Introduction

Standardized norm-referenced tests are important for assessing adults with aphasia. Although standardized aphasia tests have been developed in several languages, none exist to date in the Russian language. Traditional aphasia assessment practice in Russia is based on the Lurian neuropsychological framework, which has a long tradition of qualitative, rather than quantitative analysis (Luria, 1976; Homskaya, 2005). The Multiple-Choice Test of Auditory Comprehension (MCTAC) in Russian was developed and standardized to help address the lack of aphasia assessment tools in Russian.

The MCTAC's construct validity was originally based on principles supporting the development of the traditional RTT (McNeil & Prescott, 1978) and has been further substantiated (Odekar & Hallowell, 2005, 2006). Concurrent validity of the test in English has been established for individuals with aphasia through strong correlations with scores from traditional administration of the RTT (Hallowell, 2008a), and with auditory comprehension scores from the Western Aphasia Battery (Kertesz, 1982) (Hallowell, 2008a).

In the current study, the MCTAC was translated into Russian and its psychometric properties were systematically explored. The primary goal was to describe the test's psychometric properties by analyzing data collected on a large sample of participants with and without aphasia.

Method

Participants without brain injury and language impairment (n=103) and participants with aphasia (n=75) were recruited in Moscow. All participants were native speakers of Russian and passed vision and hearing screenings. Participants with aphasia were administered the Russian modified short form of the Bilingual Aphasia Test (BAT) (Ivanova & Hallowell, in press) and were given subjective overall ratings of severity through consensus of two speech-language pathologists.

The MCTAC is a multiple-choice test based on an adaptation of the RTT (McNeil & Prescott, 1978) designed by Hallowell (2008a). To create the MCTAC the first eight subtests of the RTT were modified. Verb phrases such as "touch" and "put" were eliminated. Rather than being asked to manipulate items, participants are instructed to point to a target image corresponding to the spoken stimulus. As in the RTT, squares and circles are the shapes; colors are black, green, red, blue, and white; big and little correspond to the size of individual shapes. An image is located at each corner of a page. One of the four images on a page serves as a target corresponding to the spoken stimulus; the other three are non-target foils. Non-target images differ from target images in terms of visual characteristics representing one or more semantic elements of the verbal stimulus (shape, color, size, and spatial orientation). The location of the four images in each of quadrants of each visual array is counterbalanced. An example is presented in Figure 1.

[Insert Figure 1 about here]

Based on recommendations for a shortened form of the RTT (Arvedson & McNeil, 1985; Park, McNeil & Tompkins, 2000), five items were created for each of the eight subtests. The subtests vary in terms of verbal stimulus length and complexity. Scoring is binary (correct/incorrect). Visual stimuli for the Russian version are identical to the English version.

Verbal stimuli were translated into Russian by a native speaker of Russian. The translation was validated by a linguist who is bilingual in Russian and English.

Visual stimuli were presented in a test manual. Participants were instructed to point to the image corresponding to the spoken stimulus. Verbal stimuli were presented once for each item. Participants were not limited in the time they had to select an appropriate image.

To evaluate inter-rater reliability, performance of 15 participants with aphasia was scored at the same time by two examiners. These 15 participants were also tested twice over a period of one to three days to examine test-retest reliability.

Results

There was minimal variability in performance by participants without language impairment (M=99.47% SD=1.09%; range=95% - 100%). There was considerably more variance among participants with aphasia (M=67.5% SD=20%; range=10% - 100%) (see Table 1). Demographic characteristics, time post-onset, etiology of lesion, and aphasia subtype were not related to performance of participants with aphasia.

[Insert Table 1 about here]

Internal consistency for combined data was equal to or above .7 (Kuder-Richardson correlation) overall and for all individual subtests (see Table 2).

[Insert Table 2 about here]

Scores by the two examiners in the same session were perfectly correlated, $r(13)=1$, $p<.001$. Test-retest reliability was high overall and across subtests (see Table 3). There was no significant difference between testing sessions across subtests and overall, $t(14)=0.361$, $p=.723$.

[Insert Table 3 about here]

All eight subtests and the overall test effectively discriminated between performance of participants with and without aphasia (see Table 4). There was minimal (5%) overlap in overall percentiles for each group.

[Insert Table 4 about here]

Concurrent validity was established through correlations with the auditory comprehension items of the Russian modified short form of the BAT (Ivanova & Hallowell, in press) (see Table 5).

[Insert Table 5 about here]

Across all subtests there was a significant difference between groups of participants with aphasia having different levels of subjectively rated severity of language impairment, $F(3, 71)=29.7$, $p<.001$, $\omega^2=.54$. The total score on the Russian MCTAC decreased linearly with severity of language impairment, linear-trend contrast, $F(1, 71)=78.12$, $p<.001$.

Conclusions

Sensitivity and specificity of a new auditory comprehension test in Russian are strong. The overall score was a better discriminator for separating participants with and without aphasia than any individual subtest score. An overall score of 95% provides an appropriate cut-off score to discriminate MCTAC scores of those with and without aphasia, with a minimal overlap of 5% of participants. As with the traditional RTT, etiology of lesion, time post-onset, age, and aphasia subtype (anterior-posterior) were not related to performance on the MCTAC.

Overall and across subtests the test demonstrated high internal consistency (at or above .7). There was 100% agreement between examiners in scoring of the participants' responses, suggesting that the examiner factor had minimal influence on performance. Test-retest reliability was high overall and across subtests (except subtest #4).

Variance of MCTAC scores corresponded well with that of scores on an additional measure of comprehension ability. Interestingly, MCTAC test scores had a significant linear trend in relationship to subjective ratings of severity based on combined expressive and receptive performance.

The MCTAC has the potential for practical clinical and research applications. Simple administration and scoring allow the test to be administered reliably without extensive training. The test can be administered and scored in a short time – 30 minutes or less. Lack of a correlation between age or educational level and test scores supports the potential for use among participants with varying ages and educational backgrounds. This, along with the aspect of inherently “culture-free” test items attributed to the stimuli for the RTT, may bode well for administration of the test to a culturally heterogeneous population of Russian-speaking adults with aphasia.

In sum, the Russian MCTAC’s brevity of administration, ease of scoring, sensitivity, specificity, inter-rater and test-retest reliability, internal consistency, validity, and lack of bias according to age and education support its clinical strength for determining the severity of auditory comprehension deficits in Russian-speaking adults with aphasia. The test’s sensitivity to detecting change following treatment should be explored. Additionally, a Russian version of an English-language test using reading instead of auditory stimuli (Hallowell, 2008b), should be investigated.

References

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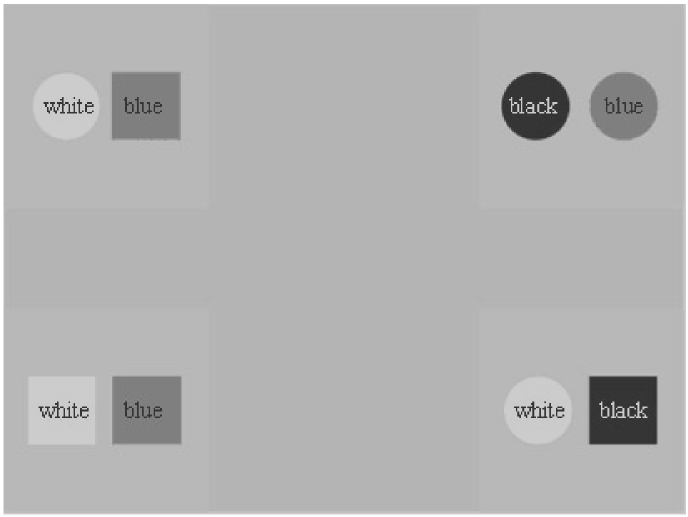

Figure 1. Example of a MCTAC visual array corresponding to the verbal stimulus “white square and blue square”. Note: The actual stimuli are colored; color words are printed only for this black-and-white illustration.

Table 1

Descriptive Statistics across MCTAC Subtests for Participants with Aphasia.

	N	Mean correct %	SD %	Range %
Subtests:				
1	75	89.6	20	20 – 100
2	75	82.9	26	0 – 100
3	75	79.6	26	0 – 100
4	75	72	27	0 – 100
5	75	54.3	30	0 – 100
6	74*	53.1	29	0 – 100
7	73*	63.3	30	0 – 100
8	72*	43.3	30	0 – 100
Overall	75	67.5	20	10 - 100

* Not all participants with aphasia completed subtests 6, 7, and 8.

Table 2

Internal-consistency Measures (Kuder-Richardson Correlation) for MCTAC Based on Combined Data of the Two Groups.

	Combined Data
	Kuder-Richardson correlation
Subtests:	
1	.799
2	.746
3	.750
4	.741
5	.766
6	.803
7	.796
8	.838
Overall	.959

Table 3

Test-retest Reliability of the MCTAC .

	Pearson Correlation
Subtests:	
1	.916**
2	.729*
3	.761**
4	.470
5	.619*
6	.574*
7	.518*
8	.577*
Overall	.976**

*p<.05
**p<.001

Table 4

Test of Differences in Scores between Samples with and without Aphasia.

	F-value
Subtests:	
1	26.24**
2	43.66**
3	62.65**
4	106.22**
5	226.63**
6	250.33**
7	141.69**
8	353.66**
Overall	259.05**

**p<.001

Table 5

Correlations between Scores on the MCTAC and Auditory Comprehension Items of the BAT.

	Pearson Correlation
Subtests:	
1	.615**
2	.645**
3	.67**
4	.478**
5	.646**
6	.6**
7	.527**
8	.529**
Overall	.756**

**p<.001