The Use of Standardized Tests for Individuals with Cognitive-Communication Disorders

Lyn S. Turkstra, Ph.D.,[1] Carl Coelho, Ph.D.,[2] and Mark Ylvisaker, Ph.D.[3]

ABSTRACT

The assessment of individuals with cognitive-communication disorders after traumatic brain injury can present a major challenge to speech-language pathologists. For this reason, the Academy of Neurologic Communication Disorders and Sciences Practice Guidelines Group dedicated a specific writing committee to this topic. This article summarizes the writing committee's efforts related to the use of standardized, norm-referenced tests. The article begins with the key questions speech-language pathologists might ask in choosing a standardized test. We then provide a summary of the results of the writing committee's data-gathering activities and a brief description of the tests that appeared to meet most established criteria for validity and reliability for use with this clinical population. The article concludes with the identification of areas in which instruments and additional normative data are needed.

KEYWORDS: Assessment evaluation cognitive-communication brain injury

Learning Outcomes: Upon completion of this article, the reader will be able to (1) define the terms ''standardized'' and ''norm-referenced'' in relation to tests, (2) discuss key criteria for evaluating a test's reliability and validity for the evaluation of individuals with cognitive-communication disorders after traumatic brain injury and identify tests that meet those criteria, (3) describe some strengths and limitations of current instruments, and (4) consider their own assessment practices in light of the findings.

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The assessment of individuals with cognitive-communication disorders after traumatic brain injury (TBI) can present a major challenge to speech-language pathologists. These individuals are a heterogeneous group, with complex constellations of strengths and limitations, and their formal inclusion in our scope of practice is relatively recent.[1] For this reason, the Academy of Neurologic Communication Disorders and Sciences (ANCDS) Practice Guidelines Group chose to dedicate a specific writing committee to the topic of assessment of individuals with cognitive-communication disorders after TBI. The aim of this writing group was to evaluate the evidence base for standardized and nonstandardized evaluation of cognitive-communication disorders and to provide guidelines for speech-language pathologists searching for valid and reliable tools in clinical practice. We divided this effort into two parts: this article is a discussion of standardized assessment approaches and is a clinically oriented summary of a comprehensive guidelines paper published elsewhere this year[2]; a companion article on nonstandardized assessment is also included in this issue of *Seminars in Speech and Language*. It should be noted that the writing committee focused on individuals with TBI but expected that the results would inform clinical evaluation of individuals with other acquired cognitive impairments, particularly those with frontolimbic lesions (e.g., related to anterior communicating artery stroke or frontal lobe tumors). A separate writing committee is addressing issues specific to dementia (see www.ancds.org).

This article begins with a few definitions, followed by a discussion of the questions speech-language pathologists might ask in choosing a standardized test of cognitive-communication skills. Next, we summarize the results of the writing committee's data gathering, including the results of surveys and literature reviews. This includes a brief description of the tests that appeared to meet most criteria for validity and reliability for use with individuals with cognitive-communication disorders after TBI. The article concludes by revisiting the central issue that motivated the committee—what, if any, standardized instruments are recommended for speech-language pathologists to use, and what is needed that does not currently exist? Readers will note that this is not an exhaustive review of available tests of cognition and communication, and the rationale for the choice of instruments, as well as the role of collaboration in assessment, will be discussed.

DEFINITIONS

For the purposes of this project, a standardized test was defined as a test with clearly defined procedures for administration. Many standardized tests are also norm referenced; that is, test scores are interpreted with reference to the scores from a normative sample.[3,4] Standardized, norm-referenced tests were the focus of this review.

For brevity, the committee used the term "test" to refer to both tests and measures of performance, recognizing that the more general term "measure" included instruments such as questionnaires and checklists. From the perspective of the International Classification of Functioning, Disability, and Health (ICF), published by the World Health Organization,[5] a standardized test can measure any component of health outcome, including impairments, limitations in activities and participation, and personal or environmental factors. For example, executive function can be measured using a standardized test such as the Behavioral Assessment of the Dysexecutive Syndrome[6] or using a nonstandardized set of verbal problems developed by a hospital for its own use. Similarly, performance in communication activities can be measured using a standardized test such as the Communication Activities of Daily Living[7] or a checklist from a published textbook, and communication participation can be measured using the recently published standardized Quality of Communication Life scale[8] or a nonstandardized measure such as the number of conversations that person engages in each week.

Standardized tests may be "functional," in the sense that they measure daily functioning, but because the administration is standardized, these tests are always limited in their ability to capture the unique characteristics of an individual's communication life. In the next section, we consider this and other limitations and strengths of standardized tests, beginning

with the key questions a clinician might ask in assessment.

KEY QUESTIONS FOR TEST EVALUATION

Question 1: Does the Person Have a Problem?

Typically, the initial question asked by the speech-language pathologist is whether a patient or client has a cognitive-communication disorder. That is, is the individual's communication performance in a given context outside the range of values that would typically be expected given that person's age, race, sex, education, culture, ethnicity, and socioeconomic status? This first question raises two key issues relevant to the selection of an assessment measure. First, a comparison with "typical" values suggests a need for normative data, but those data must include scores from individuals whose sociodemographic characteristics resemble those of the client, at least for the characteristics that might affect communication ability. Thus, we have identified several criteria for standardized, norm-referenced tests:

- The normative data must be from populations that resemble those for whom the test will be used (*appropriateness of the standardization sample*).
- The test must be able to identify a cognitive-communication disorder as distinct from typical communication behavior (*discriminant validity*), and the results should be consistent with other, valid diagnostic information (*concurrent validity*).
- The results should be the same regardless of who is giving the test (*interrater reliability*), and, to the extent that the individual and his or her context does not change, the results should be consistent over repeated administrations (*test-retest reliability*).

Question 2: If There Is a Cognitive-Communication Disorder, What Are Its Characteristics?

A clinician evaluation does not conclude with the diagnosis. Rather, the clinician aims to characterize the factors contributing to performance. This is particularly true in cognitive-communication disorders, in which the core feature is that impairments in underlying cognitive processes such as working memory, self-regulation, and divided attention are manifest in difficulties in listening, speaking, reading, and writing. Thus, a critical requirement of a standardized test for individuals with TBI is that it considers the relation of cognition to communication in its construction and that it measures what the test authors claim to measure. We can then add the following to our list of test criteria:

- The test should be well described, including reference to its theoretical and empirical foundations, and the authors should clearly describe the purposes and characteristics of items and subtests (*content validity*).
- The test should look as if it is measuring what it is supposed to and should appear as such to the test-taker (*face validity*). For example, a pediatric test of receptive vocabulary might appear to an adult test-taker to be childish, and this might confound his or her response tendencies.
- Individuals with cognitive-communication disorders—in this case related to TBI—should be mentioned in the test materials as a population for which the test is appropriate. Ideally, individuals with cognitive-communication disorders should be included in the standardization process so that clinicians can see evidence of differences between typical and injured groups and decide whether the test has a sufficient sensitivity and specificity for their use.
- A factor analysis, item analysis, or other statistical measure should indicate that the test data are consistent with the intended structure of the test (*construct validity*).

Question 3: What Are the Implications of the Test Results beyond the Test Session?

Murray and Chapey[9] identified several reasons for which one might perform a clinical assessment. These include medical or neurological diagnosis, diagnostic classification (e.g., aphasia

versus a cognitive-communication disorder), measuring progress, generating a prognosis, determining eligibility for services, and preparation for legal testimony. No test will be valid for all of these purposes; rather, as Plante[10] stated in relation to child language tests, "the validity of an assessment procedure is completely dependent on the purpose for which the clinician employs it and for the inferences the clinician intends to draw" (p. 100). Thus, the test stimuli must engage cognitive and communication processes that are invoked in the contexts to which the results are to be generalized. The tasks do not have to be the same as those in the individual's daily communication life as long as they predict performance in those settings. Thus, another criterion is as follows:

- The tests should predict performance on other measures or in contexts to which the results will be generalized (*predictive validity*). Beyond this, these contexts should be relevant to the client in his or her daily communication life (*ecological validity*).

For example, if an individual needs specific skills for work, home, or school, the test should capture critical elements of the demands those contexts place on communication. Also, if a test is used to make intervention and placement decisions (e.g., decisions about independent versus assisted living or the use of assistive technology), there must be evidence that the test scores do, in fact, predict performance in those contexts. Again, this does not mean that test items must be identical to the context; rather, it means that the component skills required are captured by the test.

Given the infinite variety of individual contexts, the ANCDS writing committee's efforts in regard to evidence for validity must be considered a "first-pass" attempt at identifying which tests and approaches meet the most basic criteria for a test. Ultimately, the decision of which test or measure to use will depend on the context itself.

Question 4: Where Should I Begin with Treatment?

Many clinicians surveyed by the ANCDS writing committee reported that they used tests to identify clients' strengths and challenges as a starting point for intervention. In fact, many test manuals include statements about using the results to set treatment goals. Typically, this means that the subtest scores stand alone. For example, a test might have subtests for abstract reasoning, immediate memory, delayed memory, calculation, and naming. A clinician might interpret low scores on one of these subtests as indicating an area in which intervention is needed. Most often, however, the factor analysis of the test data does not support this use. That is, most tests used by speech-language pathologists are single-factor or, at most, two-factor tests, for which the only mathematically independent score is the total score. Most clinicians would be surprised to know the extent to which the scores of "normal" individuals in the standardization sample vary from subtest to subtest. Inspection of the standard deviations of the standardization sample on a particular subtest can be informative in this regard. Thus, to our list of criteria we should add:

- A test that purports to identify "strengths and weaknesses" for intervention should provide statistical evidence that the measures of these individual components stand alone as distinct scores (another aspect of *construct validity*).

If the reader is not familiar with the just-noted statistical aspects of test construction, it might seem intimidating to make judgments about the test's validity. There are, however, several good sources of basic information that can be of assistance, including publications by Anastasi and Urbina[4] and articles from the child language literature such as those by Plante[10] and Sabers.[11]

REVIEW OF PUBLISHED TESTS

The questions just presented yielded a list of test criteria, and these were the criteria used by the ANCDS writing committee in their evaluation of standardized tests. The tests chosen for evaluation were those recommended by speech-language pathologists responding to a survey on assessment ($n = 84$ tests) or by test

publishers and distributors ($n = 40$ tests). It should be noted that neuropsychological tests of component processes were included only if they were recommended for or by speech-language pathologists. This is not to imply that the assessment of cognitive functions is beyond the scope of practice of speech-language pathology. Rather, detailed reviews of neuropsychological tests are available elsewhere[12,13] and thus were considered beyond the scope of the committee's efforts.

The writing committee combined the two lists and completed a first-stage screening to eliminate tests that did not mention TBI in the test manual. This yielded a final group of 31 tests for children, adolescents, and adults, which are listed in Appendix A. These were reviewed in detail to determine whether they met criteria for reliability and validity established by the Agency for Health Care Policy Research (www.ahrq.gov/clinic/epc/, accessed August 1, 2005). Of these, seven tests or measures met most of the published criteria. These were considered by the committee to be candidate tests for standardized assessment in appropriate contexts (i.e., where the test's goals, structure, and standardization sample matched the needs of the clinician and the characteristics of the individual with the cognitive-communication disorder). They are as follows:

- American Speech Language Hearing Association Functional Assessment of Communication Skills in Adults (ASHA-FACS[14])
- Behavior Rating Inventory of Executive Function (BRIEF[15])
- Communication Activities of Daily Living, Second Edition (CADL-2[7])
- Functional Independence Measure (FIM; Uniform Data System for Medical Rehabilitation[16])*
- Repeatable Battery for the Assessment of Neuropsychological Status (RBANS[17])
- Test of Language Competence–Extended (TLC-E[18])
- Western Aphasia Battery (WAB[19])

**The FIM was included because of its psychometric strengths, with the caveat that the items for evaluation of communication are very limited and the rating scale may lack the sensitivity to capture meaningful improvements.*

These tests and measures are discussed in detail in the full guidelines report.[2] It is noteworthy that of the 31 tests reviewed, only 4, including the FIM, formally evaluated predictive validity, and only 2 (the BRIEF and ASHA-FACS) formally evaluated performance outside clinical settings. In general, tests used and recommended by speech-language pathologists were strong in content and face validity (i.e., thoughtfully constructed) but relatively weak in construct validity (i.e., did not measure what the manual claimed, particularly "strengths and weaknesses"). Ecological validity was not measured formally by any test and thus must be considered a weakness. It is noteworthy, however, that several of the tests (the CADL-2, ASHA-FACS, BRIEF, and TLC-E) were based on research about daily communication needs in the target population, and the ASHA-FACS and CADL-2 explicitly incorporated consumer feedback about ecological validity into the design.

Several other issues are suggested by inspection of the final list. First, from the ICF perspective, there are tests and measures at both the impairment level and the activity/participation level of health outcome. Although none consider personal or environmental factors influencing performance (e.g., access to communication opportunities, desire to engage in social activities, or partner competencies) and none formally compare capacity with performance, three of the measures (the BRIEF, FIM, and ASHA-FACS) incorporate the perspectives of relevant others in the individual's daily life. This reinforces the point made earlier in this article, that "standardized" does not mean "impairment-oriented" or "nonfunctional" (in the sense of addressing activities in daily living). Second, the lists includes a comprehensive test battery (the WAB), a single construct battery (the TLC-E), and a screening test (the RBANS), as well as questionnaires, illustrating the range of test types available in different settings.

A third, and perhaps the most important, theme that emerges from the lists here and in the Appendix is the striking absence of a test developed for the evaluation of *communication* in individuals with cognitive-communication disorders, versus tests of basic neuropsychological functions that may be administered by

speech-language pathologists or tests borrowed from other populations, such as aphasia. To date, much of the research on communication disorders after TBI has focused on characterizing behavior, including communication behaviors in contexts such as discourse. Now that more data are emerging, it is hoped that this will lead to the development of new tests specifically for this population. A promising development in this regard is the recent publication of the Functional Assessment of Verbal Reasoning and Executive Strategies,[20] which was designed specifically for the assessment of cognitive-communication skills in activities that require reading, writing, and reasoning. Many of the respondents to the ANCDS survey commented on the shortcomings of existing tests and the need for tests across service delivery settings. This is a critical research need for the future.

ADVICE FROM THE EXPERTS

To put the test review in context, the ANCDS writing committee reviewed the work of experts in the field, as published in texts and chapters. The expert authors were Kennedy and DeRuyter,[21] Hartley,[22] Gillis, Pierce, and McHenry,[23] Ylvisaker and Gioia,[24] Sohlberg and Mateer,[25] and Blosser and DePompei.[26] The general consensus of these experts was that standardized tests should be viewed as only one component of an evaluative process that includes multiple sources of information. They considered tests to be useful for the identification of cognitive and linguistic functions that might influence communication performance but noted the discordance between standardized tests—most of which are at the impairment level—and the needs of clients in life outside clinical settings.

Most of the experts recommend a combination of cognitive tests and language or aphasia tests, acknowledging the many psychometric problems in this approach, including the questionable validity of using tests designed for language development or aphasia for an individual with an acquired cognitive-communication disorder. Overall, the authors noted that the limitations of existing measures could lead to a misleading picture of the individual's communication performance outside clinical settings.

RECOMMENDATIONS OF THE WRITING COMMITTEE

Typically, evidence-based practice papers conclude with a statement about practice *standards*, *guidelines*, or *options*, depending on the quality of the available evidence. Given the limited evidence in regard to standardized assessment for individuals with cognitive-communication disorders, the committee limited its recommendations to practice options. In brief, these were as follows: (1) to use caution when evaluating individuals with cognitive-communication disorders using existing standardized tests, given the limitations discussed in this article; (2) to consider standardized testing "within a broader framework that considers evaluation of the person's pre-injury characteristics, stage of development and recovery, communication-related demands of personally meaningful everyday activities and life and communication contexts"[2(p. xxxii)]; and (3) to collaborate with other professionals who evaluate cognitive function, particularly when considering the use of impairment-level cognitive tests. With the caveats noted previously, the committee also recognized that the seven tests on the final test list met most of the established criteria for reliability and validity and thus might be used in appropriate contexts.

The writing committee identified several areas in which there is a critical need for future research. These included research to develop improved standardized measures of communication (including social communication and connected discourse) at the impairment and activity/participation levels of health outcome, measures that consider context factors such as partner communication competence, studies of the predictive value of tests beyond clinical assessment settings, and normative data for populations that were underrepresented in or excluded from the standardization samples of most tests, including individuals from minority populations and those with preexisting language disorders.

SUMMARY AND CONCLUSIONS

Given the limitations of most of the standardized tests in our field, it is tempting to abandon the notion of standardized assessment

for individuals with cognitive-communication disorders after TBI. The heterogeneity of this group and the discrepancy between performance in structured versus unstructured settings might suggest that a standardized approach will never yield useful information for an individual client. Nonstandardized approaches have many limitations, however, as discussed in the next article. Thus, rather than abandoning standardized tests, we should take an active role in developing instruments that meet our needs.

As the field of speech-language pathology begins to incorporate formally the ICF framework in assessment, we will need new assessment tools that capture multiple elements of health outcome. The recent publication of measures such as the ASHA Quality of Communication Life Scale[8] is an encouraging move in this direction, and we look forward to future research evidence that our instruments make a difference to the health outcomes of our clients.

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Appendix A. Standardized Tests Reviewed

American Speech Language Hearing Association—Functional Assessment of Communication Skills
Aphasia Diagnostic Profiles
Behavior Rating Inventory of Executive Function (Parent Report Form)
Behavioral Assessment of the Dysexecutive Syndrome
Brief Test of Head Injury
California Verbal Learning Test–Second Edition
California Verbal Learning Test for Children
Children's Orientation and Amnesia Test
Clinical Evaluation of Language Fundamentals (Third Edition)
Cognitive Linguistic Quick Test
Communication Activities of Daily Living (Second Edition)
Comprehensive Assessment of Spoken Language
Controlled Oral Word Association Subtest
Discourse Comprehension Test
Functional Independence Measure
Galveston Orientation and Amnesia Test
LaTrobe Communication Questionnaire
Measure of Cognitive-Linguistic Abilities
Mount Wilga High Level Language Test
Multilingual Aphasia Examination
Paced Auditory Serial Addition Test
Rancho Los Amigos Levels of Cognitive Functioning
Repeatable Battery for the Assessment of Neuropsychological Status
Rivermead Behavioral Memory Test
Ross Information Processing Assessment (Second Edition)
Scales of Cognitive Ability for Traumatic Brain Injury (Normed Edition)
The Speed and Capacity of Language Processing Test
The Token Test (Shortened Form)
The Awareness of Social Inference Test
Test of Everyday Attention for Children
Test of Language Competence–Extended
Western Aphasia Battery