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Regulating the Diagnosis of Learning Disability and the Provision of Test Accommodations in Institutions of Higher Education¹

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The current paper describes an endeavor to develop policy and procedure for standardizing and regulating the diagnosis of learning disability (LD) both in applicants to higher education institutions and in currently enrolled students, and for regulating the provision of test accommodations.

This endeavor, conducted by The National Institute for Testing and Evaluation (NITE) in cooperation with the Council of Higher Education in Israel, included: (1) development, validation and norming of MATAL: a computer-based test battery for the diagnosis of LD; (2) development of a statistical decision rule for determining diagnosis based on test results; (3) development of guidelines for the provision of test accommodations; (4) establishment of diagnostic centers within institutions of higher education; and (5) establishment of a professional network of all parties involved in the diagnosis and support of students with LD in institutions of higher education.

Over 10,000 applicants to higher education institutions and students were diagnosed by MATAL in the past five years.

Key words: higher education, learning disability, test accommodations, test standardization,

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Introduction

Over the past decade, there has been an increase in the number of students with learning disabilities (LD) in schools, colleges and universities. According to the American Council on Education (1995) and the U.S. Department of Education Annual Report (2000), approximately 10% of students in the American education system were diagnosed with LD (Vogel, 1998). According to the National American Resource Center (HEATH) and the National Center for Education Statistics (2000) about 9% of all college students in the U.S. reported having LD. In Israel, enrollment in higher education institutions of students with LD was estimated to be 3% in 1998 and 6.7% in 2007.

In 1997 the Israeli Council for Higher Education (CHE) appointed a committee whose main task was to estimate the incidence of students with LD in higher education and to suggest a policy for their care and support. One of the principal recommendations of the committee was to standardize the diagnostic procedure and to regulate the provision of accommodations and assistance (Margalit, Breznitz, & Aharoni, 1998).

In accordance with that committee's recommendations, the CHE appointed a special committee whose chief mandate was to develop a model for the allocation of financial support to learning disabled students in all institutions of higher education via the support centers. The final model considered a variety of factors, including: the number of students with LD in each institution, the number of treatment hours required and the prospective acquisition of special equipment. Upon the application of the budgeting model, it soon became clear that determining the incidence of LD among students was a far from simple task.

The diagnosis of learning disabilities is in itself a highly complex undertaking. It is especially challenging when the main purpose is determining eligibility for accommodations in high-stake tests, a context in which standardization, objectivity and fairness must not be compromised. A few institutions have established their own diagnostic centers, others have used the service of one or two private diagnostic institutions, while the rest have accepted any diagnosis presented by the student regardless of its quality or the soundness of its recommendations. Consequently, the processes on the basis of which the diagnosis was approved and the accommodations were determined, were often vague, invalid, un-standardized and relied on un-normed tests. This, in turn, resulted in a great variability in the decision-making process.

Moreover, since in most cases diagnosis was done for profit, the cost of the diagnosis was often excessively high, such that students from low socio-economic areas could not afford diagnosis. Surveys conducted by the Ministry of Education often revealed marked differences between high-SES schools and low-SES schools, with regard to the percentage of students with LD who received accommodations on their Matriculation exams. This trend caused serious concern, namely, that those who are especially in need of special accommodations and treatments are not eligible for them because they are not being properly diagnosed.

To correct this regrettable state of affairs the CHE committee commissioned the National Institute for Testing and Evaluation (NITE) to develop a sound and valid standardized procedure for the diagnosis of learning disabilities (for provision of test accommodations) which would be accessible to all candidates and students at a relatively low cost.

The current paper describes that endeavor to develop policy and procedures for standardizing and regulating the diagnosis of LD both in applicants to higher education institutions and in currently enrolled students, and to regulate the provision of test accommodations and other types of assistance.

To standardize the diagnosis of learning disabilities a computer-based test battery (MATAL) was developed, validated and normed. Based on the results of the validation study, a prediction model (algorithm) was developed for the diagnosis of four disabilities. The above processes are described in the first section of the paper. The following section documents the standardization of the provision of test accommodations. The final section reports on the dissemination of the policy and its regulated implementation in institutions for higher education. The conclusion includes suggestions for future plans.

Standardization of the diagnosis of learning disabilities

Guiding principles for the development of the diagnostic system (MATAL)²

To standardize the diagnosis of learning disabilities a comprehensive, standardized, computer-based test battery for the diagnosis of LD was developed (Ben-Simon & Inbar-Weiss, 2012). The following were established as guiding principles for the development of MATAL.

² MATAL is a Hebrew acronym for a Learning Functions System

Target population – MATAL would diagnose adults aged 16-30;

The disabilities diagnosed – MATAL would focus mainly on diagnosing: Dyslexia, Dysgraphia, Dyscalculia and Attention Deficiency Disorder. Deficits in the cognitive domains of memory, attention, visual perception and speed of processing would be diagnosed only to the extent that they might assist in a causal interpretation of the four specific difficulties observed.

Data collected – the data collected and used for diagnosis would include: performance scores on 20 cognitive tests (54 performance measures), medical and educational history collected via a personal questionnaire, previous diagnoses of LD, and relevant documents. The final diagnosis of LD would be conducted by an expert clinician and based on all the above data, including examiner's observations documented during the testing sessions and information gathered through an intake interview.

Test administration mode - All tests would be administered by computer. A trained examiner would be present throughout the entire examination session.

Detection of Malingering - MATAL would include several measures to detect subjects whose claims of disability were not bona fide.

Accessibility – MATAL-based diagnostic centers would be established in institutions for higher education across the country and the diagnostic procedure would be offered at a relatively low cost.

Central database – A central database would be developed to allow further research. Data collected from all MATAL-based diagnostic centers would be transferred to the central database.

Transparency – The features of MATAL that are related to diagnostic procedure and the principles underlying the provision of test accommodations would be made public.

Legal admissibility – The criteria used for the diagnosis of a learning disability and for determining the subsequent accommodations would be defined so as to be legally admissible in a court of law.

Periodic updating - MATAL would be constructed so as to allow relatively simple updating in accordance with developments in the field.

Development process

Professional experts in learning disabilities served on an advisory committee and were involved in all aspects of the test-battery development process. The process comprises eight stages:

1. Mapping the main academic skills and basic cognitive functions associated with learning processes.
2. Establishing an operational definition of learning disability
3. Identifying the main learning disabilities that are relevant to the higher education context and can be accommodated for in psychometric and academic tests and assignments.
4. Mapping the specific academic skills associated with each disability as well as their underlying cognitive functions.
5. Developing appropriate diagnostic tools for the assessment of the above-mentioned academic skills and cognitive functions.
6. Validating the diagnostic tools and identifying the performance measures that best discriminate between students with LD and those with no LD.
7. Determining population norms based on a representative sample of 508 students with no learning disability.
8. Developing a decision-making algorithm (criterion) for determining each disability and its severity level.

The last stage involves the integration of numerous test results in order to reach a diagnosis. In a typical clinical situation, a battery of 10-20 achievement and cognitive tests is administered to a given client and 20-40 measures may be computed to indicate performance level. To arrive at a final diagnosis, the scores on these measures, along with personal information such as medical and learning history, school reports, etc., are combined subjectively, based on clinical judgment.

While clinical judgment of dozens of performance outcomes may be an adequate procedure in a clinical setting (which focuses mainly on identifying strengths and weaknesses for the purpose of designing an assistance or rehabilitation plan), it is highly inappropriate in a diagnostic setting which determines eligibility for test accommodations or financial aid, a context in which standardization and objectivity must not be compromised. Moreover, the superiority of statistical models over clinical models in decision-making has long been established by research in the field (e.g., Dawes, Faust and Meehl, 1993; Meehl, 1954). Thus, in the last step of the battery

development process much effort has been invested in determining the decision-making algorithm.

MATAL Test Battery

General features

MATAL consists of 20 cognitive tests in five domains and two questionnaires (see Table 1). Main features:

- Instructions for all tests appear on-screen and are also available in audio mode
- Each test is preceded by a training session
- Oral responses are recorded by the computer and can be accessed at any time
- Response time (RT) is recorded with ± 7 ms accuracy

 Insert Table 1 about here

The diagnostic procedure

The diagnostic procedure comprises eight stages (see also Flowchart 1.)

Stage 1. Application for diagnosis.

Stage 2. Submission of Personal Questionnaire and relevant documents: Each applicant fills out the 'Personal Questionnaire' and submits relevant documents such as school reports, previous diagnostic reports and medical reports.

Stage 3. Verification of applicant's eligibility for diagnosis: Upon receipt of the application and background materials, the applicants' eligibility for undergoing diagnosis is verified according to the following criteria: age – 16 to 30; Hebrew language proficiency – must be proficient; existing physical or mental disorder that may hinder his/her performance – no such disorder should be present. In addition, only applicants who have not taken MATAL's tests in the preceding year will be admitted for diagnosis. Once the application is approved, the applicant's name and ID are entered into a central internet-based database.

Stage 4. Administration of MATAL tests: The computerized test battery is administered in two separate sessions by a trained examiner. Verbal (oral and written) responses are recorded and scored by the examiner. In addition, the examiner writes an observational report documenting the applicant's behavior during the test.

Stage 5. Generating computerized report: A summary report that includes the applicant's performance on each MATAL test and a final diagnosis for each of the four disabilities diagnosed by MATAL is produced automatically.

Stage 6. Review and integration of test results and background information: an expert clinician reviews MATAL's computerized test report (test results, final computerized diagnosis), the examiner's observational report, the Personal Questionnaire and all other background information submitted by the applicant.

Stage 7. Intake session for in-depth inquiry and feedback: an expert clinician meets with the applicant in order to get a close impression of him/her and further explore the reported difficulties; to resolve discrepancy between these difficulties and the test results; and to provide feedback and discuss potential accommodations and means of assistance in accordance with the difficulties observed.

Stage 8. Final diagnostic report: following the intake session the clinician writes a final report. It includes a verbal summary and interpretation of the test results, as well as a final diagnosis with regard to each of the four disabilities diagnosed by MATAL. In addition, where appropriate, the clinician suggests suitable test accommodations and other means of support which should be granted to the applicant in his/her academic studies.

 Insert Flowchart 1 about here

Standardization of the provision of test accommodations

Most institutions of higher education have a support center for students with LD. These centers are responsible for communicating the recommended accommodations to the faculty and administrators in the institution and for providing LD students with additional assistance (e.g., appropriate learning technologies).

To standardize the procedure of providing test accommodations in colleges and universities and to facilitate the work of the support centers, detailed guidelines were developed by a committee composed of the heads of 20 support centers, expert clinicians and NITE's MATAL development team.

The resulting document presents the general principles governing the provision of test accommodations, as well as a list of accommodations and detailed guidelines for their provision. Each accommodation is classified by: (1) accommodation level: the extent to which it compromises validity, and (2) accommodation type: its cost and applicability. For each accommodation, the document also lists specific criteria for its application with respect to each of the four disabilities diagnosed by MATAL and with respect to the presence of other cognitive deficits (e.g., in visual perception, memory).

Though the document provides detailed guidelines for the provision of accommodations, implementation of the guidelines is not obligatory. Every institution is autonomous and free to adopt the guidelines or not, in accordance with its general policy, the availability of appropriate resources, and the specific requirements of each academic program. However, it is safe to assume that the existence of standardized accommodation guidelines will encourage all institutions to adopt the recommended policies.

The accommodation guidelines document was made available to support centers in all institutions for higher education as well as to clinicians who diagnose applicants and to students who seek accommodations on academic exams. At a later point the document will be made available to faculty and administrative personnel in institutions for higher education, as well as to students and to the general public.

The following are some of the general principles underlying the guidelines for the provision of test accommodations:

- ▶ Accommodations should be provided for deficits in lower order functions but not for deficits in higher order functions.
- ▶ It should be ascertained that the accommodations provided do indeed compensate for the impaired mechanisms.
- ▶ Accommodations should not jeopardize test validity.

- ▶ Extra caution should be exercised when granting accommodations that are expected to significantly improve the performance of "normal" examinees and thus create a risk that the ability assessed by the test may be over-estimated.
- ▶ One should be aware of the possibility that some accommodations may result in an allocation of candidates to courses or positions that they might find very hard or even impossible to cope with.

Dissemination of the standardized diagnostic procedure and provision of accommodations

To disseminate the MATAL-based diagnostic procedure, 12 diagnostic centers were established in institutions of higher education across the country. Specific criteria were set with respect to the qualifications of the personnel employed, and the facilities and equipment required for testing.

Two instructional guides were developed to facilitate and standardize the diagnostic procedure. The Examiner Guide includes a detailed description of the role of the examiner, as well as instructions regarding test administration, scoring of vocal and written responses, and documentation of examinees' behavior during the test sessions. The User Guide includes a complete manual for the test battery and guidelines for arriving at a differential diagnosis. Extensive training workshops prepare clinicians and examiners to operate MATAL.

Two additional steps were taken: (a) All data collected was transmitted to a central database for monitoring purposes and for further research; (b) A nationwide network of clinicians who use MATAL was established to facilitate communication among experts and to resolve professional dilemmas.

Future plans

As already stated, MATAL was developed with the intention that the test battery and the diagnostic procedure would be periodically updated in accordance with various developments. Such developments might include: advances in learning disability research; specific research applied to MATAL data (in particular, a replication of the validation study with larger samples of clinical groups); needs expressed by MATAL users; and technological advances. To achieve this, MATAL's implementation is closely monitored by NITE's development team. Any problem encountered is duly

noted, and suggestions for development of additional diagnostic tools and improvements of the infrastructure are collected and carefully documented. Further plans include: the translation of MATAL language tests into Arabic and the adaptation of the diagnostic system for Arabic-speaking students; the development of special norms for immigrants; and the adaptation of MATAL for other clients in Israel, such as the K-12 education system.

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Table 1: MATAL Assessment Tools: Tests, Questionnaires and Supporting Materials

Diagnostic tools and supporting materials	Skill/Function	Task description	Performance measures
Background Questionnaire			
Language (reading & writing)			
Vocal Text Reading	Phonological decoding	Vocal reading of a non-vocalized text	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
Non-word Reading (production)	Phonological decoding	Vocal reading of vocalized non-words	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
Non-word Reading (Identification)	Phonological decoding & lexical retrieval	Identification of a non-word that sounds like a common word in Hebrew	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT*
Phonemic Deletion	Phonological awareness	Phonemic deletion in non-words	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
Phonemic Count	Phonological awareness	Phoneme count in non-words	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
Dictation	Grapho-motor efficiency Spelling	Writing a text vocalized by the computer	<ul style="list-style-type: none"> ▪ Handwriting ▪ Writing pace ▪ Homophonic spelling errors ▪ Morpho-phonological spelling errors
Rapid Automatic Naming (RAN)	Lexical retrieval	Rapid naming of objects, letters and numbers	<ul style="list-style-type: none"> ▪ Naming rate
Verbal Fluency	Lexical retrieval	Words retrieval by phonological cue and by semantic cue	<ul style="list-style-type: none"> ▪ Number of words retrieved in each category
Syntactic Awareness	Syntactic awareness / Mastery of syntax	Reading a complex sentence with irregular syntax and then identifying a very short sentence which has a similar meaning.	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
Reading Comprehension	Reading comprehension	Reading 3 passages and answering 30 MC questions	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT ▪ Omissions
English Reading Comprehension	Reading comprehension in 2 nd language	Sentence completion	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
English Listening Comprehension	Listening comprehension in 2 nd language	Sentence completion	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT

Diagnostic tools and supporting materials	Skill/Function	Task description	Performance measures
Attention			
Continuous Performance Task (CPT)	Sustained attention	Responding to a two-dimensional target stimuli (shape & color)	<ul style="list-style-type: none"> ▪ Omissions ▪ Commissions in 1st part ▪ Commissions in 2nd part ▪ RT ▪ Variability of RT
Attentional Network (ANT)	<ul style="list-style-type: none"> ▪ Alerting attention ▪ Orienting of attention ▪ Executive attention ▪ Sustained attention 	Determining the direction (left/right) of a target symbol (arrow) presented with or without various cues	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT ▪ Executive attention ▪ Alerting attention ▪ Orienting of attention
ADHD self-report questionnaire	<ul style="list-style-type: none"> ▪ Attention difficulties in adulthood & childhood ▪ Impulsivity and hyperactivity in adulthood & childhood 	Self-reporting of behavioral symptoms	<ul style="list-style-type: none"> ▪ Attention in adulthood ▪ Impulsivity-hyperactivity in adulthood ▪ Attention in childhood ▪ Impulsivity-hyperactivity in childhood
Mathematics / Numeracy			
Computational Automaticity	Retrieval of simple arithmetic facts	Judging the correctness of simple arithmetic equations	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
Procedural Knowledge	Mastery of basic arithmetic procedures	Judging the correctness of arithmetic equations	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT
Number Sense	Number-line representation	Determining which of two number values presented on a number-line is located at the correct point.	<ul style="list-style-type: none"> ▪ Accuracy ▪ RT ▪ Distance-related accuracy
Memory			
Auditory Verbal Memory	Short-term memory Long-term memory	Free recall of words from a given list Identification of words from a previously presented word list	<ul style="list-style-type: none"> ▪ Immediate recall ▪ Delayed recall ▪ Delayed recognition
Visual Perception			
Visual Perception: parallel processing	Spatial perception	Discrimination between two spatial frequencies presented simultaneously	<ul style="list-style-type: none"> ▪ JND threshold
Visual Perception: temporal processing	Working memory Visual perception	Discrimination between two spatial frequencies presented one after the other	<ul style="list-style-type: none"> ▪ JND threshold
Supporting materials			
Individual testing booklet			
Examiner's Guide			
Clinician's Guide			
Guidelines for the provision of test accommodations			

Flowchart no. 1: MATAL's diagnostic procedure

Diagnostic Procedure

