove the criteria validity of both separate tasks (points) of the questionnaire and its final diagnostic assessment. Also, the data speak in favor of the current and prognostic validity of the questionnaire and allow to recommend it for additional confirmation of clinical diagnosis and prognosis.

Diagnostic norms

Diagnostic norms were created taking into account the nature of the distribution of the test results of the standardization sample. The data in Table 9 indicate that the distribution of primary scores on the sub-scales and on the integral scale of the questionnaire deviates significantly from the normal distribution. Deviation from normality is evidenced by the high estimated values of the Komogorov-Smirnov criterion as well as the values of asymmetry,

which greatly exceeds the magnitude of the standard errors (0,10). The positive values of the asymmetry index and the quantitative ratio of the central trend indicators (mode < median < average) allow us to clame that the general pattern of distribution of raw scores on the partial and composite indicators of the questionnaire is expressed in the right-hand shift, i.e. the shift to the low values. It should be noted that the right-hand shift of distributions in our case was predictable, since this kind of asymmetry of test results is typical for the whole family of self-report techniques that diagnose everyday personality-related problems and daily stressors. This is probably due to the fact that the stimulus material in these techniques is represented by ordinary problems and events (as opposed to methods that evaluate the perception and response to extreme and extraordinary situations). Because of their habitual character, everyday problems are more feasible for respondents, which is reflected in the relatively low estimates of the subjective difficulty of solving and overcoming them.

Table 9. Descriptive statistics of the distribution of test results in the standardization sample

Areas of questioning	M	Me	Mo	[min; max]	σ	Asymmetry	MaxD
Problems of self-assertion	16,29	16	13	[9; 34]	4,79	0,85	0,09**
Problems of time regulation	22,62	22	21	[12; 42]	6,29	0,55	0,08**
Problems of self-consciousness	13,33	13	12	[8; 26]	3,86	0,75	0,12**
Moral problems	15,99	15	12	[10; 34]	4,33	0,86	0,11**
Problems of SP adaptation	7,29	7	4	[4; 16]	2,83	0,85	0,13**
Problems of coping and self-regulation in DLS	20,24	20	16	[10; 40]	5,54	0,51	0,06*
Cognitive problems	7,50	7	7	[4; 14]	2,22	0,48	0,15**
Total score	103,27	100	84	[57; 214]	23,14	0,64	0,05*
Notes:	1) list of symbols: M – arithmetic mean; Me – median; Mo – mode; min – minimal value in the sample; max – maximal value in the sample; σ – standard deviation; MaxD – empirical value of Kolmogorov-Smirnov criterion; 2) * p < 0,05; ** p < 0,01						

Taking into account the form of empirical distribution of test results and the low severity of gender and age differences in them, diagnostic norms were determined based on the analysis of the frequency distribution of raw scores in the standardization sample and were considered as common for men and women in adolescence and adulthood. We used a quintile scale, which involves dividing a number of test values into five intervals (quintiles), which correspond to different levels of severity of the diagnosed characteristic: very low (1–20 percentile), low (21–40 percentile), medium (41–60 percentile), high (61–80 percentile) and very high (81–100 percentile). Table 10 shows the diagnostic norms constructed in this way for the "Scale of everyday personal problems" are shown in Table 10.

Table 10. Diagnostic norms (in raw scores)

Indicators of the tool	The degree of expression of the diagnostic sign				
	Very low	Low	Average	High	Very high
Problems of self-assertion	9-12	13-14	15-17	18-20	21-36
Problems of time regulation	12-17	18-21	22-23	24-28	29-48
Problems of self-consciousness	8-10	11-12	13-14	15-17	18-32
Moral problems	10-12	13-14	15-17	18-19	20-40
Problems of SP adaptation	4-5	6	7-8	9-10	11-16
Problems of coping and self-regulation in DLS	10-15	16-18	19-21	22-25	26-40
Cognitive problems	4-5	6	7	8-10	11-16
Total score	57-83	84-95	96-107	108-121	122-228

Conclusion

The work resulted in creation of the original tool for Russian-speakers designed to diagnose the individual severity of everyday personal problems of the subject. The tool represents a multi-dimensional standardized questionnaire and has the appropriate measuring properties – high reliability, as well as the necessary criterial, structural, convergent and differential validity. The current version of the questionnaire can be recommended for use for scientific purposes: collecting empirical material in research on personality psychology, social psychology, psychology of coping behavior and other subject areas; for practical purposes – as an additional assessment method in the process of psychological counseling, correction, prevention and therapy, including the clinical setting. The prospects of

further psychometric development may lie in the definition of the retest reliability of the questionnaire and the assessment of the impact of social desirability on the results, as well as in the clarification and differentiation of test standards on the material taken from larger-scale population and clinical samples.

References

1. Asmolov A. G. Psychology of modernity: Challenges of uncertainty, complexity and diversity. *Psychological Studies*, 2015, Vol. 8, no. 40, p. 1. Available at: http://psystudy.ru (Accessed 05 September 2018).
2. Gusel'tseva M. S. Everyday life psychology: methodology, history and perspectives. *Psychological Studies*, 2017, Vol. 10, no. 51, p. 12. Available at: http://psystudy.ru (Accessed 05 September 2018).
3. Martsinkovskaya T. D. Modern psychology: Challenges of transitivity. *Psychological Studies*, 2015, Vol. 8, no. 42, p. 1. Available at: http://psystudy.ru (Accessed 05 September 2018).
4. Costa P. T., Jr., Widiger T. A. (eds.) *Personality disorders and five-factor model of personality*. Washington, DC: American Psychological Association, 2002. 493 p.
5. Piedmont R. L., Sherman M. F., Sherman N. C., Dy-Liacco G. S., Williams J. E. Using the five-factor model to identify a new personality disorder domain: the case for experiential permeability. *Journal of Personal Social Psychology*, 2009, Vol. 96, pp. 1245–1258.
6. Pincus A. L., Wiggins J. S. Interpersonal Problems and Conceptions of Personality Disorders. *Journal of Personality Disorders*, 1990, Vol. 4, no. 4, pp. 342–352.
7. Widiger T. A., Costa P. T., Jr., McCrae R. R. A proposal for Axis II: Diagnosing personality disorders using the five-factor model. In: P. T. Costa, Jr., T. A. Widiger (eds.) *Personality disorders and the five-factor model of personality*. Washington, DC, US: American Psychological Association, 2002, pp. 431–456.
8. Widiger T. A., Mullins-Sweatt S. N. Clinical utility of a dimensional model of personality disorder. *Professional Psychology: Research and Practice*, 2010, Vol. 41 (6), pp. 488–494.
9. McCrae R. R., Lockenhoff C. E., Costa P. T. A step toward DSM-V: cataloguing personality related problems in living. *European Journal of Personality*, 2005, Vol. 19 (4), pp. 269–286.
10. Ozer D. J., Benet-Martínez V. Personality and the prediction of consequential outcomes. *Annual Review of Psychology*, 2006, Vol. 57, pp. 401–421.
11. Piedmont R. L., Sherman M. F., Barrickman L. Brief psychosocial assessment of a clinical sample: an evaluation of the Personal Problems Checklist for Adults. *Assessment*, 2000, Vol. 7 (2), pp. 177–187.
12. Boudreaux M. J. Personality-related problems and the five-factor model of personality. *Personal Disorders*, 2016, Vol. 7(4), pp. 372–383.

13. Boudreaux M. J., Piedmont R. L., Sherman M. F., Ozer D. J. Identifying personality-related problems in living: The Multi-Context Problems Checklist. *Journal of Personality Assessment*, 2013, Vol. 95 (1), pp. 62–73. DOI: 10.1080/00223891.2012.717149
14. Schinka J. A. *Children's Problems Checklist*. NY: Psychological Assessment Resources, 1985.
15. Horowitz L. M., Rosenberg S. E., Baer B. A., Ureno G., Villasenor V. S. Inventory of interpersonal problems: Psychometric properties and clinical applications. *Journal of Consulting and Clinical Psychology*, 1988, Vol. 56, pp. 885–892.
16. Osin E. N., Leont'ev D. A. Aprobatsiya russkoyazychnyi versii dvukh shkal ekspress-otsenki sub"ektivnogo blagopoluchiya [Testing of Russian versions of the two scales of a rapid assessment of subjective well-being]. *Materialy III Vserossiiskogo sotsiologicheskogo kongressa* [Proc. the 3rd All-Russian Sociological Congress]. Moscow, Institute of Sociology RAS Publ., 2008.
17. Osin E. N. Measuring positive and negative affect: Development of a Russian-language analogue of PANAS. *Psikhologiya. Zhurnal Vysshei shkoly ekonomiki – Psychology. Journal of the Higher School of Economics*, 2012, Vol. 9, no. 4, pp. 91–110 (in Russian).
18. Khromov A. B. *Pyatifaktornyi oprosnik lichnosti* [Five-factor personality questionnaire]. Kurgan, Kurgan State University Publ., 2000. 23 p.
19. Gordeeva T. O., Sychev O. A., Osin E. N. Development of the Russian-language version of the test of dispositional optimism (LOT). *Psikhologicheskaya diagnostika – Psychological Diagnostics*, 2010, no. 2, pp. 36–64 (in Russian).
20. Leont'ev D. A., Rasskazova E. I. *Test zhiznestoikosti* [Resilience test]. Moscow, Smysl Publ., 2006. 63 p.
21. Costa P. T., Jr., McCrae R. R. Personality Disorders and The Five-Factor Model of Personality. *Journal of Personality Disorders*, 1990, Vol. 4 (4), pp. 362–371. DOI: 10.1521/pedi.1990.4.4.362
22. Maddi S. R. Hardiness: The courage to grow from stresses. *Journal of Positive Psychology*, 2006, Vol. 1(3), pp. 160–168. DOI: 10.1080/17439760600619609
23. Emmons R. The psychology of ultimate concerns: Motivation and spirituality in personality (Russ. ed.: Emmons R. *Psikhologiya vysshikh ustremlenii: motivatsiya i dukhovnost' lichnosti*. Moscow, Smysl Publ., 2004. 416 p.).
24. Diener E. Subjective well-being. *Psychological Bulletin*, 1984, no. 95 (3), pp. 542–575. DOI: 10.1037/0033-2909.95.3.542
25. Diener E., Emmons R. A., Larsen R. J., Griffin S. The Satisfaction with Life Scale. *Journal of Personality Assessment*, 1985, Vol. 49, pp. 71–75.
26. Aleksandrovskii Yu. A. *Pogranichnye psikhicheskie rasstroistva* [Borderline mental disorders]. Moscow, Meditsina Publ., 2000. 301 p.

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Technique for Studying Motivation Toward Scientific Activity: Development and Practical Application

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Abstract

Introduction. As our analysis has shown, the literature offers very few publications that address the issue of diagnosing motives for scientific activity in adult research professionals. Being guided by the principles of the meta-system approach, we developed the concept of motivation toward scientific activity as a theoretical foundation for the appropriate diagnostic technique. According to this concept, motivation toward scientific activity includes 10 various motivational subsystems (groups of motives) such as external, internal, value, cognitive, reflexive, and indirect ones, competition-, security-, and achievement-related motives, and anti-motivation. These subsystems are reflected in the corresponding scales of the developed technique.

Methods. A total of 944 research professionals at various research institutes, including universities, and commercial scientific organizations from different cities of the Russian Federation participated in this study. Exploratory factor analysis was employed to select tasks for the technique.

Results. The final version included 70 items (7 for each of the 10 scales), of which 25,71 % were 'reverse-worded' and 74,29 % were 'positive-worded'. The technique met the criteria of test-retest reliability ($r = .899$, $p = .001$), half-split reliability (Spearman–Brown: $r = .822$, $p = .001$; Rulon: $r = .814$, $p = .01$), and internal consistency reliability ($r = .814$, $p \leq .05$). The authors determined empirical validity of the technique by examining the relationship between scientific productivity and motivation. The Motivational Profile test by W. Richie and P. Martin was instrumental in testing construct validity. A Shapiro–Wilk test showed that the scores for each scale were normally distributed, which made it possible to use sten-score scales.

Discussion. The practice of psychological support of research activity at the RAS research institutes and R&D commercial organizations enabled authors to provide recommendations for chiefs, psychologists, and human resource managers for managing and optimizing the structure and level of motivation among research workers and increasing their labour productivity.

Keywords

psychodiagnostic technique, motivation toward scientific activity, research professionals, meta-system approach, subsystems, diagnostic scales, item analysis, reliability, validity, normalization of results

Highlights

► At the present time, there are no special psychodiagnostic tools for studying motivation toward scientific activity among research professionals.

► The developed diagnostic technique underwent all necessary psychometric evaluation and met all validity and reliability criteria.

► This is a fundamentally new original technique for diagnosing a wide range of motives for scientific activity in adult research professionals.

► Diagnosing the level and structure of motivation toward scientific activity opens new opportunities for purposefully stimulating scientific activity, taking into account the effects of systemic and time continuity, as well as a combination of individual and group stimulation.

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Introduction

The studies of need-motivational sphere of the researchers are actual today in both theoretical and applied aspects. Against the background of great attention to the studies of motivation of students' educational and scientific activity [1, 2,] and researching the content and processes of scientific activity [3, 4, 5], the methods of evaluating the motivation of scientific activity (hereinafter – MSA) in adults are not numerous, and they do not always take into account the specificity of this type of activity [6, 7]. In Russia, content analysis [8] or non-specialized psychodiagnostic methods of motivation are used to study MSA [9]. The author's original methods allow to study only certain aspects of the MSA, for example, its origin [10].

The listed problems of studying MSA caused the necessity to create its concept, which is methodologically based on metasystem approach, as one of the historically and logically conditioned branches of the development of the system approach [11]. MSA, being a system with a built-in metasystem level, includes a number of motivational subsystems (groups of motives), which together

exhaust the entire list of potential motives of scientific activity. This is external and internal motivation [12, 13, 14]. Cognitive motivation [15, 16]. Motivation for success [17, 18]. Security motivation [19, 20]. Competition motivation [21, 22, 23, 24]. Value motivation [25]. Reflexive motivation partially corresponds to the construct of autonomous motivation [26, 27]. Antimotivation is studied for the first time in scientific activity [28, 29]. Indirect motivation. Ten motivational subsystems listed above formed the basis of the theoretical construct of the developed technique and its scales.

Methods

The development of the method included three standard stages of the development of questionnaire-like psychodiagnostic methods: item analysis, verification of validity and reliability, standardization. The first sample consisted of 326 people, researchers of RAS institutes and universities: average age: 40.7 years old, average experience of scientific work – 18.1 years. The sample of the second stage was 284 people, researchers of RAS institutes and universities: the average age was 46.15 years old, the average length of scientific work 21.5 years. The sample of the third stage consisted of 334 employees of scientific institutes and universities. The average age was 41.08 years old, the average length of research work – 17.04 years.

Results

Initially, 10–15 questions or statements reflecting its typical manifestations in scientific activity were made for each of the motivational subsystems. Questions and statements were "direct" in 75 % of cases and "reverse" in 25 % of cases. Each question or statement was evaluated by respondents on a standard 7-point scale from "absolutely true" to "absolutely incorrect".

The results of the first stage of the study were subjected to exploratory factor analysis to establish the ways in which the questions of methodology and theoretical factors (subsystems) correlate. Factor loads were calculated using principal component analysis (Annex 1). The final version of the method includes the questions demonstrating the values of 0.35 and higher according to [30]. If more than 25 % of respondents found the question difficult to answer, it was excluded. The selected 70 questions were included in the final version of the MSA (Annex 1) with 7 questions for each of the 10 scales. Of these, 18 (25.71 percent) were "reverse" and the remaining 52 (74.29 percent) were "direct".

Reliability of MMSA. Retest reliability check was carried out on a limited sample (49 people). Two tests were carried out at intervals of 6 months (Table 1).

Table 1. Retest reliability of MMSA

MMSA Scales	
External	,56
Competition	,72
Achievement	,68
Security	,79
Internal	,75
Value	,76
Cognitive	,91
Antimotivations	,58
Reflexive	,76
Indirect	,73
Total score	,89

Symbols: r – value of Pearson's linear correlation coefficient, at p ≤ 0.01.

For most scales, retest reliability shows satisfactory values ($r \geq 0.7$). The exceptions are the "External", "Achievements" and "Antimotivation" scales, which correspond to our concept, assuming the presence of temporal dynamics and self-organization of the MSA's system on the basis of situational goals.

The reliability of the equivalent halves of the test was checked for both the total score (total MSA level), using the method of Spearman-Brown (0.83, $p < 0.001$) and Rulon's method (0.82, $p < 0.001$). The reliability based on the internal consistency or inter-consistency of the MMSA tasks was calculated based on Cronbach's Alpha for multivariate answers, which also showed satisfactory results (0.82, $p \leq 0.01$).

Empirical validity of MMSA. The information about the products of scientific work serves as an objective empirical indicator: the higher is the subject's MSA, the more productive he or she is, however: "...correlations are not too strong – in most cases they fit in the range from 0.20 to 0.30" [31, p. 153]. Given that "highly productive scholars are characterized by the orientation on scientific work and not on the career as such" [32, p. 159], the positive correlation relationship should be detected between productivity, the "Internal", "Cognitive" and "Values" scale and the scale of "Achievements" [33]. The results of the empirical verification of the validity of MSA (Table 2) confirm that they correspond to the listed theoretical and empirical regularities that that indicates MMSA's satisfactory empirical validity. The "Reflexive" and "Security" scales negatively correlate with the products of scientific activity because of the fear of error and the desire for self-control inhibits the growth of quantitative indicators of productivity, but contributes to quality improvement. The lack of interrelation of the work products with the "Indirect", "External" and "Competition" scales is theoretically justified, since these subsystems do not work to increase productivity directly.

Table 2. Correlation between indicators of productivity of scientific activity and MMSA

MMSA scales	Total number of works	Monographs	Papers in the journals included into the SAC list	Patents	Certificates	Citation Index	Works for the last three years	Conference presentations
External								
Competition								
Achievement	0,17*	0,15*		0,11**	0,11**		0,18*	0,22*
Security	-0,10**	-0,10**						-0,12**
Internal	0,22*	0,22*	0,11**	0,13*		0,15*	0,23*	0,17*
Value	0,19*	0,16*			0,12**			0,011**
Cognitive	0,18*	0,15*	0,19*	0,20*		0,13*	0,19*	0,20*
Antimotivation					0,11**			
Reflexive								
Indirect			-0,14**					
Total score		0,10**				0,11**	0,15*	0,11**

*Symbols: * – the value of the Spearman correlation coefficient, at $p < 0.05$, ** – the value of the Spearman correlation coefficient, at $0.1 \leq p \leq 0.05$. Minor correlations are not included in the table.*
Rationing of MSA was carried out using STEN-scores scale (Annex 2).

Using the Shapiro-Wilk test, the data for each scale and the total score for the test were tested for normal distribution. After that, the accumulated frequencies for each scale were calculated. Then with the help of the calculator in Statistica 6.0. the frequencies for the wall scale were calculated (Annex 2). The STEN-scores scale is most commonly used in psychodiagnostic techniques that allow comparative studies, and the dimensionality of the "raw" points allowed to do this: for each scale, the subject can score from 7 to 70.

The developed method allowed to study the structural-level characteristics of the MSA and their genesis in the process of professionalization of the researchers, this process revealed the fundamental laws of its functional organization. The method was used to audit staff in universities, research institutes and commercial R&D organizations [33, 34, 35]. As a result, a number of recommendations were made and their implementation allowed to optimize the socio-psychological climate and increase job satisfaction. Below we provide a number of recommendations on influencing various motivational subsystems.

As a rule, **external motivation** is generally stimulated by a cash reward because it includes material motives. However, extrinsic motivation also includes fame motives, needs for recognition, respect, status enhancement. This can be achieved due to a number of organizational factors (symbols, emphasizing the status, publications in the press, etc.). Of course, these motives are not operating for all the researchers and a number of them can, on the contrary, feel irritated and demotivated at these perspectives. That is why the issue of individual evaluation of the MSA system becomes a priority.

Security motivation involves avoiding failures and fear of rejection by the scientific community and achieving stability in the scientific organization. Usually the management of scientific organizations is trying to use the effect on this subsystem by "intimidating" employees with deprivation of bonuses, reductions, etc. For the effective research work the security subsystem must be neutralised, as it only hampers scientific thought and creativity. To do this, one needs to create conditions in which the employee will feel secure about his life tomorrow and today and cease to feel struggling for existence. If the primary goal of the scientist is to achieve the necessary survival financial minimum, he will not be able to focus on research. There is a need for a higher base salary and a minimum contract period of 5 years, since research cycles that can lead to serious results usually take long periods of time.

Competition motivation may have a positive impact on the results of work, if it is manifested at the inter-group level. Therefore, depending on the nature of the scientific work (if it is a group work), in each case it is necessary to introduce incentives connected not with the individual work, but with the results of the work

of the group as a whole and to encourage the whole group. And it is desirable to make these incentives not of a material nature in order to stop attempts of their subsequent intragroup division and comparison, which provokes resentment and conflict. As a group reward one can use buying new equipment or moving into a new, more convenient room or having group business trips.

Reflexive motivation includes self-motivation, self-control, goal-setting, self-stimulation in scientific activity, i.e. self-organization of the scientist in scientific work and is more often higher in "reclusive scientists" who are well-known and respected in the scientific community, who are authorities, luminaries. However, their objectives may differ significantly from those set by management. It is quite difficult to manage this category in traditional incentive systems, since they are not interested in material bonuses. Such a scientist should feel that his right for exclusivity is recognized. There is a need for personal and informal contact between the manager and the scientist, who should see that his work is genuinely interesting. Such a scientist should be given independence and autonomy, the ability to carry out research, have a flexible work schedule, be mobile. Feeling respect and recognition from the management, he will strongly support the organization that appreciates him, including the provision of the necessary scientific products.

As a rule, individuals with high reflexive motivation also have high **internal motivation**, which is defined as intellectual and aesthetic pleasure from the process of scientific research; as far as scientific activity is the purpose, meaning of life, it gives a sense of fullness of self-realization and being. Therefore, all of the above methods of stimulating reflexive motivation are suitable for people with high internal motivation. It is necessary, however, to take into account that not all persons with high internal motivation also have a reflexive one (it is usually young scientists), and working with this group it is necessary to use other methods of motivational influence, contributing to their greater ability to be well-organized.

Value motivation provides the scientific activity with higher meaning, without which it cannot be carried out. Researcher must understand and keep in mind not only the immediate objectives and benefits from his work, but also the ones at existential level, there must be an understanding of why his research work is necessary both for him personally and for society, for mankind in general. Now the discussions about such values and such motivation are extremely unpopular, regarded as romanticism, lack of practicality. However, these are the values that guide scientific work and act as the motivational basis on which scientific activity is carried out, when all external incentives, including material ones, are absent or exhausted. It is important not to make a mistake here and avoid thinking that the presence of the value motivation compensates for all the other motives,

which continue to exist: the scientist with a high value motivation also needs both financial incentives and recognition of his merits, etc. In the absence of value motivation, the scientist, sooner or later, comes to the idea of the meaninglessness of his work and either just drops it or starts pretending he is doing real work. Due to the general disapproval of humanistic values, scientists who share them and try to implement them in their work, try not to advertise it. At the same time, the need to implement the highest values in the work is present and manifested most often in the desire to transfer one's knowledge, to create a group of like-minded people. Because of this, many scientists are beginning to actively engage in teaching. In part, humanistic motives can be implemented in contractual activities, when scientists work on a specific order, they see that their work is needed by specific people and then can be convinced of its real use. This is often not possible in grants and that's the reason why many scientists do not seek to actively engage in grant activities.

Discussion

There is another type of motivation which is quite close to the value motivation. **Cognitive motivation** includes curiosity, enjoyment of cognitive efforts, the need for actual or theoretical solution to the problem, the focus on obtaining fundamentally new knowledge based on interest, not associated with practical benefits. Of course, it should be the basis of scientific activity, since the ultimate goal of science is to obtain fundamentally new knowledge. The heyday of cognitive motivation falls on the early periods of scientific career and it is important at this point to give it opportunities for development. Unfortunately, modern science management system often destroys cognitive motives. If at a young age cognitive motivation has not been formed and has not become a leader in the structure of scientific activity, then in the subsequent age periods it can no longer occur, respectively, there is no sense to stimulate it, as there is no sense to expect fundamentally new scientific results from these employees. In the process of training young scientists, a huge role is played by the formation of the value-normative base, the formation of ideas that intellectual potential is necessary not to win the grant competition, but to expand the system of socially useful knowledge.

Anti-motivation is the motivation of overcoming, when the stimulating effect is exerted by external (resistance of the material under study, nature) or internal (own psychological characteristics – personality traits, etc.) conditions that complicate the implementation of scientific activities. This subsystem appears not in all the subjects, but even if we are dealing with an employee with a pronounced anti-motivation, it makes no sense to create additional difficulties for him, considering that they activate it. Scientific work in the Russian Federation

often consists of overcoming a series of obstacles, therefore, in relation to anti-motivation, efforts should be directed to its reduction.

For effective research the **achievement motivation** must be closely connected with the intrinsic or cognitive motivation. Sometimes, however, in the **achievement motivation** there is a kind of overlap with the external motivation, as a result, the motivation of achievement begins to be focused on obtaining material benefits, status, position. The emergence of such a tendency is provoked, among other things, by the existence of grant system against the background of excessively meager basic wages. To avoid such a tendency, the researcher should also have the opportunity of career advancement, which can be carried out proactively. From this point of view, the system of positions of researchers in the Russian Federation is quite effective, because it can "cover" the period of 24–30 years with its stimulating effect.

Indirect motivation includes the whole set of motives and other entities that can create conditions for the successful implementation of scientific activities, while not being directly related to scientific work. In other words, these are some additional opportunities provided by belonging to the category of researchers and to a particular University or research Institute. As a rule, these are memberships in some interest groups, informal creative associations, etc. They arise spontaneously and reflect the line of interests, or hobbies, which already exist in a significant number of employees (literary newspaper, ski or tourist group etc.). It is important for management to recognize the existence of these communities, as well as their important role and significance. The motivating factor will be if the management will take care of various issues related to the activities of such communities – care of their place of work, material equipment, financing (at least partially), awarding of participants, coverage of the work of communities at official events, for example, at scientific councils, along with other equally important scientific issues.

It is clear that for groups and for individuals the principles and methods of motivation will be different. However, for any group to work effectively, there must be a strong motivation for each individual member. At the same time, the motives of the group members should not enter into confrontation. This requires finding a reasonable balance between individual and group incentives. Individual stimulation should not suffer from the group nature of work and vice versa.

In conclusion, it should be noted that the system of motivation of scientific activity also has a very complex temporal organization. It is almost impossible to get the result immediately after some stimulating action. This is due, first, to the nature of the scientific work, as well as due to the nature of the internal processes taking place in the MSA system itself.

References

1. Zhdanko A. P. Development of students' motivation and meaning sphere by means of self-actualization during English class. *Rossiiskii psikhologicheskii zhurnal – Russian Psychological Journal*, 2018, Vol. 15, no. 1, pp. 77–91 (in Russian). DOI: 10.21702/rpj.2018.1.4
2. Gor'kovaya I. A., Bakanova A. A. The role of motivational and meaning component of education in the formation of competence of masters psychologists. *Psikhologicheskaya nauka i obrazovanie – Psychological Science and Education*, 2015, Vol. 20, no. 1, pp. 5–14 (in Russian).
3. Yurevich A. V. *Sotsial'naya psikhologiya nauchnoi deyatel'nosti* [Social psychology of scientific activity]. Moscow, IP RAS Publ., 2013. 447 p.
4. Frigotto M. L., Riccaboni M. A few special cases: scientific creativity and network dynamics in the field of rare diseases. *Scientometrics*, 2011, Vol. 89, pp. 397–420.
5. Clement J. J. *Creative Model Construction in Scientists and Students. The Role of Imagery, Analogy, and Mental Simulation*. Dordrecht: Springer Science + Business Media B.V., 2008. 601 p.
6. Arzenšek A., Košmrlj K., Širca N. T. Slovenian young researchers' motivation for knowledge transfer. *Higher education*, 2014, Vol. 68 (2), pp. 185–206.
7. Glynn S. M., Brickman P., Armstrong N., Taasoobshirazi G. Science Motivation Questionnaire II: Validation With Science Majors and Nonscience Majors. *Journal of research in science teaching*, 2011, Vol. 48 (10), pp. 1159–1176.
8. Volodarskaya E. A. Image of science: From reflection to action. *Voprosy psikhologii*, 2011, no. 11, pp. 100–114 (in Russian).
9. Temnova L. V., Shevchenko O. A. Motivation toward scientific activity in modern scientists of various generations. *Sotsiologiya obrazovaniya – Sociology of Education*, 2012, no. 4, pp. 73–85 (in Russian).
10. Mazaletskaya A. L. *Dinamika motivatsii nauchno-issledovatel'skoi deyatel'nosti na etapakh professionalizatsii* [Dynamics of motivation toward research activity at the stages of professionalization]. Diss. Cand. Sci. (Psych.). Yaroslavl, 2011. 217 p.
11. Karpov A. V., Karpov A. A., Subbotina L. Yu. Methodological and methodical foundations for studying meta-cognitive determinants of activity. *Rossiiskii psikhologicheskii zhurnal – Russian Psychological Journal*, 2017, Vol. 14, no. 1, pp. 108–123 (in Russian).
12. Amabile T. M., Hill K. G., Hennessey B. A., Tighe E. M. The Work Preference Inventory: Assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology*, 1994, no. 66, pp. 950–967.
13. Hrakhouskaya M., van Schuppen H.-J. *Development of a conceptual framework of motivators for professionals in a multicultural organization with a hybrid R&D structure: How to avoid carrot management*, 2011. Available

at: http://www.diva-portal.org/smash/get/diva2:456091/ATTACHMENT01 (Accessed 11 April 2016).
14. McAllister R. B., Vandlen C. E. *Motivating employees in R&D*. Cornell HR Review, 2010. Available at: http://digitalcommons.ilr.cornell.edu/chrr/17 (Accessed 11 April 2016).
15. Cacioppo J. T., Petty R. E. The need for cognition. *Journal of Personality and Social Psychology*, 1982, no. 42, pp. 116–131.
16. Litman J. A. Spielberger C. D. Measuring epistemic curiosity and its diversive and specific components. *Journal of personality assessment*, 2003, Vol. 80 (1), pp. 75–86.
17. Iyer U. J. Kamalanabhan T. J. Achievement motivation and performance of scientists in research and development organizations. *Journal of Scientific & Indastrial Reserch*, 2006, no. 65, pp. 187–194.
18. Mehta M. Chugh G. Achievement Motivation and Adjustment in Members of Indian Scientific Expedition to Antarctica. *Psychological Studies*, 2011, Vol. 56 (4), pp. 404–409.
19. Hofstede G. Motivation, Leadership, and Organization: Do American Theories Apply Abroad? *Organizational Dynamics*, 1980, Vol. 9 (1), pp. 42–63.
20. Elliot A. J. The Hierarchical Model of Approach-Avoidance Motivation. *Motivation and Emotion*, 2006, no. 30, pp. 111–116. DOI: 10.1007/s11031-006-9028-7
21. Malhotra D. The desire to win: The effects of competitive arousal on motivation and behavior. *Organizational Behavior and Human Decision Processes*, 2009, Vol. 111 (2), pp. 139–146. DOI: 10.1016/j.obhdp.2009.11.005
22. Boudreau K. J., Lacetera N., Lakhani K. R. Incentives and Problem Uncertainty in Innovation Contests: An Empirical Analysis. *Management science*, 2011, Vol. 57 (5), pp. 843–863. DOI: 10.1287/mnsc.1110.1322
23. Yaroshevskii M.G. Opponentnyi krug i nauchnoe otkrytie [Opponent circle and scientific discovery]. *Voprosy filosofii – Problems of Philosophy*, 1983, no. 10, pp. 49–61 (in Russian).
24. Garcia S. M., Tor A., Schiff T. M. The Psychology of Competition: A Social Comparison Perspective. *Perspectives on Psychological Science*, 2013, Vol. 8 (6), pp. 634–650. DOI: 10.1177/1745691613504114
25. Martin M. W. Moral Creativity in Science and Engineering. *Science and Engineering Ethics*, 2006, no. 12, pp. 421–433.
26. Deci E. L., Ryan R. M. The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 2000, no. 11, pp. 227–268. DOI: 10.1207/S15327965PLI1104_01
27. Vallerand R. J. From motivation to passion: In search of the motivational processes involved in a meaningful life. *Canadian Psychology*, 2012, Vol. 53 (1), pp. 42–52. DOI: 10.1037/a0026377

28. Mayer J. D., Faber M. A., Xiaoyan X. Seventy-five years of motivation measures (1930–2005): A descriptive analysis. *Motivation and Emotion*, 2007, no. 31, pp. 83–103.
29. Karpova E. V. *Struktura i genezis motivatsionnoi sfery lichnosti v uchebnoi deyatel'nosti* [Structure and genesis of motivational sphere of personality in educational activity]. Yaroslavl, Yaroslavl State Pedagogical University, 2007. 570 p.
30. Tabachnick B. G., Fidell L. *Using multivariate statistics* (4th edn.). Boston: Allyn & Bacon, 2000. 983 p.
31. Pel'ts D., Endryus F. *Uchenye v organizatsiyakh: Ob optimal'nykh usloviyakh dlya issledovanii i razrabotok* [Scientists in organizations: The optimum conditions for research in organizations and development]. Moscow, Progress Publ., 1973. 472 p.
32. Iyer U. J., Kamalanabhan T. J. Achievement motivation and performance of scientists in research and development organizations. *Journal of Scientific & Indastrial Reserch*, 2006, no. 65, pp. 187–194.
33. Karpov A. V., Razina T. V. Features of the scientific activity motivation of employees in R&D commercial firms in the field of scientific research and development work. *Izvestiya Dagestanskogo gosudarstvennogo pedagogicheskogo universiteta. Psikhologo-pedagogicheskie nauki – Proceedings of the Dagestan State Pedagogical University. Psychological and Pedagogical Sciences*, 2014, no. 4 (29), pp. 15–20 (in Russian).
34. Kiselev M. V., Razina T. V. Motivation toward scientific activity in teaching staff of KSTU. *Vestnik Kostromskogo gosudarstvennogo tekhnologicheskogo universiteta – Bulletin of Kostroma State Technological University*, 2014, no. 2 (33), pp. 3–10 (in Russian).
35. Razina T. V., Golikova N. S. Features of motivation toward scientific activity in young people taking master and postgraduate courses. *Psikhologiya obucheniya – Psychology of Education*, 2014, no. 6, pp. 58–73 (in Russian).

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Developing the Technique for Assessing the Degree of Victimization in Adults

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Abstract

Introduction. Victimity is a predisposition to become a victim of crime. Victimization is (a) the event of violence or the experience of violence, (b) the process of a subject's transformation into a victim of criminal assault, and also (c) the result of this process. The objective of this paper is to describe the procedure of developing a technique for assessing victimization in adults. No attention has been devoted to such techniques (tests) for adults in previous research.

Methods. A combination of external, deductive, and inductive strategies helped to elaborate test tasks intended to assess the degree of victimization. Two contrasting groups (N = 389 and N = 400) participated in a pilot study. The comparison of the pilot testing results in these groups enabled the authors to select the test tasks for men and women.

Results. The findings confirmed that the developed test met standard reliability criteria (internal consistency and test-retest stability and reliability). The developed test also meets all the known validity criteria such as validation of the test construction process and substantive, obvious, concurrent (diagnostic), consensual, construct, convergent, contrast, and gender validity. The test scales (subtests) diagnose the following seven types of victimization: (i) overall victimization, (ii) implemented victimization, predisposition to (iii) aggressive, (iv) self-destructive, (v) dependent, and (vi) non-critical victimization, and (vii) the degree of a subject's vulnerability to manipulation.

Discussion. The construct of victimization as diagnosed by this test is positively correlated with the tendency to risky behavior, anxiety, depression, and low self-esteem and negatively associated with assertiveness. All this corresponds well to the essence of victimization. The test standardization was carried out on a sample of 563 men and 513 women, representative of the study prospective population in terms of gender, age, education, profession, official capacity, social status, and region of residence. The representativeness of the study samples was confirmed by a normal distribution of test results.

Keywords

assessment technique, test, victimization, reliability, validity, risky behavior, anxiety, depression, self-esteem, assertiveness, men, women

Highlights

► A reliable and valid test for assessing the degree of victimization in adults was developed. The test scales (subtests) diagnose the following seven types of victimization: (i) overall victimization, (ii) implemented victimization, predisposition to (iii) aggressive, (iv) self-destructive, (v) dependent, and (vi) non-critical victimization, and (vii) the degree of a subject's vulnerability to manipulation.

► The test is standardized; it provides the norms for men and women that allow expressing the difference between an individual participant's result and the mean scores in standard deviation units.

► Victimization in adults diagnosed by this test positively correlates with the tendency to risky behavior, anxiety, depression, and low self-esteem and is negatively associated with assertiveness.

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Introduction

Victimity (derived from the Latin term victima meaning victim) is a predisposition to become a victim of crime. Victimization is (a) the event of violence or the experience of violence, (b) the process of a subject's transformation into a victim of criminal assault, and also (c) the result of this process. "Victimization is not a simple transformation of personality or social community into a real victim, but rather into a potential victim; this is the process of increasing the degree of victimization" [1, p. 226].

Many factors contribute to the process of victimization, including personal traits of a potential victim, as "individual characteristics are the best predictors for both occurrence and intensity of personal victimization" [2, p. 265].

The experimental studies on adolescents' victimization actively employ the test of Tendency to Victim Behavior (TVB) developed by O. Andronnikova for teenagers [3]. The absence of such a technique for adults constrains experimental studies on victimization in men and women.

No publications are available in the literature that address techniques for assessing the degree of victimization in adults. At the same time, at least 5 tests for measuring adolescent victimization are available, including (i) the most often used Juvenile Victimization Questionnaire (JVQ) [4]; (ii) RVQ-R – Victimization Questionnaire – Revised [5]; (iii) MPVS-RB [6]; (iv) OVS – Online Victimization Scale [7]. CARAS – Child Abuse Risk Assessment Scale [8], which measures parents'

social and psychological traits as risk factors for cruel treatment with children is also available. The authors of these tests have revealed certain personal factors for victimization in adolescents. Some results are used in this work.

The objective of this paper is to describe the procedure of developing the test technique for assessing the degree of victimization in adults.

Methods

A combination of external, deductive, and inductive strategies helped to elaborate test tasks, which was determined by the specific character of the studied construct – victimization among individuals. The comparison of contrasting groups underlay the external strategy. Test items directly related to the manifestations of the diagnosed construct of victimization were selected in accordance with the deductive strategy. The inductive strategy was instrumental in analyzing correlations between the observed variables in order to reduce the number of test tasks, thus "allowing the data to speak for themselves" [9, p. 166].

Statistical Package for the Social Sciences SPSS (version 20.00) [10] was used for *statistical analysis*. Values of $p < 0,05$ were accepted as significant for this study.

Two contrasting groups ($N = 389$ and $N = 400$) participated in a ***pilot study***. The comparison of indices in these groups enabled the authors to select the test items for assessing victimization. The first group included the non-victimized respondents; the second group involved the victimized ones.

The group of non-victimized respondents involved individual participants who reported that they had never been victims of criminal acts including refresher course students from Minsk Academy of Postgraduate Education APE (teachers, school headteachers and deputies, kindergarten heads and teachers, psychologists, and defectologists) and students of the Republican Institute of Higher School RIHS in Minsk (teachers and specialists of technical, humanitarian, creative and military Belarus universities, heads and specialists of enterprises with various forms of ownership). The research participants comprised 389 persons, including 198 women aged 22–78 years ($M = 49,4$) and 191 men aged 24–77 years ($M = 48,6$). The anonymous testing (under the codes) was conducted during refresher courses, as the program included psychological testing.

The contrasting group must be large enough to study it using statistical methods. Victims of crimes are dispersed in space and time; it is impossible to test a large number of them. Moreover, large groups are required for developing a test (i.e., at least 200 men and 200 women are required to verify the reliability of the developed test) [9, p. 177]. All this complicated the process of forming a contrasting group of victimized subjects.

Therefore, we took advantage of the consideration that victimized persons are those who became victims of their own crimes serving their sentences in prison. It turned out that criminal activity as such was a source of a high level of victimization in persons who had broken a law. Thus, "two national victimization surveys in England and Wales showed that criminal activity (...) directly increases the risk of personal victimization" [11, p. 110]. Some authors also draw our attention to "an empirical coincidence between victims and offenders, otherwise known as 'victim-offenders'" [12, p. 16].

Hence, in the second 'victimized' group (a contrasting group for non–victimized persons of the first group) 400 prisoners from Belarusian penal colonies entered the study, including 200 women aged 23–69 years (M = 37,2) and 200 men aged 18–67 years (M = 35,3) with various levels of victimization. Half the women and men were in prison for the first time; another half served their second, third, etc. imprisonment. Specialists and psychologists from correctional colonies for men and women of the Department of Execution of the Ministry of Internal Affairs of the Republic of Belarus selected subjects that constituted the study population.

An individual may become a victim of criminal acts such as fraud. Fraud is a manipulation of a criminal content, but non-criminal manipulation has even more victims [13]. Both law-abiding individuals and violators of the law are subject to manipulation, because criminals often involve others (especially young persons) in criminal activity through manipulation. Therefore, the first group of possible items for the developed test included 20 items of the questionnaire for Assessing the Degree of a Subject's Vulnerability to Manipulation SVM developed by the authors [14].

As markers of the risk for adolescent victimization may manifest themselves in adulthood, we borrowed the second group of items from the test of Tendency to Victim Behavior (TVB) developed by O. Andronnikova [3] and included all its seven scales (subtests) into the selection procedure – namely, the social desirability scale (SD scale), the scale of implemented victimization (I scale), and five scales of predisposition to (i) aggressive behavior (A scale), (ii) self-harm and self-destructive behavior (S scale), (iii) hypersocial behavior (H scale), (iv) dependent and helpless behavior (D scale), and (v) non-critical behavior (N scale). We supplemented these seven TVB scales with an overall victimization scale as the integrated measure for assessing the degree of victimization, the sum of values of seven TVB scales.

Nine scales were analyzed for their ability to assess victimization in adults.

Victimization determinants are not equal for men and women [15–19]. This refers to a subject's vulnerability to manipulation. Thus, it was established [14, p. 153] that men were more vulnerable to manipulations.

Therefore, we decided to create parallel victimization tests for men and women and to develop a single test if the selected items coincided.

Results

Constructing the test. The first step was selecting the scales diagnosing victimization in adults (after comparing mean scores in contrasting groups of women and men). The columns of Tables 1 and 2 contain means for initial scales in the group of victimized prisoners, which were significantly greater than those measured in the group of non-victimized law-abiding citizens. The last rows of the Tables provide the two-tailed significance level ($p < 0.001$), where differences between the means were statistically reliable. SPSS-20.00 independent samples t-test was used to compare the means [10].

Table 1. Means for initial scales in the groups of victimized and non-victimized women (N = 398)

Group	Mean scores	SVM Scale	SD Scale	Scale A	Scale S	Scale H	Scale D	Scale N	Scale I	Sum Scale
Non-victimized	Total	20,02	3,93	7,69	7,17	7,67	7,77	7,54	6,08	47,88
Victimized	Total	24,27	3,36	10,01	10,04	7,33	9,4	10,22	8,06	60,41
	Min.	23,47	3,02	9,68	9,94	6.00	8,94	9,58	7,83	55,83
	Max.	26,69	4,67	12,73	10,65	8,67	10,31	10,52	9,67	67,11
Significance		,000		,000	,000		,000	,000	,000	,000

Table 2. Means for initial scales in the groups of victimized and non-victimized men (N = 391)

Group	Mean scores	SVM Scale	SD Scale	Scale A	Scale S	Scale H	Scale D	Scale N	Scale I	Sum Scale
Non-victimized	Total	20,95	3,70	8,87	7,98	7,35	7,62	7,70	6,50	48,77
Victimized	Total	26,85	3,24	10,59	10,05	7,10	9,09	8,92	7,78	56,79
	Min.	25,8	3,00	9,85	9,80	7,50	8,67	8,57	7,50	54,5
	Max.	30,62	3,69	11,17	10,75	8,13	9,60	9,29	8,44	60,06
Significance		,000		,000	,000		,000	,000	,000	,000

Seven columns in Tables 1 and 2 provide the *scales revealing victimization in men and women*, with significant differences among them.

Tables 1 and 2 provide the minimum and maximum mean scores in the groups of the convicted of various crimes in order to more confidently draw the boundaries between non-victimized and victimized subjects. It turned out that in groups of prisoners the lowest rates of vectorization significantly exceed those for law-abiding citizens.

Meanwhile, the highest rates were found among recidivists, men and women, serving more severe punishments for the most serious offences (murder, serious bodily injury, mugging, and robbery). Hence, the scales differentiating victimization also characterize the degree of victimization.

As Tables 1 and 2 indicate, two scales do not diagnose victimization among both men and women – the SD scale (social desirability) and H scale (hypersocial behaviour). It is noteworthy that the test scores on these two scales were negatively correlated with test scores on differentiating scales in both male and female samples. This confirms once more that the SD and H scales have no associations with victimization in adults. Therefore, the SD and H scales were excluded from further consideration in our study.

At the same time, all the correlations between the differentiating scales are positive for both men and women, which indicates that they represent a single complex characterizing various manifestations of victimization.

Thus, the items of seven differentiating scales may qualify for inclusion in the test developed for both men and women. These were the SVM, A, S, D, N, and I scales and overall victimization.

However, the questionnaire should include only those items of differentiating scales that are *discriminative* and measure the same psychological characteristics as the scale itself.

Discrimination (discriminant validity) of items was checked by correlation coefficients between each item and the total scale score. We calculated these coefficients for all the differentiating scales (in accordance with recommendations [9, p. 174]) and deleted the items which correlation coefficient with the scale total score was less than 0.2. In result the number of items was reduced from 27 to 14 in the A scale, from 21 to 9 in the S scale, from 19 to 11 in the D scale, from 19 to 10 in the N scale, and from 18 to 10 the I scale. The total number of items was reduced from 86 to 54. The SVM scale passed this test without changes as it was developed for adults.

It is important to note that the deleted items were non-discriminative for both female and male samples. As a result, the discrimination of the reduced differentiating scales increased in both female and male samples.

Internal consistency (*homogeneity*) of all the scales of the test is a necessary condition for *reliability* of the developed test. A measure of homogeneity – the

Cronbach's alpha coefficient – was not high enough for the initial and the majority of differentiating scales. Applying the 'alpha if item deleted' [10] SPSS procedure in two stages, we deleted some items in order to increase the homogeneity of the scales (see the last row in Table 3). The SVM, S and I scales did not change in result of the second reduction. It turned out that the items recommended for removal were the same for both women and men. This enabled us to elaborate the test valid for both sexes. Complete coincidence of the remaining items in female and male samples was an indirect confirmation that the remaining items of the subtests describe the same construct.

Table 3. Standardized Cronbach's alpha for male (M) and female (F) samples (N = 789)

Scales	A Scale		S Scale		D Scale		N Scale		I Scale		SVM Scale	
	M	F	M	F	M	F	M	F	M	F	M	F
Initial	,661	,478	,254	,333	,394	,387	,341	,138	,157	,147	,789	,775
First reduction	,768	,566	,470	,388	,668	,661	,475	,374	,617	,606	,789	,775
Second reduction	,783	,613	,626	,637	,668	,661	,704	,600	,617	,606	,789	,775

Table 3 shows a consistent improvement in the homogeneity index, starting from the initial state of the scales and then after the first and second reductions. After all the reductions the number of items was reduced to 13 in the A scale, to 7 in the S scale, to 11 in the D scale, to 7 in the N scale, and to 10 in the I scale. A total number of items was reduced from 86 to 40.

The procedure for selecting items of scales points was duplicated by nonparametric exploratory factor analysis. It turned out that the selected items exhibited high factor loadings for both female and male samples.

The test of Tendency to Victim Behavior was developed by O. Andronnikova for adolescents, however not all the markers of victimization manifest themselves in adults.

The question may be posed weather the reduction in the number of items in the scales would affect their validity? We have verified this by measuring correlations between the test scores for the initial and reduced scales. The results presented in Table 4 show the highest correlation ($p < 0,001$). This indicates that the content of the construct obtained after the reduction process corresponds to the original one. A further detailed analysis of the validity of the test will confirm this.

Table 4. Correlations of test scores for the initial and reduced scales (N = 400)

Respondents	A Scale	S Scale	D Scale	N Scale	I Scale	Overall victimization
Female	,868	,881	,859	,808	,832	,891
Male	,935	,852	,917	,897	,907	,922

Verifying the reliability of the developed victimization test

We verified the reliability in three ways, in accordance with the generally accepted procedure [20, p. 110–118; 9, p. 176–177]: internal consistency and test-retest stability and reliability. Since the test consists of seven scales (subtests), we verified each scale.

1. Table 3, the 'Initial (state)' row, shows that the internal *consistency* of initial scales was rather low in most cases. Cronbach's alpha below 0,6 was considered a sign of test unreliability [21]. Removal of some items enabled us to obtain quite acceptable indices of the homogeneity of scales (see the 'Second reduction' row), which compound the developed victimization test.

2. We verified *split-half reliability* by dividing the scales into equivalent halves. In accordance with the recommendations of experts in psychodiagnostics [20, p. 114], we distinguished even and odd items as the most protected against the possible nonequivalence of the parts of the scales.

Table 5 shows the level of reliability of equivalent halves of scales characterized by Spearman-Brown and Guttman split-half coefficients. The parts of all the scales demonstrate an acceptable level of reliability for both male and female samples.

Table 5. Spearman-Brown and Guttman split-half coefficients (N = 789)

Coefficients	A Scale		S Scale		D Scale		N Scale		I Scale		SVM Scale	
	M	F	M	F	M	F	M	F	M	F	M	F
Spearman-Brown	,812	,642	,674	,658	,703	,685	,718	,612	,626	,613	,837	,826
Guttman	,806	,639	,648	,639	,698	,679	,711	,710	,623	,611	,829	,823

3. We estimated *test-retest reliability* in two contrasting groups of victimized and non-victimized respondents. The first group included the students of

training groups from the APE and RIHS (representatives of various professions, specialties, and positions). A total of 202 women and 194 men aged 25–48 years participated in this testing. The interval between group testings was 5 weeks.

Table 6 shows the correlations of test results. All correlations are significant at $p < 0{,}001$ level. Table 6 demonstrates a good level of retest reliability.

Table 6. Test-retest correlations in the groups of teachers (N = 396)

Respondents	A Scale	S Scale	D Scale	N Scale	I Scale	Overall victim-ization	SVM Scale
Female	,868	,781	,859	,808	,832	,851	,941
Male	,935	,852	,917	,897	,907	,922	,918

Table 7 shows test-retest correlations in groups of victimized respondents (200 men and 200 women). All correlations are statistically significant at $p < 0{,}001$. Table 7 also demonstrates a good level of the 4-week test-retest reliability.

Table 7. Test-retest correlations in the groups of victimized respondents (N = 400)

Convicts	A Scale	S Scale	D Scale	N Scale	I Scale	Overall victim-ization	SVM Scale
Female	,734	,729	,730	,725	,741	,867	,911
Male	,803	,701	,794	,706	,755	,885	,949

Thus, the victimization test met all the standard reliability criteria.

Determining the validity of the developed victimization test

We checked the validity by examining all the known validity criteria [20, p. 6; 9, pp. 181–182] such as validation of the test construction process and substantive, obvious, concurrent (diagnostic), consensual, construct, convergent, contrast, and gender validity.

1. *Validation of the test construction process*. The test construction process involved only items that diagnosed the construct of victimization. This refers to the questionnaire for Assessing the Degree of a Subject's Vulnerability to Manipulation SVM developed by the authors and to O. Andronnikova's test of Tendency to Victim Behavior TVB. The above-described empirical analysis enabled us to select the items having the highest validity and reliability levels.

2. The final stimulus set included situations that were directly associated with psychological factors of victimization, significant for men and women from different age and social groups. This provided *substantive (internal) validity* [22, p. 46].

3. *Obvious (external) validity* refers to respondents' judgements that the test looks reasonable [22, p. 42]. In our study none of the respondents doubted the subject of testing and its result. Many of those who had an increased level of victimization reported that they had related problems.

4. Our test has adequate *concurrent (diagnostic) validity*, as the respondents can "diagnose a current situation" [22, p. 140] – namely, to what extent the respondents suffer from victimization in the present.

5. *Consensual validity* refers to "establishing connections (correlations) between the test data and the data obtained from external experts who were well-acquainted with respondents" [22, p. 38]. The participants of court hearings who sentenced (victimized) them were external experts for the prisoners in our study. Their conclusions regarding offenders' real level of victimization correlated with prisoners' increased rates of victimization for all seven scales of the test. A previous study confirmed consensual validity for the SVM scale [14, p. 152]. "Each case of such correlation proves that we are dealing with a valid test, and with a 'valid expert'" [23, p. 113]. The master of validation, D. T. Campbell, also claimed that "the assumed validity of both measuring instrument increases when there is a consent between them" [24, p. 548].

6. *Construct validity* includes all the considered types of validity [20, p. 134] and also convergent, contrast, and gender validity.

7. *Convergent validity* means that "proceeding from the theoretical assumptions, the test must have high correlations with other variables" [20, p. 151].

O. O. Andronnikova [3] found that adolescents' victimization was positively associated with risk-taking propensity, personal anxiety, and low self-esteem. Previous studies have also established that adolescent victimization was associated with increased symptoms of anxiety [5, 25, 26], depression [5, 26–28], and low self-esteem [6, 29, 30]. It is natural to expect that these characteristics of victimization in teenagers can manifest themselves in adults.

We tested the relationships between these qualities and victimization in groups of students of the Republican Institute of Higher School RIHS in Minsk. We examined a total of 292 participants (139 men and 153 women) aged 23–74 years. We measured risk-taking propensity by Schubert Test [31], anxiety and depression by a modified [32] Hospital Anxiety and Depression Scale [33], and the level of self-esteem by a modified [34] Rosenberg's Self-esteem Scale [35].

Table 8 confirms the expected positive associations between victimization in adults and their risk-taking propensity, anxiety, and depression and a negative association between victimization and self-esteem.

Table 8. Correlations between victimity and risk-taking, anxiety, depression, and self-esteem (N = 292)

	A Scale	S Scale	D Scale	N Scale	I Scale	Overall victimization
Risk-taking		,730/,000		,310/,007	,313/,029	,363/,003
Anxiety	,539/,000	,239/,037	,414/,003	,606/,000	,387/,006	,637/,000
Depression			,469/,000			,289/,003
Self-esteem	-,461/,023	-,431/,036	-,298/002	-,381/,046		-,401/,025

Note. Numerators represent the Pearson correlation coefficients; denominators represent two-tailed significance levels (in Tables 8 and 9).

A person's assertiveness should have a negative correlation with his/her victimization. "Assertiveness is a person's ability to confidently *defend his/her interests and rights* without trampling on the rights and interests of others" [36, p. 40]. It is shown [37] that this definition unifies the opinions of the authors who made a significant contribution to studying assertiveness. Assertiveness is a constructive alternative to dependent behavior, manipulation, and aggression [38]. We measured assertiveness using our corresponding test which was proved to be reliable and valid [38].

Table 9 demonstrates a negative relationship between victimization and assertiveness test scales for a group of the first- and second-year cadets (N = 78, half boys and half girls) of Belarusian State Academy of Aviation and for a group of training teachers of Minsk Republican Institute of Higher School (N = 142, 73 women and 69 men aged 21–76 years). As we established earlier, the SVM scale had a negative correlation with assertiveness [38, p. 112–113].

Table 9. Correlations between victimization and assertiveness (N = 220)

Respondents	A Scale	D Scale	I Scale	Overall victimization
Cadets	-,240/,049	-,526/,000	-,283/,021	-,346/,004
Teachers		-,339/,000	-,147/,048	

These results support the convergent validity of the victimization test

Other correlations also testify to convergent validity. Thus, the SVM scale positively correlates with other scales of the victimization test, which corresponds to the nature of these scales and confirms the reliability of the estimates. The SVM scale positively correlated with implemented victimization (r = 0,185, p = 0,027),

dependent behavior (r = 0,162, p = 0,047), and overall victimization (r = 0,194, p = 0,020) in the groups of teachers. The SVM scale positively correlated with implemented victimization (r = 0,250, p = 0,043) in the groups of students.

8. *Validation by contrasting groups*. We compared the contrasting groups of (a) non-victimized men and women (N = 389) and (b) victimized men and women serving their prison sentences (N = 400). Table 10 shows their recalculated answers on the reduced differentiating scales, where both victimized men (even lines) and victimized women (odd lines) have higher test scores.

Table 10. Means of the victimization test scales for women and men (N = 789)

Respondents	Gender	SVM Test	A Scale	S Scale	D Scale	N Scale	I Scale	Overall victimization
Victimized	Female	20,02	4,75	2,96	3,88	3,52	3,59	13,34
	Male	20,95	5,24	3,74	3,71	3,68	3,57	14,11
Non-victimized	Female	24,27	7,41	4,30	4,72	4,76	4,77	26,88
	Male	26,85	6,26	4,72	4,43	4,12	4,27	24,91

Men and women, whose scores are compared below, represent another pair of contrast groups.

9. *Gender validation*. Compared with women, men (a) are less likely to be protected against manipulation [14], (b) are more aggressive, and (c) have more self-destructive habits. Hence, it follows that among male respondents mean scores for the SVM, A, and S scales should be higher than those among female respondents. Women generally are more dependent than men. Thus, the N scale scores should be higher among female respondents. Table 10 represent mean scores for the scales among male and female respondents, both victimized and non-victimized, which correspond to these gender stereotypes. All differences in the SVM, A, S, and D scales are statistically significant at p = 0,05 level.

The above paragraphs 1–9 enable us to conclude that *the proposed adult victimization test is valid*.

Test standardization

Table 11 shows the norms for men and women presented in mean scores and standard deviations. They express the difference between an individual participant's result and the mean scores in standard deviation units.

Table 11. Normative indices for the victimization test scales among men and women (N = 1076)

Respondents	Indices	SVM Scale	A Scale	S Scale	D Scale	N Scale	I Scale	Overall victimization
Female (N = 563)	Mean score	20,02	5,04	2,98	3,92	3,58	3,66	19,18
	Standard derivation	5,18	2,51	1,59	1,95	1,59	1,57	5,55
Male (N = 513)	Mean score	20,95	5,47	3,80	3,79	3,70	3,64	20,47
	Standard derivation	6,34	3,18	1,77	1,70	1,93	1,50	6,23

When calculating the standard indices, we were guided by the recommendations for the standardization of tests [9, p. 182–183] – namely, large representative samples (more than 500 subjects). We calculated normative indices for both the female (N = 563) and male (N = 513) samples.

Discussion

The test standardization was carried out on the sample representative of the study prospective population in terms of gender, age, education, profession, official capacity, social status, and region of residence. The representativeness of the study samples was confirmed by a normal distribution of test results.

The test scores are normally distributed. This testifies to the fact that the samples are "representative of the study prospective population" [20, p. 201].

We used the one-sample Kolmogorov-Smirnov test for assessing normal distribution of test results in the groups. Calculating Z-scores and the error probability (p) showed that all the studied variables were normally distributed and significant at the p = 0,05 level. This enabled us to apply parametric statistical methods.

Thus, the representativeness of the samples was confirmed by statistical analysis.

Conclusions

A test technique for assessing the degree of victimization in adults was developed. The developed test meets standard reliability criteria (internal consistency, split-half reliability, and test-retest reliability).

The developed test meets all the known validity criteria such as validation of the test construction process and substantive, obvious, concurrent (diagnostic), consensual, construct, convergent, contrast, and gender validity.

The test scales (subtests) diagnose the following seven types of victimization: (i) overall victimization, (ii) implemented victimization, predisposition to (iii) aggressive, (iv) self-destructive, (v) dependent, and (vi) non-critical victimization, and (vii) the degree of a subject's vulnerability to manipulation.

The test is standardized; it provides the norms for men and women expressed in the mean scores and standard deviation scores.

Victimization in adults diagnosed by this test positively correlates with the tendency to risky behavior, anxiety, depression, and low self-esteem and is negatively associated with assertiveness.

The developed test was prepared for publication. We plan to publish it in a scientific journal.

References

1. Vishnevetskii K. V. Victimization: factors, conditions, and levels. *Teoriya i praktika obshchestvennogo razvitiya – Theory and Practice of Social Development*, 2014, no. 4, pp. 226–227 (in Russian).
2. Uludag S., Colvin M., Hussey D., & Eng A. L. Democracy, inequality, modernization, routine activities, and international variations in personal crime victimization. *International Criminal Justice Review*, 2009, Vol. 19, pp. 265–286.
3. Andronnikova O. O. Test of tendency to victim behavior. In: *Razvitie gumanitarnogo obrazovaniya v Sibiri: Sb. nauch. tr.: V 2ch* [Development of humanity education in Siberia: the collection of scientific papers: in 2 parts]. Novosibirsk, NSPI Publ., 2004, Issue 9, Part 1, pp. 11–25.
4. Finkelhor D., Hamby S., Ormrod R., Turner H. The Juvenile Victimization Questionnaire: Reliability, validity, and national norms. *Child Abuse & Neglect,* 2005, Vol. 29 (4), pp. 383–412.
5. Dempsey A., Storch E. Relational victimization: The association between recalled adolescent social experiences and emotional adjustment in early adulthood. *Psychology in the Schools,* 2008, Vol. 45 (4), pp. 310–322.
6. Betts L. R, Houston J. E, Steer O. L. Development of the Multidimensional Peer Victimization Scale-Revised (MPVS-R) and the Multidimensional Peer Bullying Scale (MPVS-RB). *Journal Genet Psycholo*gy, 2015, Vol. 176 (1–2), pp. 93–109. DOI: 10.1080/00221325.2015.1007915
7. Tynes B., Rose C., Williams D. The Development and Validation of the Online Victimization Scale for Adolescents. Cyberpsychology. *Journal of Psychosocial Research on Cyberspace*, 2010, Vol. 4(2). Article 2. Available at: https://cyberpsychology.eu/article/view/4237/3282 (Accessed 24 August 2018).
8. Chan K. L. Evaluating the Risk of Child Abuse: The Child Abuse Risk Assessment Scale. *Journal of Interpersonal Violence*, 2012, Vol. 27, no. 5, pp. 951–973. DOI: 10.1177/0886260511423252

9. Burlachuk L. F. *Psikhodiagnostika* [Psychodiagnostics]. St. Petersburg, Piter Publ., 2010. 384 p.
10. Nasledov A.D. *SPSS. Komp'yuternyi analiz dannykh v psikhologii i sotsial'nykh naukakh* [SPSS. Computer data analysis in psychology and social sciences]. St. Petersburg, Piter Publ., 2005. 416 p.
11. Sampson R. J., Lauritsen J. L. Deviant Lifestyles, Proximity to Crime, and the Offender-Victim Link in Personal Violence. *Journal of Research in Crime and Delinquency*, 1990, Vol. 27, no. 2, pp. 110–139.
12. Jennings W. G., Piquero A. R., Reingle J. M. On the overlap between victimization and offending: A review of the literature. *Aggression and Violent Behavior*, 2012, Vol. 17, no. 1, pp. 16–26.
13. Sheinov V. P. *Makiavellizm lichnosti: kto umelo manipuliruet lyud'mi* [Machiavellian personality: Who expertly manipulates people?]. Moscow, AST Publ.; Minsk, Kharvest Publ., 2012. 416 p.
14. Sheinov V. P. Development of a questionnaire for assessing the degree of insecurity of an individual from manipulative influences. *Voprosy psikhologii*, 2012, no. 4, pp. 147–154 (in Russian).
15. Atik G., Güneri O. Y. Bullying and victimization: Predictive role of individual, parental, and academic factors. *School Psychology International*, 2013, Vol. 34, no. 6, pp. 658–673. DOI: 10.1177/0143034313479699
16. Mustaine E. E. Victimization risks and routine activities: A theoretical examination using a gender-specific and domain-specific model. *American Journal of Criminal Justice*, 1997, Vol. 22, no. 1, pp. 41–70. DOI: 10.1007/BF02887340
17. Moon B., McCluskey J. School-Based Victimization of Teachers in Korea. Focusing on Individual and School Characteristics. *Journal of Interpersonal Violence*, 2016, Vol. 31, no. 7, pp. 1340–1361.
18. Popp A. M., Peguero A. A. Routine Activities and Victimization at School: The Significance of Gender. *Journal of Interpersonal Violence*, 2010, Vol. 26, no. 12, pp. 2413–2436. DOI: 10.1177/0886260510383021
19. Carbone-Lopez K., Esbensen F.-A., Brick B. T. Correlates and Consequences of Peer Victimization: Gender Differences in Direct and Indirect Forms of Bullying. *Youth Violence and Juvenile Justice*, 2010, Vol. 8, no. 4, pp. 332–350.
20. Anastasi A., Urbina S. Psychological Testing. Upper Saddle River, NJ: Prentice-Hall, 1997 (Russ. ed.: Anastazi A., Urbina S. *Psikhologicheskoe testirovanie*. St. Petersburg, Piter Publ., 2002. 688 p.).
21. Cronbach L. J. Coefficient alpha and intimal structure of tests. *Psychometrica,* 1981, Vol. 16, no. 3, pp. 297–334.
22. Burlachuk L. F., Morozov S. M. *Slovar'-spravochnik po psikhodiagnostike* [Dictionary-directory of psychodiagnostics]. St. Petersburg, Piter Publ., 2004. 528 p.

23. Gil'bukh Yu. Z. Current problems of the validation of psychological tests. *Voprosy psikhologii*, 1978, Vol. 5, pp. 108–118 (in Russian).
24. Campbell D. T. Recommendations for APA tests standards regarding construct, trait, or discriminant validity. *American Psychologist,* 1960, Vol. 15, no. 8, pp. 546–553.
25. Lee K. M., Shellman A. B., Osmer S. C., Day S. X., Dempsey A. G. Peer Victimization and Social Anxiety: An Exploration of Coping Strategies as Mediators. *Journal of School Violence*, 2016, Vol. 15, no. 4, pp. 406–423.
26. Holt M. K., Espelage D. L. Social support as a moderator between dating violence victimization and depression/anxiety among African American and Caucasian adolescents. *School Psychology Review*, 2005, Vol. 34, no. 3, pp. 309–328.
27. Schacter H. L., Juvonen J. Depressive symptoms, friend distress, and self-blame: Risk factors for adolescent peer victimization. *Journal of Applied Developmental Psychology*, July 2017, Vol. 51, pp. 35–43.
28. Buelga S., Cava M. J., Musitu G. Validation of the Adolescent Victimization through Mobile Phone and Internet Scale. *Revista Panamericana de Salud Publica = Pan American Journal of Public Health,* 2012, Vol. 32, no. 1, pp. 36–42.
29. Gaspar T., Ribeiro J. P., Leal I., Albergaria F., De Matos M. G. Psychosocial Factors Related to Bullying and Victimization in Children and Adolescents. *Health Behavior and Policy Review*, 2014, Vol. 1, no. 6, pp. 452–459. DOI: 10.14485/HBPR.1.6.3
30. Cava M. J., Musitu G., Buelga S., Murgui S. The Relationships of Family and Classroom Environments with Peer Relational Victimization: An Analysis of their Gender Differences. *The Spanish Journal of Psychology*, 2010, Vol. 13, no. 1, pp. 156–165.
31. Raigorodskii D. Ya. (ed.) *Entsiklopediya psikhodiagnostiki. Psikhodiagnostika vzroslykh* [Encyclopedia psychodiagnosis: adult psychodiagnostics]. Samara, Bakhrakh-M. Publ., 2009, Vol. 2. 704 p.
32. Belova A. N., Shchepetova O. N. (eds.) *Shkaly, testy i oprosniki v meditsinskoi reabilitatsii. Gospital'naya shkala trevogi i depressii [Scales, tests, and questionnaires in medical rehabilitation. Hospital Anxiety and Depression Scale].* Moscow, Antidor Publ., 2002. 400 p.
33. Zigmond A. S., Snaith R. P. The hospital anxiety and depression scale. *Acts Psychiatry Scand,* 1983, no. 67 (6), pp. 361–370. DOI: 10.1111/j.1600-0447.1983.tb09716.x
34. Bodalev A. A., Stolin V. V., Avanesov V. S. *Obshchaya psikhodiagnostika* [General psychodiagnostics]. St. Petersburgue, Rech' Publ., 2000. 440 p.
35. Rosenberg M. Self-Esteem Scale. In: J. P. Robinson, P. R. Shaver (eds.) *Measures of Social Psychological Attitudes.* Ann Arbor: Institute for Social Research, 1972, pp. 98–101.

36. Meshcheryakov B. G., Zinchenko V. P. *Bol'shoi psikhologicheskii slovar'* [Great psychological dictionary]. St. Petersburg, Praim-Evroznak Publ., 2004. 672 p.
37. Sheinov V. P. Determinants of assertive behavior. *Psikhologicheskii zhurnal*, 2015, Vol. 36, no. 3, pp. 28–37 (in Russian).
38. Sheinov V. P. Development of the assertiveness test meeting the requirements of reliability and validity. *Voprosy psikhologii*, 2014, no. 2, pp. 107–116 (in Russian).

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Manipulating basic characteristics of the Rapid Automatized Naming task in search for its most reliable connections to reading performance

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Abstract

Introduction. Connections between Rapid Automatized Naming (RAN) task performance and reading are well documented. Primary empirical studies and meta-analyses established and described associations between specific RAN subtasks and reading outcomes. The cognitive nature of these associations, however, remains largely underexplored. This study attempts to address the issue by explicitly manipulating some critical characteristics of the RAN task (stimuli types, combinations, and familiarity) and conditions of its administration (attention demand) in search for factors that affect RAN performance and underlie its connections to reading competencies.

Method. Ten modified RAN subtasks were created by manipulating type and familiarity of the stimuli, size of the stimuli source set, and demand to attention (cognitive controlled processing), involved in RAN performance. Measures of ballistic and efficiency-based automaticity, attention control, and reading rate were collected and analyzed using, ANOVA – with respect to performance on modified RAN subtasks, and correlational and multiple regression analyses – to address interrelations among major independent variables and their connections to reading rate.

Results. The study found differential sensitivity of the RAN performance to the explored experimental manipulations. Specifically, significant main effects on naming speed were observed for stimuli type, stimuli familiarity and attention demand. RAN performance on most of the modified subtasks (seven out of ten) was significantly correlated with the measure of attention control, whereas only one correlation between RAN and measures of automaticity was statistically significant. Findings of multiple regression analyses confirmed this pattern of results. Attention factor explained substantially larger portion of variance in performance on modified RAN than both indices of automaticity combined. Reading rate was significantly correlated with bigram-based RAN (supposedly reflecting practice), and its correlations with other modified subtasks were higher for the elevated attention demand conditions, in one case exceeding significance level.

Discussion. Understanding the cognitive nature of RAN is important for informing instructional practice of what reading skills might require special attention. This study

explored specific conditions to which RAN performance may be especially sensitive. Modified RAN subtasks were markedly influenced by experimental manipulations, especially with regard to attention demand, indicating that attention, more than automaticity, could be a factor underlying naming speed as a predictor of reading.

Keywords

Rapid Automatized Naming (RAN), literacy, reading, automaticity, attention, symbolic RAN stimuli, non-symbolic RAN stimuli, modified RAN subtasks, naming speed, bigram frequency, cognitive mechanisms of RAN performance

Highlights

► RAN task performance is sensitive to the explicit manipulation of the attention factor, whereas the set size factor played much more modest role in affecting naming time.
► Neither 'ballistic' nor efficiency-based automaticity made substantial contribution to explaining variability in RAN task performance.
► General attention demand emerged as a strong predictor of performance practically on all (original and modified) RAN tasks.
► Stimulus familiarity, being a function of frequency of occurrence in printed text and exposure through practice in reading, appeared to be an important factor in linking RAN task performance to reading rate.

For citation

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Introduction

The role that naming speed phenomenon, as assessed by performance time on various forms of so-called Rapid Automatized Naming (RAN) task [1, 2] plays in anticipating reading outcomes has been repeatedly addressed in the research literature [e.g., 3, 4, 5], including several related meta-analyses [6, 7, 8]. Correlations between RAN and reading rate, specifically, though ranging in magnitude from study to study were quite consistent, regardless whether or not the researchers subscribed to the explanations offered by the double-deficit framework [9, 10, 11]. By now, the RAN task as a correlate/predictor of reading is not in question, though the strength of this association varies substantially – from nearly zero to considerably high, as reflected in the most comprehensive meta-analysis [6] – depending on both specific RAN tasks and reading outcomes. There remain, however, many

important questions about the cognitive nature of performance on the RAN task that underlies its association with reading [e.g., 3, 4, 12]. Numerous hypotheses have been proposed since the test first appeared [13], but hardly any provides a full explanation of what might be behind the association between reading and RAN performance. The only real consensus rather stipulates the need for better understanding of possible cognitive nature of RAN-to-reading association. Consider, for example: "The arguments … are highly speculative and represent work in progress… Considerable further work is needed before these relationships will be sufficiently clarified" [14, p. 396]. This and similar statements in [3, 4] illustrate that empirical research is still far from an unequivocal solution to the question of why RAN task performance is associated with reading, even several decades after the test was launched.

The goal of the present work is to shed some light on the nature of the RAN task and its association with reading performance by experimentally addressing several important issues regarding conditions to which actual RAN task performance may be especially sensitive. Understanding the cognitive nature of RAN might lead to improving instruction in reading by targeting skills and competencies identified as potentially vulnerable by the corresponding deficiencies in RAN task performance.

Objectives and Rationale

The current study was designed to complement findings reported in [15] by experimentally addressing issues that had arisen there as well as to clarify those documented in [6]: (1) strong involvement of attention in RAN task performance and (2) substantial difference between symbolic and non-symbolic RAN subtasks performance and in their associations to reading outcomes. Subsequently, the study was guided by the following research questions:

How sensitive is RAN task performance to explicit manipulation of attention demands?

How important to RAN task performance is the "set size" factor, that is, the size of the source set from which the actual target stimuli are drawn from?

Does stimulus familiarity, as function of frequency in printed text, play any role in RAN task performance and its link to reading rate?

As shown in [15], attention-related factors influence RAN task performance and its connection to reading. Also, previous research has made a clear case for difference among various RAN subtasks in both these measures [e.g., 3, 4, 16]. Performance on the symbolic (letters and digits) and non-symbolic (colors and objects) RAN subtasks were not only significantly different in terms of time and supposedly some the underlying mechanisms, but more importantly, in the patterns of connection between RAN and reading outcomes [6].

The following assumptions guided the design and implementation of the current study. RAN task performance, aside from its articulation component (voicing out the stimuli), rests on the two major types of expertise: (1) the ability to quickly recognize each individual stimulus in the presented sequence and establish a link to its correct name (transforming that name into the appropriate speech sounds) and (2) the ability to efficiently disengage from each already named individual stimulus and engage with the naming of the subsequent stimulus. The first assumption is fully consistent with the framework provided by the double-deficit hypothesis, whereas the second assumption emphasizes the potential role of attention-related factors. There is also a possibility that successful performance on RAN tasks relies on ability to process large sequences of individual stimuli, thus implicating attention in an even broader sense. Viewed from this perspective, automaticity of stimulus recognition and efficient management of attention resources remain the two potentially greatest contributors to naming speed.

Carefully weighing these two in the light of findings of [15], it seems plausibly that the RAN task is less dependent on automatic processing, at least at the level of single stimulus recognition and much more – on the ability to adequately direct and efficiently shift the respondent's attention. Initially (in children just learning how to read), all RAN subtasks are good predictors of reading outcomes. With time and practice in everyday reading, the growing familiarity with letters and digits may help to perfect performance of naming them, making this process more automatic. This automatized ability, however, cannot completely replace the important contribution of attention, and that is why, perhaps, the role of attention in naming non-symbolic stimuli does not diminish over time. Non-symbolic naming might even become more demanding because practice with language creates additional mental representations that have to be searched for proper names (written and spoken ones) of a very large number of objects (effectively unlimited), whereas the representations of letters and digits remains more or less the same.

Under these circumstances, the predictive power of symbolic RAN tasks for reading remains intact. Performance on the non-symbolic RAN tasks, on the contrary, is no longer connected to reading competency to the same extent. Other, more powerful factors (growing vocabulary, real life experience and academic knowledge, etc.) are coming into play. In other words, symbolic RAN task performance is based upon two major factors (first and foremost, it depends on the effects of practice, and somewhat secondarily on attention), whereas non-symbolic RAN task performance still mostly relies on the efficiency of attention control. One could say that, for regular readers, the "A" in RAN should really stand for attention, not automaticity (at least, not only), but to a different extent for the symbolic and non-symbolic subtasks.

Experimental Framework

If the above account is correct, it is worth looking more closely at what stimuli features matter the most when used in symbolic and non-symbolic RAN subtasks. Presumably, some combination of the following factors needs to be considered:

Natural sequencing. It should be important to examine the contribution of stimulus sequencing in the performance of the RAN task. For example, letters and digits are more likely than objects or colors to be processed in short sequences (letters as bigrams or trigrams, digits as two or three digit sequences), whereas objects and colors are not likely to be chunked as sequences of two or three items. Practicing reading and dealing with numbers presents a person with a rich set of sequential experiences, so that some combinations should become familiar than others, because they are just more frequent and hence are more likely to be perceived and processed in sequence.

Symbolic/Non-symbolic status of the stimulus. The nature of the link between a stimulus and its name (which also determines some basic inherited difference between symbolic and non-symbolic stimuli in RAN) may be important. For example, a given letter of the alphabet will evoke its name because the visual form the item takes will normally closely resemble some basic (prototypical) mental representations of that item. In the case of objects, a given line drawing used as a stimulus in the RAN task may depart greatly from a mental representation of the prototype for that object (e.g., a picture of a clock will likely not correspond directly to the prototypical mental image of a clock as much as does, say, the letter "A" correspond to a mental image of an "A").

Size of the stimulus source set. It should be important to examine the impact of the total number of potential stimuli in the source "universe" (i.e., its full source set), which the stimuli used in a given RAN task subset was drawn from (e.g., the 26 letters of the alphabet or the 10 digits as compared to the virtually unlimited number of objects or substantially smaller but still very considerable number of shades of different colors).

Attention load handling demands. Finally, individual differences in how efficiently attention resources are managed should substantially influence RAN performance across all types of stimuli, if indeed attention remains an important determinant of the RAN task performance.

To test these assumptions, the RAN subtasks were modified to manipulate the factors of (1) familiarity in combinations of symbolic stimuli (relative frequency of bigrams), (2) source set size, and (3) attention load demands – with the two last factors varying within the two stimulus types (symbolic and non-symbolic), as follows.

Modified Versions of the RAN Task

Overall, ten modified RAN subtasks were developed for this study. Two of them addressed the difference in familiarity with the elements of printed text by using as stimuli (symbolic) bigrams of different relative frequencies as they appear in printed English texts. The same 5 letters – *a, d, o, p,* and *s* – as used in the original letter naming RAN subtask were put into pairs in all possible combinations, and the relative frequency for each bigram was obtained using data from [17]. For example, the English bigram *sa* has a high relative frequency of 11.4 (number of appearances per 1000 characters in an average printed text), whereas the bigram *ao* is extremely rare, appearing in printed texts on average only 0.2 times per 1000 characters. These relative frequencies then were used to create two bigram-based versions of the letter naming RAN subtask. In the High Frequent version, the mean of the relative frequencies of all the bigrams used was 7.86, whereas in the Low Frequent version the mean was only 2.54. The "5 lines by 10 items per line" matrix used in the RAN task yielded a set of 9 x 5 = 45 bigrams (the pairs formed by the last letters of each line with the first letters of the next line not counted). As in the original letter naming RAN subtask, each of the 5 stimuli appeared 10 times in the High Frequent and Low Frequent modified versions.

The remaining 8 modified versions of the RAN task were constructed by manipulating the following characteristics: (1) symbolic versus non-symbolic nature of the stimuli, (2) heavy versus light attention load, and (3) source set size (large versus small). These manipulations were crossed (2 x 2 x 2) to yield the 8 new RAN subtasks.

Stimuli type. The symbolic RAN subtasks used letter stimuli and the non-symbolic subtasks used pictures of objects and animals.

Source set size. In the symbolic RAN subtask, the Large set size version used 5 consonants *(d, n, p, s,* and *v*) as stimuli and the Small set size version used 5 vowels (*a, e, i, o*, and *u*). In the non-symbolic RAN subtask, the Large set size version used line drawings of 5 unrelated objects (*bell, book, clock, flag,* and *star*) as stimuli and the Small set size version used line drawings of 5 pictures of animals (*bear, cat, cow, dog,* and *pig*). The names of the pictures were matched for length and all were drawn from nouns with relatively high frequencies.

Attention load. Attention was manipulated by asking participants to perform a concurrent activity while naming stimuli that appeared on the screen. In the Light Attention Load condition, the participants were required to press the space bar on the computer keyboard each time they named the last stimulus in the row (i.e., five times to simply indicate the completion of each line), without otherwise pausing in reading the names of the stimuli. In the Heavy Attention Load condition, the participants were required to press the space bar on the computer

keyboard each time a particular combination of stimuli was encountered, without otherwise pausing in reading the names of the stimuli (participants were instructed as to what particular stimulus pair watch for). The target pair occurred 5 times to match the criterion for the space bar pressing in the other condition.

To summarize, there were 10 modified RAN subtasks:

1. M-RAN-High-Frequency-Bigram (here and further M stands for "modified") subtask used high frequency bigrams (consonants and vowels).

2. M-RAN-Low-Frequency-Bigram subtask used low frequency bigrams.

3. M-RAN-Symbolic-Small-Light subtask used letter stimuli (*symbolic*) – vowels (*small* source set) with the *light* attention load directive (press 'space bar' at the end of each line).

4. M-RAN-Symbolic-Small-Heavy subtask used letter stimuli (*symbolic)* – vowels (*small* source set) with the *heavy* attention load directive (press 'space bar' upon encountering a designated stimulus pair).

5. M-RAN-Symbolic-Large-Light subtask used letter stimuli (*symbolic*) – consonants (*large* source set) with the *light* attention load.

6. M-RAN-Symbolic-Large-Heavy subtask used letter stimuli (*symbolic*) composed of consonants (*large* source set) with the *heavy* attention load.

7. M-RAN-Non-symbolic-Small-Light subtask used picture (*non-symbolic*) of animals (*small* source set) with the *light* attention load.

8. M-RAN- Non-symbolic-Small-Heavy subtask used pictures (*non-symbolic*) of animals (*small* source set) with the *heavy* attention load.

9. M-RAN- Non-symbolic-Large-Light subtask used pictures (*non-symbolic*) of unrelated objects (*large* source set) with the *light* attention load.

10. M-RAN- Non-symbolic-Large-Heavy subtask used pictures (*non-symbolic*) of unrelated objects (*large* source set) with the *heavy* attention load.

The following outcomes were hypothesized. Regarding the comparison between bigram-based versions of the RAN task, it was expected that the processing of higher frequency bigrams would proceed faster, resulting in shorter RAN performance time (hypothetical Scenario 1 in Figure 1).

With respect to the eight RAN subtasks involving orthogonal manipulations of symbolic versus non-symbolic stimuli, light versus heavy attention load and larger versus small source set, we hypothesized the following.

Slower performance on non-symbolic subtasks, as less familiar and hence less automatized in processing – due to higher variability in how the recognized stimulus is mapped to its proper label (Figure 2);

Heavy attention load will slow down RAN performance if attention control is instrumental in the rapid naming (Figure 3);

Stimuli drawn from the larger source set will be named slower than stimuli drawn from the smaller source set (Figure 4).

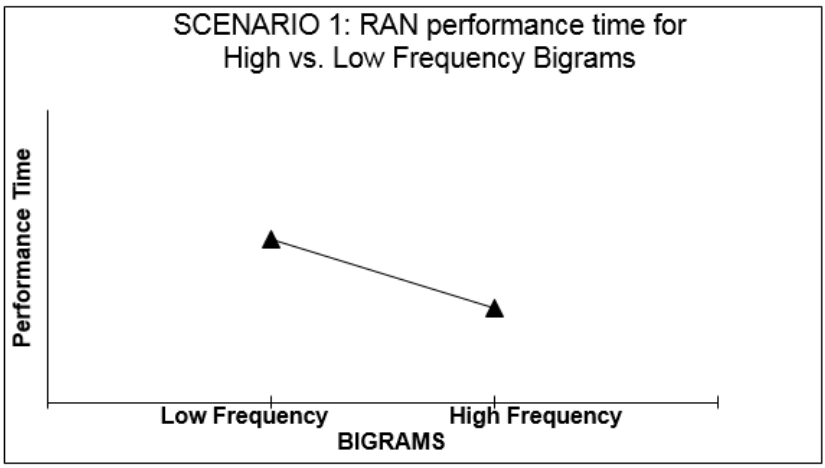

Figure 1. A hypothetical scenario reflecting expected pattern in performance times on bigram-based modified RAN subtasks

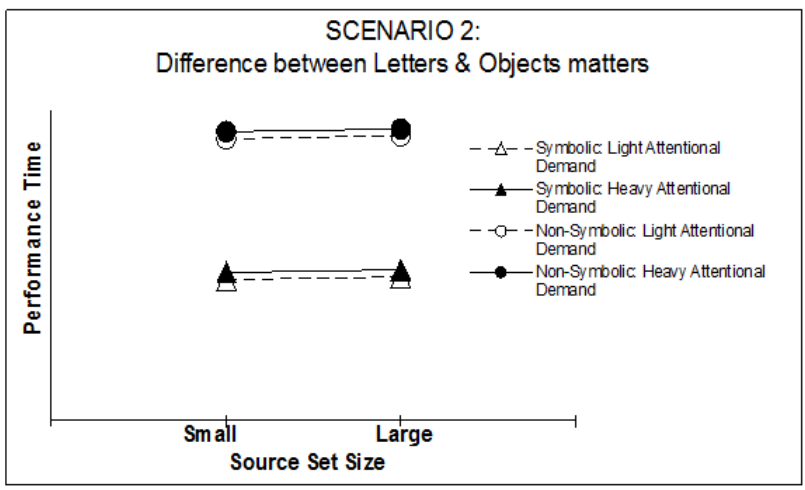

Figure 2. A hypothetical scenario reflecting expected pattern in performance times on modified RAN subtasks if stimulus type matters the most

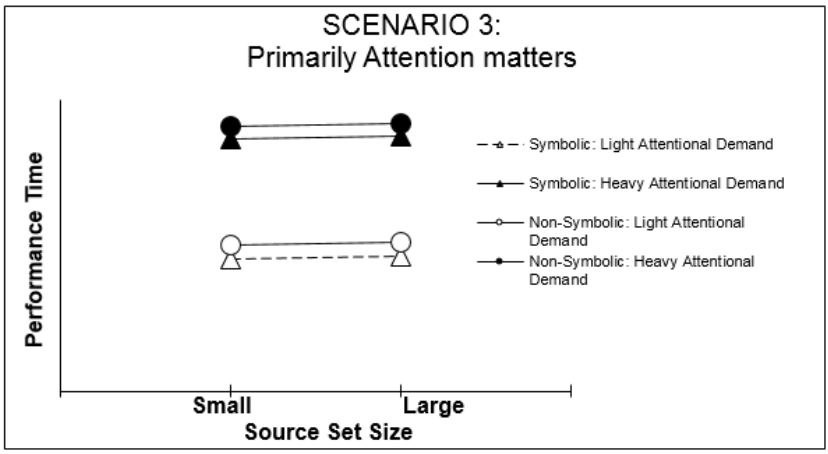

Figure 3. A hypothetical scenario reflecting expected pattern in performance times on modified RAN subtasks if attention matters the most

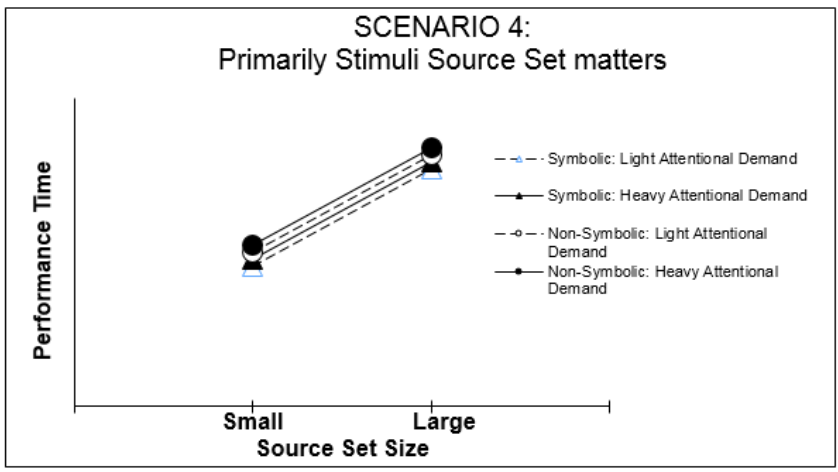

Figure 4. A hypothetical scenario reflecting expected pattern in performance times on modified RAN subtasks if source set size matters the most

If observed: (1) Scenario 1 would affirm the frequency/familiarity account for explaining RAN task performance and its likely link to reading; (2) Scenario 2 would affirm the automaticity account; (3) Scenario 3 would affirm the attention account; and (4) Scenario 4 would affirm the source set account. Of course, only main effects are projected here. With so many variables, a strong possibility of various interaction effects exists. There is no particular conceptual ground for confidently generating and sorting out these potential interaction effects, however, one stands out as intuitively the most plausible (Figure 5).

This last scenario depicts the possibility that attention demand and source set size would affect RAN performance differently in symbolic and non-symbolic subtasks. Namely, in more automatized symbolic subtasks source size would influence performance time to a greater extent, while non-symbolic subtasks that are more attention-based would be more sensitive to manipulations of the attention load factor.

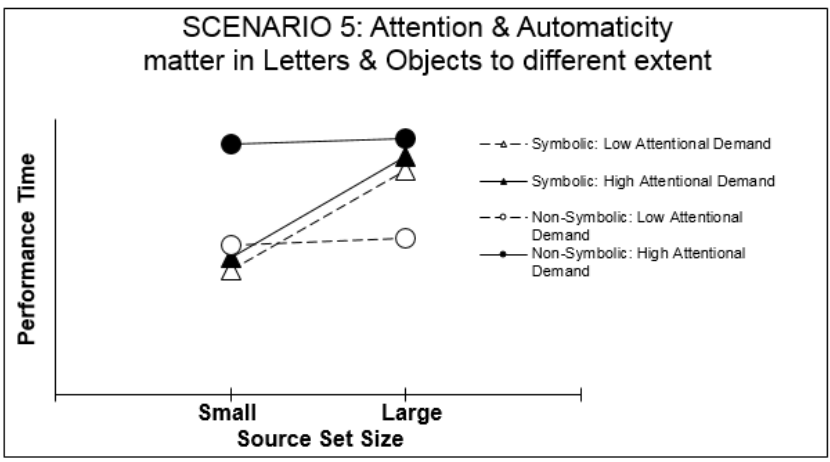

Figure 5. A hypothetical scenario reflecting expected pattern in performance times on modified RAN subtasks if attention and source set size influence naming speed symbolic and non-symbolic subtasks to a different degree

As revealing about the cognitive underpinnings of the RAN performance as these modified versions of the task could be, they are in the focus of this study not just per se, but in connection with the reading outcomes. Besides the likely (inherently strong) association between performance on symbolic RAN subtask and reading rate, we hypothesized that the more challenging modified RAN subtasks (the ones resulting in overall slower naming speed) would also show

a higher degree of association with reading rate, thus confirming the greater role of the corresponding factors in it with respect to reading. This expectation is based on the assumption that a shared set of cognitive mechanisms underlies both RAN and reading performance, thus making the former a reliable predictor of the latter.

Method

Participants. Sixteen participants (11 women and 5 men, ranging in age from 19 to 42 with the mean of 24.5, median of 22.5, and the mode of 21), predominantly Psychology undergraduate and graduate students, composed the sample for the study, randomly selected from the pool of participants of [15]. As such they all undertaken the entire set of test activities there, just supplemented by administration of the modified RAN tasks in the current study. Thirteen named English as their dominant language, and the remaining three were fluently bilingual (French-English). All participants signed a standard (approved by the University ethical committee) consent form were compensated (20$ CA) for their participation in the experiment and upon its completion were debriefed – i.e., informed of the purposes of the study and given an opportunity to ask related questions.

Materials. Ten modified versions of the RAN task manipulating three factors – attention load, source set size, stimulus type and familiarity factors – comprised the main test activity:

M-RAN-High-Frequency-Bigram. Five letters – *a, d, o, p,* and *s*, – each repeated ten times were mixed to produce pairs (bigrams) with the highest possible index of relative frequency, as determined in [17].

M-RAN-Low-Frequency-Bigram. Five letters – *a, d, o, p,* and *s*, – each repeated ten times were mixed to produce pairs (bigrams) with the lowest possible index of relative frequency, as determined in [17].

For the remaining modified subtasks the stimuli were orthogonally varied as follows:

The subtasks *M-RAN-Symbolic-Small-Light* and *M-RAN-Symbolic-Small-Heavy* used as stimuli the vowels: *a, e, i, o,* and *u* (symbolic; small source set) and presented with the Light Attention load (the task of pressing a space bar each time when the last character in each raw is named) and the Heavy Attention load instructions respectively (the task of pressing a space bar in response to each encounter of the combination "*e-a*").

The subtasks *M-RAN-Symbolic-Large-Light* and *M-RAN-Symbolic-Large-Heavy* used as stimuli the consonants: *d, n, p, s,* and *v* (symbolic; large source set) and presented either with the Light or Heavy Attention load, as described earlier (the target pair of consonant stimuli in the latter was "*n-p*").

The subtasks *M-RAN-Non-symbolic-Small-Light* and *M-RAN-Non-symbolic-Small-Heavy* used of the animals: *bear, cat, cow, dog,* and *pig* (small source set) and presented either with the Light or Heavy ("*cow-dog*" as the target) Attention load.

The subtasks *M-RAN-Non-symbolic-Large-Light* and *M-RAN-Non-symbolic-Large-Heavy* used pictures of the unrelated objects: *bell*, *book*, *clock*, *flag*, and *star* (large source set) and presented either with the Light or Heavy ("*clock-star*" as the target) Attention load.

In addition, (and as part of the experimental procedure of [15], the following measures were administered in the current study.

The original four *RAN tasks*: symbolic – letters and digits and non-symbolic – objects and colors, presented in five rows, each containing ten stimuli – randomly mixed ten repetitions of five stimuli of each type.

Measures of ballistic and efficiency-based automaticity included two indices of a person's ability to perceive and process target stimuli automatically. The first addressed the degree to which participants were capable of recognizing simple stimuli – letters and digits – in a ballistic (unstoppable) manner. The procedure used was based on so-called "primed decision" experimental paradigm [18, 19]. In this procedure, participants were given the task of judging whether a letter target was a vowel or a consonant, and whether a digit target was even or odd. Each target stimulus was preceded by another stimulus intended to prepared – or *prime* – participants for the upcoming target letter or digit. The design of the task made it possible to determine if the prime had been processed in a ballistic manner or not by extracting indices of the 'interference' effect (in the 'unexpected' – digits preceded by letters and vice versa – trials) and 'facilitation' effect (in the 'expected' – same category of primed and target stimuli – trials), both calculated in comparison with the 'neutral' trials, in which the target stimulus was preceded by a string of asterisks [20 – for details].

The second measure of automaticity – coefficient of variation (CV) or the ratio of standard deviation of reaction time to the mean reaction time – addressed the degree to which participants were able to process stimuli efficiently [21, 22]. This index is based on the idea of distinguishing between rapid task performance that is due simply to a speeding-up of all the underlying processing components and rapid task performance that is due to a restructured and more efficient deployment of underlying processing components. For the purposes of the current study the CV index was extracted for participants' performance on short stimulus onset asynchrony (SOA) 'neutral' primed trials – for details, please, see [20].

Attention control was measured by the "Trail Making" test [e.g., 23, 24]. In general, attention can be understood in terms of sustaining, focusing, dividing, suppressing, or shifting the concentration of conscious resources. Our focus of interest was on the efficiency of the attention shifting process as most reflective

of participants' ability to manage the complex processing of large sequences of stimuli – the requirement, supposedly shared by the RAN task and reading. The test consists of two conditions that require participants to connect a set of 25 circles randomly distributed across a page. In one condition, the circles are numbered from 1 to 25 and must be connected in numerical order. In the other condition half the circles are labeled with numbers (1–12) and half with letters (A–M). The participant must connect the circles by shifting from letters to digits and back in the standard order (A-1-B-2...etc.). The difference in time between the shifting and non-shifting conditions provides an index of attention control (shift cost).

Finally, *Reading Performance* was assessed by measures of silent reading rate and comprehension using Nelson-Denny standardized test of reading skills [25], specifically, forms G and H – for college students. Each participant received two text fragments, about one page or 600 words long each, one at the beginning of the experimental session and one at the end, counterbalanced across participants. Participants were instructed to read silently as fast as possible while at the same time reaching full understanding of the text and being prepared to answer comprehension questions when finished. After the first minute of reading they were asked to mark the line they were reading at that. The number of words the participant had read in one minute served as the test measure of reading rate. In this study, however, following a suggestion in [26], reading rate was converted from words per minute to milliseconds per word and in this form entered all subsequent analyses as a measure of reading speed.

Design and Procedure. All participants completed the full set of tasks, outlined in the above section. All RAN subtasks (including the modified ones) were administered in the same mode as the original RAN subtasks were – on a computer screen of a G4 iMac in 5 rows of 10 items, using PsyScope software [27] with the performance time on each subtask recorded by the program.

In all other respects the current study matched precisely the procedure of [15], including administration of measures of silent reading rate and comprehension as well as of deriving the indices of different types of automaticity and attention shift cost. Presentation of the modified RAN subtasks was carefully counterbalanced across participants by conditions and proximity to other tasks, so that nobody received them in the same order in identical combinations with the neighboring activities and assessment tools.

Results

Modified RAN Subtasks

The naming times obtained for the 10 modified RAN subtasks were submitted to analyses as follows. First, to address the question of whether the bigram frequency had an impact on naming times, we compared the naming times

for the M-RAN-High-Frequency-Bigram and the M-RAN-Low-Frequency-Bigram conditions. The results indicated that letter targets in sequences composed of highly frequent bigrams were named significantly faster than those in sequences composed of low frequency bigrams: $t = 3.276$, $p = .005$).

The next analysis addressed the questions about whether the symbolic versus non-symbolic nature of the RAN task stimuli, the source set size, and attention load all play roles in RAN task performance and whether there are interactions between these factors. For this purpose, the naming times were submitted to a 2x2x2 repeated measures ANOVA where the factors were Type (symbolic, non-symbolic stimuli), Source Set Size (large, small) and Attention Load (heavy, light). As expected, the analysis revealed a significant main effect for stimulus type (F (1,15) = 131.22, MSe =70,787,953.39, $p < .001$, partial $\eta^2 = .897$), indicating faster naming for symbolic stimuli. The analysis also revealed a significant main effect for attention load (F (1,15) = 62.12, MSe = 27,543,164.06, $p < .001$, partial $\eta^2 = .806$), indicating faster naming under the light attention demand. There was no main effect for source set size (F (1,15) = 1.063, $p > .05$). See Figure 6, and Table 1 for the ANOVA summary.

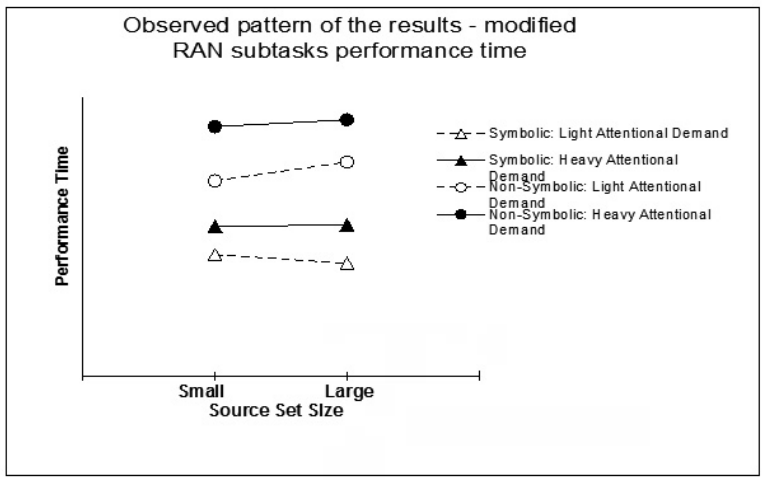

Figure 6. Observed pattern of performance times on modified RAN subtasks

The 2x2x2 interaction effect was not significant, suggesting that the effects of attention and stimulus type were consistent across conditions. However, there was a significant interaction effect of stimulus source set size by stimulus type (F (1,15) = 18.973, MSe = 3,775,251.33, $p = .001$, partial $\eta^2 = .558$). The nature of this interaction was that among non-symbolic stimuli, those drawn from

a smaller source set (pictures of animals) were named significantly faster than those drawn from a larger source set (pictures of unrelated common objects), whereas within the symbolic stimuli, the reverse was true: stimuli drawn from a smaller source set (vowels) were named significantly slower than those drawn from a larger source set (consonants).

Table 1. Performance on modified RAN subtasks – ANOVA summary

Source	*Df*	*F*	*MS*	*h*	*P*
Attention:					
Effect	1	62.124	1711095750	.806	< .001
Error term	15		27543164.1		
Stimulus type:					
Effect	1	131.216	9288504253	.897	< .001
Error term	15		70787953.4		
Source set size:					
Effect	1	1.063	22266132.8	.066	.319
Error term	15		20950585.3		
Attention x Type:					
Effect	1	3.923	57467240.3	.207	.066
Error term	15		4648836.6		
Attention x Size:					
Effect	1	.079	164164.5	.005	.782
Error term	15		2078085.1		
Type x Size:					
Effect	1	18.973	71628480.5	.558	.001
Error term	15		3775251.3		
Attention x Type x Size:					
Effect	1	3.558	52790826.5	.192	.079
Error term	15		9214886.4		

Relationships among Variables

Correlational analyses were run to examine the relationships among variables used as predictors of RAN task performance in the subsequent multiple regression analyses and their connections to reading. The results of these analyses are shown in Tables 2, 3.

The pattern of inter-correlations among the individual RAN subtasks, both the original and the modified ones, emerged to be quite strong (not surprisingly because they overlap greatly in the basic task demand – rapid naming). RAN subtasks using stimuli of the same type composed pairs that were most highly correlated, whereas the least correlated RAN subtasks were those with stimuli of different types. For example, performance on the original letter-naming subtask was correlated with performance on the task requiring the naming of vowels (under both low and the high attention demand conditions), and with naming of frequent and rare bigrams (all $r \geq .690$, all p-values $\leq .01$). The same was true for the naming of common objects in the original and modified RAN subtasks (all $r \geq .64$, all p-values $\leq .01$).

Analyses of correlations between performance on the modified RAN subtasks and the reading measures and indices of automaticity and attention revealed the following patterns. Regarding correlations between indices of automaticity and performance on the modified RAN subtasks, only the CV index of automaticity was significantly correlated with the speed of naming vowels, under the light attention load condition ($r = .457$, $p = .038$). No other correlation with an automaticity index was statistically significant.

In contrast, correlations between indices of attention and RAN performance did yield several significant results. Performance time on Form B of the Trail Making test and the speed of naming consonants under the low attention load condition were significantly correlated ($r = .670$, $p < .01$). Also, it was correlated significantly with naming vowels, consonants, pictures of animals, and pictures of common objects ($r = .641$, $p < .01$; $r = .706$, $p < .001$; $r = .650$, $p < .01$; and $r = .618$, $p < .01$, respectively) under high attention load condition.

The correlations between performance on the modified RAN subtasks and reading rate were not strong. Only one of them (that is for RAN-M-Symbolic-Small-Heavy) reached significance ($r = .449$, $p = .040$). The correlation between RAN-M-Non-Symbolic-Small-Heavy and reading showed a trend only ($r = .365$, $p = .082$). However, the magnitudes of these correlations are compatible with the significant correlations between measures of RAN task performance and reading rate observed in [15], with the only difference that the small sample size was responsible for the lower power. Performance on both High-Frequency and Low-Frequency bigram-based RAN subtasks was strongly correlated with L1 silent reading speed ($r = .533$, $p = .017$, and $r = .638$, $p = .004$, respectively). Finally, when the correlations among variables in the current study were compared with the analogous correlations obtained in [15], the patterns of these correlations seemed fairly consistent.

Table 2. Inter-correlation coefficients among original and modified RAN subtasks

VARIABLES:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Letter-RAN	-													
2. Digit-RAN	.596**	-												
3. Color-RAN	.072	.331	-											
4. Object-RAN	-.066	-.086	.406	-										
5. M-RAN-Symbolic-Small-Light	.716**	.647**	.094	.128	-									
6. M-RAN-Symbolic-Large-Light	.475*	.675**	.583**	.350	.519*	-								
7. M-RAN-Non-Symbolic-Small-Light	-.016	.171	.474*	.805***	.264	.594*	-							
8. M-RAN-Non-Symbolic-Large-Light	-.055	.040	.325	.916***	.206	.430	.894***	-						
9. M-RAN-Symbolic-Small-Heavy	.737**	.612**	.562**	.176	.645**	.652**	.203	.325	-					
10. M-RAN-Symbolic-Large-Heavy	.462*	.341	.397	.723**	.542*	.647**	.762***	.672**	.633**	-				
11. M-RAN-Non-Symbolic-Small-Heavy	.306	.319	.517**	.586**	.327	.633**	.671**	.731**	.665**	.678**	-			
12. M-RAN-Non-Symbolic-Large-Heavy	.268	.338	.597**	.644**	.274	.737**	.755***	.764***	.580*	.750**	.907***	-		
13. M-RAN-High-Frequency-Bigram	.690**	.655**	.199	-.056	.569**	.624**	-.031	.137	.595**	.287	.214	.266	-	
14. M-RAN-Low-Frequency-Bigram	.722**	.740**	.471*	.029	.493**	.785***	.125	.276	.790***	.458*	.607**	.647**	.791***	-

** p < .05, ** p < .01, *** p < .001.*

The list of variables:

1 – RAN performance time on letters task; 2 – RAN performance time on digits task; 3 – RAN performance time on colors task;

4 – RAN performance time on objects task; 5 – Modified RAN: light attention load, vowel letters; 6 – Modified RAN: light attention load, consonant letters; 7 – Modified RAN: light attention load, pictures of animals; 8 – Modified RAN: light attention load, pictures of common objects; 9 – Modified RAN: heavy attention load, vowel letters; 10 – Modified RAN: heavy attention load, consonant letters; 11 – Modified RAN: heavy attention load, pictures of animals; 12 – Modified RAN: heavy attention load, pictures of common objects; 13 – Modified RAN: based on frequent bigrams; 14 – Modified RAN: based on rare bigrams.

Table 3. Inter-correlation coefficients for the major variables

VARIABLES:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. M-RAN-Symbolic-Small-Light	-															
2. M-RAN-Symbolic-Large-Light	.519*	-														
3. M-RAN-Non-Symbolic-Small-Light	.264	.594*	-													
4. M-RAN-Non-Symbolic-Large-Light	.206	.430	.894***	-												
5. M-RAN-Symbolic-small-Heavy	.645**	.652**	.203	.325	-											
6. M-RAN-Symbolic-Large-Heavy	.542*	.647**	.762***	.672**	.633**	-										
7. M-RAN-Non-Symbolic-Small-Heavy	.327	.633**	.671**	.731**	.665**	.678**	-									
8. M-RAN-Non-Symbolic-Large-Heavy	.274	.737**	.755***	.764***	.580*	.750**	.907***	-								
9. M-RAN-High-Frequency-Bigram	.569**	.624**	-.031	.137	.595**	.287	.214	.266	-							

VARIABLES:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
10. M-RAN-Low-Frequency-Bigram	.493**	.785***	.125	.276	.790***	.458*	.607**	.647**	.791***	-						
11. Ballistic automaticity	.262	-.081	-.058	-.077	-.193	-.091	-.273	-.384	.235	-.136	-					
12. Automaticity/ Efficiency	.457*	.211	.230	.306	.052	.164	.176	.199	.130	.142	.389	-				
13. Attention: Form B	.409	.670**	.320	.203	.641**	.706***	.650**	.618**	.515*	.573*	-.010	.062	-			
14. Attention shift cost	.254	.294	.404	.483*	.197	.537*	.318	.291	.165	.047	.107	-.068	.736***	-		
15. Reading rate (L1)	.170	.309	.176	-.024	.449*	.204	.365	.280	.533**	.638**	.132	-.091	.380	.011	-	
16. Reading rate (L2)	-.155	-.215	.224	-.001	.044	-.145	.195	.165	.316	.403	.053	.049	.208	-.116	.625**	-

* p < .05, ** p < .01, *** p < .001.

The list of variables:

1 – Modified RAN: light attention load, vowel letters; 2 – Modified RAN: light attention load, consonant letters; 3 – Modified RAN: light attention load, pictures of animals; 4 – Modified RAN: light attention load, pictures of common objects; 5 – Modified RAN: heavy attention load, vowel letters; 6 – Modified RAN: heavy attention load, consonant letters; 7 – Modified RAN: heavy attention load, pictures of animals; 8 – Modified RAN: heavy attention load, pictures of common objects; 9 – Modified RAN: based on frequent bigrams; 10 – Modified RAN: based on rare bigrams;11 – Facilitation effect ('Expect Unrelated' short SOA, surprise trials) – relative value (adjusted by the corresponding base-line condition); 12 – CV index ('Expect Related' short SOA, neutral trials); 13 – Attention: Form B performance time ("Trail Making" test of attention); 14 – Standardized residual (Form B against Form A performance time on the "Trail Making" test) as an index of the attention shift cost; 15 – Reading rate (ms/word) in first language; 16 – Reading rate (ms/word) in second language.

Multiple Regression Analyses

To address the major research question about factors underlying RAN task performance, the data were submitted to a series of multiple regression analyses. First, here is a word of caution. The multiple regression statistical technique typically requires samples of much larger size [28] to produce more reliable results. Therefore, the findings discussed below should be treated very carefully to avoid premature conclusions. Even statistically very sound results, at best, represent just tendencies to be verified in follow-up studies on more diverse samples. For this reason, as well, adjusted (for a small sample size) R^2 are reported in addition to the statistics presented in the corresponding tables.

In these multiple regression analyses, performance on the modified RAN subtasks served as the criterion variables to be explained by the following predictor variables to determine what factors best explain the naming speed phenomenon:

(1) The index of ballistic automaticity (relative facilitation effect on surprise trials with the short SOA in the 'expect unrelated target' condition of the primed decision making task);

(2) The index of efficiency (automaticity) in stimulus recognition (the CV-index), calculated for neutral trials with the short SOA in the 'expect related target' condition of the primed decision making task; and

(3) The index of general attention (performance time on Form B of the Trail Making test).

The following statistically significant findings were obtained (please, see Tables 5 through 14 for details). The overall model for the consonant naming RAN subtask, i.e., involving symbolic stimuli from a large source set under the condition of light attention load, was significant ($R^2 = .501$, adjusted $R^2 = .376$, $p = .034$). It was the only significant result for the condition of light attention load, whereas three out of four models with modified RAN subtasks under the condition of heavy attention load were statistically significant. These were: $R^2 = .533$, adjusted $R^2 = .416$, p = .024, for M-RAN-Symbolic-Large-Heavy (naming consonants), $R^2 = .561$, adjusted $R^2 = .451$, p = .017, for M-RAN-Non-Symbolic-Small-Heavy (naming pictures of animals), and $R^2 = .631$, adjusted $R^2 = .546$, p = .006, for M-RAN-Non-Symbolic-Large-Heavy (naming pictures of common objects).

Table 4. Results of a multiple regression analysis of modified RAN (M-RAN-Symbolic-Small-Light) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	.262	.262	.069	.069	1.030	.327	.114
CV index of automaticity	.457	.466	.217	.149	2.469	.140	.388
Attention (Form B)	.409	.605	.366	.148	2.805	.120	.386

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 5. Results of a multiple regression analysis of modified RAN (M-RAN-Symbolic-Large-Light) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.081	.081	.007	.007	.092	.766	-.166
CV index of automaticity	.211	.275	.076	.069	.975	.341	.235
Attention (Form B)	.670**	.708	.501**	.425**	10.221	.008	.654**

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 6. Results of a multiple regression analysis of modified RAN (M-RAN-Non-Symbolic-Small-Light) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.058	.058	.003	.003	.047	.831	-.154
CV index of automaticity	.230	.281	.079	.075	1.065	.321	.259
Attention (Form B)	.521*	.575	.331	.252	4.515	.055	.503

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 7. Results of a multiple regression analysis of modified RAN (M-RAN-Non-Symbolic-Large-Light) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.077	.077	.006	.006	.083	.777	-.212
CV index of automaticity	.306	.373	.139	.133	2.007	.180	.359
Attention (Form B)	.502*	.604	.365	.226	4.279	.061	.477

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 8. Results of a multiple regression analysis of modified RAN (M-RAN-Symbolic-Small-Heavy) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.193	.193	.037	.037	.543	.473	-.226
CV index of automaticity	.052	.238	.057	.019	.265	.615	.101
Attention (Form B)	.641**	.674	.454	.398*	8.751	.012	.632*

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 9. Results of a multiple regression analysis of modified RAN (M-RAN-Symbolic-Large-Heavy) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.091	.091	.008	.008	.116	.738	-.154
CV index of automaticity	.164	.235	.055	.047	.647	.436	.181
Attention (Form B)	.706**	.730	.533**	.477**	12.259	.004	.693**

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 10. Results of a multiple regression analysis of modified RAN (M-RAN-Non-Symbolic-Small-Heavy) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.273	.273	.075	.075	1.130	.306	-.377
CV index of automaticity	.176	.410	.168	.094	1.465	.248	.283
Attention (Form B)	.650**	.749**	.561**	.392**	10.726	.007	.628**

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 11. Results of a multiple regression analysis of modified RAN (M-RAN-Non-Symbolic-Large-Heavy) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.384	.384	.148	.148	2.425	.142	-.520*
CV index of automaticity	.199	.539	.291	.143	2.624	.129	.365
Attention (Form B)	.618*	.798**	.631**	.346**	11.425**	.005	.590**

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 12. Results of a multiple regression analysis of modified RAN (M-RAN-High-Frequency-Bigram) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	.235	.235	.055	.055	.818	.381	.238
CV index of automaticity	.130	.239	.057	.002	.024	.878	.005
Attention (Form B)	.515*	.568	.322	.265	4.702	.051	.517

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

Table 13. Results of a multiple regression analysis of modified RAN (M-RAN-Low-Frequency-Bigram) subtask performance by index of ballistic automaticity, CV-index of automaticity, and attention index

Variable:	*r*[a]	R	R^2	R^2 change	*F* change	Sign. *F*	Final b
Ballistic automaticity	-.136	.136	.019	.019	.265	.615	-.203
CV index of automaticity	.142	.252	.064	.045	.625	.443	.187
Attention (Form B)	.573*	.613	.375	.312*	5.987	.031	.560*

[a]Zero-order correlations. *$p < .05$, ** $p < .01$, *** $p < .001$

All other models were non-significant, ranging in their overall explanatory power from 32.2 % (adjusted $R^2 = .153$, $p = .183$) in the M-RAN-High-Frequency-Bigram subtask to 45.4 % (adjusted $R^2 = .318$, $p = .056$, almost approaching the level of significance) in the M-RAN-Symbolic-Small-Heavy subtask (naming vowels under the condition of heavy attention load). In other words, this set of predictors was capable of explaining from 32 % to 63 % of variability in different modified RAN subtasks.

It is interesting to note that the most important predictor in practically all of the above analyses appeared to be the index of general attention. Its unique contribution varied across RAN subtasks, but was always higher than (or equal to, in one case) the contribution of either index of automaticity. Specifically, for the subtasks with the light attention load the attention factor alone explained: 14.8 % (adjusted R^2 change = .110, $p = .120$) of the variance in M-RAN-Symbolic-Small-Light subtasks (naming of vowels); 42.5 % of the variance (adjusted R^2 change = .442, $p = .008$) in naming consonants (M-RAN-Symbolic-Large-Light subtask); 25.2 % of the variance (adjusted R^2 change = .226, $p = .055$) in naming pictures of animals (M-RAN-Non-Symbolic-Small-Light subtask); and 22.6 % of the variance (adjusted R^2 change = .200, $p = .061$) in naming pictures of common unrelated objects (M-RAN-Non-Symbolic-Large-Light subtask).

In the case of the modified RAN subtasks associated with the heavy attention demand, attention alone explained even more variability in the criterion variables: 39.8 % (adjusted R^2 change = .407, $p = .012$) in naming vowels (M-RAN-Symbolic-Small-Heavy subtask); 47.7 % (adjusted R^2 change = .506, $p = .004$) in naming consonants (M-RAN-Symbolic-Large-Heavy subtask); 39.2 % (adjusted R^2 change = .410, $p = .007$) in naming pictures of animals (M-RAN-Non-Symbolic-Small-Heavy subtask); and 34.6 % (adjusted R^2 change = .364, $p = .005$) in naming pictures of unrelated common objects (M-RAN-Non-Symbolic-Large-Heavy subtask).

Also, even in the presumably most automatized of all modified RAN subtasks – the one based on the High Frequency bigrams – the attention factor accounted for greater variance in naming performance than either of the indices of automaticity: R^2 change = .265, .241 after adjustment, p = .051 (compared to unadjusted 5.5% for ballistic automaticity and 0.2 % for the CV index of efficiency). Similar results were observed in the case of the Low Frequency bigram RAN subtask: R^2 change = .312, .299 after adjustment, p = .031 (unadjusted 1.9 % and 4.5 % for the ballistic and efficiency-related indices of automaticity, respectively).

Discussion

Before discussion the study findings with regard to its major research questions, it is important to mention that we, first, compared the obtained data structure with the results of [15]. There was no substantial difference, but one – with participants in the current study performing task of the Trail Making test Form B markedly faster. All other variables were compatible in their average values and variability between the two studies. This fact increases our confidence that the results obtained in the present study (despite its relatively limited sample) are reliable and likely to be representative of participants' performance on the RAN task and related measures.

Findings with Regard to Major Research Questions

The first two research questions concerned with how sensitive RAN task performance would be explicit manipulations of the attention demands and the source set size. As reported earlier, the ANOVA of performance time on the modified RAN subtasks yielded statistically significant main effects of stimuli type and attention load factors.

The observed pattern of results with regard to the first research question resembled most closely the projected scenario depicted in Figure 2. There were clear differences in naming time between symbolic and non-symbolic stimuli. However, in addition, difference was observed between subtasks involving the heavy versus light attention load, as illustrated in Figure 3. Finally, partly in accord with the pattern shown in Figure 5 attention load affected naming to different degrees in symbolic and non-symbolic RAN subtasks. These results once again demonstrate that participants take significantly longer to recognize and name aloud pictures than letters, as was repeatedly shown in the related literature (e.g., 3, 6, 8, 10, 16]. In agreement with the hypothesized outcomes and some of the previous research [e.g., 4, 6, 15], heavier attention demands slowed the naming process significantly across all stimuli types and set sizes, including symbolic ones. Given that light and heavy attention load conditions were perfectly matched in their mechanical components (pressing the space bar on a computer

keyboard 5 times per individual subtask), the difference in naming time can be attributed solely to how much attention control was required for successful task execution. The heavy attention load condition presumably involved working memory (remembering the particular "target" combination of stimuli to respond to) to much greater extent than in the light attention load condition (press the space bar at the end of each line). This idea, in particular, is supported by research that implicated working memory in RAN task performance [e.g., 4, 20, 29, among many others]. It is of an additional interest that these attention-related results were combined with the low degree of involvement of automaticity measures in explaining variance in RAN task performance.

With respect to the second research question that addressed the effect of the source set size factor on the RAN task performance time, our study found no significant main effect of this manipulation. However, the results revealed a significant interaction effect involving source set size and stimulus type. We observed significantly faster naming of pictures of animals (drawn from the smaller source set, in agreement with what was expected) on non-symbolic RAN subtasks and of consonants (drawn from the larger source set, contrary to the original expectations) on symbolic RAN subtasks than on the corresponding smaller source set of symbolic stimuli (vowels) and larger source set of non-symbolic stimuli (objects).

Finally, in response to the third research question, the results revealed that naming of letters in the condition involving high frequency bigrams was faster than in the conditions involving low frequency bigrams. This result likely reflects the effect of reading practice (exposure to printed text) in symbolic RAN task performance.

The most important, in our view, of these results is the indication that performance on the RAN task largely reflects the attention demand, created by the specific task of naming stimuli, presumably making attention-related cognitive factors the major driving force of rapid naming, at least in the adult population. In addition, we observed that the source set size of the stimuli used in particular RAN subtasks can affect naming time, but here the results were more complex. When the stimuli were unlikely to be overlearned (pictures of animals and other objects), the fact that stimuli came from a large set size was associated with slower naming compared to stimuli from the smaller source set. This particular pattern of results implicates memory capacity into RAN task performance, at least with non-symbolic stimuli.

However, the same was not true for heavily practiced (routinely used) letters. The stimuli from the large source set (consonants) were named faster than stimuli from the smaller source set (vowels). This finding is paradoxical at first sight. If letter names are retrieved automatically, then there should be no real

difference in naming consonant and vowels or just a marginal difference, but still in favour of stimuli from the smaller source set. Whatever the explanation for the reversed pattern is speculated – for example, that in a typical phonological training vowels tend to be more sustained in their pronunciation (i.e., produce longer lasting sounds), – one particular interpretation seems to be sufficiently plausible. It stipulates that the RAN task performance is unlikely to reflected automaticity of name retrieval alone.

To summarize this section of the discussion, the explicit manipulation of various factors influencing RAN task performance seems to point rather toward attention than toward automaticity account for naming speed. Stopping sort of definitively proclaiming just one major cognitive mechanism of RAN task performance, we would like, nevertheless, to once again suggest that 'A' in RAN could stand for 'attention' no less (if not considerably more) than for 'automaticity'.

Interrelations among Variables

In addition to the major research questions, this study also looked at relationships among variables, including RAN performance connection to reading rate. Perhaps, one of the most interesting results was that RAN subtask performance based on the low frequency bigrams correlated significantly with naming on all RAN subtasks except for the low attention demand task involving vowel naming and did so noticeably more strongly than with the subtask involving high frequent bigrams. One could probably speculate that this particular modification of the RAN task shares the most with either type of others – efficient recognition of highly practiced symbols and efficient management (presumably through higher attention control) of their more challenging (less familiar) combinations.

As it would be expected, all modified RAN subtasks under the condition of high attention load showed the strongest correlations with the primary measure of attention – Form B of the Trail Making test performance time. Also not surprisingly, all three significant coefficient of correlation between modified RAN subtasks and reading rate in participants' native language, involved symbolic stimuli. Moreover, and related to the last research question, both bigram-based modified RAN subtasks were highly correlated to L1 reading rate, providing yet another indication that practice with printed text is likely to strengthen RAN-to-reading association. Interestingly, performance on the subtasks utilizing less frequent, and hence less familiar, bigram patterns showed somewhat stronger correlations with reading than did more familiar highly frequent bigram subtasks. This particular pattern of results might reflect the possibility that more challenging tasks (the low frequency bigram condition) provided processing challenges that could differentiate strong performers better than did the easier tasks. If so, the same

should be true for even more challenging (that is reading for comprehension) task. Consider also that, no matter how much processing of symbolic stimuli is automatized, more challenging tasks would still share some elevated attention demand.

Finally, the multiple regression analyses revealed that attention-related factors accounted for more variance in participants' performance on different RAN subtasks than did automaticity-related factors. The unique contribution of the index of general attention in some cases exceeded 40 % of explained variance in the case of several RAN subtasks, and not surprisingly, even more in subtasks with additional attention demands. Indeed, the association of attention with performance in the modified RAN subtasks appears to be higher than observed in the original RAN subtasks.

These results once again point to the importance of attention-related factors in RAN task performance. Consider that even four subtasks under the condition of light attention demand still in fact carried some extra load (presumably on working memory) of responding to the last stimulus in each row. As such, they were more dependent on attention-related factors, than the original RAN subtasks were. The contribution of attention to performance on four RAN modifications with the extra task of responding to particular combinations of targets was even higher. Very interestingly, in this subset of modified RAN subtasks, it appears that keeping track of more familiar (automatically recognized stimuli – vowel and consonant letters) in order to properly respond to their target combinations, took even more attention resources than it did for their more variable counterparts – presumably less automatically recognized pictures of animals and common objects.

Conclusion

To summarize, this study has shown that both symbolic and non-symbolic version of the RAN task are noticeably sensitive to direct manipulations of attention demand characteristics, resulting in significantly slower naming, when the attention demand is higher. More importantly, when attention was challenged, as it was in the high load condition, the connection of RAN task performance to reading (as well as the inter-correlations among different RAN subtasks) appeared to become stronger. Altogether, these findings suggest that it is the development of attention control that is likely to be strongly involved in successful rapid serial naming, although practice in reading by young adults is able to automatize the naming of symbolic stimuli. The latter observation is also in line with what previous meta-analyses [6, 7, 8] established about RAN-to-reading connections. The issue of balance between automaticity and attention-driven factors in naming is of interest not only to early literacy research and practice, but also to second language learning [e.g., 30].

References

1. Denckla M. B., Rudel R. G. Rapid 'automatized' naming (R.A.N.): Dyslexia differentiated from other learning disabilities. *Neuropsychologia,* 1976, Vol.14, Issue 4, pp. 471–479.
2. Denckla M. B., & Cutting L. E. History and significance of rapid automatized naming. *Ann Dyslexia*. 1999, Vol. 49, pp. 29–42. DOI : 10.1007/s11881-999-0018-9
3. Savage R. Motor skills, automaticity and developmental dyslexia: A review of the research literature. *Reading and Writing: An Interdisciplinary Journal*, 2004, Vol. 17, pp. 301–324. DOI: 10.1023/B:READ.0000017688.67137.80
4. Stringer R. W., Toplak M. E., Stanovich K. E. Differential relationships between RAN performance, behavioral ratings, and executive function measures: Searching for a double dissociation. *Reading and Writing: An Interdisciplinary Journal,* 2014, Vol. 17, pp. 891–914.
5. Bowers P. G., & Swanson L. B. Naming speed deficits in reading disability: Multiple measures of a singular process. *Journal of Experimental Child Psychology,* 1991, Vol. 51, Issue 2, pp. 195–219. DOI: 10.1016/0022-0965(91)90032-N
6. Borokhovski E., Bernard R. M., Segalowitz N., Sokolovskaya A. Mapping connections between Rapid Automatized Naming (RAN) task and reading: A meta-analysis of correlational data. *Russian Psychological Journal*, 2018, Vol. 15, no. 1, pp. 46–76. DOI: 10.21702/rpj.2018.1.3
7. Hammill D. D. What we know about correlates of reading, *Except Child,* 2004, Vol. 71, Issue 4, pp. 453–469. DOI: 10.1177/001440290407000405
8. Swanson H. L., Trainin G., Necoechea D. M., Hammill D. D. Rapid naming, phonological awareness, and reading: A meta-analysis of the correlation evidence. *Review of Educational Research*, 2003, Vol. 73, Issue 4, pp. 407–440. DOI: 10.3102/00346543073004407
9. Wolf M., Bowers P. G. The double-deficit hypothesis for the developmental dyslexia. *Journal of Educational Psychology*, 1999, Vol. 91 (3), pp. 415–438.
10. Wolf M., Bowers P., Biddle K. Naming-speed processes, timing, and reading: A conceptual review. *Journal of Learning Disabilities*, Vol. 33, pp. 387–407. DOI: 10.1177/002221940003300409
11. Ackerman P. T., Holloway C. A., Youngdahl P. L., Dykman R. A. The double-deficit theory of reading disability does not fit all. *Learning Disabilities Research & Practice*, 2001, Vol. 16, pp. 152–160. DOI:10.1111/0938-8982.00016
12. Stanovich K. *Progress in understanding reading: Scientific foundations and new frontiers.* New York: Guilford Press, 2000. 536 p.
13. Denckla M. B. Color-naming defects in dyslexic boys. *Cortex.* 1972, Vol. 8, Issue 2, pp. 164–176.
14. Wolf M., Bowers P., Biddle K. Naming-speed processes, timing, and reading: A conceptual review. *Journal of Learning Disabilities,* 2000, Vol. 33, pp. 387–407.

15. Borokhovski E., Segalowitz N., Lacroix G. L. On a test for predicting success in reading skill development anatomy of the RAN task. In: *Proceedings of Cognitio Conference*. Montreal: Universite du Quebec at Montreal (UQAM), 2004, pp. 18–32. http://cognitio.uqam.ca/2004
16. Meyer M. S., Wood F. B., Hart L. A., & Felton R. H. Selective predictive value of rapid automatized naming in poor readers. *Journal of Learning Disabilities,*1998, Vol. 31, Issue 2, pp. 106–117.
17. Pommerening K. *Relative bigram frequencies in English*, 2000. Available at: https://www.staff.uni-mainz.de/pommeren/Cryptology/Classic/8_Transpos/Bigrams.html (Accessed 10 September 2018).
18. Neely J. Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited capacity attention. *Journal of Experimental Psychology: General*, 1977, Vol. 106, pp. 226–254.
19. Favreau M., Segalowitz N. Automatic and controlled processes in the first and second language reading of fluent bilinguals. *Memory & Cognition*, 1983, Vol. 11, pp. 565–574.
20. Borokhovski E. *Explorations of the rapid automated naming (RAN) task: What should the "A" in RAN stand for?* [Doctoral dissertation]. Concordia University, 2007. Available at: https://spectrum.library.concordia.ca/975691/1/NR31121.pdf (Accessed 10 September 2018).
21. Segalowitz N., Segalowitz S. J. Skilled performance, practice, and the differentiation of speed-up from automatization effects: Evidence from second language word recognition. *Applied Psycholinguistics,* 1993, Vol. 14 (3), pp. 369–385.
22. Segalowitz N., Poulsen C., Segalowitz S. RT coefficient of variation is differentially sensitive to executive control involvement in an attention switching task. *Brain and Cognition*, 1999, Vol. 38, pp. 255–258.
23. Reitan R., Wolfson D. *The Halstead-Reitan neuropsychological test battery: theory and clinical interpretation.* Tucson: Neuropsychology Press, 1993. 912 p.
24. Spreen O., Strauss E. *A compendium of neuropsychological tests. Administration, norms, and commentary.* New York: Oxford University Press, 1991. 464 p.
25. Brown J. I., Fishco V. V., & Hanna G. *Nelson-Denny reading test: Technical report forms G&H.* Chicago: Riverside, 1993.
26. Ackerman P. L. Individual differences in skill learning: An integration of psychometric and information processing perspectives. *Psychological Bulletin*, Vol. 102 (1), pp. 3–27.
27. Cohen J. D., MacWhinney B., Flatt M. R., Provost J. PsyScope: A new graphic interactive environment for designing psychology experiments. *Journal Behavior Research Methods, Instruments, & Computers,* 1993, Vol. 25, Issue 2, pp. 257–271.

28. Tabachnick B. G., Fidell L. S. Using Multivariate Statistics. 6th ed. Harlow, UK: Pearson Education Limited, 2014. 1056 p.
29. Savage R., Frederickson N., Goodwin R., Patni U., Smith N., & Tuersley L. Valuating current deficit theories of poor reading: Role of Phonological processing, naming speed, balance automaticity, rapid verbal perception and working memory. *Perceptual and Motor Skills,* 2005, Vol. 101, Issue 2, pp. 345–361.
30. Segalowitz N. Cognitive bases of second language fluency. New York, NY: Routledge, 2010. 240 p.

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Toward an Ecological Perspective of Interethnic Ideologies: Moderation Effects of Ethnic Density on Relationships between Interethnic Ideologies and Intergroup Bias

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Abstract

Introduction. In this exploratory study, we examined several interethnic ideologies held by individuals (assimilation, colorblindness, multiculturalism, and polyculturalism) from a social ecological perspective. We examined moderation effects of neighborhood ethnic density (ED) on relationships between interethnic ideologies and intergroup bias towards various minority ethnic groups in the Russian context. Intergroup bias was assessed as a composite score of bias toward four ethnic groups who have different cultural distances from the Russian mainstream population: Chechens, Belarusians, Uzbeks, and Chinese.

Method. We obtained a gender balanced sample of ethnic Russians from the Central Federal District of Russia (N = 359) comprising of 47 % women and 53 % men. The measures were used in a Russian translation by an adaptation using the back-translation and cognitive interviews. Multiple regression analysis was used to test the relationships.

Results. The results showed that high perceived neighborhood non-Russian ED weakened negative relations between intergroup bias and ideologies that purportedly accept cultural diversity (multiculturalism and polyculturalism). On the other hand, for interethnic ideologies those purportedly reject cultural diversity, high perceived neighborhood non-Russian ED weakened the positive relations between intergroup bias and assimilation and strengthened the negative relations between intergroup bias and colorblindness.

Discussion. The pattern of results suggests that the relationship between attitudes and intergroup bias may change based on the perceived ethnic composition of the local area and frequency of contacts. Although our findings are relatively novel they support the emerging view that attitudes and intergroup relations need to be studied from a social ecological context.

Keywords

ethnic density, interethnic ideologies, intergroup bias, assimilation, colorblindness, multiculturalism, polyculturalism, intercultural relations, ethnic diversity, generalized prejudice

Highlights

► High perceived neighborhood non-Russian ethnic density weakened negative relations between intergroup bias and multiculturalism and polyculturalism.

► High perceived neighborhood non-Russian ethnic density weakened the positive relations between intergroup bias and assimilation.

► High perceived neighborhood non-Russian ethnic density strengthened the negative relations between intergroup bias and colorblindness.

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Introduction

In recent years the study of intergroup relations is actively spurred on by the acute need to manage an increasingly culturally and ethnically diverse society. The creation of a social climate where all ethnic groups might harmoniously coexist is the central challenge for many communities today [e.g., 1]. This need is especially important for culturally and ethnically diverse societies such as Russia. Should we emphasize similarities and common ground or, conversely, recognize that there are important differences between groups? What interethnic ideology and politics of intercultural relations in Russia would be most successful in reducing intergroup prejudice and discrimination? In the literature there are contradictory results about the role of each of the interethnic ideologies in pathways to positive intergroup relations and more research is needed to understand and recognize the mechanisms and consequences of interethnic ideologies [2, 3]. In addition, a social ecological context is frequently overlooked in the psychological acculturation literature [4]. Although there is some limited research on perceived ethnic diversity [e.g., 5] and perceived ethnic density of minority immigrant groups and discrimination [e.g., 6] we are not aware of research on intergroup bias that has examined minority ethnic density from the perspective of majority group members. In this study, we thus addressed

interethnic ideologies from an ecological perspective by considering moderation effects of neighborhood ethnic density (ED) on relations between interethnic ideologies and intergroup bias in the Russian context.

Interethnic Ideologies

Interethnic ideologies have both a socially constructed superstructure (the network that creates and transmits the social representation of an ordered society) and a motivational substructure (epistemic, existential, and relational motives) reflecting shared belief systems or prescription about how society should be structured, while providing a cognitive framework in which to interpret the social environment [7]. At the core of each of the interethnic ideologies lie different principles of categorization that divide the human social world into various groups [see 8]. These different principles of categorization underlie interethnic ideologies, policies, and individual and group attitudes: (1) *assimilation* assumes that there should be a common group, and minority groups must correspond to the main part of society by adopting a mainstream culture while rejecting their own (i.e., recategorization → one group → assimilation); (2) *colorblindness* assumes that intergroup relations can be improved by ignoring the differences between groups (i.e., decategorization → no group → colorblindness); (3) *multiculturalism* recognizes differences between groups and assumes that maintenance of this diversity is important (i.e., salient categorization → multiple groups → multiculturalism); and (4) *polyculturalism*, which assumes a strong connection between all groups and pays less attention to the boundaries between them; put simply, all cultures are not isolated systems but are the product of intergroup interaction [for a review, see 8, 2, 3, 9]. This taxonomy of the interethnic ideologies is presented in Table 1.

Table 1. Taxonomy of the Interethnic Ideologies

Interethnic ideologies			
Rejection of cultural diversity		**Acceptance of cultural diversity**	
Assimilation (one group with a common mainstream culture; eliminating minority group memberships)	Colorblindness (no groups, only unique people; ignoring group memberships)	Multiculturalism (plurality of different groups; acknowledging and valuing group memberships)	Polyculturalism (plurality of interconnected groups; acknowledging group memberships with valuing interconnection between groups)

Neighborhood Ethnic Density

The interethnic processes can be conceptualized at different levels, such as, describing a neighborhood, a region or even country, each of which represents a special social community climate, etc. [for a review, see 10]. Despite the fact that these processes have been thoroughly studied at the macro level, the investigation of factors that affect these processes in a local, neighborhood environment has begun relatively recently [6, 11]. Such neighborhood factors include ED understood as the proportion of ethnic minority representatives living in a particular local area [12]. Ethnic or linguistic density can be studied using two main approaches: objectively (e.g., measured through census data) and subjectively (perceived individually), with recent studies showing that both types are moderately correlated [13, 14]. In other words, individuals seem to have a fairly accurate perception of the ethnolinguistic composition of their neighborhood. Although there are some inconsistent findings, research has shown that ED has been related to less prejudice, more social support, as well as better physical and mental health outcomes (protective ED-health associations are often referred to as the "ethnic density effect" [e.g., 6, 12, 13, 15]. In recent years there has been a developing interest in considering the moderating effects of ED on the acculturation process [e.g., 6, 13, 16]. Concurrently, research examining ethnic density and the interethnic attitudes of the majority group remains unexplored. Thus, it is possible that perceptions of co-ethnic concentration, and opportunities for interethnic contact, may influence the types of attitudes that the majority cultural group holds. ED effects in Russia, an increasingly diverse society with a very high rate of migration, have yet to be understood.

Present Study

In the present exploratory study, we examined models of relationships between assimilation, colorblindness, multiculturalism, polyculturalism and intergroup bias with moderation effects of perceived non-Russian ED and frequency of contacts. Assessment of generalized prejudice was based on two assumptions: (1) the prejudice towards one specific outgroup is, for the most part, associated with prejudice towards other outgroups [17]; and (2) attitudes towards ethnic groups are likely to differ depending on the specific group, and thus studying broad attitudes towards the groups in general will obfuscate such variance [18]. We considered four ethnic groups which have different cultural distances from the Russian mainstream population: Chechens, Belarusians, Uzbeks, and Chinese. We composed the intergroup bias outcome to reflect blatant and subtle bias towards each of the considered groups using measures of willingness for intergroup contact and endorsement of discrimination in the socioeconomic domain as manifest variables; both of these latter variables are informative

aspects of intergroup bias since they reflect prejudice and negative attitudes towards ethnic outgroups [e.g., 19, 20, 21]. Finally, we added the frequency of contacts to separate the ED effect from the effect of intergroup contacts, which commonly reduces prejudice [e.g., 22, 23].

Method

Sample. The total sample comprised 359 ethnic Russians residing in the Central Federal District of Russia. It included 167 women (46,5 %) and 192 men (53,5 %), aged from 16 to 68 years (*M* = 33,9, *SD* = 11,9); 79 participants (22 %) were students.

Measures. All measures which did not have a Russian translation were adapted by back-translation and cognitive interviews with the think-aloud technique [24]. All measures included or were adapted to use a 9-point Likert scale, so that higher scores indicate stronger endorsement of the concept. Internal consistency coefficients for the current study were generally adequate to excellent (Cronbach's alpha (α) ranging from 0,62 to 0,94; the average value was 0,81) and are provided in brackets.

Antecedent Variables

Interethnic ideologies. Three interethnic ideologies, colorblindness, multiculturalism, and polyculturalism were assessed with 5 items [9] and 5 items to assess for assimilation [8]. Sample items included "There should be no cultural differences between ethnic groups; there should be a single group and people should maintain the culture of the majority of the country's population," (assimilation, α = 0,75), "All human beings are individuals, and therefore race and ethnicity are not important," (colorblindness, α = 0,83), "There are differences between racial and ethnic groups, which are important to recognize," (multiculturalism, α = 0,63), and "There are many connections between different cultures" (polyculturalism, α = 0,78).

Frequency of contacts. We used 3 items assessing frequency of interethnic contacts [23]. A sample item was "How many people from another ethnic group in Russia do you know personally?" (α = 0,85).

Perceived ethnic density. A 4 item scale was used to assess perceived neighborhood ethnic density [13]. We revised the items to assess participant perceptions about the proportion of non-Russians residing in their local areas [8]. For example, participants were asked in Russian to think of their local area (15–20 minutes walking distance from their home) and to estimate "What proportion of all the people in this local area is of other [i.e., non-Russian] ethnic groups?" (α = 0,76).

Outcome Variables

Blatant bias. A 5 item scale assessed blatant bias towards each of the considered ethnic groups [19]. Sample items included "I would agree to live in

the same neighborhood with an Uzbek," and "I am willing to invite an Uzbek to a social event at my home" (for Chechens α = 0,92; for Belarusians α = 0,94; for Uzbeks α = 0,93; for Chinese α = 0,90).

Subtle bias. We used 6 items for each considered group asking for endorsement of behaviors that reflect discrimination of immigrants in the workspace, labor market, rental housing sectors, and other relevant socioeconomic domain according to literature [e.g., 19, 20]. Sample items included endorsing "Paying Chechens lower wages than natives, provided equal qualifications and level of education," and "The lack of career prospects for Chechens" (for Chechens α = 0,80; for Belarusians α = 0,62; for Uzbeks α = 0,86; for Chinese α = 0,83).

Data Analysis

Using SPSS v. 22, we conducted data screening including checking for outliers and missing data. We used the lavaan R package [25] to construct the measurement model with eight latent factors and one second-order factor: intergroup bias was set to load onto specific group bias, which was composed of blatant and subtle bias towards each considered group (i.e., Chechens, Belarusians, Uzbeks, and Chinese). We checked the fit of this model by applying confirmatory factor analysis (CFA). Estimation of the model was carried out with the use of robust statistics chi-square (Satorra-Bentler corrections – MLM estimator). We employed commonly recommended global fit measures: CFI > 0,90 and RMSEA < 0,08 [26].

We tested moderation effects in the regression models applying a test of the difference between the simple slopes for low (–1 *SD* below the mean) and high (+1 *SD* above the mean) levels of frequency of contacts and perceived ethnic density. This method is more accurate than a test of the interaction term in the full regression model [27]. To estimate the moderation effects we used the Model 2 template of PROCESS macro v.2.15 for SPSS [28].

Results

Preliminary Analysis

The data had no outliers and missing values. The measurement model had an acceptable global fit: $\chi^2(330, N = 359) = 699{,}22$, $p < 0{,}001$; CFI = 0,906; RMSEA [90 % CI] = 0,056 [0,051, 0,061]. Descriptive statistics including means, standard deviations, and bivariate correlations are presented in Table 2.

The results for the moderation models and simple slopes are shown in Table 3 and Figure 1. The explained variation of intergroup bias ranged from 7 % to 14 % across the tested models. The main effects showed that frequency of contacts, colorblindness, multiculturalism, and polyculturalism negatively predicted intergroup bias; assimilation positively predicted intergroup bias.

Additionally, frequency of contacts weakened the relation between intergroup bias and interethnic ideologies for all tested moderating variable conditions. Furthermore, high perceived non-Russian ED strengthened the negative relation between intergroup bias and colorblindness, but for assimilation, non-Russian ED weakened the positive relation with intergroup bias. Although, effect sizes for these changes were remarkably small. Also, high perceived non-Russian ED weakened the negative relation between intergroup bias and polyculturalism and made the relationship between intergroup bias and multiculturalism non-significant.

Table 2. Descriptive Statistics and Bivariate Correlations between the Variables (N = 359)

	M (SD)	**1**	**2**	**3**	**4**	**5**	**6**
1. Intergroup bias	2,81 (1,51)						
2. Assimilation	5,47 (1,79)	0,26					
3. Colorblindness	4,10 (2,17)	-0,32	0,06				
4. Multiculturalism	7,32 (1,13)	-0,12	-0,02	-0,18			
5. Polyculturalism	7,33 (1,29)	-0,33	0,06	0,09	0,37		
6. Frequency of contacts	5,48 (2,13)	-0,17	-0,01	0,08	0,04	0,13	
7. Perceived ethnic density	3,80 (1,65)	0,02	-0,03	0,01	0,10	0,05	0,32

Note. All correlations with absolute value greater than 0,10 are significant (p < 0,05).

Simple Slopes Analysis

Table 3. The Results for the Moderation Models between Interethnic Ideologies, Perceived Non-Russian Ethnic Density and Frequency of Interethnic Contact for Intergroup Bias (N = 359)

		β
Model 1 (R^2 = 0,11)		
Main effects		
Assimilation		0,27***
FC		-0,20***
PED		0,10
Simple slope analysis		
Low PED	Low FC	0,35***
	High FC	0,28**
High PED	Low FC	0,26**
	High FC	0,19**

		β
Model 2 (R^2 = 0,13)		
Main effects		
Colorblindness		-0,30***
FC		-0,17**
PED		0,07
Simple slope analysis		
Low PED	Low FC	-0,28**
	High FC	-0,25*
High PED	Low FC	-0,36**
	High FC	-0,32***
Model 3 (R^2 = 0,07)		
Main effects		
Multiculturalism		-0,14**
FC		-0,21***
PED		0,08
Simple slope analysis		
Low PED	Low FC	-0,30**
	High FC	-0,22*
High PED	Low FC	-0,07
	High FC	0,01
Model 4 (R^2 = 0,14)		
Main effects		
Polyculturalism		-0,32***
FC		-0,17**
PED		0,08
Simple slope analysis		
Low PED	Low FC	-0,42***
	High FC	-0,38***
High PED	Low FC	-0,26**
	High FC	-0,22**

Note. FC = Frequency of contacts; PED = Perceived ethnic density.
*** $p < 0,001$, ** $p < 0,01$, * $p < 0,05$

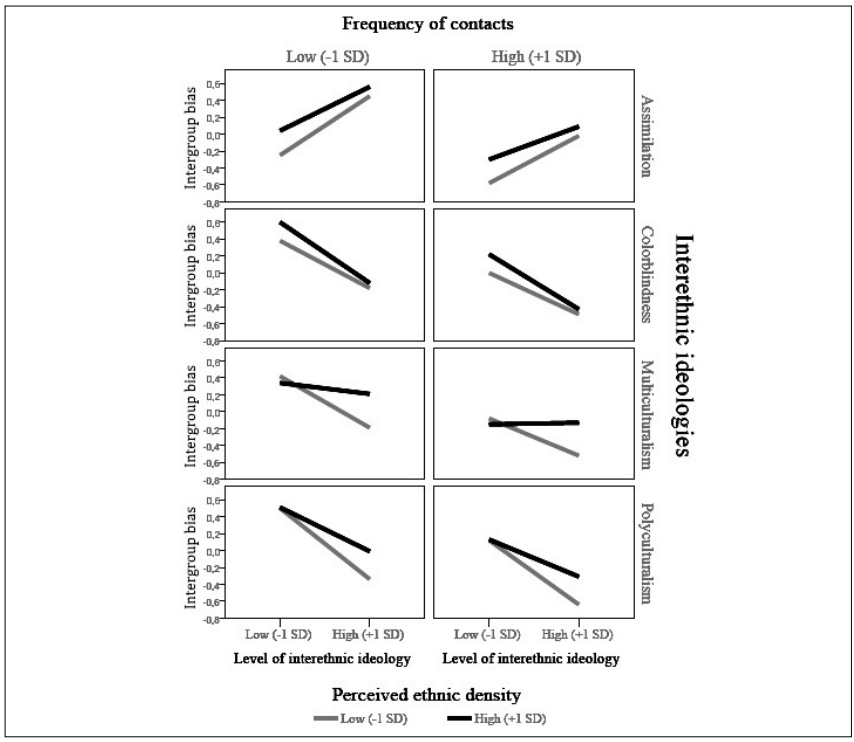

Figure 1. The simple slopes examining the relations between interethnic ideologies, perceived non-Russian ethnic density and frequency of interethnic contact for intergroup bias

Discussion

In this study, we investigated the moderation effects of neighborhood ED on relationships between assimilation, colorblindness, multiculturalism, polyculturalism and intergroup bias in the Russian context. In the case of ideologies that purportedly reject cultural diversity, we found negative (colorblindness) and positive (assimilation) relations with bias, respectively. We also found that high non-Russian ED weakened protective effects against intergroup bias for ideologies that purportedly accept cultural diversity (multiculturalism and polyculturalism). Moreover, while the negative multiculturalism-bias relation lost significance in the high ED condition, in contrast the polyculturalism-bias relationship was robust for those living in high non-Russian ED neighborhoods. Perhaps this finding occurred because polyculturalism is associated with more interest and appreciation for diversity and comfort with differences [9].

Some of our findings with ethnic density may be paradoxical. Indeed, beliefs in cultural diversity (i.e., multiculturalism and polyculturalism) were associated with less intergroup bias, but it is noteworthy that this relation seemed *more* pronounced in neighborhoods perceived to have a *smaller* proportion of minority members. Perhaps this finding speaks to some of the challenges with trust and cohesion that occur with increasing ethnic diversity [e.g., 1]. Although we found no correlation between ED and intergroup bias, ED may interact with individual attitudes and beliefs [e.g., 6]. In addition, our results confirmed the well-established finding that intergroup contact is associated with reduced prejudice [e.g., 22], and showed that non-majority group ED is associated with more contact with minority members.

Implications

Our patterns of results suggest that the relationship between attitudes and prejudice may change based on the perceived ethnic composition of the local area and frequency of interethnic contacts. The current study is one of the first studies to explore the interactions between ED and interethnic ideologies in the Russian population. It adds to the mounting evidence that attitudes or individual ideologies need to study in social context to better understand the complexity of psychological phenomena, and may help explain some of the contradictory findings in cross-cultural research which neglect to account for such (real or perceived) ecological contexts [e.g. 6, 29].

Limitations and Further Research

There are some limitations of the study and alternative explanations. Acceptance of cultural diversity (i.e., less bias) in the case of high levels of multi- and poly-culturalism may be due the features of design of this study; perhaps such a bias would be less pronounced in studies that examine implicit attitudes. Alternatively, the results may be affected by authoritarian attitudes. Those high on authoritarianism tend to overestimate diversity (or minority ethnic density) of their environment or live in neighborhoods with an objectively smaller minority presence, perceive more threat, and negatively relate to diversity [e.g., 9, 26]. Since the study is correlational and may be affected by unmeasured confounds, cause and effect between the measured variables cannot be disentangled.

In our study, we measured perceived non-Russian ED as perceived by the majority using revised items, which is not typical, given that most research uses perceived ED of the participant's group [e.g., 6, 13, 14], and it is less clear how the current adaptation is associated with objective or census-tract ED. Nevertheless, our findings support the idea that psychological attitudes are more meaningful when studied in social ecological context [4].

Future studies may benefit from use of a longitudinal design in well as objective measures of ED in combination with subjective ones [e.g., 13]. Other variables of interest may include authoritarian attitudes, perceived threat, intergroup anxiety, and national identification. Addressing these antecedents of intergroup bias from an ecological perspective may lead to a better understanding of intergroup attitudes and perhaps resolve some existing unanswered questions in the field.

Summary and Conclusions

The current exploratory study examined relations between intergroup bias, interethnic ideologies, and local area ED in an ethnically Russian sample. Participants reported less intergroup bias if they endorsed a greater amount of interethnic contact. Most interethnic ideologies (multiculturalism, polyculturalism, and colorblindness) were also associated with less bias, although the reverse was found for assimilation. Perhaps paradoxically, a greater perceived concentration of minority members in the participants' neighborhoods may have weakened the protective effects of ideologies focused on recognizing cultural diversity. Our findings may highlight some of challenges and opportunities associated with changing demographics, and shed further light on how belief systems may interact with social ecology. Future researchers will likely have a more meaningful story to tell if they study social psychological phenomena in context.

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References

1. Putnam R. D. E Pluribus Unum: Diversity and Community in the Twenty-first Century The 2006 Johan Skytte Prize Lecture. *Scandinavian Political Studies*, 2007, Vol. 30, pp. 137–174. DOI: 10.1111/j.1467-9477.2007.00176.x
2. Pedersen A., Paradies Y., Barndon A. The consequences of intergroup ideologies and prejudice control for discrimination and harmony. *Journal of Applied Social Psychology*, 2015, Vol. 45, pp. 684–696. DOI: 10.1111/jasp.12330
3. Rattan A., Ambady N. Diversity ideologies and intergroup relations: An examination of colorblindness and multiculturalism: Diversity ideologies and intergroup relations. *European Journal of Social Psychology*, 2013, Vol. 43, pp. 12–21. DOI: 10.1002/ejsp.1892
4. Jurcik T., Yakobov E., Ahmed R., Solopieieva-Jurcikova L., Sunohara M., Ryder A. Social Ecology and the Recontextualization of Acculturation:

Exploring the Psychological Role of Ethnic Density. In: J. Merton (ed.) *Acculturation: Psychology, Processes, and Global Perspectives*. Hauppauge, NY: Nova Science, 2014, pp. 97–114.
5. van Assche J., Roets A., Dhont K., van Hiel A. The association between actual and perceived ethnic diversity: The moderating role of authoritarianism and implications for outgroup threat, anxiety, and mistrust. *European Journal of Social Psychology*, 2016, Vol. 46, pp. 807–817. DOI: 10.1002/ejsp.2211
6. Jurcik T., Ahmed R., Yakobov E., Solopieieva-Jurcikova L., Ryder A. G. Understanding the role of ethnic density effect: Issues of acculturation, discrimination and social support. *Journal of Community Psychology,* 2013, Vol. 41, pp. 662–678. DOI: 10.1002/jcop.21563
7. Badea C. Group Ideologies. In: F. M. Moghaddam (ed.) *The SAGE Encyclopedia of Political Behavior*. London, UK: SAGE Publications, 2017, pp. 46–47.
8. Grigoryev D., Batkhina A., Dubrov D. Assimilationism, multiculturalism, color-blindness, and polyculturalism in the Russian Context. *Cultural-Historical Psychology*, 2018, Vol. 14, pp. 53–65. DOI: 10.17759/chp.2018140206
9. Rosenthal L., Levy S. R. The relation between polyculturalism and intergroup attitudes among racially and ethnically diverse adults. *Cultural Diversity and Ethnic Minority Psychology*, 2012, Vol. 18, pp. 1–16. DOI: 10.1037/a0026490
10. Berry J. W. Contexts of acculturation. In: D. Sam & J. W. Berry (ed.) *The handbook of acculturation psychology*. Cambridge, UK: Cambridge University Press, 2006, pp. 27–42.
11. Birman D., Trickett E., Buchanan R. M. A tale of two cities: Replication of a study on the acculturation and adaptation of immigrant adolescents from the former Soviet Union in a different community context. *American Journal of Community Psychology,* 2005, Vol. 35, pp. 87–101. DOI: 10.1007/s10464-005-1891-y
12. Shaw R. J., Atkin K., Bécares L., Albor C. B., Stafford M., Kiernan K. E., Nazroo J. Y., Wilkinson R. G., Pickett K. E. Impact of ethnic density on adult mental disorders: Narrative review. *British Journal of Psychiatry,* 2012, Vol. 201, pp. 11–19. DOI: 10.1192/bjp.bp.110.083675
13. Jurcik T., Yakobov E., Solopieieva-Jurcikova L., Ahmed R., Sunohara M., Ryder A. G. Unraveling ethnic density effects, acculturation and adjustment: The case of Russian-speaking immigrants from the former Soviet Union. *Journal of Community Psychology*, 2015, Vol. 43, pp. 628–648. DOI: 10.1002/jcop.21708
14. Stafford M., Bécares L., Nazroo J. Objective and perceived ethnic density and health: 111 findings from a UK general population survey. *American Journal of Epidemiology,* 2009, Vol. 170, pp. 484–493. DOI: 10.1093/aje/kwp160
15. Bécares L., Shaw R., Nazroo J., Stafford M., Albor C., Atkin K., … Pickett K. Ethnic Density Effects on Physical Morbidity, Mortality, and Health Behaviors:

A Systematic Review of the Literature. *American Journal of Public Health*, 2012, Vol. 102, pp. 33–66. DOI: 10.2105/AJPH.2012.300832
16. Miller A. M., Birman D., Zenk S., Wang E., Sorokin O., Connor J. Neighborhood immigrant concentration, acculturation, and cultural alienation in former Soviet 107 immigrant women. *Journal of Community Psychology,* 2009, Vol. 37, pp. 88–105. DOI: 10.1002/jcop.20272
17. Hodson G., MacInnis C. C., Busseri M. A. Bowing and kicking: Rediscovering the fundamental link between generalized authoritarianism and generalized prejudice. *Personality and Individual Differences*, 2017, Vol. 104, pp. 243–251. DOI: 10.1016/j.paid.2016.08.018
18. Satherley N., Sibley C. G. A Dual Process Model of attitudes toward immigration: Predicting intergroup and international relations with China. *International Journal of Intercultural Relations*, 2016, Vol. 53, pp. 72–82. DOI: 10.1016/j.ijintrel.2016.05.008
19. Grigoryev D., van de Vijver F., Batkhina A. Discordance of acculturation attitudes of the host population and their dealing with immigrants. *Journal of Intercultural Communication Research*, 2018. DOI: 10.1080/17475759.2018.1497678
20. Mallender J., Gutheil M., Heetman A., Griffiths D., Carlberg M., Marangozov R. *Discrimination of migrant workers at the workplace.* Luxembourg, Luxembourg: Publications Office, 2014. 64 p.
21. Wang C. S., Kenneth T., Ku G., Galinsky A. D. Perspective-Taking Increases Willingness to Engage in Intergroup Contact. *PLoS ONE*, 2014, Vol. 9 (1), e85681. DOI: 10.1371/journal.pone.0085681
22. Pettigrew T. F., Tropp L. R. A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, 2006, Vol. 90 (5), pp. 751–783. DOI: 10.1037/0022-3514.90.5.751
23. Visintin E. P., Voci A., Pagotto L., Hewstone M. Direct, extended, and mass-mediated contact with immigrants in Italy: their associations with emotions, prejudice, and humanity perceptions. *Journal of Applied Social Psychology*, 2017, Vol. 47, pp. 175–194. DOI: 10.1111/jasp.12423
24. Willis G. B. *Cognitive interviewing: A tool for improving questionnaire design.* Thousand Oaks, CA: Sage Publications, 2004. 335 p.
25. Rosseel Y. *lavaan:* An *R* Package for Structural Equation Modeling. *Journal of Statistical Software*, 2012, Vol. 48, pp. 1–36. DOI: 10.18637/jss.v048.i02
26. van de Schoot R., Lugtig P., Hox J. A checklist for testing measurement invariance. *European Journal of Developmental Psychology*, 2012, Vol. 9, pp. 486–492. DOI: 10.1080/17405629.2012.686740
27. Robinson C. D., Tomek S., Schumacker R. Tests of moderation effects: Difference in simple slopes versus the interaction term. *Multiple Linear Regression Viewpoints,* 2013, Vol. 39, pp. 16–25.

28. Hayes A. F. *Introduction to mediation, moderation, and conditional process analysis: a regression-based approach*. New York, NY: Guilford Press, 2013. 494 p.
29. Trickett E., Persky I., Espino S. Acculturation research: Proxies as sources of concept obfuscation. In: A. Gari, K. Mylonas (eds.) *Quod Erat Demostrandum: From Herodotus' ethnographic journeys to cross-cultural research*. Athens, Greece: International Association for Cross-Cultural Psychology, 2009, pp. 267–277.

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The subject of behavior and dynamics of its states

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Abstract

Introduction. The concept of a "subject of behavior" (SB) was formulated within the system-evolutionary theory in systemic psychophysiology. It is argued that the development of the concept of SB requires describing other components of this internally consistent theory.

Theoretical Review. This section reviews the theoretical and empirical grounds used by V.B. Shvyrkov to formulate the original foundations of the concepts of SB and "state of the subject of behavior" (SSB). SB is defined as the whole set of functional systems (elements of subjective experience) comprising memory. SSB is defined as a section of functional systems (part of the whole set) that are formed at different stages of individual development and simultaneously actualized in order to provide the deployment of a certain step of the behavioral continuum. Behavior is considered as the dynamics of SSBs, i.e. the transition from the state corresponding to one behavioral act of the continuum to the state corresponding to the next behavioral act.

Results. This section reviews the results of theoretical and empirical development of the concepts of SB and SSB that was aimed to expand their factually supported meaning. This development has been implemented via the research paradigm of system psychophysiology representing a field of multidisciplinary studies focused on the mechanisms of formation and actualisation of experience in human and other animals during individual and collective behavior. I review neurogenetic bases of experience formation; dynamics of the formation of the structure of experience within a strategic game; variability of SSBs during consequent behaviors; the role of learning history during formation of the structure of experience; specific characteristics of various domains of experience; the unified theory of consciousness and emotion along with its implications; dynamics of SSBs underlying regression; properties of various forms of social interaction in individuals with holistic and analytical mentalities; the system mechanisms of moral judgement of actions; and results of mathematical modelling of SB formation.

Conclusions. Results of the reviewed studies of SB and SSB demonstrate heuristic value of these concepts and their potential as methodological tools for coordinated development in various fields of psychology and neuroscience.

Keywords

brain, development, system, subjective experience, individual behavior, collective behavior, learning, regression, mind, consciousness, emotion

Highlights

► Subjective experience is represented by the models of individual and collective interactions with the environment, including the social environment, i.e. the systems (elements of subjective experience) that are formed in sequential acts of learning throughout the life span; the whole set of these systems form an individual's "subject of behavior" (SB).

► Current findings from interdisciplinary research of the structure of experience and its actualization, which is described as the transition from one "state of the subject of behavior" (SSB) (a specific set of systems actualized in a certain action) to another SSB, suggest that the concept of SB and SSB have great potential for development in psychology and neuroscience, integrating knowledge obtained from the studies of brain activity, behavior dynamics, and mentality in terms of the system-evolutionary theory.

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Introduction

The concept of "subject of behavior" is a component of the system-evolutionary theory formulated by Shvyrkov as a development of the theory of functional systems of P. K. Anokhin in psychology, neuroscience and psychophysiology. It is clear that the disclosure of this concept involves at least a brief description of the other components of this internally consistent theory. In this article, I will start with this description, and then give a definition of the subject of behavior and its dynamics (in the process of unfolding of the behavioral continuum) as it was done by Vyacheslav Borisovich Shvyrkov. In the last part of the article I will describe the further development of this concept and the expansion of its empirically grounded content which were carried out in the course of realization of the multidisciplinary research program of the "Systemic Psychophysiology" scientific school [1, 2, 3, 4], formed on the basis of the laboratory of psychophysiology named after V. B. Shvyrkov at the Institute for Psychology, Russian Academy of Sciences.

Theoretical Review

System-evolutionary theory and the concept of «subject of behavior» as its component

As the most important components of the factual basis of the system-evolutionary theory, V. Shvyrkov [1] considered: a) the establishment of specialization of neurones of different brain structures in relation to the systems formed during the mastery of behavioral acts at successive stages of individual development; b) the discovery of empirical arguments in favor of the fact that new organization of neurones, the impulses of which provide accomplishing a useful result of emerging behavior, is formed by selecting these neurons in the process of learning from the previously impulsively inactive ("silent") cells.; c) finding out the fact of simultaneous activation of neurones specialized in relation to systems of different "ages" (i.e. formed at different – early and late – stages of individual development), in the implementation of any behavior. Integration of these and other facts with the data and concepts available in psychology, physiology, neuroscience, ethology, sociology, genetics, anthropology, etc., allowed us to formulate the concepts of the system-evolutionary theory as follows.

"By interacting with the environment, the body deploys a genetic program of its own life cycle. Before the appearance of nervous system, interactions can be described by the following formula: genome <-> body <-> environment. The emergence of a developed nervous system (and the major part of the individual's genome is expressed in the cells of this very system) causes the modification of the above formula, turning it into: genome <-> brain <-> body <-> environment. Based on this modification, B. Shvyrkov considered the behavior as unfolding of the genetic program of the life cycle, which is "expressed" mainly in neurones. The nervous system in this case can be described not as a "body", but as a "subjective screen", which was formed during the evolution between the genetic program and its implementation, provided by bodily processes and changes in the interaction of the body with the environment" [5, p. 11–12].

"From the standpoint of these concepts, neurone is not a "coding element" or "combiner", but an "organism", which meets its needs with the help of metabolites, which come to it from other neurones, glial and other cells. Neurone impulse transmission occurs when there is a mismatch between the flow of metabolites from other cells and the metabolic needs of the neurone. These needs, in a situation of mismatch, determine the neural implementation of a special (impulse activity) way to change its connections with other cells, that at the whole organism level can (in case of activity coordination between this and many other neurones) act as an unfolding of individual behavior, aimed at achieving a holistic result, and provide "need-related" change in metabolic (including synaptic) inflow to this (and other) neurone(s).

The structure of "innate acts" manifests the history of adaptive interactions between organism and environment in the course of evolution. The neurones specialized in the systems of these acts are found more frequently in the relatively older structures of the central nervous system.

In the cortical structures of the brain there is a significant reserve of "silent" neurones. These cells are employed to form new behavioral acts. A set of these cells if selected from the previously silent neurones that provide activations in the test acts, and only those cells are selected whose activation provides the result of the formed act. Fixation of the new act system is realized through specialization of reserve neurones in relation to this system and strengthening of cell connections of new and previously formed behavior (this very condense formulation of the idea of the patterns of a new behavior formation was called the system-selection hypothesis of learning) [6, p. 125].

The systems of acts of behavior accumulated in the phylo- and ontogeny form the structure of the individual's subjective world. In this world there are no special neural "mechanisms of perception", "movements control", etc. Therefore, the analysis of the systemic specializations' composition and the dynamics of the neural impulsation can be considered an objective method for studying the structure and dynamics of the subjective world per se.

The nature of the implemented behavior is associated with a set of memory-extracted and simultaneously activated systems of different "ages", and their relationships (intersystemic ones) can be studied using both qualitative and quantitative methods.

"The emergence of human consciousness is inextricably linked with the formation of human community. The formation of the latter, probably, caused even greater modification of the relationships between the organism (person) and the environment than the development of the nervous system. The new relations are expressed by the following formula: genome < - > brain < - > body < - > cultural environment < - > society < - > universe. Therefore, the idea of the structure of the subjective world of a human being can be obtained by comparing the data obtained both with the help of brain activity mapping, and through the analysis of the structure of social consciousness, which elements are "assimilated" by the individual and transformed into individual knowledge. These elements include knowledge about "mental processes", such as perception, will, emotions, etc., which are actually products of social consciousness, formed as characteristics of the individuals' external behavior for practical purposes of the organization of interactions between society members. Not only the above, but also other concepts that describe the subjective reality, probably correspond to certain systemic states. It is these systems, and not from other "processes" (different for different psychologists) that constitute an individual's subjective world. A study

of the systemic states and "intersystemic relations algebra" can be considered to be a general task of systemic psychophysiology" [5, p. 13].

The structure of the subjective world and the subject of behavior

The conclusion of fundamental importance for psychophysiology, which follows from the above, is that the study of brain activity, especially its individual neurones, is the way to an objective analysis of subjective reflection. This is so because the specialization of neurones with respect to the elements of individual experience (functional systems) means that their activity reflects not the outside world as such, but the connections, interaction with the individual. Therefore, studying the systemic specialization of neurones is an adequate method for the description of the subjective world *proper*.

From the considered positions, the subjective world turns out to be a structure that, as noted above, includes functional systems accumulated in the course of evolution[1] and individual development.

In this regard, the term "subject of behavior" refers to the entire set of functional systems that make up the memory of the individual. The "the subject of behavior state" is understood as a part of this set – a set of systems formed at different stages of individual development and simultaneously actualized to

[1] "Accumulated in evolution in comparison with" individually specific "does not imply that the first are given to the individual as ready-made "bricks" of the structure of individual memory and in this sense are innate. There is considerable stock of literature devoted to the analysis of the meaning of the seemingly clear term "innate". It is effectively integrated in the theoretical work of R. Samuels [7]. As Samuels, in particular, notes, properties are often considered innate, if they are not acquired. Acquired are such properties that appeared during a certain period of development of the individual, until which they were absent. From the standpoint of this "perfectly sound understanding of acquisition», "all the cognitive structures are acquired", or let us formulate it differently – if "innate properties are those that are not acquired", then "there are no innate cognitive properties" [7, pp. 136, 137]. Our systemogenetic views are consistent with this approach. In accordance with them, any relationship with the environment, even the one that is species-specific (peculiar to all individuals of this species) as well as individually specific ones (appearing in connection with the peculiarities of the individual life history in some of the species representatives, but not in other individuals) is provided by the activity of specialized neurones, and their specialization occurs in the process of learning. This means that it is necessarily formed in the process of individual development, which represents a sequence of systemogenesis. In other words, any "innate" behavior does not exist initially in the form of a ready-made "brick" ("body part", "alphabet", integration, network, system, etc.), but is formed in the process of individual development, is in this sense acquired and carries the features of this development (see, for example: [8]). As for the difference between species-specific and individual-specific behavior, we can say the following. In early ontogenesis different groups of specialized neurones are formed due to selection. Then, in the process of learning (systemogenesis) the second stage of selection gets shaped, culminating in the specialization of the neurone in relation to the system of a particular act. Apparently, the pre-specialization of neurones intended for ancient systems of species-specific acts, in contrast to individually specific ones, is relatively rigid (but not absolute; see, for example: [9]) and determines what specific act they will be specialized for in the process of learning.

ensure the deployment of a specific stage of the behavioral continuum. A set of systems of different "age", the actualization of which constitutes the basis for achieving an adaptive result of a particular act of behavior, represents a unit of individual experience, and the system represents its element.

The dynamics of the subjective world as shift of the subjects of behavior states

"Behavior can be understood as an unfolding of a behavioural continuum, that is, a sequence of behavioural acts in which an individual act appears to be part of a continuum concluded between two outcomes: the preceding and the given acts. Thus, adjacent acts are joined by the transitional processes that unite them, which *simultaneously* represent an assessment of the result achieved in the previous act and the organization associated with this assessment, with planning of the next act" [10, p. 263]. Then *the dynamics of the subjective world* becomes a transition from one state of the subject of behavior to another in the behavioral acts shifts, which correspond to these states, and also represents the transitional processes, as a substitution of one set of systems with another.

Results

Experimental and theoretical development of ideas about the subject of behavior and its states

Below one can see representative examples that demonstrate the results of the development of ideas about the subject of behavior and its states in the scientific school "System psychophysiology" briefly discussed above (4; look http://www.ipras.ru/cntnt/rus/institut_p/nauchnye_s/nauchnaya_2.html).

Neurogenetic patterns of the experience structure formation

We have demonstrated that the expression of early genes, in particular, the early C-fos gene, can serve as a sign of the process of neurone specialization formation in relation to systems that through the learning process get included in the structure of experience characterizing the subject of behavior. It was found that the distribution of the expression product of this gene (protein c-Fos – transcriptional factor, inducing changes in the expression of other genes and leading to changes in the protein phenotype of the neuron) in the animal brain corresponds to the distribution of neurones specialized in relation to the acquired element of the experience of food-seeking behavior [11]. It was found that the subject of behavior state (the composition of actualized systems) in learning depends on the experience that the animal possessed before training [12]; the organization of the experience formed before this episode of learning is modified by learning through the

processes of accommodation reconsolidation [13, 14]. Thus, the subject of behavior in learning is modified both by the inclusion of new systems in its composition, and by the reorganization of systems formed at the previous stages of individual development.

The dynamics of the experience structure formation in the strategic game and the problem of the rational vs. intuitive

In the descriptions of formation patterns and dynamics of sets of systems typical for certain states of the subject of behavior, the concepts of "opposition" or "reciprocity" are used, denoting a complete or partial ban on the simultaneous actualization of interacting systems, as well as the concept of "synergy" as a characteristic of systems juxtaposition that provides the possibility of their simultaneous actualization in one set.

The use of mathematical apparatus of relational algebra [15] gave grounds for a more detailed consideration of these relations. In studies of the formation of two zero-sum and full-information partners in the strategic game, two groups of relations between the components of experience were identified. The first group of relations provides a sequence of components actualization, linking them into a "semantic propositional network" (SPN), which represents "strict order" relations, forming stable linear sequences and "non-strict order" relations that create loops and cycles on SPN [16]. The relations of the second group form a "semantic associative network" (SAN); they link components into groups or define demarcation between sets of components, restricting or prohibiting simultaneous updating of some of these sets. It is established that the processes of formation of SPN and SAN are asynchronous. Studies show that in similar behavioral situations different states of the subject of behavior get shaped on a consistent basis and the order of change of these states in individuals prone to predominantly "rational" or "intuitive" method of solving test problems, differs [17].

Variability the subject of behavior states in successive implementations of behavior

Insofar as neurones are specialized with respect to systems, with the help of recording the impulses of neurones in the unfolding of behavior, it is possible to establish what kind of system – elements of experience are actualized at each of the behavioral stages. It was found out that in the implementation of this behavioral act the subject of behavior state is represented as a group of systems, invariably (in all implementations) actualized in the unfolding of this act, and a group of systems, the composition of which varies from one implementation of the same looking act to another. At the same time, the

systems of the second group can always be involved in other acts of individual behavior. The variability of the subject of the behavior state characteristic of this act is associated with the complexity of intersystem and interneuron relations, which, apparently, can not be reproduced twice in an exact form. Indeed, even if we use the criterion of motor characteristics, re-implementing of the acts turns out to be "repetition without repetition" [18]. P. Anokhin [19] also stressed that the parameters of the result obtained in the implementation of behavior can not match the model formed in the acceptor of the action results with "mathematical accuracy".

Modification of the subject of behavior state means that when reproducing externally "the same" action, subjective world is not the same. The analysis of impulse activation of brain cells, representing the actualization of those systems, in regards to which these cells are specialized, allows to reveal qualitative and quantitative regularities, describing the dynamics of the state of the elements of experience, which determines the specified variability of the subjective world. Based on the data obtained in the course of such an analysis [20], it is established, for example, that 1) the severity of changes in the subject of behavior state in the implementation of successive implementations of the same (by the criterion of the achieved result) behavior is associated with the history of the formation of this behavior in learning and that 2) the variability affects relatively "newer" systems, i.e. those that were formed at later stages of individual development.

It was discovered that the subject of behavior state changes not only in successive implementations of externally identical behavior after changing the method of obtaining the result, but also when considering the states at much longer intervals. Thus, in animals, the lobes of neurones specialized in the approach to the pedal (pressing on which leads to appearance of a full feeder) and with respect to the approach to the feeder differed between the first and second weeks of the experiment with instrumental food-seeking behavior of animals [21].

Therefore, similarly looking acts of behavior at different stages of learning can correspond to different subject of behavior states. It is also found that changes in the subject of behavior state at successive stages of memory consolidation have an impact not only on the composition of activated systems, but also on the relations between the systems – intersystemic relations [22].

The subject of behavior state and the history of learning

We have found that different sequences of the stages of the same cyclic instrumental behavior are characterized by different actualization of the systems that as a result of learning make up the subject of behavior state. The results

showed that these differences relate to the above-mentioned dynamics of inter-systemic relations, in this case – the relations between the systems of the current behavior and systems of other behaviors implemented in the same environment. It is shown that in the nonspecific activity of specialized neurones (that reflects the aforementioned intersystem relations) the history of behavior formation is recorded, i.e. this activity (and hence intersystem relations) differs when we compare animals whose resulting behavior has a different history of formation [23].

In other experiments, it was discovered that the characteristics of the subject of behavior state are related to how the animal is trained to this (similarly-looking) behavior: in one or many stages. After multi-stage animal training in instrumental food-seeking behavior, this behavior activated more neurons involved that specialized in acts formed in the training of this behavior (neurones of "new" systems) than it happened in animals that learned similar behavior in one session [24].

The subject of behavior state and domains of individual experience

In special experiments conducted with the registration of neuronal activity in animals, we analyzed the relationship between different domains of individual experience (by which we mean sets of systems related to the commonality of the results achieved). It was found that systems from the domain of one form of behavior can be updated when performing acts of another domain. The differences in the number of relations between the systems of one domain of individual experience and systems belonging to different domains [25] are revealed. Thus, it is confirmed that the state of the subject of behavior includes systems of acts of the same form of behavior as well as the system of acts of other forms of behavior in an actualized form.

Relations between different domains of experience were studied in humans as well: they were studied in the experiments with semantic priming [26]. It is shown, in particular, that an essential factor determining the characteristics of the state of the subject of behavior is the number of systems in the domain of experience, the elements of which are actualized as a part of the composition of this state.

Systems of different "age" in the structure of the subject of behavior states and their psychological characteristics: a unified concept of consciousness and emotions

The unified concept of consciousness and emotions that we suggested [27–31] uses a non-disjunctive approach to the analysis of the problem of consciousness and emotions. The essential moment for the theory

is the statement reasoned by us and other authors, according to which successive systemogenesis, the formation of new systems in the processes of learning throughout individual development, is associated with an increase in the differentiation of the interaction of the individual and the environment. "Consciousness and emotions are the characteristics of different systems that are part of the subject of behavior state, which belong to different levels of the system organization of behavior. These levels are transformed stages of development of the individual, which correspond to relatively higher and lower levels of systemic differentiation. Emotions characterize the actualization of relatively "old" systems formed at the earliest stages of ontogenesis and correlated with the minimum level of differentiation: "good – bad" (approach – withdrawal). Consciousness characterizes the actualization of those relatively "new" systems, the formation of which in the later stages of ontogenesis provides an increase in the differentiation of individual's interactions" [32, p. 16–17]. In a number of experiments it was demonstrated that the change in expression of more or less differentiated systems in the state of the subject of leads to a corresponding change in the severity of these characteristics.

For over than twenty years we have been using this theory for the formulation of hypotheses and interpretation of results in various problem fields of psychology. An example of its application to the study of the connections between the language, the development of behavior in ontogenesis and emotions represented in a series of works [33–35], in which it is shown that if a person is offered to imagine (mentally realize) early-formed types of behavior, for example, those associated with olfactory and taste sensations or sensations of the skin, this person will assess the emotions that arise in this case as more intense than when he or she is presented with late-formed types of behaviors associated with visual, auditory or tactile sensations.

The difference is associated with different contributions (larger for the types of behavior of the first group) of low-differentiated systems in the subject of behavior state associated with the actualization of experience in the internal plan. In addition, the decision-making time when assessing the presented behavior also corresponded with the characteristics of the subject of behavior state: if a person represented early-formed behaviors, he or she evaluated them faster than late-formed ones. This pattern was probably due to the fact that earlier formed behaviors are provided with a smaller number of functional systems, than the ones generated later, and the updating of a smaller number of systems takes less time.

Another example is our formulation of the ideas about the system basis of regression.

Reversible dedifferentiation as a characteristic of the subject of behavior state typical of regression

Regression is usually understood as a decrease in the "level of organization" of behavior, a kind of return of the individual to the earlier stages of development. We conducted both theoretical and empirical analysis of the dynamics of system organization of behavior, based on the results of interdisciplinary research (from neurodevelopmental and neurophysiological studies in animals to studies of prosocial behavior in healthy adults and children, and also people suffering from chronic disease) to conditions in which there is regression: stress, illness, learning disability, emotional status and alcohol intoxication [36–40], allowed us to detect the similarity of the regularities underlying regression in these situations. In all of these situations, the subject of behavior state could be described as reversible dedifferentiation: a transient relative increase of expression of low-differentiated systems in the actualized experience. We have argued that it is the systemic ("developmental") value of dedifferentiation, "phenomenologically described as regression and being a common mechanism for restructuring the interaction of the organism with the environment in different situations in which past patterns of behavior have become ineffective, is the most significant factor that plays role not only in its consolidation it the course of evolution as a component of stress adaptation, but also in general its occurrence in those situations, which involve the formation of a new and major modification of existing adaptations in a changing external and/or internal environment" [40, p. 87].

Holistic and analytic nature of thinking as a culturally specified characteristic of the subject of behavior

A large amount of data accommodated in the literature allows us to believe that one of the key characteristics of the human mentality, including the fact of its cultural or subcultural embeddedness, is the analyticity–holisticity of thinking [41, 42]. Analyzing the co-evolution of the mentality types and institutional matrices, we can argue in favor of the predominant development of holistic strategies in non–Western countries, which are dominated by cooperative forms of interaction, and of analytical ones in the West, with a predominance of competitive forms of interaction [43, 44].

We have demonstrated that the systemic organization of behavior associated with competitive and cooperative forms of social interaction is different for subjects with analytical and holistic thinking. It turned out, that the holistic subjects expressed greater sensitivity to different forms of social interaction [45, 46]. It is revealed that for subjects with analytical thinking the process of actualization of systems within the subject of behavior state goes

on faster in competitive forms of interaction, and for subjects with holistic thinking – in cooperative ones.

The subject of behavior and moral assessment of actions

Moral assessment of actions is an important component of adaptive human behavior in society and is viewed from our point of view as a characteristic of the individual's integral behavior [9]. Features of moral assessment are determined by the set of systems that make up the structure of the subject's experience, and inter-system relationships that are associated with assessment (self-report) of one's own behavior with the eyes of an external "observer" (society). Moral assessments change with age and are specific for men and women [47, 48], as well as for representatives of different cultures [48]. Our results indicate that the moral assessment is based on the actualization of systems of different ages and degrees of differentiation: intuitive assessment of actions, which the subject learns from an early age, is based on the actualization of mostly low-differentiated experience and takes place in a similar form among representatives of different socio-cultural groups; rational evaluation of actions is provided mainly by actualization of highly differentiated experience, formed at later stages of individual development of the subject, and has a pronounced socio-cultural specificity. Using alcohol as a factor of controlled experimental influence on the subject of behavior state (selective oppression of actualization of the most differentiated systems), we have demonstrated that moral assessment is carried out mainly intuitively on the basis of actualization of low-differentiated systems, in the very first place alcohol inhibits the processes of rational reasoning, without disturbing the intuitive assessment of actions [49]. In addition, in the situation of moral evaluation, alcohol intake was associated with changes in the dynamics of the heart rate (increase in heart rate and decrease in RR-interval variability), which can be considered a physiological indicator of systemic dedifferentiation – a reversible decrease in the contribution of the activity of highly differentiated systems to behavior [50, 51].

We also analyzed the formation of a sense of justice in 4–11 years old children in terms of changes in the subject of behavior. The analysis is based on the results of the study of solutions of moral dilemmas "friend" – "stranger" in the situation of the implementation of behavior aimed at coordinating the opponent's goals: providing assistance to a member of his group when one is not obliged to, because he is a "friend", and vital assistance to a member of another group. The arguments are given that the decision in favor of "friend" is based on the actualization of the older systems that underlie parochial altruism, nepotism, etc., while the basis of the choice of assistance

to the "stranger" is the actualization of the later formed systems. In favor of this assumption, evidence suggests that older children prefer to help the "stranger" than younger children much more often [52]. The subject of behavior state in the implementation of later formed behavior (decision in favor of "stranger") is characterized by a pronounced "intersystem mismatch", which is manifested in a greater value of the index of vegetative balance in children, who more often side with a "stranger" than in children, who more often side with their "friend". Probably, this mismatch reflects the processes of learning and exists due to the implementation of the newly formed behavior, provided by the actualization of systems of different age, aimed at achieving previously agreed goals [53]. It can be assumed that an important role in the actual subject of behavior state is played by conscious control of one's own behavior, i.e. an internal report «in front of the society» (see above – "observing" society) on the compliance with moral norms, i.e. on compliance of the result achieved by an individual with the "collective result" of society [9]. Thus, the decrease in the level of conscious control of one's own behavior in the absence of visible external control in the face of the experimenter during the solution of moral dilemmas leads to the implementation of earlier formed behavior, an increase in the share of support to one's "friend" [54]. Moreover, stress, which blocks the actualization of more differentiated systems of behavior that was formed relatively late [38], causes regression of adults, as a rule, in the control of choosing the option of vital assistance to a member of someone else's group – to an "alien", to the "childish" method of making decisions: "my close people are always right" [55].

Mathematical modeling of patterns of the subject's of behavior formation and the dynamics of its state

With the help of mathematical modeling it was shown that the subject, by actively interacting with the environment in which it is located, spontaneously transforms it so that the objective laws of the environment change for him in the process of his activity in this environment [56]. In particular, the probability of occurrence of a certain situation in the environment (for example, the appearance of a "food object" in the field of view) is not fixed, but depends on the behavior of the subject and his skills of interaction with the environment and can significantly change in the learning process. Similarly, the regularities of the action – result ratio vary greatly: the probability of achieving the goal by a certain action (for example, the probability of successfully approaching the object from the left by the action of turning to the left).

There are some arguments in favor of the fact that it is necessary to study the behavior of the active subject by the method of immersion into

the environment [57], and not, for example, by the method of presenting incentives, in which the laws of the environment are fixed, and the subject is deprived of the opportunity to influence the environment. The results of the study of the behavior of model agents are consistent with the results obtained by us (see above) in the study of "natural" agents – people and animals: individuals who have a different history of formation of the subject of behavior structure and placed in the same environment, interact with it in different ways, and the laws of this environment are different for them depending on what skills they have learned in it [56].

In the research with the help of using mathematical modeling of the dynamics of the subject of behavior state, it is shown that if the actualization of the elements of experience (systems) is primary and determines the behavior, i.e. the dynamics of actualization of the elements of experience has immanent causes and is not determined solely by the external situation, the behavior can have fractal characteristics. Such a pattern can be considered in connection with the mechanism of "internal causality" and activity in the subject [58].

Conclusions

The above review of the results (both theoretical and empirical) of the use of the concept of "subject of behavior" and "the subject of behavior state" showed that they can be applied in order to

- analyze the laws of formation and actualization of the subjective experience of people and animals in individual and collective (competitive and cooperative) behavior;
- interpret the results obtained in field and model experiments;
- to study prosocial behavior in adults (belonging to different cultures and social groups) and its development in ontogenesis;
- to identify the mechanisms of influence of stress and alcohol on the systemic organization of behavior;
- to form a system-evolutionary understanding of the relationship of consciousness and emotions, as well as the value of regression as a stage of development;
- to examine the relationships between language acquisition and the development of behavior in ontogenesis and emotions;
- to describe differences between behaviors of approaching and avoidance as specifics of the properties of systems belonging to the matching domain experience;
- to establish a link between the history of mastering a certain behavior and the structure of the experience underlying this behavior; etc.

Analysis of the results of using the concepts of "subject of behavior" and "the subject of behavior state" shows that they can be successfully used to conduct research in a variety of problem fields of psychology and neuroscience, and also demonstrates the high heuristic efficiency of these concepts.

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References

1. Shvyrkov V. B., Alexandrov Y. I. (eds.) *Vvedenie v ob"ektivnuyu psikhologiyu. Neironal'nye osnovy psikhiki* [Introduction to objective psychology: Neuronal basis of mind]. Moscow, Institute of Psychology RAS Publ., 1995. 164 p.
2. Alexandrov Yu. I. Systemic psychophysiology. In: Chris Forsythe et al. (eds.) *Russian Cognitive Neuroscience: Historical and Cultural Context*. N.Y.: Create Space Independent Publishing, 2015, pp. 65–100.
3. Alexandrov Yu. I., Krylov A. K., Arutyunova K. R. Activity during learning and the nonlinear differentiation of experience. *Nonlinear Dynamics, Psychology, and Life Sciences*, 2017, Vol. 21, no. 4, pp. 391–405.
4. System psychophysiology. In: *Vedushchie nauchnye shkoly Rossii* [Russian leading scientific schools]. Moscow, Yanus-K Publ., 1998. 547 p.
5. Alexandrov Yu. I. Advancing the time: introduction. In: V. B. Shvyrkov Yu. I. Aleksandrov (eds.) *Vvedenie v ob"ektivnuyu psikhologiyu. Neironal'nye osnovy psikhiki* [Introduction to objective psychology: Neuronal basis of mind]. Moscow, Institute of Psychology RAS Publ., 1995, pp. 5–28.
6. Aleksandrov Yu. I. V. B. Shvyrkov as the originator of a new scientific worldview (on his seventieth birthday). *Psikhologicheskii zhurnal*, 2009, Vol. 30, no. 4, pp. 123–126 (in Russian).
7. Samuels R. Innateness in cognitive science. T*rends in Cognitive Sciences,* 2004, Vol. 8, no. 3, pp. 136–141. DOI: 10.1016/j.tics.2004.01.010
8. Alexandrov Y. I. *Moral' i geny. Predislovie k knige M. Khauzera Moral' i razum* [Morality and genes: Preface of the Moral Minds book by M. Hauser]. Moscow, Drofa Publ., 2008, pp. 5–17.
9. Aleksandrov Yu. I., Aleksandrova N. L. *Sub"ektivnyi opyt, kul'tura i sotsial'nye predstavleniya* [Subjective experience, culture, and social representations]. Moscow, Institute of Psychology RAS Publ., 2009. 319 p.
10. Aleksandrov Yu. I. System psychophysiology. In: *Psikhofiziologiya* [Psychophysiology]. St. Petersburg, Piter Publ., 2011, pp. 252–309.

11. Svarnik O. E., Alexandrov Yu. I., Gavrilov V. V., Grinchenko Yu. V., Anokhin K. V. Fos expression and task-related neuronal activity in rat cerebral cortex after instrumental learning. *Neuroscience,* 2005, Vol. 136, no. 1, pp. 33–42. DOI: 10.1016/j.neuroscience.2005.07.038
12. Svarnik O. E., Bulava A. I., Alexandrov Y. I. Expression of c-Fos in the rat retrosplenial cortex during instrumental re-learning of appetitive bar-pressing depends on the number of stages of previous training. *Frontiers in Behavioral Neuroscience*, 2013, Vol. 7, pp. 1–7. DOI: 10.3389/fnbeh.2013.00078
13. Alexandrov Yu. I., Grinchenko Yu. V., Shevchenko D. G., Averkin R. G., Matz V. N., Laukka S., Korpusova A. V. A subset of cingulate cortical neurons is specifically activated during alcohol-acquisition behaviour. *Acta Physiologica Scandinavica*, 2001, Vol. 171, no. 1, pp. 87–97. DOI: 10.1046/j.1365-201X.2001.00787.x
14. Svarnik O. E., Anokhin K. V., Aleksandrov Yu. I. Experience of the first "whisker-dependent" task influenced c-Fos induction in rat barrel cortex neurons during acquisition of the second "whisker-independent" task. *Zhurnal vysshei nervnoi deyatel'nosti im. I. P. Pavlova – I. P. Pavlov Journal of Higher Nervous Activity*, 2014, Vol. 64, no. 1, pp. 77–81 (in Russian). DOI: 10.7868/S0044467713060178
15. Osipov G. S. *Priobretenie znanii intellektual'nymi sistemami: Osnovy teorii i tekhnologii* [Knowledge acquisition by intelligent systems: Basics of the theory and technology]. Moscow, Nauka, Fizmatlit Publ., 1997. 112 p.
16. Aleksandrov I. O. *Formirovanie struktury individual'nogo znaniya* [Formation of the structure of individual knowledge]. Moscow, Institute of Psychology RAS Publ., 2006. 560 p.
17. Maksimova N. E., Aleksandrov I. O., Tikhomirova I. V., Filippova E. V. Typology of the intuitivity-rationality and forming of the individual knowledge structure. *Psikhologicheskii zhurnal*, 2001, Vol. 22, no. 1, pp. 43–60 (in Russian).
18. Bernshtein N. A. *Fiziologiya dvizhenii i aktivnost'* [Physiology of movements and activity]. Moscow, Nauka Publ., 1990. 494 p.
19. Anokhin P. K. *Filosofskie aspekty teorii funktsional'noi sistemy* [Philosophical aspects of the theory of functional systems]. Moscow, Nauka Publ., 1978. 400 p.
20. Aleksandrov Yu. I., Shevchenko D. G., Gorkin A. G., Grinchenko Yu. V. Dynamics of system organization of behavior in its sequential realization. *Psikhologicheskii zhurnal*, 1999, Vol. 20, no. 2, pp. 82–89 (in Russian).
21. Sozinov A. A., Grinchenko Yu. V., Kazymaev S. A., Aleksandrov Yu. I. Pokazateli stabil'nosti i dinamiki mozgovogo obespecheniya novogo povedeniya [Stability and dynamics of brain mechanisms for new behavior]. *Nelineinaya*

dinamika v kognitivnykh issledovaniyakh – 2015. Trudy IV Vserossiiskoi konferentsii [Proc. the IV All-Russian Conference "Nonlinear dynamics in cognitive studies – 2015"]. Nizhny Novgorod, Institute of Applied Physics RAS Publ., 2015, pp. 220–222.

22. Kuzina E. A., Aleksandrov Yu. I. Multiple repetition of instrumental behavior and the reorganization of its cerebral mechanisms. In: A. L. Zhuravlev, V. A. Kol'tsova *Fundamental'nye i prikladnye issledovaniya v sovremennoi psikhologii* [Fundamental and applied research in modern psychology]. Moscow, Institute of Psychology RAS Publ., 2017, pp. 1583–1591.
23. Gorkin A. G., Shevchenko D. G. Distinctions in the neuronal activity of the rabbit limbic cortex under different training strategies. *Zhurnal vysshei nervnoi deyatel'nosti im. I. P. Pavlova – I. P. Pavlov Journal of Higher Nervous Activity*, 1995, Vol. 45, no. 1, pp. 90–100 (in Russian).
24. Kuzina E. A., Aleksandrov Yu. I. Aktivnost' neironov retrosplenial'noi kory krys v povedenii, sformirovannom s raznym kolichestvom etapov obucheniya [Neuron activity in the rat retrosplenial cortex in the behavior formed with various numbers of learning stages]. *Sbornik tezisov: Dvenadtsatyi Mezhdunarodnyi Mezhdistsiplinarnyi Kongress "Neironauka dlya meditsiny i psikhologii"* [Proc. the 12th International Interdisciplinary Congress "Neuroscience for medicine and psychology"]. Sudak, 2016, pp. 235–236.
25. Gorkin A. G., Rozhdestvin A. V., Chistova Yu. R. Reconstructing relationships between the components of subjective experience by the activity of specialized neurons. *Neirokomp'yutery: razrabotka, primenenie – Neurocomputers: Development and Application*, 2015, no. 4, pp. 29–30 (in Russian).
26. Bezdenezhnykh B. N., Marchenko O. P. Categorization of words as a way of studying intersystem relations. *Psikhologicheskii zhurnal*, 2008, Vol. 29, no. 3, pp. 77–85 (in Russian).
27. Aleksandrov Yu. I. Soznanie i emotsii [Consciousness and emotions]. *Teoriya deyatel'nosti i sotsial'naya praktika: 3-i mezhdunarodnyi kongress* [Proc. the 3rd International Congress "Theory of activity and social practice"]. Moscow, Fizkul'tura, obrazovanie, nauka Publ., 1995, pp. 5–6.
28. Aleksandrov Yu. I. From emotions to consciousness. In: D. V. Ushakov (ed.) *Psikhologiya tvorchestva: shkola Ya. A. Ponomareva* [Psychology of creativity: I. V. Ushakov's school]. Moscow, Institute of Psychology RAS Publ., 2006, pp. 293–328.
29. Alexandrov Yu. I. Psychophysiological regularities of the dynamics of individual experience and the "stream of consciousness". In: C. Teddei-Ferretti, C. Musio (eds.) *Neuronal bases and psychological aspects of consciousness*. Singapour, N.Y., London, Hong-Kong: "World Scientific", 1999, pp. 201–219. DOI: 10.1142/9789814313254_0017

30. Alexandrov Yu. I. Comparative description of consciousness and emotions in the framework of systemic understanding of behavioral continuum and individual development. In: C. Teddei-Ferretti, C. Musio (eds.) *Neuronal bases and psychological aspects of consciousness*. Singapour, N.Y., London, Hong-Kong: "World Scientific", 1999, pp. 220–235. DOI: 10.1142/9789814313254_0018
31. Alexandrov Yu. I., Sams M. E. Emotion and consciousness: Ends of a continuum. *Cognitive Brain Research*, 2005, Vol. 25, no. 2, pp. 387–405. DOI: 10.1016/j.cogbrainres.2005.08.006
32. Aleksandrov Yu. I. Regularities of actualization of individual experiences and reorganization of its systemic structure: a complex investigation. *Trudy ISA RAN – Proceedings of ISA RAS*, 2011, Vol. 61, Issue 3, pp. 3–25 (in Russian).
33. Kolbeneva M. G., Aleksandrov Yu. I. *Organy chuvstv, emotsii i prilagatel'nye russkogo yazyka. Lingvo-psikhologicheskii slovar'* [Sense organs, emotions, and adjectives in Russian: Linguistic and psychological dictionary]. Moscow, Yazyki slavyanskikh kul'tur Publ., 2010. 368 p.
34. Kolbeneva M. G., Myagchenkova M. A., Aleksandrov Yu. I. Characteristics of the mental reactivation of tactile experience in patients with chronic tension-type headache. *Psikhologicheskii zhurnal*, 2017, Vol. 38, no. 3, pp. 66–80 (in Russian). DOI: 10.7868/S0205959217030060
35. Kolbeneva M. G., Aleksandrov Yu. I. Mental reactivation and pleasantness judgment of experience related to vision, hearing, skin sensations, taste and olfaction. *PLoS ONE,* 2016, Vol. 11, no. 7, e0159036. DOI: 10.1371/journal.pone.0159036
36. Aleksandrov Yu. I. Differentiation and development. In: *Teoriya razvitiya: Differentsionno-integratsionnaya paradigm* [Developmental theory: Differentiation-integration paradigm]. Moscow, Yazyki slavyanskikh kul'tur, 2009, pp. 19–28.
37. Aleksandrov Yu. I. Regressiya [Regression]. *Tezisy dokladov: 7-ya mezhdunarodnaya konferentsiya po kognitivnoi nauke* [Proc. the 7th International Conference on Cognitive Science]. Moscow, Institute of Psychology RAS Publ., 2016, pp. 100–101.
38. Aleksandrov Yu. I., Svarnik O. E., Znamenskaya I. I., Kolbeneva M. G., Arutyunova K. R., Krylov A. K., Bulava A. I. *Regressiya kak etap razvitiya* [Regression as a stage of development]. Moscow, Institute of Psychology RAS Publ., 2017. 191 p.
39. Aleksandrov Yu. I., Svarnik O. E., Znamenskaya I. I., Kolbeneva M. G., Arutyunova K. R., Krylov A. K., Bulava A. I. Alcoholization as a condition of regression in learning and prosocial behavior. *Voprosy psikhologii*, 2017, no. 3, pp. 80–91 (in Russian).

40. Aleksandrov Yu. I., Svarnik O. E., Znamenskaya I. I., Kolbeneva M. G., Arutyunova K. R., Krylov A. K., Bulava A. I. Stress, disease, and learning as conditions for regression. *Voprosy psikhologii*, 2017, no. 4, pp. 87–101 (in Russian).
41. Aleksandrov Yu. I. Cognition as systemogenesys. *Anticipation: Learning from the Past: The Russian/Soviet Contributions to the Science of Anticipation*. New York: Springer, 2015, Vol. 25, pp. 193–220. DOI: 10.1007/978-3-319-19446-2_11
42. Apanovich V. V., Znakov V. V., Aleksandrov Yu. I. Testing the analytic-holistic scale in a Russian sample. *Voprosy psikhologii*, 2017, Vol. 38, no. 5, pp. 80–96 (in Russian). DOI: 10.7868/S0205959217050075
43. Aleksandrov Yu. I., Kirdina S. G. Mentality types and institutional matrices: Multi-disciplinary approach. *Sotsiologicheskie issledovaniya (Sotsis) – Sociological Studies (Socis)*, 2012, no. 8, pp. 3–12 (in Russian).
44. Alexandrov Yu., Kirdina S. Toward integration of social mental and institutional models: systemic approach. *Montenegrin Journal of Economics*, 2013, Vol. 9, no. 1, pp. 7–15. Available at: http://repec.mnje.com/mje/2013/v09-n01/mje_2013_v09-n01-a11.html (Accessed 08 August 2018).
45. Apanovich V. V., Bezdenezhnykh B. N., Znakov V. V., Sams M., Yaaskelainen I., Aleksandrov Yu. I. Differences of the brain activity in individual, competitive and cooperative behavior between subjects with analytic and holistic cognitive styles. *Eksperimental'naya psikhologiya – Experimental psychology*, 2016, Vol. 9, no. 2, pp. 5–22 (in Russian). DOI: 10.17759/exppsy.2016090202
46. Apanovich V. V., Bezdenezhnykh B. N., Sams M., Jääskeläinen I. P., Alexandrov Yu. I. Event-related potentials during individual, cooperative, and competitive task performance differ in subjects with analytic vs. holistic thinking. *International Journal of Psychophysiology*, 2018, Vol. 123, Issue 1, pp. 136–142. DOI: 10.1016/j.ijpsycho.2017.10.001
47. Arutyunova K. R., Aleksandrov Yu. I. Factors of gender and age in moral judgment of actions. *Psikhologicheskii zhurnal*, 2016, Vol. 37, no. 2, pp. 79–91 (in Russian). DOI: 10.7868/S0205959217050075
48. Arutyunova K. R., Alexandrov Yu. I., Hauser M. D. Sociocultural influences on moral judgments: East-West, male-female, and young-old. *Frontiers in Psychology,* 2016, Vol. 7, no. 1334, pp. 1–15. DOI: 10.3389/fpsyg.2016.01334.
49. Arutyunova K. R., Bakhchina A. V., Aleksandrov Yu. I. The effects of alcohol on heart rate and evaluation of actions in moral dilemmas. *Eksperimental'naya psikhologiya – Experimental Psychology*, 2017, Vol. 10, no. 1, pp. 5–22 (in Russian). DOI: 10.17759/exppsy.2017100102
50. Bakhchina A. V., Alexandrov Yu. I. Heart rate complexity during the temporary systems dedifferentiation. *Eksperimental'naya psikhologiya – Experimental psychology*, 2017, Vol. 10, no. 2, pp. 114–130 (in Russian). DOI: 10.17759/exppsy.2017100210

51. Bakhchina A. V., Arutyunova K. R., Sozinov A. A., Demidovsky A. V., Alexandrov Y. I. Sample entropy of the heart rate reflects properties of the system organization of behaviour. *Entropy*, 2018, Vol. 20, no. 6, p. 449 (1–22). DOI: 10.3390/e20060449
52. Sozinova I. M., Sozinov A. A., Laukka S. J., Alexandrov Yu. I. The prerequisites of prosocial behavior in human ontogeny. *International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE),* 2017, Vol. 5, no. 1, pp. 57–63. DOI: 10.5937/IJCRSEE1701057S
53. Sozinova I. M., Bakhchina A. V., Aleksandrov Yu. I. Dynamics of heart activities during moral dilemmas solving by children aged 4–11. *Eksperimental'naya psikhologiya – Experimental Psychology*, 2017, Vol. 10, no. 3, pp. 97–109 (in Russian). DOI: 10.17759/exppsy.2017100307
54. Sozinova I. M., Peskova P. A., Aleksandrov Yu. I. Own/alien moral dilemmas solving by children aged 4–11 in the absence of a visible external control. *Voprosy psikhologii*, 2018, no. 2, pp. 53–63 (in Russian).
55. Znamenskaya I. I., Markov A. V., Bakhchina A. V., Aleksandrov Yu. I. The attitudes toward out-group in the stress: system dedifferentiation. *Psikhologicheskii zhurnal*, 2016, Vol. 37, no. 4, pp. 44–58 (in Russian).
56. Krylov A. K. *Psikhofiziologicheskii analiz reflektornogo vzaimodeistviya so sredoi* [Psychophysiological analysis of a reflective interaction with the environment]. Diss. Cand. Sci. (Psych.). Moscow, 2007. 208 p.
57. Krylov A. K., Aleksandrov Yu. I. Immersion in the environment as an alternative to the method of stimulus presentation: A model study. *Psikhologicheskii zhurnal*, 2007, Vol. 28, no. 2, pp. 106–113 (in Russian).
58. Krylov A. K. Aktualizatsiya opyta kak vozmozhnaya prichina fraktal'noi struktury poiskovogo povedeniya [Actualization of experience as a possible cause of the fractal structure of searching behavior]. *Trudy V Vserossiiskoi konferentsii: Nelineinaya dinamika v kognitivnykh issledovaniyakh-2017* [Proc. the V All-Russian Conference "Nonlinear dynamics in cognitive studies – 2017"]. Nizhny Novgorod, Institute of Applied Physics RAS Publ., 2017, pp. 128–131.

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