<table>
<thead>
<tr>
<th>Overview of School Neuropsychology</th>
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KIDS, Inc. (schoolneuropsych.com)’s
School-Neuropsychology
Post-Graduate
Certification Program

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Introduction of the Core Faculty

• Christopher Bedford, Ph.D., ABSNP
• Rhonda Cunningham, Ph.D., ABSNP
• Julie Gettman, Ph.D., ABSNP
• Ann Leonard-Zabel, Ed.D., ABSNP
• Robb Matthews, Ph.D.

About the Presenter

• Executive Director, Woodcock Institute for the Advancement of Neurocognitive Research and Applied Practice, Texas Woman's University, Denton, Texas.
• Emeritus Professor, Department of Psychology and Philosophy, Texas Woman's University, Denton, Texas.
• Director, School Neuropsychology Post-Graduate Certification Program, KIDS, Inc.
  www.schoolneuropsych.com
• Founding President of the Texas Association of School Psychologists, 1993
• President of the National Association of School Psychologists (2002-03)
• Evidence-based Selective Assessment for Academic Disorders (2017) - co-author
The Influences of my Career on School Neuropsychology

- Undergraduate work at the University of Cincinnati, Ohio.
- School Psychology Specialist training at Miami University in Oxford, Ohio.
- Early career as a rural school psychologist.
- The 7 year old that changed my professional life.
- Doctoral work at The Ohio State University.
- Career at Texas Woman’s University since 1990.
- Service to the profession.
- Director of national training program in school neuropsychology since 2002.

NASP Presidential Year 2002-03

- Theme for the year was “Mind Matters: All Children Can Learn”.
- Tried to refocus our practice on the importance of the biological bases of behavior.
Let’s Get to Know the Audience

Poll #1

Presentation Outline

- Why the increased interest in school neuropsychology?
- The history of neuropsychology
- Limited access to neuropsychologists.
- Limited usefulness of neuropsychological reports.
- How does school neuropsychology fit within the broader field of school psychology?
- Definition of school neuropsychology
Presentation Outline

- Roles and functions of a school neuropsychologist
- What constitutes competency?
- Specialty certification
- When to refer for a school neuropsychological evaluation?
- The state of the art of pediatric neuropsychology assessment
- A model of school neuropsychological assessment and intervention.
- Resources for school neuropsychology

Presentation Outline

- Why the increased interest in school neuropsychology?
- The history of neuropsychology
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- Definition of school neuropsychology
Why the increased interest in school-neuropsychology?

• Interest in neuropsychological principles applied to the practice of school psychology is not new. Started in the early 1980s.
• Frustration of many current school psychologists over limitations to their professional practices.
• Over-reliance on special education diagnosis and classification → taken the principles of psychology out of the practice of school psychology.

Some reasons for the increased interest in school neuropsychology?

• Recognition of the neurobiological bases of childhood learning and behavioral disorders.
• Influences of federal education laws and national task force reports.
• Increased number of children with medical conditions that affect school performance.
• Increased use of medications with school-aged children.
• Increase in the number of challenging educational and behavioral issues in the schools.
• Increased emphasis on the identification of processing disorders in SLD children.
Recognition of the Neurobiological Bases of Childhood Learning and Behavioral Disorders

• Interest in the biological bases of human behavior is not new to our profession, but it is becoming more relevant to the current generation of school psychologists.
• The “nature vs. nurture” debate is as old as the psychology profession.
• The curriculum-based measurement/assessment approach touted by many practitioners today has its theoretical roots in behaviorism.

Recognition of the Neurobiological Bases of Childhood Learning and Behavioral Disorders

• Late 1950s - researchers came to realize that the behaviorist approaches could not explain complex mental functions such as language and other perceptual functions.

• 1970s - cognitive psychologists tremendously aided by the development of neuroimaging techniques. MRI, PET, & fMRI are all useful tools in validating or helping to refine theoretical models of cognition developed by cognitive psychologists.
1970s - the integration of neuropsychological principles into educational practice got off to a rough start.

Doman and Delcato's perceptual-motor training for children with "minimal brain dysfunction" or Illinois Test of Psycholinguistic Abilities had good face validity, but they did not accurately show treatment efficacy for either perceptual-motor deficits or language deficits.

Unfortunately, those who advocate exclusively for behavioral approaches in working with school-aged children seem to have omitted an impressive body of empirical research in the past 30 years that supports biological bases to the majority of childhood disorders.

Miller, 2007, 2013
• Passage of P.L. 94-142 in the 1970s, served as the catalyst for researchers to began to investigate the neurobiological bases of learning disabilities and behavioral disorders.

• The past 40 years have yielded substantial evidence for the biological bases of behavior. There is strong neurobiological evidence for attention deficit hyperactivity disorders, reading disorders, written language disorders, mathematics disorders, and pervasive developmental disorders.

School psychologists who want to translate this brain-behavior research into practice are increasingly interested in the specialty of school neuropsychology.
Some reasons for the increased interest in school neuropsychology?

• Recognition of the neurobiological bases of childhood learning and behavioral disorders.

Influences of federal education laws and national task force reports.

• Increased number of children with medical conditions that affect school performance.
• Increased use of medications with school-aged children.
• Increase in the number of challenging educational and behavioral issues in the schools.
• Increased emphasis on the identification of processing disorders in SLD children.

Influences of Federal Education Laws and National Task Force Reports

• No Child Left Behind (NCLB) Act of 2001
• Minority Overrepresentation in Special Education (Donovan & Cross, 2002). Report for the National Research Council.
Influences of Federal Education Laws and National Task Force Reports

• And miles to go....: State SLD requirements and authoritative recommendations. Report to the National Center for Learning Disabilities (2003)


• Individuals with Disabilities Education Improvement Act (IDEA) of 2004.

• The Every Student Succeeds Act (ESSA: 2015)

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• The No Child Left Behind Act of 2001 (NCLB) and the Individuals with Disabilities Education Improvement Act of 2004 (IDEA) were not designed to be mutually exclusive.

• Both laws together envision a seamless system of supports in both general and special education based on evidence-based instruction.

• After the passage of NCLB in 2001, the focus shifted to what was, and was not, working in special education.

• The ESSA gave greater control to states to set educational policies.
The national task forces identified problems with SLD identification:

- Too many students were being identified as SLD as compared to other disabilities.
- There was an over-representation of minorities identified as SLD.
- The widespread use of the discrepancy model required a “wait to fail” approach, resulting in identification much too late in the educational process.
- Current identification methods were too costly and often identified the wrong students.

The concept of SLD is valid and supported by strong converging evidence.

SLDs are neurologically based and intrinsic to the individual [and the statutory definition of SLD should be maintained in IDEA reauthorization].

Individuals with SLD show intra-individual differences in skills and abilities.
Specific Learning Disabilities: Finding Common Ground  
(Learning Disabilities Roundtable, 2002)

• The ability-achievement discrepancy formula should not be used for determining eligibility.

• Decisions regarding eligibility for special education services must draw from information collected from a comprehensive individual evaluation using multiple methods and sources in gathering relevant information.

Is the Definition of SLD Safe?

The LD Roundtable participants did not recommend changes in the IDEA definition of SLD, although the NJCLD formulated an SLD definition in 1988 that did not mention psychological process disorders (Hammill, 1990). It is likely that this was not a mere oversight, but more likely a conscious effort to focus on the most pressing issues, elimination of the ability-achievement discrepancy and development of a reasonable set of alternative procedures. (Reschly et al., 2003, p. 7).
A chief concern among school neuropsychologists is the increased emphasis in these federal laws and national reports on behavioral techniques at the apparent expense of the role that individual differences in cognitive processes play in the child’s learning.

Is the SLD a politically charged issue?

- Reschly, Hosp, & Schmied (2003) surveyed participants across all states that were deemed by their State Education Agency to be experts regarding SLD issues.
- Two questions were asked in this survey that are of interest to school neuropsychology.
Question #6 - Diagnosis of neuropsychological causes of learning problems is useful in intervention planning.

<table>
<thead>
<tr>
<th>Mean</th>
<th>SD</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.29</td>
<td>1.03</td>
<td>5</td>
<td>23</td>
<td>20</td>
<td>48</td>
<td>5</td>
</tr>
</tbody>
</table>

- 29.6% Strongly Disagree
- 20.4% Disagree
- 54.1% Agree

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Question #18 - Neuropsychological information is useful to determine who has a genuine learning disability rather than undifferentiated low achievement.

<table>
<thead>
<tr>
<th>Mean</th>
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<th>Strongly Disagree</th>
<th>Disagree</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3.17</td>
<td>1.00</td>
<td>5</td>
<td>24</td>
<td>24</td>
<td>43</td>
<td>2</td>
</tr>
</tbody>
</table>

- 27.7% Strongly Disagree
- 19.8% Disagree
- 52.5% Agree
Is the SLD a politically charged issue?

Reschly and his colleagues (2003) inaccurately reported, “there is no consensus regarding the usefulness of neuropsychological information (see previous items)”, when in fact, their own survey data showed there was a 2-to-1 percentage of the respondents who agreed or strongly agreed with the usefulness of neuropsychological information: as a cause of learning problems, as an aid in intervention planning, and being useful in determining the presence of a learning disability (p. 26).

The RTI Model

• Another concept introduced in the 2002 Learning Disabilities Roundtable meeting as an alternate approach to the special education identification was the response to intervention (RTI) model.

• The proposed RTI approach to special education assessment has been criticized as well.
A Few Words About RTI

Requires knowledge of:
- Pre-referral interventions strategies
- Evidence-based interventions
- Progress monitoring
- Knowing when to seek additional assessment information about the child’s individual strengths and weaknesses to help guide interventions.

Proposed RTI Model

<table>
<thead>
<tr>
<th>Proposed Tier</th>
<th>Tier Emphasis</th>
<th>Possible role of the School-Neuropsychologist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>High quality instructional and behavioral supports for all students in general education.</td>
<td>Serve on pre-referral intervention teams. Use consultation skills and knowledge of instructional design and support.</td>
</tr>
</tbody>
</table>
## Proposed RTI Model

<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>Tier 2</strong></td>
<td>Targeted intensive prevention or remediation services for students whose performance and rate of progress lag behind the norm for their grade and educational setting.</td>
<td>Ideal place for curriculum-based assessment or criterion-referenced testing for Annual Yearly Progress monitoring.</td>
</tr>
</tbody>
</table>

## Proposed RTI Model

<table>
<thead>
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<th>Tier Emphasis</th>
<th>Possible role of the School Neuropsychologist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tier 3</strong></td>
<td>Comprehensive evaluation by a multi-disciplinary team to determine eligibility for special education and related services.</td>
<td>Conduct comprehensive, multi-dimensional school neuropsycho-logical assessments that link cognitive strengths and weaknesses to evidence-based interventions.</td>
</tr>
</tbody>
</table>
RTI Model: Questions Remain

• How long does one intervene at Tier 2 before making a referral for Tier 3?
• How long does one stick with an intervention in Tier 2 before switching interventions?
• Is RTI also a wait to fail model depending on how it is operationalized?
• Would it make more sense to complete a comprehensive, multidisciplinary evaluation first that could target specific deficits and provide for better linkage to early and prescriptive interventions?

Some “experts” in the field of school psychology equate RTI with a strict behavioral or CBM approach to identifying children with disabilities.

• Progress monitoring will not ultimately answer the question why is the child not learning or behaving?
• Without accounting for individual differences, interventions become based on trial and error alone.
Intervening without assessment data is like a “fish and wish” approach - hoping that an intervention works by chance........
.....or like “throwing darts at a target” and hoping that one hits the target.

Without accounting for individual differences, interventions become based on trial and error alone.
RTI Model: Questions Remain

Perhaps we need to reconceptualize RTI as:

**Response To the “Right” Intervention (RTRI)**

A RTRI Model requires valid assessment data based on theory.

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A Recommended Resource

- Available through online book reseller or directly from Wiley & Sons.
- Provides answers on the role of neuropsychological information in the identification of SLD.

Douglas Della Toffalo, Ph.D., ABSNP
A Recommended Resource

- Available through online book reseller or directly from Wiley & Sons.
- Provides a historical review of SLD assessment and discusses the 3rd method of SLD assessment or PSW models.

Some reasons for the increased interest in school neuropsychology?

- Recognition of the neurobiological bases of childhood learning and behavioral disorders.
- Influences of federal education laws and national task force reports.
- Increased number of children with medical conditions that affect school performance.
- Increased use of medications with school-aged children.
- Increase in the number of challenging educational and behavioral issues in the schools.
- Increased emphasis on the identification of processing disorders in SLD children.
More children began to survive neurological trauma.

• Children who would have died 30 years ago are surviving birth traumas, head injuries, and other neurological disorders due to advances in modern medicine.

• Many of these children have soft neurological signs associated with these previous traumas.

• Negative impact of managed care.

Some reasons for the increased interest in school neuropsychology?

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The use of prescription medication for emotional and behavioral regulation in children has increased dramatically in the last 20 years (Howie, Paster, & Lukacs, 2014). During 2011-12, the National Center for Health Statistics (nchs.gov) reported that 7.5% of children ages 6 to 17 were prescribed psychotropic medication; with 4.2% prescribed psychostimulants. However, research on the use of medication with children has not kept pace, and many kinds of medications are used off label with children. “Off label” means the medication has not been approved for use (by the Food and Drug Administration) for that particular age or group or for that particular disorder.

Polypharmacy is the simultaneous use of more than one psychiatric medication for ongoing treatment, which is both a common and an increasingly used treatment strategy for youth (Baker, Bellonci, Huefner, Hilt, & Carlson, 2017).

Comer, Olfson, and Mojtabai (2010) reported that the treatment of ADHD in children and youth with multiple medications accounts for some of the increases in polypharmacy seen between the late 1990s and 2004-2007.
Increased Use of Medications with School-Aged Children

Polypharmacy in the treatment of childhood mental disorders may be appropriate for four reasons:

1) the child may have multiple distinct disorders for which there are different and appropriate multiple medications,
2) the symptoms of the disorder are only partially treated with one medication,
3) an additional medication is needed to reduce side effects of the other medications, and
4) in complex cases decisions to prescribe medications are complicated by diagnostic uncertainty (Baker et al., 2017).

Increased Use of Medications with School-Aged Children

• School neuropsychologists are not physicians, but they can provide information about how psychotropic medication used to treat common problems like depression, anxiety, attentional processing disorders, etc. can affect learning and behavior.

• There is a wealth of information available about medication interactions and potential side effects on the Internet.

• Questions such as the interactions and long-term consequences of multiple medications (or polypharmacy), and the neuropsychological effects of medications, are currently being researched.
Some reasons for the increased interest in school neuropsychology?

- Recognition of the neurobiological bases of childhood learning and behavioral disorders.
- Influences of federal education laws and national task force reports.
- Increased number of children with medical conditions that affect school performance.
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- Increase in the number of challenging educational and behavioral issues in the schools.
- Increased emphasis on the identification of processing disorders in SLD children.

Increase in the Number of Challenging Educational and Behavioral Issues in the Schools

- School psychologists report that there are more children today, than 10-20 years ago, who are exhibiting severe behavioral, social-emotional, and academic problems. There appears to be evidence to support that consensus.

- The Centers for Disease Control and Prevention reported that a total of 13%-20% of children living in the United States experience a mental disorder in a given year, and tracking of data between 1994-2011 has shown the prevalence of these conditions to be increasing.
Many of the serious emotional disturbances experienced by children such as depression, anxiety-related disorders, ADHD, etc. all have known or suspected neurological etiology. Nevertheless, many children with known or suspected neurological impairments who exhibit symptoms of mental health problems are not identified or are identified and not receiving services.

Another major concern in educational practice is inaccurate diagnoses and placements of children and adolescents with known or suspected neurological impairments.

Neurologically impaired children are often mislabeled as seriously emotionally disturbed or specific learning disabled.

These diagnoses and subsequent educational and behavioral interventions do not address underlying neuropsychological dysfunction.

Misdiagnosis or misclassification can lead to serious consequences in a child’s lifetime.
Increase in the Number of Challenging Educational and Behavioral Issues in the Schools

• From a prevention and early intervention perspective, it seems to make sense that children with known or suspected neurological disorders must be educated appropriately.

• Too often, educators treat only the symptoms and not the underlying problems.

• Even though, the classification of TBI has been in the IDEA law since 1990, many educators and school psychologists are ill equipped to deal with the special needs of this population.

Some reasons for the increased interest in school neuropsychology?

• Recognition of the neurobiological bases of childhood learning and behavioral disorders.

• Influences of federal education laws and national task force reports.

• Increased number of children with medical conditions that affect school performance.

• Increased use of medications with school-aged children.

• Increase in the number of challenging educational and behavioral issues in the schools.

• Increased emphasis on the identification of processing disorders in SLD children.
IDEA Definition of SLD

“...a disorder in one or more of the basic psychological processes involved in the understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia” but does not include “...learning problems that are primarily the result of visual, hearing, or motor disabilities, or intellectual disability, or emotional disturbance, or of environmental, cultural, or economic disadvantage” (34 C. F. R. § 300.8(c)(10)).

The Third Method of SLD Identification

• While using an RTI framework in a school can be beneficial to many students, RTI is not a diagnostic means in and of itself to assess SLD.
• However the use of a third method of SLD identification is now an option.
• The third method includes any alternative, research-based procedure.
• Several alternative research-based approaches to SLD identification exist which are consistent with the third method, including:
  • the Operational Definition of SLD,
  • the Hypothesis Testing Cattell-Horn-Carroll Approach,
  • the Concordance-Discordance Model of SLD Determination
  • the Discrepancy/Consistency Model, and
  • the Response to the Right Intervention (RTRI) Model.
### School Neuropsychological Assessment and SLD Identification

<table>
<thead>
<tr>
<th>School Psychology:</th>
<th>School Neuropsychology:</th>
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<tbody>
<tr>
<td>• Reading Disabled</td>
<td>• Reading Disabilities Subtypes:</td>
</tr>
<tr>
<td></td>
<td>• Dysphonetic dyslexia</td>
</tr>
<tr>
<td>• Writing Disability</td>
<td>• Surface dyslexia</td>
</tr>
<tr>
<td>• Math Disability</td>
<td>• Mixed dyslexia</td>
</tr>
</tbody>
</table>

- Rather than just identifying a SLD area based on a broad classification (e.g., reading disabled), school neuropsychologists try to drill down to the underlying cause of the reading disability.

- Knowing “why” a disability is occurring leads to more targeted interventions.

**WHY**
Summary of reasons why the increased interest in school-neuropsychology?

- Recognition of the Neurobiological Bases of Childhood Learning and Behavioral Disorders.
- Influences of Federal Education Laws and National Task Force Reports.
- Increased Number of Children with Medical Conditions that Affect School Performance.
- Increased Use of Medications with School-Aged Children.
- Increase in the Number of Challenging Educational and Behavioral Issues in the Schools.
- Lack of training opportunities in school neuropsychology.
- Increased emphasis on the identification of processing disorders in SLD children.
Presentation Outline

• Why the increased interest in school neuropsychology?

• The history of neuropsychology
  • Limited access to neuropsychologists.
  • Limited usefulness of neuropsychological reports.
  • How does school neuropsychology fit within the broader field of school psychology?
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Historical Influences on School Neuropsychology

- Adult Clinical Neuropsychology
- Pediatric Neuropsychology
- School Psychology
- Educational Law, Policies, & Practices
- School Neuropsychology
Exploring historical trends in neuropsychology/pediatric neuropsychology

I. The Single-Test Approach

II. Test Battery/Lesion Specification Stage

III. Functional Profile Stage

IV. The Integrative and Predictive Stage

The Single-Test Approach

• Dominated the field mid-1940s-mid-1960s
• Characterized by:
  • use of general, all purpose measures for diagnosing brain damage or “organicity”
  • guided by the belief that brain damage, regardless of its extent, location, or pathological process, manifested itself in a unitary fashion.
  • goal was group differentiation (normals - brain damaged).
The Single-Test Approach

Examples:
- Bender Visual Motor Gestalt Test (Bender, 1938, Koppitz, 1964)
- Visual Retention Test (Benton, 1963)
- Memory for Designs Test (Graham & Kendall, 1960)

This approach did not differentiate brain injured from non-brain injured children with sufficient validity.

Exploring historical trends in neuropsychology/pediatric neuropsychology

I. The Single-Test Approach
II. Test Battery/Lesion Specification Stage
III. Functional Profile Stage
IV. The Integrative and Predictive Stage
Ernhart and Graham (1963) - first to apply a battery of tests in assessing developmental outcomes of children with brain injury.

- found brain damaged children manifested deficits on verbal and conceptual measures as well as on perceptual measures.
- No single measure yielded a satisfactory discrimination of brain damaged children, use of the whole battery did.


- Referred to the first two stages of development in clinical neuropsychology as the static phase.
- The emphasis was on detection and localization of brain lesions
The approach was empirical, atheoretical, and geared heavily toward establishing cutoff scores and rules of inference for the purpose of maximizing hit rates in categorical diagnosis.

Exploring historical trends in neuropsychology/pediatric neuropsychology

I. The Single-Test Approach
II. Test Battery/Lesion Specification Stage
III. Functional Profile Stage
IV. The Integrative and Predictive Stage
Functional Profile Stage

- Rourke referred to this as the **cognitive stage**.
- Controversy over the validity of neuropsychological batteries to localize brain lesions in children, coupled with the rapid development of other noninvasive neurodiagnostic methods, resulting in a gradual de-emphasis on using neuropsychological tests for making inferences regarding brain lesions.

The emphasis shifted more to the role of neuropsychological assessment in specifying the behavioral effects of cerebral lesions.
Functional Profile Stage

- Goal was to differentiate between spared and impaired abilities (functional strengths and weaknesses).
- The concern was not only on the extent of impairment but also on the pattern of deficit and the underlying components of impaired performance.

This stage re-emphasized the “repsychologizing” of neuropsychology by emphasizing the psychological aspects of neurological insults and anomalies.
Functional Profile Stage

Although this stage of development represented a shift in the goals of neuropsychological assessment, there were no dramatic changes or innovations in the types of test and measures being used.

SLD Identification and Parallels with Neuropsychology

<table>
<thead>
<tr>
<th>Functional Profile Stage</th>
<th>SLD ID Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>• &quot;Repsychologizing&quot; of the field through emphasis on cognitive strengths and weaknesses.</td>
<td>• De-emphasis on discrepancy formulas and reemphasis on processing deficits.</td>
</tr>
<tr>
<td>• Few new tests in the 1980s that addressed the reconceptualization</td>
<td>• Many new assessment measures and intervention techniques designed to address processing deficits.</td>
</tr>
</tbody>
</table>
Exploring historical trends in neuropsychology/pediatric neuropsychology

I. The Single-Test Approach

II. Test Battery/Lesion Specification Stage

III. Functional Profile Stage

IV. The Integrative and Predictive Stage

Integrative and Predictive Stage (present)

Introduction of new tests with strong theoretical foundations (Carroll-Horn-Cattell, Luria, etc.).

- Current state of the art practice demands that assessments have a theoretical foundation to aid in test interpretation.
Integrative and Predictive Stage (present)

Emphasis will be placed on the qualitative aspects of performance in addition to the quantitative scores.

- What strategies does a child use when solving a problem?
- What qualitative behaviors does the child exhibit during testing (e.g., asking for repetitions)?
- What is the incidence rate of common qualitative behaviors?

Integrative and Predictive Stage (present)

- Researchers will continue to integrate psychological, neuropsychological, neuroanatomical, biochemical, and electrophysiological measures.
  - Continued validation of behavioral measures using brain imaging techniques.
- There will also be an increased emphasis on ecological validity - relating assessment findings to an individual's everyday functioning.
Parents of brain-injured children and other consumers of neuropsychological services want to be provided with more than just a delineation of the child's deficits. They want to know precisely what these will mean in terms of the child's everyday functioning and future potential.

Greater emphasis will be placed on the entire field of school psychology and the emerging field of school-neuropsychology to demonstrate predictive validity of assessment techniques.
Summary of the Integrative and Predictive Stage

- Development of tests specifically designed for school-aged children
- Influences of brain imaging studies on learning and behavior
- The expansion of theoretical frames of reference
- Influences of the Cross-Battery Approach
- Influences of the Process Assessment Approach
- Push for ecologically valid assessments
- The necessity for linking assessment results with evidence-based interventions

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- Definition of school neuropsychology
Limited Access to Neuropsychologists

- Access to neuropsychological services both in and outside of the schools is difficult.
- Supply and demand problem:
  - evaluation may be costly
  - there may be a long wait time to have it completed
  - often more difficult, if not impossible, in rural portions of the country

Training School Psychologists to Integrate Neuropsychological Principles into Practice

- In 2003, Rohling et al. estimated that there were approximately 3,500 – 4,000 professionals who practice as clinical neuropsychologists. The majority of those practitioners specialized in working with adults.
- Pediatric neuropsychologists are often found in hospital or rehabilitation settings and may or may not take outside referrals.
Limited Access to Neuropsychologists

- In an ideal world, each school district would have access to a pediatric neuropsychologist who would write reports that were both informative and educationally relevant, and consult regularly with educators and parents.
- Across the country, clinical neuropsychologists are more plentiful than pediatric neuropsychologists, but most clinical neuropsychologists are trained to work with adult populations not school-aged children.

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Limited usefulness of neuropsychological reports

A 42 page report with lots of data may or may not be useful to the schools.

Limited usefulness of neuropsychological reports

A report with diagnostic conclusions but no prescriptive recommendations.
- A teacher may be interested in a conclusion that “Johnny has a suspected lesion in the right parietal lobe” but that information alone will not help Johnny learn any better.
- Reports need to link assessment data with prescriptive recommendations.
Limited usefulness of neuropsychological reports

• A report full of technical jargon.
  • Medical terms should be explained in the report when possible.
  • Consider whom the report is being written for. The report content may differ based on the intended reader.
• Diagnostic classifications which do not relate to the IDEA guidelines for TBI.

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How does school neuropsychology fit within the broader field of school psychology?

- *Is the integration of neuropsychological principles into the practice of school psychology only a role expansion?*

- *Is school neuropsychology a specialty within the broader field of school psychology?*

- *Is school neuropsychology an emerging and unique specialization, separate but related to, school psychology and pediatric neuropsychology?*

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- Definition of school neuropsychology
Definitions of school neuropsychology

School neuropsychology requires the integration of neuropsychological and educational principles to the assessment and intervention processes with infants, children, and adolescents to facilitate learning and behavior within the school and family systems. School neuropsychologists also play an important role in curriculum development, classroom design, and the integration of differentiated instruction that is based on brain-behavior principles in order to provide an optimal learning environment for every child (Miller, Lang, and DeFina, 2003).

Presentation Outline

- Roles and functions of a school neuropsychologist
- What constitutes competency?
- Specialty certification
- When to refer for a school neuropsychological evaluation?
- The state of the art of pediatric neuropsychology assessment
- A model of school neuropsychological assessment and intervention.
- Resources for school neuropsychology
George Hynd (1981):

- Interprets the results of neuropsychological assessment and develops strategies of intervention.
- Presents recommendations for remediation based on knowledge of scientifically validated interventions.
- Consults with curriculum specialists in designing approaches to instruction that more adequately reflect what is known about neuropsychological development.

George Hynd (1981):

- Acts as an organizational liaison with the medical community, coordinating and evaluating medically based interventions.
- Conducts inservice workshops for educational personnel, parents, and others on the neuropsychological basis of development and learning.
- Conducts both the basic and applied educational research investigating the efficacy of neuropsychologically-based interventions and consultation in the schools.
Crespi and Cooke (2003) posed that training in neuropsychology can:

- Facilitate teacher and parent education/consultation;
- Assist in developing neuropsychologically-informed special education decision;
- Enhance referral use for neuropsychological services;
- Increase the ability to comprehend articles that have relied on neuropsychological concepts and methods in attempts to understand the etiology and behavioral or educational consequences of childhood developmental disorders;
- Protect against more simplistic and inaccurate habits (i.e., specific localization of brain functions or dysfunctions based on performance on a single psychological measure);
- Serve as a bridge between clinically-based neuropsychologists and school-based psychologists in providing an interpretative explanation of specific results and recommendations, and;
- Provide a theoretical framework that appreciates the value of multidimensional batteries and the inherent complexities and difficulties of making inferences about brain integrity.
Summary of Roles and Functions of a School Neuropsychologist

• Provide neuropsychological assessment and interpretation services to schools for children with known or suspected neurological conditions.
• Assist in the interpretation of neuropsychological findings from outside consultants or medical records.
• Seek to integrate current brain research into educational practice.
• Provides educational interventions that have a basis in the neuropsychological or educational literature.

Summary of Roles and Functions of a School Neuropsychologist

• Act as a liaison between the school and the medical community for transitional planning for TBI and other health impaired children and adolescents.
• Consults with curriculum specialists in designing approaches to instruction that more adequately reflect what is known about brain-behavior relationships.
• Conduct inservice trainings for educators and parents about the neuropsychological factors that relate to common childhood disorders.
• Engage in evidenced-based research to test for the efficacy of neuropsychologically based interventions.
Keeping the limited access to neuropsychologists in mind and the documented needs of children with known or suspected neurological conditions in the schools, we turn our attention to the approximate 35,000 school psychologists in the U.S. who have direct access to children.
What constitutes competency in school neuropsychology?

- Many of the new cognitive abilities tests and tests of memory and learning that are routinely used by school psychologists have strong theoretical foundations in neuropsychological theory.

- At a minimum, all school psychologists will have to improve their knowledge base about neuropsychological theories if they are going to appropriately interpret these new tests.

The advantage of having a school psychologist trained in integrating neuropsychological principles into their practice is that the end product of all services delivered by the school psychologist will be generally more pragmatic for the school and the child.
What constitutes competency in school neuropsychology?

- Although a school neuropsychologist writes an insightful report and makes practical, evidence-based recommendations, there is no guarantee that the recommendations will be implemented.

- A major role of a neuropsychologist, whether an external consultant or an internal school psychologist with neuropsychology expertise, is to help teachers implement the educational recommendations using their consultation skills, instructional design knowledge and program evaluation skills.

Keep in Mind

An excellent neuropsychological evaluation filed away in the child's cumulative folder will benefit neither the school nor the child.
What constitutes competency in school neuropsychology?

- In larger school districts with multiple school psychologists, the practitioners often, by choice or demand, “specialize” into niches of interest and expertise.

- For example, one or more school psychologists are identified as experts in diverse areas such as autism spectrum disorders, early childhood assessment/interventions, or neuropsychological assessment/interventions.

What constitutes competency in school neuropsychology?

- The question that arises is: What constitutes competency within a specialty area?

- The practice of school neuropsychology is largely a qualitative understanding of brain behavior relationships and how those relationships are manifested in behavior and learning.

- A competent school neuropsychologist with a solid understanding of brain-behavior relationships can recognize neuropsychological conditions based on observing the child in the normal course of daily activities.
What constitutes competency in school neuropsychology?

- A good school neuropsychologist can conduct a neuropsychological examination of a child using some Legos™.

- Neuropsychological assessments are tools, but knowing how to use those tools does not make a practitioner a school neuropsychologist.

What constitutes competency in school neuropsychology?

- Competency is often loosely defined in many professions particularly as it relates to post-graduate CEU training.

- For example, in school psychology when a new version of a cognitive abilities test comes out, a practitioner goes to a three-hour workshop on how to administer and interpret that new instrument.

- Does that make the practitioner competent to use that new test?
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Specialty Certification

- The terms “psychologist” and “neuropsychologist” are protected terms in many states by their respective Psychology Licensing Act.

- In most states, if a practitioner wants to be called a psychologist, he/she most probably will be required to have a doctorate in psychology and be licensed as a psychologist.
Licensure as a psychologist in most states is generic (not specific to specialty area).

The title “neuropsychologist” is usually not regulated by state licensing acts; but rather regulated by the level of attained professional experience and training.

Unfortunately, there are too many practitioners who claim expertise in neuropsychology when they have had only minimal training in the area (Shordone & Saul, 2000).

The American Psychological Association (APA) and the National Academy of Neuropsychologists has consistently taken the position that a doctorate is the entry level of training for clinical neuropsychology, including the subspecialization of pediatric neuropsychology.
Training Standards in Clinical Neuropsychology

Two major training guidelines suggested for the education and training of clinical neuropsychologists:

• the Guidelines of the INS - Division 40 Task Force on Education, Accreditation, and Credentialing (1987) and
• the Houston Conference on Specialty Education and Training in Clinical Neuropsychology (Hannay et al., 1998).

• The INS-Division 40 Guidelines represent a broader view of neuropsychology than the Houston Conference Policy Statement.

• The INS-Division 40 Guidelines state that a neuropsychologist may or may not be a psychologist, which suggests that neuropsychology is viewed in a broad interdisciplinary context.
Training Standards in Clinical Neuropsychology

- The Houston Conference Policy Statement suggests that neuropsychology is a specialty area within psychology only.
- Many concerns have been expressed about the Houston Conference Policy Statement ranging from:
  - the lack of a broad base of constituents when the document was developed (Reitan, Hom, Van De Vorrde, Stanczak, & Wolfson, 2004; Reynolds, 2002)
  - lacking in content (e.g., not providing enough background training in basic neuropsychology knowledge (Arilla, 2002), and
  - concerns about the restrictive definition of a clinical neuropsychologist (Reitan et al., 2004).

Training Standards in Clinical Neuropsychology

- Koffler (2002) suggested that the INS-Division 40 Guidelines serve to outline training programs in clinical neuropsychology; whereas,

- The Houston Conference Policy Statement sets aspirational goals for individuals wanting to be trained in clinical neuropsychology.
Despite these differences between these sets of clinical neuropsychology guidelines, both of these training standards take the position that a clinical neuropsychologist is a doctoral-level service provider.

---

A. Successful completion of systematic didactic and experiential training in neuropsychology and neuroscience at a regionally accredited university;

B. Two or more years of appropriate supervised training applying neuropsychological services in a clinical setting;

C. Licensing and certification to provide psychological services to the public by the laws of the state or province in which he or she practices;

D. Review by one’s peers as a test of these competencies.
In 1947, the American Psychological Association (APA) set up an independent certification board that is known today as the American Board of Professional Psychology (ABPP).

However, contrary to popular belief, “APA does not endorse or recognize any examining board in psychology” (Goldstein, 2001, p. 57).

Recognizing the Increased Specialization in Clinical Neuropsychology

- American Board of Professional Neuropsychology (ABN)
  - Recognized by ABPP
  - Not Recognized by ABPP

- American Board of Pediatric Neuropsychologists (ABPdN)

Board Certified Clinical Neuropsychologists

Recognized by ABPP
Any school psychologist who meets the eligibility requirements may apply for the ABSNP Diplomate. The credential is not limited to graduates of one or two programs. A recent review of the ABSNP Diplomates, showed that 40% hold a doctorate (Ph.D./PsyD./Ed.D.), (Ed.S.), and the remaining 60% hold either a Specialist Degree or a Masters Degree in school psychology. All of the ABSNP Diplomates are credentialed school psychologists within their state.

Certification Boards Compared

<table>
<thead>
<tr>
<th>Requirement</th>
<th>ABCN</th>
<th>ABN</th>
<th>ABpdN</th>
<th>ABSNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed Doctorate in Psychology</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</tr>
<tr>
<td>Completed Specialist-Level Training (60+ hrs.) in School Psychology</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Yes</td>
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<tr>
<td>Completion of an APA, CPA, or APPIC listed internship</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Completion of a 1,200 hour internship with at least 600 hours in the schools.</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Licensed as a psychologist</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>State Credentialed as a School Psychologist or a NCSP</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>3 years of experience in the field</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>2 years post-doctoral residency</td>
<td>Yes</td>
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<td>Yes</td>
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<tr>
<td>Minimum of 500 hours each of the past 5 years providing neuropsychological services</td>
<td>No</td>
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<td>No</td>
<td>No</td>
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</table>
Certification Boards Compared

<table>
<thead>
<tr>
<th>Requirement</th>
<th>ABCN</th>
<th>ABN</th>
<th>ABpDN</th>
<th>ABSNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation of approved ongoing CEU workshops.</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Objective Written Exam</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Work samples peer reviewed</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Oral Exam</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Number of board certified individuals (as of 1999)</td>
<td>4441</td>
<td>2171</td>
<td>Not known</td>
<td>10k</td>
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<td>Number of board certified individuals (as of 10/25/06)</td>
<td>562</td>
<td>197</td>
<td>40</td>
<td>197</td>
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<tr>
<td>Number of board certified individuals (as of 10/25/08)</td>
<td>632</td>
<td>283</td>
<td>41</td>
<td>355</td>
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<tr>
<td>Number of board certified individuals (as of 8/20/10)</td>
<td>665</td>
<td>313</td>
<td>57</td>
<td>444</td>
</tr>
<tr>
<td>Number of board certified individuals (as of 10/25/11)</td>
<td>756</td>
<td>316</td>
<td>73</td>
<td>465</td>
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<tr>
<td>Number of board certified individuals as of 4/1/18</td>
<td>1008</td>
<td>4001</td>
<td>141</td>
<td>620</td>
</tr>
<tr>
<td>Percentage change in a six-and-a-half year period</td>
<td>33.3%</td>
<td>26.5%</td>
<td>93.1%</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Opinion

Specialization in school neuropsychology for the entry-level school psychologist can only be obtained by completing an organized, competency-based program of study with a strong supervised and field-based experience component, or by obtaining a doctoral with a preferred emphasis in school neuropsychology.
Opinion

• When a specialist-level school psychologist completes a post-graduate certification program in school neuropsychology, the title “school neuropsychologist”, may or may not be used in their practice depending upon the provisions of the state laws in which the practitioner works.

• School psychologists and psychologists are bound by codes of ethics that require them to work within their areas of competency.

• A specialist-level school psychologist can integrate neuropsychological principles and practices into their daily work provided they have received the training, or competency, to do so.

Presentation Outline

• Roles and functions of a school neuropsychologist
• What constitutes competency?
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  • When to refer for a school neuropsychological evaluation?
    • The state of the art of pediatric neuropsychology assessment
    • A model of school neuropsychological assessment and intervention.
    • Resources for school neuropsychology
Common child neuropsychological assessment referral questions

- A severe learning disabled child who is not responding to traditional intervention techniques.
- Children with processing discrepancies on psychoeducational measures:
  - Memory deficits
  - Language processing deficits
  - Attentional processing deficits
  - Processing speed deficits
- A child with a past or recent head injury who is having academic or behavioral difficulties.

Common child neuropsychological assessment referral questions

- A child returning to school after a head injury.
- A child who has a documented rapid drop in academic achievement that cannot be explained by social, environmental, or medical causes.
- A child with a history of congenital or acquired brain damage.
- Children with neuromuscular diseases such as cerebral palsy.
- Children with epilepsy.
Common child neuropsychological assessment referral questions

- Children with neurodevelopmental risks such as low birth weight, prenatal exposure to drugs and/or alcohol or both, or exposure to environmental toxins (e.g., lead).

- Children with brain tumors.

- Children with central nervous system infection.

- Children who have an unusually large scatter among their test scores.

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What is the state-of-the-art of school-neuropsychology?

Fixed batteries standardized 20-40 years ago are still touted as state-of-the-art by some clinicians.

- Halstead-Reitan Neuropsychological Test Batteries for Older Children (ages 9-14) - 1965
- Reitan-Indiana Neuropsychological Test Battery for Younger Children (ages 5-8) - 1969
- Luria-Nebraska Neuropsychological Battery (ages 15 - adult) - 1985
- Luria-Nebraska Neuropsychological Battery: Children's Revision (ages 8-12) - 1987

The State of the Art

- The quality of theory-based, psychometrically sound assessments has improved in the past decade.

- The challenge for fields of school psychology and the specialization of school neuropsychology is to provide better linkage between assessments and interventions.
CHC Factors on the WJ IV

- Long-term Retrieval (Glr)
- Processing Speed (Gs)
- Auditory Processing (Ga)
- Visual Processing (Gv)
- Fluid Reasoning (Gf)
- Short-Term/Working Memory (Gsm)

Cognitive Ability

Comparison of the Major Tests of Intelligence and What They Measure Relative to the WJ IV Tests of Cognitive Ability

|---------------------------------|-------------------|------------------|---------------------------|------------------------|-----------------------|----------------------|----------------------|--------------------------|

<table>
<thead>
<tr>
<th>WISC-V Factor Scores</th>
<th>Gc Comprehension</th>
<th>Gv Perceptual Reasoning</th>
<th>Gs Working Memory</th>
<th>Gs Processing Speed</th>
</tr>
</thead>
</table>

|-----------------------------------------------------------------------|--------------|----------------|-------------|--------------|

|---------------------------------------------|-------------------|----------------|---------------------------|------------------|--------------------------|

<table>
<thead>
<tr>
<th>Cognitive Assessment System 2 Factor Scores</th>
<th>Gf Planning</th>
<th>Gv Simultaneous</th>
<th>Gs Attention</th>
</tr>
</thead>
</table>

Note: When choosing a cognitive abilities test, make sure that the measure will test the cognitive constructs that will help answer the referral question. Not all tests of cognitive ability are created equal.
Major Measures of Cognitive Processing

CHC Theory:
- Woodcock-Johnson IV Tests of Cognitive Ability
- Stanford Binet - Fifth Edition

Lurian Theory:
- Cognitive Assessment Battery - Second Edition

CHC & Lurian Theory:
- Kaufman Assessment Battery for Children - Second Edition

Atheoretical:
- Wechsler Intelligence Scale for Children - Fourth Edition

The Process Approach to Assessment

- How a child performs tasks is as important, and often more important, than the score obtained at the subtest and above levels of aggregation.
- When these observations reflect
  - a pattern of behavior,
  - observed in multiple contexts,
  - (a preponderance of evidence)
- Understanding performance on items, including the kinds of errors a child makes, provides rich clinical information that may be used in conjunction with knowledge of effective instruction.

Edith Kaplan
Why Use Process Assessment?

• Rule in or out hypotheses
• Intervention planning
  • Where in the information processing circuit do problems occur?
• Determine reasons for low scores on WISC-V Basic subtests
• Provide baseline information
• Assist in reliable and valid interpretation of observations

Tests of Memory and Learning

• Test of Memory and Learning (TOMAL: 1994) Ages 5-19 (TOMAL-2, 2007 - Ages 5 to 59-11)
• California Verbal Learning Test: Children's Version (CVLT-C: 1994) Ages 5-16.11
• Children's Memory Scale (CMS: 1997) Ages 5-16
• Wechsler Memory Scale 4th Ed. (WMS-IV: 2009) Ages 16-90.11
• Child and Adolescent Memory Profile (ChAMP: 2015) Ages 5 to 21 years
Selected Fixed Batteries for Children

- NEPSY (1998)
- Delis-Kaplan Executive Functions Test (2001)
- WPPSI-III (2002)
- Dean-Woodcock Neuropsychological Battery (2003)
- KABC-II (2004)
- NEPSY-II (2007)
- WISC-V (2014)
- WISC-V Integrated (2015)

The Dean-Woodcock Neuropsychological Battery

A comprehensive assessment of sensory-motor functioning that includes a structured interview and mental status exam. The DW expands the psychologist’s range of assessment and provides standardized procedures and normative information to typically unstandardized measures used in neuropsychology.
The Dean-Woodcock Neuropsychological Battery

**Ages**
- 4.0-adult, including the geriatric population

**Administration Time**
- The *DW* is portable and time efficient—administration time is approximately 40 to 45 minutes.

The Dean-Woodcock Neuropsychological Battery

The *Dean-Woodcock Neuropsychological Battery* is comprised of three parts:
- Structured Interview
- Mental Status Exam

During the Structure Interview, clinicians ask questions to determine an individual's medical and family background. The Mental Status Exam includes psychiatric signs and symptoms—covering most major disorders found in the DSM-IV—as well as clinical impressions.
The Dean-Woodcock Neuropsychological Battery

- Sensory-Motor Battery (18 subtests)
  - Sensory Tests:
    - Lateral Preference Scale
    - Near Point Visual Acuity
    - Visual Confrontation
    - Naming Pictures of Objects
    - Auditory Perception

- Tactile Examination:
  - Palm Writing
  - Object Identification
  - Finger Identification
  - Simultaneous Localization
The Dean-Woodcock Neuropsychological Battery

- Sensory-Motor Battery (18 subtests)
  - Motor Tests (subcortical):
    - Gait and Station
    - Romberg Test
    - Coordination Test

- Sensory-Motor Battery (18 subtests)
  - Motor Tests (Cortical):
    - Construction Test (clock and cross)
    - Mime Movements
    - Left-right movements
    - Finger tapping
    - Expressive speech
    - Grip strength
NEPSY-II

- Published in 2007
- Integrates more processing assessment data into the new version of the test.
- Requires training on how to interpret the scores.

NEPSY-II: Learning is a Multifactorial Process

LEARNING

- Memory & Learning
- Executive Functioning/Attention
- Language
- Sensorimotor Functioning
- Social Perception
- Visuospatial Processing
What’s important in any new neuropsychological battery for children?

- A recent and broad-based normative sample of children only.
- A test with a strong theoretical foundation.
- A test that has flexible components to be administered based on the referral question.
- Have both quantitative and qualitative analyses.
- A test with strong psychometric properties.
- A linkage with intervention is preferred.

The Importance of Executive Functions

- The assessment of executive functions has taken on an added emphasis in our field in the past few years.
- Executive systems play a key role in the retrieval of verbal information which is required in reading.
- Executive systems are often compromised in a wide range of handicapping conditions.
Constellation of behavioral difficulties: inattention, hyperactivity, poor conduct, antisocial behavior, aggressive acts towards peers, verbal hostility towards authority figures, oppositional-defiant behaviors, impulsivity, somatic complaints, addictive behaviors.

Delis-Kaplan Executive Functions Test

- Comprehensively assess with nine new tests, the key components of executive functions believed to be mediated primarily by the frontal lobe.
- D-KEFS is the first nationally standardized set of tests to evaluate higher-level cognitive functions in both children and adults (8 - 89 years).
Delis-Kaplan Executive Functions Test

- Trail Making Test
- Verbal Fluency Test
- Design Fluency
- Color-Word Interference Test
- Sorting Test
- Twenty Questions
- Word Context
- Tower Test
- Proverbs Test

Greater Emphasis on the “processes” behind a given task

- What strategies does a learner employ during the performance of a task?
- Qualitative Component to Assessment
  - LNNB-C & LNNB
  - Cognitive Assessment System
  - NEPSY
  - WISC-III PI
  - WISC-IV Integrated
  - D-KEFS
  - NEPSY-II
  - WISC-V Integrated
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Levels of Assessment Model

Informal Assessment/Intervention by the Classroom Teacher

Formal Interventions/Progress Monitoring by Student Assistance Team

Psychoeducational Assessment

Neuropsychological Assessment

Neurological Assessment (e.g., MRI, CAT scans)
### Integrated SNP/CHC Model
(Miller, 2013; Miller & Maricle, 2019)

<table>
<thead>
<tr>
<th>Facilitators/Inhibitors</th>
<th>Allocating and Maintaining Attention</th>
<th>Working Memory</th>
<th>Speed and Efficiency of Cognitive Processing</th>
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<tr>
<td>Cognitive Processes:</td>
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<tr>
<td>• Visuospatial</td>
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<tr>
<td>• Auditory</td>
<td></td>
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<tr>
<td>• Learning and Memory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Executive</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acquired Knowledge:</td>
<td></td>
<td></td>
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<tr>
<td>• Acculturation Knowledge</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Language Abilities</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• Reading Achievement</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• Written Language Achievement</td>
<td></td>
<td></td>
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<tr>
<td>• Mathematics Achievement</td>
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</table>

<table>
<thead>
<tr>
<th>Basic Sensorimotor Capabilities:</th>
<th>Sensory Functions</th>
<th>Fine Motor Functions</th>
<th>Visual-Motor Integration Skills</th>
<th>Visual Scanning</th>
<th>Gross Motor Functions</th>
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<td>Social-Emotional, Cultural, and Environmental Factors</td>
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</table>

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• Resources for school neuropsychology
Despite the certain biological bases of all developmental disorders, school psychologists interested in reading original research on topics related to school neuropsychology must go beyond the traditional school psychology journals (e.g., School Psychology Review – the official journal of the National Association of School Psychologists, or the School Psychology Quarterly – the official journal of the American Psychological Association's Division 16 – School Psychology).

These two school psychology journals have only published 62 original school/pediatric neuropsychology articles in the past 27 years, compared to 5,437 original peer-reviewed journal articles published in other journals associated with neuropsychology.
### Journals Relevant to School Neuropsychology

<table>
<thead>
<tr>
<th>Journal</th>
<th>Number of Articles (1991 – 2018) Related to School/Pediatric Neuropsychology Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal of Intellectual Disability Research</td>
<td>997</td>
</tr>
<tr>
<td>Developmental Neuropsychology</td>
<td>758</td>
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<tr>
<td>Child Neuropsychology</td>
<td>723</td>
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<td>Brain Injury</td>
<td>883</td>
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<tr>
<td>Neuropsychologie</td>
<td>351</td>
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<tr>
<td>Neuropsychology</td>
<td>327</td>
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<tr>
<td>Archives of Clinical Neuropsychology</td>
<td>326</td>
</tr>
<tr>
<td>Journal of the International Neuropsychological Society</td>
<td>326</td>
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<tr>
<td>Journal of Learning Disabilities</td>
<td>253</td>
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<tr>
<td>The Clinical Neuropsychologist</td>
<td>183</td>
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<tr>
<td>Applied Neuropsychology: Child</td>
<td>140</td>
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<tr>
<td>Psychological Assessment</td>
<td>136</td>
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<td>Biological Psychiatry</td>
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<td>Journal of Educational Psychology</td>
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<td>Journal of Applied School Psychology</td>
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¹ Through April 1, 2018

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### Relevant Journals

- [Journals](#)
- [Child Neuropsychology](#)
- [TCN](#)
- [Neuropsychologia](#)
- [Brain and Cognition](#)
Related Professional Organizations

- International Mind, Brain, and Behavior Society
- International Neuropsychological Society
- National Academy of Neuropsychologists
- American Psychological Association - Division 40: Clinical Neuropsychology
- American Academy of Clinical Neuropsychology
- National Association of School Psychologists
- Hispanic Neuropsychological Society

Presentation Summary

- Pediatric Neuropsychology and School-Neuropsychology are rapidly evolving professions.
- School psychologists need training and supervised experience in neuropsychological assessment techniques for school aged children.
- Standards for practice and resources for school neuropsychologists are becoming more available.