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Review Article

Success in Solving Riddles and Psychometric Intelligence of Students

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Abstract

The results of performing the intelligence test were compared with the successfulness of solving Russian folk riddles. Significant correlations between the level of intellectual ability and the number of riddles solved have been discovered. Linear regression relationships between the number of riddles solved and the successfulness of performing the intelligence test have been built. An assumption that riddles may serve as a cognitive model for the investigation of human intelligence was made.

Keywords: *Riddle, Intelligence, Metaphor, Language game*

Introduction

In the classical psychology of ability, intelligence is understood as the ability to solve well-defined problems, which, as a rule, have a single solution. The limitations of this interpretation have long been the subject of criticism by both domestic and foreign psychologists J. Guilford, E. Torrance and others). In this situation, a number of leading researchers of the problem of cognitive abilities criticize the academicism of the modern psychology of intelligence. For example, R. Sternberg calls the system of diagnosing intelligence a "vicious circle of testing", in the process of which one test is compared with another [1]. The need to rely on common sense in the study of intellectual phenomena is also emphasized by representatives of the so-called "contextual interactionism." Referring to IQ as "the kingdom of hobbits," M. Andersen criticizes the mechanism of the psychometric approach to intelligence [2]. For example, a large number of studies within the framework of cross-cultural psychology are devoted to the so-called "everyday cognition". In particular, A. D. Schliemann and D. W. Karracher "... call into question cognitive analysis, which is based solely on laboratory research" [3].

Basic Assumptions

Metaphorical ability-the ability to create metaphors-was spoken of as a creative ability by Aristotle [4]. As you know, metaphorization is based on the vagueness, inaccuracy and ambiguity of everyday concepts that a person operates. The assumption that the understanding and construction of metaphor is closely related to the intellectual abilities of a person is expressed by a number of Russian and foreign scientists (E. Cassirer, D. Lakoff, P. Ricoeur, M. A. and others). In particular, J. Ortega y Gasset points out that "... metaphor serves not only to change but also to think", and that it "... lengthens the arm of the intellect" [5].

In our study, the criterion of metaphor was the level of success in solving Russian folk riddles. The simplest and most succinct definition of the riddle is given by Aristotel, who understood the latter as "a well-constructed metaphor". I. I. Revzin, assuming the importance of riddles as an integral element of folk pedagogy, defined a riddle as "... a minimal coherent text that stimulates direct activity (finding a denotation)" [6]. Y. I. Levin, interpreting riddles as "... intentionally transformed description of reality", emphasized the fundamental difficulties of algorithmization and formalization of the semantic procedure for solving a riddle [7].

The important role of riddles as an integral attribute of archaic cultures is noted by J. Huizinga. Calling the riddle a "sacred game" that is on the verge of "serious and non-serious," this philosopher emphasizes the fundamental role of the play principle in the structure of social consciousness [8]. L. Wittgenstein, illustrating the understanding of the "language game", along with such classical examples of intellectual activity as the formulation and testing of hypotheses, the solution of arithmetic problems, also cites the solution of riddles as an example [9]. Although the experimental psychology of thought and intellect has a history of more than a century, only a few studies have been devoted to riddles. Such tasks are considered to be the prerogative of developmental psychology, and the object of study is most often children. It should be noted that the riddles are included in the set of test tasks of the popular in the United States test of intellectual achievements by A. S. Kaufman-Kaufman Assessment Battery for Children (KABCsampler.pdf) [10]. When planning the experiment, we proceeded from the hypothesis that the success of solving riddles, which are an example of problem situations used by people for the "spontaneous diagnosis" of ingenuity and ingenuity, is somehow related to the level of psychometric intelligence of adult subjects.

Research Methodology

In the experiments conducted with 2nd year students of the Faculty of Romance and Germanic Philology of the Bashkortostan State University, three selections of Russian folk riddles taken from an academic collection prepared by V. V. Mitrofanova [11] were used. Each experimental series consisted of thematically homogeneous riddles: in the first series (12 tasks) the subjects solved riddles dedicated to natural phenomena (rain, snow, snowdrift, etc.), in the second (10 tasks) riddles related to a person and parts of his body (teeth, tongue, mouth, etc.), and in the last series (10 tasks) students were offered riddles from the animal world. The experiment involved 130 people, 122 girls and 8 boys, aged 17 to 20 years. The experiments were carried out with training groups during laboratory classes on psychology, and no more than 30 minutes were given to solve each cycle. A separate lesson was devoted to the diagnosis of intelligence according to the test of R. Amthauer modified by V. N. Druzhinin [12].

Results of the Study

Describing the results obtained, it should be noted that a number of tasks turned out to be quite difficult for this contingent of subjects. For example, such riddles as "The little horse drank the whole lake", or "The mother-in-law stands on the current and threatens the daughter-in-law" in general, no one has solved. Although the experimental tasks were organized into thematically homogeneous cycles, only one subject suggested that the riddles were thematic. The average success rate of solving the riddles of the first series was 1.2, the second-3.3, and the third-0. 6 riddles. The results of R. Amthauer's test are much more stable: the average indices of success in solving the verbal, arithmetic, and geometric subtests of this method are 4.8, 4.1, and 5.8, respectively. A comparison of the success of solving riddles with indices with indicators of intellectual competence according to R. Amthauer using Kendall's nonparametric correlation coefficient revealed a large number of significant relationships ($p<0.05$), highlighted in bold in Table 1.

The normality of the distribution of the total results of R. Amthauer test, checked with the help of the Chi-square test, made it possible to apply the apparatus of linear regression analysis, in which the predictor was the number of solved riddles and the regressor is the success of the R. Amthauer test.

In general, the linear relationship between the overall success of solving riddles (X) and the number of correctly solved tasks according to the R. Amthauer test (Y) is described by the following equation ($p<0.01$):

$$Y = 9,6 + X \qquad (1)$$

In the process of analyzing the answers of the subjects, it turned out that for a number of tasks the students managed to find answers that did not literally coincide with the correct ones, but in general were no less successful. For example, the answer to the riddle "A black cat licks the window" is "night." The answer "wipers on the car window" was assessed as no less successful and was counted as a solution. This circumstance, already described in the literature (Levin, 1973), increased the variability of the subjects' answers and made it possible to compare the "conditional success" of solving individual riddles with the psychometric intelligence.

With the help of step-by-step regression analysis, it was possible to obtain a linear dependence between the total success of solving individual riddles (X) and intelligence (Y) for only seven experimental tasks: ($p<0.01$):

$$Y = 9,5 + 1,6X \qquad (2)$$

Conclusions and Prospects of the Study

1. A comparison of the productivity of R. Amthauer test with the success of students in solving Russian folk riddles revealed a close relationship between R. Amthauer intellectual competence and the number of correctly solved riddles.
2. The analysis of the success of solving individual riddles made it possible to construct a number of reliable linear regression dependencies between the total success of individual puzzle selections and the indices of intellectual competence according to R. Amthauer.
3. As a result of the experiments, it can be concluded that the riddle is a prototype of an intellectual test that was part of the system of folk psychology and pedagogy. The intellectual abilities of students, revealed with the help of riddles, are comparable to the indicators of the classical test of cognitive abilities, and riddles can be used as one of the methods of "non-classical" diagnosis of intelligence.
4. We believe that on the basis of the results obtained, it is possible to make an assumption about the fundamental importance of a comprehensive psychological and linguistic study of such forms of spontaneous intellectual activity as riddles, proverbs, humor, etc., for understanding such a complex phenomenon as human intelligence. Following L. Wittgenstein (Wittgenstein, 2003), the above phenomena can be considered as a kind of "transcendental normative language games" that play an important role in the process of socialization of the individual. In this regard, such a complex and ambiguous phenomenon as a riddle can be considered as a kind of complex lingvo-psychological model for the study of human intelligence.

Table 1: Intercorrelation matrix of intellectual competence according to R. Amthauer with the success of solving riddles.

	Verbal subtest	Arithmetic subtest	Geometric Subtest	Total intelligence	Success in solving riddles
Verbal subtest	1,00	0,10	0,19	0,36	0,20
Arithmetic subtest	0,10	1,00	0,40	0,65	0,21
Geometric Subtest	0,19	0,40	1,00	0,74	0,35
Total intelligence	0,36	0,65	0,74	1,00	0,34
Success in solving riddles	0,20	0,21	0,35	0,34	1,00

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