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## Adaptation and standardization of the R. Amthauer intelligence test on the Kazakhstan population

**Abstract.** *The article presents the experience of adapting the foreign intelligence test by R. Amthauer on the Kazakh population. The test translated into Kazakh was conducted on a sample of 509 people. Of these, 192 test takers were males, and 317 test takers were females. Pupils of school-lyceum «Binom-Uly Dala», Nur-Sultan city and first year students of humanities of L.N. Gumilyov Eurasian National University, aged from 13 to 18 years old, took part in the research. The article contains basic literature on this problem. It highlights the variants of psychodiagnostic tools developed with the adaptation of the test of the structure of intellect. It presents a brief description of R. Amthauer's structure of intellect. The article presents results of the study of reliability of subtests.*

*The results of the psychometric study are substantiated on a representative sample of respondents in the Kazakh and Russian languages. Cronbach's alpha (0.945) of R. Amthauer's intelligence test indicates a high level of internal consistency and reliability of test questions.*

**Keywords:** *psychodiagnostic, standardization of foreign tests, adaptation of foreign tests, intelligence structure test, R. Amthauer intelligence test.*

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### Introduction

At the present time, addressing questions of standardization of psychodiagnostic tests in Kazakhstan is caused not only by internal scientific, but also real practical demands of psychologists. Modern Kazakhstan psychodiagnostics has a small number of standardized techniques aimed at measuring the intellectual abilities of children and adults.

A number of psychological tests from Soviet times are fairly well-known and widely used in psychological practice (Wechsler, Amthauer, Eiseneck, Raven, Ketell tests, etc.), but they have not been adapted and standardized for the Kazakhstan population.

The Amthauer test and many other tests are counterfeit products, which in modern conditions of integration of Kazakhstani psychology violate copyright and publishing rights.

And, as the Russian scientist Baturin N.A. rightly notes. [1], psychodiagnostic tests of Amthauer, Wechsler and others from the 1970s, which are still in use today, have not been adapted and tested for reliability and validity. In fact, they have not been standardized.

The R. Amthauer test in the Russian-language version is used by Kazakhstani psychologists and in a free translation into the Kazakh language without adaptation or standardization.

Moreover, most psychologists are not aware of this fact and compare the results of modern

studies with the American (or German) norms of the 50-60s. Therefore, the results obtained are always not only questionable, but also distorted by inadequate norms [1,2,3]. There is a lack of theoretical and empirical validity of tests, which should be valid, reliable and representative. The translation of the Amthauer test contains dozens of errors, which were propagandized in manuals and textbooks on psychodiagnostics [4,5,6,7].

Manuals of tests for psychologists often lack information about tests developed with the requirements for diagnostic tools and results of their psychometric testing. It is worth noting here the usual tendency of non-comparability of results on tests, which, according to psychologists, investigate the same intellectual abilities.

The predominant majority of psychodiagnostic techniques, including the Amthauer test, are not fully adapted versions or simply translated. Applied research shows low correlations of test results with the effectiveness of the subjects' learning or professional activity.

The situation in the sphere of psychodiagnostic techniques used in Kazakhstan practice can hardly be called adequate and prosperous. The procedure of adapting any foreign psychodiagnostic test after the initial translation should undergo a mandatory expert evaluation of the equivalence of the obtained version to the original, including the reverse translation.

Expert evaluation of the translation includes the adaptation of the vocabulary and grammar of the language to the characteristics of the test takers for whom the questionnaire is intended. It is at this stage that not only obvious differences between the original and the translation should be eliminated, but also that cultural specificities of the country in which the original was created should be taken into account. After all, the norms and values of one society are difficult to find equivalents in another culture. It is worth paying attention to the need to improve the psychodiagnostic and especially psychometric culture of our psychologists in their training and advanced training.

The next important point for domestic psychological science is to update the content of textbooks and manuals on psychodiagnostics. After all, we are not sufficiently aware of the latest

developments in foreign psychology besides the tests we are familiar with in studying intellectual abilities. For example, in the appendix to the book by J. Guilford and R. Hopfner «Analysis of the intellect» [8] there are many types of tests for the analysis of intelligence containing many types of test types of tasks for measuring different sides of the intellect.

Today it is especially important for Kazakh psychological science not only to adapt and standardize foreign psychodiagnostic techniques, but also to create their own domestic tests for the study of various patterns of functioning and development of personality.

When creating domestic psychodiagnostic tests it is necessary to check them on all parameters and certify them. Standards for psychodiagnostic methods reduce the risk of harm to the test taker and are, to some extent, a guarantee that all the benefits of the tests are used with cross-cultural sensitivity.

Without solving this issue, it is impossible to carry out many scientific studies in Kazakhstan. In the long term, an important point for Kazakh psychological science is integration into the international scientific psychological community. And we will be required to unconditionally comply with international standards and recommended practices, applying to the International Test Commission (ITC) [9].

International practice has adopted ISO 10667. The first ISO standard includes various aspects of psychological assessment quality. This quality standard in the provision of psychological assessment services provides a framework on which more specific state and international standards and qualifications can be built.

Not only adaptation, standardization, but also certification of psychodiagnostic techniques is necessary for our country to further their use by psychologists in their practice. For example, the British Psychological Society (BPS), the European Federation of Psychological Associations (EFPA) and the International Testing Commission (ITC) have united to recommend psychodiagnostic tests to psychologists.

Many countries have long developed national standards and psychometrically grounded intellectual tests.

## The main part

The purpose of the study is to apply and use the R. Amthauer intelligence test on the Kazakhstan population in compliance with psychometric world standards and to familiarize with the experience of adapting the foreign method.

R. Amthauer's intelligence test was chosen for the following reasons:

1. The results of this test correlate well with scores on other tests on the study of intelligence Eysenck, Amthauer, Wechsler, Kettell, Raven, Sullivan, Flanagan, CAT, STUR and GATB;
2. The R. Amthauer test is well-proven, is a reliable tool for diagnosing the structure of intelligence and identifying levels of different aspects of its development in different linguistic cultures (French, Russian, Spanish, etc.). The need for its application now becomes relevant due to the need to identify the aptitudes and intellectual orientation of students, the right choice of further development of abilities and future profession. The advantage of the Amthauer test is the possibility not only of individual, but also of group testing.

Before proceeding directly to the main stages of adaptation, a few words about the method itself.

The R. Amthauer Intelligence Test is a well-known instrument for the diagnosis of intellectual development from the age of 12 to 61 years, which is widely used in many countries.

R. Amthauer's test (Amthauer Intelligenz-Struktur-Test, I-S-T) was proposed by the author in 1953 (second edition in 1973) and was known in our country only according to the description in the monograph by J. Schwanzara [10]. The theoretical basis of R. Amthauer's test is that the intellect is a specialized substructure in the integral structure of the personality. "This construct is understood by him as a structured integrity of mental abilities, manifested in various forms of activity" [11, p. 16].

The Russian version of this test has been adapted several times. For the first time, it was described in the monograph by V.M. Bleicher and L.F. Burlachuk «Psychological diagnostics of intelligence and personality» [12].

The scientific literature provides an adaptation of the R. Amthauer test under the guidance of L.K. Akimova and co-authors (1984) [13] and the adaptation version by V.N. Namazov and A.N. Zhmyrikov (1988) [14]. These options are incomplete and differ from the original test by R. Amthauer. In 2002, an adapted version of R. Amthauer's test was published by the author L.A. Yasyukova in a series of complex support for psychological practice of the IMATON company. This work is the result of comparative studies by Yasyukova L.A. with the predictive performance of the intelligence tests of Eysenck, Amthauer, Wexler, Cattell, Raven, Suliven, Flanagan, CAT, STUR, and GATB [15].

R. Amthauer's intelligence test consists of 9 subtests, which include general awareness, classification of concepts, establishment of analogies, generalization of concepts, solving arithmetic problems, the ability to find numerical patterns, the ability to mentally operate images of geometric shapes on a plane, the ability to operate images of three-dimensional figures and memorize words. The test consists of 176 items grouped into 9 subtests. Each subtest includes from 16 to 20 tasks that are performed by the test subjects for a while. A more detailed description of this test can be found in the work of E.E. Tunik [15] or on the website of the Institute of Practical Psychology Imaton <https://imaton.com/catalog/test-amthauera/>.

Adaptation and standardization of the test was carried out according to a certain technology and is a very time-consuming process. Let us briefly describe the process of adaptation and standardization of R. Amthauer's intelligence test.

The standard algorithm used in the practice of international research to adapt survey methods included the following procedures:

- 1) preparing a preliminary translation of the questionnaire into the user's language (for example, Kazakh);
- 2) editing the received preliminary version and an expert assessment of its equivalence with the obligatory involvement of linguists and professional psychologists who speak the original language and have experience in practical work with personality questionnaires;

3) reverse translation into the original language of the preliminary version; 4) presentation of a preliminary version of the translation into the user's language and back translation to the author of the original methodology for an expert assessment of their equivalence;

5) evaluation of the corrected version and secondary experimental verification of its equivalence to the original;

6) checking the stability of the final indicators of the test and identifying its validity;

7) collection of preliminary norms on the corresponding sample.

The test, translated and approximated to Kazakh cultural norms, was conducted on a representative sample of the adaptable population. The adequacy and closeness of the translation of the test to the mentality of the Kazakh culture and the Kazakh language were assessed by five psychologists experts who speak the state, Russian languages and the original test. Translation of each sentence, expressions and drawings of the test was evaluated by five experts in order to identify compliance with the original. In the process of translation, some expressions were replaced (proverbs and sayings were replaced with similar ones in the Kazakh language, arithmetic tasks, calculations given in foreign currency were replaced by tenge, etc.).

The translated version of the test was peer-reviewed by bilingual psychologists. After expert assessments, adjustments were made to the test in the Kazakh language.

The results obtained were calculated according to the «key» and received «raw» results (points) for each subject. Then the results were subjected to psychometric analysis and the z-transform of the sample was calculated for each age for whom the test is intended and for checking the internal consistency of the scales (Cronbach's alpha test). Average norms for each age for the population were revealed (QQ-plot procedure).

## **Results and discussion**

The test, translated into Kazakh, was conducted on a sample of 509 people. Of these,

192 test takers were male and 317 test takers were female.

The study involved students of the lyceum «Binom-Uly Dala», Nur-Sultan and first-year students of humanitarian specialties of the Eurasian National University named after L.N. Gumilyov, aged 13 to 18 years.

Due to the fact that in Kazakhstan schools are taught in the state and Russian languages, the Amthauer intelligence test was presented to the respondents in two languages, depending on the language of instruction at school. When collecting data for the normative sample, the test was presented in two languages - Kazakh and Russian.

Taking into account the peculiarities of the native speakers of the population of Kazakhstan (Kazakh is the state language, and Russian is the language of interethnic communication), the respondents chose the language of the test voluntarily. Representative data were obtained for each age group. The results obtained were subjected to psychometric analysis. Psychometric analysis was carried out in SPSS version 23.

To identify the norm of the R. Amthauer intelligence test, the average indicators and standard deviation were calculated for each age. The calculation results showed that for the sample for each age, the average is 100 points, and the standard deviation is 15 points for the sum of the results of each subtest.

This procedure allows you to assess the compliance of the sample data with a normal distribution for each age.

The results for each age are performed in z-transform according to the formula. The z-transform procedure is a mandatory procedure for standardizing tests, where the «raw» scores are «centered» based on a linear transformation of the raw data. The Z-transform is sometimes referred to as the procedure for centering test results on a representative sample. This procedure was carried out for each age for each of the 9 subtests. Based on the results of this procedure, there were obtained the normative indicators of the Amthauer intelligence test for each age.



**Table 1.** Indicators of calculating Cronbach's alpha of R. Amthauer's intelligence test.

| Reliability Statistics |                                              |            |
|------------------------|----------------------------------------------|------------|
| Cronbach's Alpha       | Cronbach's Alpha Based on Standardized Items | N of Items |
| 0,945                  | 0,938                                        | 176        |

To assess the internal consistency of the test, the Cronbach's alpha calculation was carried out, which shows the internal consistency of questions that describe the test scales, but are not an indicator of the homogeneity of the object under study.

The results of calculating the Cronbach's alpha of the Amthauer test indicate a high level of consistency and reliability of the test questions (0.945). The results of calculating Cronbach's alpha of R. Amthauer's intelligence test are shown in Table 1.

The results of the psychometric analysis carried out confirmed compliance with the psychometric requirements and meets the requirements of a normal distribution. As evidenced by the results of the z-transform. The results obtained on the Kazakh population once again confirm the compliance of the R. Amthauer intelligence test on the Kazakh population. A factor analysis of the R. Amthauer intelligence test with other tests was carried out in connection with other research tasks.

The factor analysis performed showed that all subtests are combined into one common factor with the highest weights, which also indicates the integrity and internal consistency of subtests in the structure of intelligence according to R. Amthauer's concept of intelligence. This result also indicates the high reliability of the test also on the Kazakh population.

The results of R. Amthauer's intelligence test normalization can be used on the Kazakhstani population for respondents from 12 to 18 years

old. The test norm results will be published in a separate user manual.

### Conclusion

The analysis and study of the psychometric indicators of R. Amthauer's intelligence test allow us to draw the following conclusions.

1. Normalization of test results for each age category meets the requirements of a normal distribution.
2. Internal consistency (Cronbach's alpha) of R. Amthauer's intelligence test has a high value (0.987).
3. Test norms have been created for the Kazakhstani population for the age from 12 to 18 years.

The psychometric testing of the test, the developed norms and the practice of using it in the framework of cross-cultural studies [led to the conclusion that the test is highly effective, which accordingly implies the use of the test in the practice of Kazakhstani psychologists.

In conclusion, I would like to say that the experience of developing the Kazakhstani version of the foreign intelligence test by R. Amthauer, presented in this article, in compliance with all professional standards and requirements, will contribute to the formation of an adequate understanding of this procedure among users and test developers and will reduce the likelihood of making those mistakes that can influence the possibility and effectiveness of the use of tests in the practice of Kazakhstani psychodiagnostics.

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### **Қазақстан халқына Р. Амтхауэрдің интеллект тестін бейімдеу және стандарттау**

**Аңдатпа.** Мақалада Р. Амтхауэрдің шетелдік барлау тестін қазақ халқына бейімдеу тәжірибесі берілген. Қазақ тіліне аударылған тест 509 адамға іріктеу бойынша жүргізілді. Зерттеуге қатысқандар Нұр-Сұлтан қаласындағы «Бином-Ұлы Дала» лицейінің және Л.Н. Гумилев 13 пен 18 жас аралығындағы оқушылары: 192 тест тапсырушы ер адам, 317 әйел адам. Бұл мәселе бойынша негізгі әдебиеттер берілген және интеллект құрылымы тестінің бейімделуімен әзірленген психодиагностикалық құралдардың нұсқалары сипатталған. Р.Амтхауэр интеллектінің құрылымына қысқаша сипаттама беріледі. Субтесттердің сенімділігін зерттеу нәтижелері берілген.

Психометриялық зерттеудің нәтижелері респонденттердің қазақ және орыс тілдеріндегі репрезентативті іріктемесіне негізделген. Р.Амтхауэрдің интеллект тестінің Кронбах альфасы (0,945) тест сұрақтарының ішкі жүйелілігі мен сенімділігінің жоғары деңгейін көрсетеді.

*Түйін сөздер:* психодиагностика, шетелдік тесттерді стандарттау, шетелдік тесттерді бейімдеу, интеллект құрылымы тесті, Р.Амтхауэрдің интеллект сынағы.

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### **Адаптация и стандартизация теста интеллекта Р. Амтхауэра на населении Казахстана**

**Аннотация.** В статье приводится опыт адаптации зарубежного теста интеллекта Р. Амтхауэра на казахстанской популяции. Переведенный на казахский язык тест был проведен на выборке 509 человек.

Из них 192 тестируемых составили лица мужского пола, а 317 тестируемых – женского пола. В исследовании приняли участие ученики школы-лицея «Бином-Улы Дала», г. Нур-Султана и студенты первого курса гуманитарных специальностей Евразийского национального университета имени Л.Н. Гумилева, в возрасте от 13 до 18 лет. Приведена основная литература по этой проблеме и рассказано о вариантах психодиагностического инструментария, разработанного с адаптацией теста структуры интеллекта. Дано краткое описание структуры интеллекта Р. Амтхауера. Представлены результаты исследования надежности субтестов.

Результаты психометрического исследования обоснованы на репрезентативной выборке респондентов на казахском и русском языках. Альфа Кронбаха (0.945) теста интеллекта Р. Амтхауера свидетельствует о высоком уровне внутренней согласованности и надежности вопросов теста.

**Ключевые слова:** психодиагностика, стандартизация зарубежных тестов, адаптация зарубежных тестов, тест структуры интеллекта, тест интеллекта Р. Амтхауера.

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