Chapter 9
Using a Standardized Neuropsychological Model to Guide a Qualitative and Quantitative Assessment for Evidence-Based Interventions

Elizabeth M. Power and Rik Carl D'Amato

Learning Objectives

- To be able to defend the empirical and rational arguments for using clinical neuropsychology as your paradigm for approaching evaluations and neuropsychological services.
- To understand the importance of knowing your personal psychological paradigm from which you practice.
- To be able to explain how to use an Eastern or qualitative approach to neuropsychological assessment with a focus on the uniqueness of planning, conceptualization, and formulation for individual clients.
- To be able to explain how to use a Western or quantitative approach to neuropsychological assessment with a focus on the uniqueness of planning, conceptualization, and formulation for individual clients.
- To understand the difference between a fixed-battery and flexible-battery in a neuropsychological evaluation and explain when different batteries should be considered.
- To be able to tell which areas should be evaluated for assessment and evidence-based intervention when providing comprehensive clinical neuropsychological services.
- To differentiate the assessments used at the primary, secondary, and tertiary levels that lead to evidence-based interventions in a comprehensive neuropsychological evaluation.

E. M. Power (✉)
Department of Educational/School Psychology, The College of Saint Rose, Albany, NY, USA
e-mail: powere@strose.edu

R. C. D'Amato
Department of School Psychology, The Chicago School of Professional Psychology & Presence Learning, Chicago, IL and New York, NY, USA

R. C. D'Amato et al. (eds.), *Understanding the Biological Basis of Behavior*,
https://doi.org/10.1007/978-3-030-59162-5_9

The Professional Practice of Clinical Neuropsychology

Clinical neuropsychology is the study of brain-behavior relations. It stems from the early ideas that all behavior could be categorized into one of two major paradigms – those developing from *nature* (i.e., the biogenetic or organic approach) or *nurture* (i.e., the environmental approach). With a focus on understanding our behavior and its relationship to overall brain integrity, clinical neuropsychology has developed into one of the most sophisticated areas of psychology, with strong links to medicine, psychopharmacology, school psychology, counseling, consulting, and rehabilitation (D'Amato et al., 2005; Davis, 2011). Some have argued persuasively that *all psychologists* must be comprehensively trained in this seminal area if we are to effectively practice any type of psychology (D'Amato & Rothlisberg, 1997; Power & D'Amato, 2018).

Leaders in psychological training, such as the American Psychological Association (APA) require the biological basis of behavior to be both included by accredited doctoral programs and as part of the health service provider definition for psychological practice (APA, 2017). This is understandable given the interplay and overlap between psychology, medicine, and the brain. Almost 100 years ago, one of our most seminal leaders argued that psychometric testing should be viewed as a *significant psychological dimension* important in understanding the practice of clinical neurology (Wechsler, 1928). For better or for worse, all psychologists utilize some type of ***model*** which is related to how they conceptualize, diagnose, and treat individuals, groups, systems, etc. While some may claim to be eclectic or more recently ecological, the data they collect, the way they interpret this information, and the type of evidence-based interventions they select all relate to **the approach** they explicate (Nicholson et al., 2011). Thus, while all psychologists are trained in various psychotherapeutic approaches, such as cognitive-behavioral, client-centered/humanistic, and psychoanalytic, the way an individual practices psychology reveals the belief system they utilize (D'Amato & Rothlisberg, 1997). The purpose of this chapter is to review various paradigms used within clinical neuropsychology and offer an integrative ecological model that allows one to effectively understand and practice clinical neuropsychology applied to meet a variety of societal needs (D'Amato et al., 2011). This could include providing neuropsychological services at the primary, secondary, or tertiary levels with patients from any and all age groups. Without at least a beginning understanding of the integrity of the central nervous system and its functioning, psychologists are not able to provide suitable psychological services to meet the needs of the general public (Hynd & Semrud-Clikeman, 1990). The knowledge of this book allows all health service providers a comprehensive understanding of the biological basis of behavior. This opens doors to services in a variety of unique and additional settings (D'Amato et al. 2005).

Neurology and Psychiatry

Neurology concerns the assessment and rehabilitation of abnormalities of the nervous system. This emphasis includes both the central and peripheral nervous systems, as well as their communication with muscles. Moreover, emotional and psychological functions are often impacted by neurological disorders (e.g., multiple sclerosis). Some have defined neurological difficulties as clearly related to nerve function problems (Hartlage & D'Amato, 2008). In fact, higher-order psychological functions are likely to be the initial symptom of central nervous system impairment (D'Amato & Dean, 1988). Recent technological advances (e.g., CT scans) have paved the way for advances and integration of disciplines that have helped clinical neuropsychology become prominent as part of rehabilitation services in many subareas of medicine.

> *Historically, psychiatry and neurology were the same field, and only recently have two separate specialties emerged. For many patients, however, the distinction is arbitrary. Diseases of the brain can produce severe psychological disturbances, and the causes are only beginning to be understood* (Kolb & Whishaw, 2003, p. 748).

A related specialty is that of the psychiatrist. Given the complexity of societal functioning and problems in human development, psychiatry has ballooned into being a critical specialty which is in great demand. Moreover, this has forced many psychiatrists to have a singular focus on psychopharmacology. However, the specialty was originally delineated to focus on community mental health within the general population and a small number of psychiatrists do regulary provide psychoptherapetic services. Related to this notion is the fact that many psychological advances, such as the development of consultation have psychiatric roots (Caplan et al., 1995). Because of the shortage of psychiatrists, some have advocated that psychologists seek further education and training to be able to prescribe medication to clients (McGrath et al., 2004). For a comprehensive overview of neurological and psychiatric disorders, see Hartlage and D'Amato (2008).

Neurologists work to describe, understand, and treat neurological abnormalities (D'Amato & Dean, 1988). Although neurological examinations involve a variety of evaluative techniques, they routinely include a broad physical examination (including an extensive history), basic laboratory tests (e.g., urine analysis), and an in-depth neurological exam. The neurological exam is a universal standardized procedure that may be divided into a series of assessments concerning (a) cranial nerves, (b) reflexes, (c) motor functions, (d) sensory functions, (e) cerebellar functions, (f) cerebrovascular functions, and (g) the patient's mental status and language (D'Amato & Dean, 1988). Based on this comprehensive examination, more specific and/or advanced tests may be ordered. These procedures may involve assessment of brain functioning, brain structure, or psychological processes. The neuropsychologist's chief role in the medical/neurologic setting involves the use of psychometric assessments to offer an objective baseline of the patient's impaired functioning and remaining adaptive behaviors (Hartlage & D'Amato, 2008a, b).

More than 100 years of seminal research has made clear that we should conceptualize psychiatric (organic) and neurological (environmental) as two ends of a

single continuum (Lezak et al., 2012; Schultz & Schultz, 2016). This makes clear the need to conceptualize disorders on an interactive, continuum given our current level of understanding of neuropsychiatric disorders (Hartlage & D'Amato, 2008a). It seems important to hypothesize this as a spectrum such as the autism spectrum disorder conceptualization with two distinct, yet related ends. In fact, the very notion of a disconnected dichotomy with psychiatric at one end, unconnected to neurologic at the other end, seems static and is not in line with the multidimensional brain-related notions of influential researchers (Reitan, 1985; Luria, 1966; Dean, 1986a, 1986b; Kolb & Whishaw, 2003; Kaufman, 2001). If conceptualized as an interactive continuum, and not as an all-or-none occurrence, this allows neuropsychologists to answer more than yes/no questions regarding brain damage (Hartlage & D'Amato, 2008a, b). This makes conceptual sense because an organic disorder when left untreated often leads to environmental or functional changes. For example, a clinical neuropsychologist may prescribe a child who presents with depression with an antidepressant medication (i.e., organic end). While symptoms of depression may subside, the practitioner must also consider the other end of the spectrum (i.e., behavioral and environmental), which impacts his or her depression, such as imparied social skills. If a child is depressed, they may stop contact with their friends. This often causes friends to cut off contact with them. If they have improved neurotransmission with this medication, they may feel like establishing relationships. Now, although they may no longer feel depressed, they created an environment of depression which interferes with their ability to interact with friends. If viewed along a continuum, a clinical neuropsychologist must comprehensively address organic and environmental/behavioral issues. This data allows the neuropsychologist to analyze, integrate, and interpret the patient's abilities related to known behavioral patterns associated with specific neurologic or psychiatric disorders (D'Amato & Dean, 1988; Hartlage & D'Amato, 2008a, b).

Instruments Used in Neuropsychological Practice

Neurologists and other trained health service psychologists utilize a variety of techniques to assess a patient's behavioral and cognitive functioning. It is important for a clinical neuropsychologist to be aware of many of the traditional scales used in most medical facilities to evaluate brain functioning.

Specialized Techniques

Using these techniques may be a part of a clinical neuropsychologist's role related to neuropsychological rehabilitation. Most neuropsychologists will assess and/or review a patient's mental status, lateral preference, and scores from the APGAR, Glasgow Coma Scale, and the Ranchos Los Amigos Levels of Cognitive Functioning Scale.

Mental Status Exam

During a neurological examination, a patient's mental status is measured through a structured assessment of their behavioral and cognitive functioning. During this examination, the following functions are assessed: level of consciousness, attention, motor functioning, speech, mood, affect, thoughts/perception, attitude, insight, reaction level to the examiner, and higher cognitive abilities (Martin, 1990). The mental status exam is equivalent to a physical exam; it occurs as a series of observations. The observations may occur at different times throughout an appointment, in that they may be ordered differently for each client. In the end, the findings help to describe a client's appearance, cognition, and emotion. The mental status exam assists clinicians in determining psychiatric diagnoses. For example, a person with dementia might present with difficulty speaking, which will be evident when the client is expected to answer questions. Upon recording responses to questions and observations, the clinician should take such responses into consideration when offering a final diagnosis/decision.

APGAR

The APGAR test was developed in 1952 and has become a standard tool used immediately following the delivery of a baby. The APGAR provides scores for a baby's breathing effort, heart rate, muscle tone, reflexes, and skin color at 1 and 5 min post-delivery (Apgar, 1966). As a result of the use of medication and anesthesia during delivery, the APGAR was established to provide a quick and accurate assessment of an infant's status post-birth. In addition to identifying signs of distress, the APGAR works well to identify metabolic imbalance (Apgar, 1966). For each of the systems assessed using this test, the infant is assigned a number (0–2). For example, if a baby is not breathing at birth, they are assigned a *0* to indicate that they are not breathing. If a baby engages in active motion, they are assigned a *2* to indicate such behavior (Finster & Wood, 2005). It should be noted that the APGAR score was invented to assess the baby's condition at birth, and should not be used as a predictor of long-term outcomes (Montgomery, 2000). However, low APGAR scores could indicate significant problems, such as the presence of a disability (Nelson & Ellenberg, 1981), and should be considered when making clinical formulations. This score lacks psychometric sophistication and displays reliability concerns so judicious use is recommended (Dean & Gray, 1991).

Glasgow Coma Scale

The *Glasgow Coma Scale* (GCS) was first presented in 1974 to aid in determining one's level of consciousness (Sternbach, 2000). This tool provides a practical method for assessing impairment of consciousness, especially at patient presentation or following a traumatic brain injury (TBI). It is used by trained staff at the site of an injury, as well as in hospitals to measure eye opening, verbal response, and

motor response (Teasdale et al., 2014). Patients are measured on a quantitative scale between numbers 1 and 6, depending on the function being assessed. If a patient is not testable, they are given a rating of *NT* to indicate that they are *not testable.* For example, eye opening is measured at ratings of *not testable, none (1), to pressure (2), to sound (3), and spontaneous (4;* Teasdale et al., 2014). The total GCS score is a sum of the eye opening, verbal, and motor response subscores. The GCS is used to determine cognitive functioning in adults; however, there is a modified version of the GCS for children (Hynd & Willis, 1988). While it is critical to understand this scale, many patients admitted to a hospital with a TBI will have the absence of a coma and yet suffer long-term coma-like brain injuries (Kolb & Whishaw, 2003). There is a significant relationship between a patient's short- or long-term coma and their need for comprehensive rehabilitation (Lezak et al., 2012). Clinical neuropsychologists who focus on traumatic brain injuries and other medical issues use information from patient histories as a key to understanding client rehabilitation. See Table 9.1 for Glasgow Coma Scale levels.

Ranchos Los Amigos

The Ranchos Los Amigos Levels of Cognitive Functioning Scale, also known as the Ranchos scale, is a tool used to rate recovery in patients with brain injuries. The scale assists in describing cognitive and behavioral patterns found in brain-injured patients (Lin & Wroten, 2017). This Ranchos Scale is often used in a more comprehensive fashion, both initially following an injury as well as throughout the recovery

Table 9.1 Glasgow Coma Scale

Behavior	Response	Score
Eye opening response	Open spontaneously	4
	Open to verbal command	3
	Open to pain	2
	No response	1
Verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Motor response	Obeys commands	6
	Localizing to pain	5
	Withdrawal from pain	4
	Abnormal flexion to pain	3
	Abnormal extension to pain	2
	No response	1

period (Lin & Dulebohn, 2017). The Ranchos Scale provides an easy way to describe a person's level of activity. When assessing an individual's responses, their reactions are described to occur at various cognitive functioning levels. See Table 9.2 for the various levels of the Ranchos Los Amigos Scale.

Lateral Preference

Understanding lateral preference has historically been a conundrum for clinical neuropsychologists because early on they thought that there would be a clear relationship between a patient's handedness and significant cerebral dysfunctions (Dean & Reynolds, 1997; Rothlisberg & Dean, 1985). Thus, a number of questionnaires or rating scales were developed to evaluate laterality functions, such as handedness, footedness, and eyedness. The most popular assessment for lateral preference is the *Lateral Preference Schedule* (Dean, 1978). This tool is an easy and quick self-report measure that takes approximately 15 min to complete (Davis, 2008). Within that assessment, the following factors provide understanding for individuals with mixed laterality being most significant. Numerous early studies by Dean and colleagues attempted to understand the relationship of all lateral senses to the brain (e.g., handedness, footedness, visually-guided; e.g., see Dean & Reynolds, 1997)). For example, researchers have evaluated verbal performance discrepancies, cued auditory asymmetries, and functional lateralization of the brain (Dean, 1979, 1982, 1984). Dean, Schwartz, and Smith (1981) found

Table 9.2 Levels of cognitive functioning for the Ranchos Scale

Level	Cognitive functioning response
Level 1	**No reaction**: Person is unconscious and does not respond to sight, sound, touch, or movement
Level 2	**Generalized reaction**: Person begins to respond slowly to sensory stimuli (may include chewing, sweating, moaning)
Level 3	**Localized reaction**: Person wakes on and off, makes more movements that are different each time
Level 4	**Confusion/Agitation**: Person is very active but not yet able to comprehend the situation; behavior may be bizarre or uncooperative
Level 5	**Confusion/Inappropriate**: Person may be able to attend for a few minutes; person becomes less agitated; responds to simple commands more consistently
Level 6	**Confusion/Appropriate**: Person is more motivated but still depends on others; person begins to recognize and be more aware of others
Level 7	**Automatic/Appropriate**: Person seems to act appropriately in hospital or home; person can follow a schedule with some assistance
Level 8	**Purposeful/Appropriate**: Person is cognizant of problems with cognition and memory; person may start to compensate for problems; person can learn things at a slower rate

significant differences between groups of individuals with learning difficulties in factors related to: (1) general handedness, (2) visually-guided activites (3) fine motor, (4) eye preference, (5) ear preference, (6) activities of strength, and (7) fine motor. When one considers that we are *contralaterally wired*, that is, where the right side of the body relates to the left hemisphere and the left side of the body relates to the right hemisphere, it makes conceptual sense to think that functions on one side of the body would relate to continuity of cognitive processing. Many studies show that children with neurodiversity display unique patterns of lateral preference (Dean et al., 1981; Rothlisberg & Dean, 1985).

How to Differentiate Neuropsychology from Neurology

People generally confuse, and thus cannot differentiate between the fields of neurology and clinical neuropsychology (Lezak et al., 2012). This is made even more complex by the fact that some neurologists are termed *"behavioral"* neurologists. Although there is a great deal of overlap relating to lower and higher cognitive functions, there are significant differences in the way data are interpreted and used by these specialists. The neurological history and related physical examination, which is typically the first step in a comprehensive medical/physical health evaluation, tends to be the platform which the medical specialist uses to begin to hypothesize potential concerns and test-related areas to see if concerns are similar to a constellation of issues related to a specific medical disorder (Kolb & Whishaw, 2003). All medical practitioners, including pediatricians, family practice physicians, neurologists, and psychiatrists use this examination as their first step in understanding a patient's abilities. This procedure is used to evaluate and track the basic functions of human growth, development, and aging. The emphasis of the medical practitioner will change given the nature of their specialized examination. Undoubtedly, a neurologist will focus on neurological disorders whereas a psychiatrist will focus on psychiatric disorders. However, this is where specialists utilize the knowledge of one another. If a neurologist suspects a psychological disturbance they may ask for consultation from a psychiatrist or clinical neuropsychologist. As previously stated, they may ask a question as simple as if the patient's presenting disorder appears to be primarily organic or functional in origin. Given the complexity of human functioning, and the overlap between these areas, this is not as easy a question as one might think (Hartlage & D'Amato, 2008a, b; Rothlisberg et al., 2003). But in general, neurologists focus on the larger issues relating to the initial diagnosis and later treatment of disorders of the nervous system, focusing on the multifaceted diagnosis of various neurological diseases discussed below (D'Amato, Fletcher-Janzen, & Reynolds, 2005). The complexity of this neurodiagnostic process is extremely challenging and requires considerable training, expertise, and experience (Dean, 1986; Lezak et al., 2012).

The Neurological Examination

The neurological exam often is broken down into two parts, the patient's *history* and the general *physical* examination (Kolb & Whishaw, 2003). While the history may overlap extensively with a clinical neuropsychologist, the physical examination is quite different. While some basic abilities such as walking, talking, writing, and cognitive processing may be observed by both specialists, the neurologist assesses many more complex medical/physical abilities such as (1) sounds of the heart and blood vessels, (2) pupillary reflexes, (3) gag reflexes, (4) smell, (5) taste, (6) corneal reflexes, (7) muscle stretch reflexes, (8) sensitivity to touch, and (9) blood pressure. Typically, most if not all cranial nerves are evaluated. They then go on to evaluate higher cognitive functions such as mental manipulation, reading, writing, mathematics, and problem-solving, and current issues. Motor systems in various parts of the body are further examined as well as a sensory examination that reviews areas such as touch, pain, temperature, and vibration.

The Challenge of Diagnosis before Rehabilitation

Entire books are written about this critical examination which covers significant findings related to vascular disorders, traumatic brain injuries (TBI), epilepsy, tumors, headaches, infections, disorders of motor neurons and the spinal cord, and disorders of sleep (See Chap. 1, Van Damme & D'Amato, 2021). Most of these disorders are relatively common, life-changing, and relate to significant changes in neuropsychological functioning (Hartlage & D'Amato, 2008a). The clinical neuropsychological examination while covering some of the same areas of neurology, views functioning from a different lens. They consider individuals in light of the ability they have or need to develop to return to life and be successful *with others*, *in work*, and *in life* (Rothlisberg et al., 2003). While a neurologist may diagnose a patient as having a TBI, the clinical neuropsychology will work with a team planning a rehabilitation program that will help them relearn skills and abilities, and return to life and work (if such a move is possible). However, while it is important to remember that advanced medicine based on cutting-edge technology is amazing, *"the most sensitive measure of cerebral integrity is behavior and behavior analysis consistently finds dysfunction that is not seen in MRI, especially in cases of closed head injury and epilepsy*" (Kolb & Whishaw, 2003; p. 762). Thus, the practice of clinical neuropsychology has continued to grow at an enormous rate and has developed into a critical health service provider postdoctoral specialty. See Chap. 1 for a discussion of growth and needed specialization areas.

A neuropsychological evaluation includes the consideration of many domains, in addition to the deliberation of neuroanatomy and corresponding functions. The comprehensive evaluation focuses on the skills that can be found within the different lobes of the brain. For instance, the frontal lobe of the brain often concerns executive processes, such as task initiation, organization, and long-term planning.

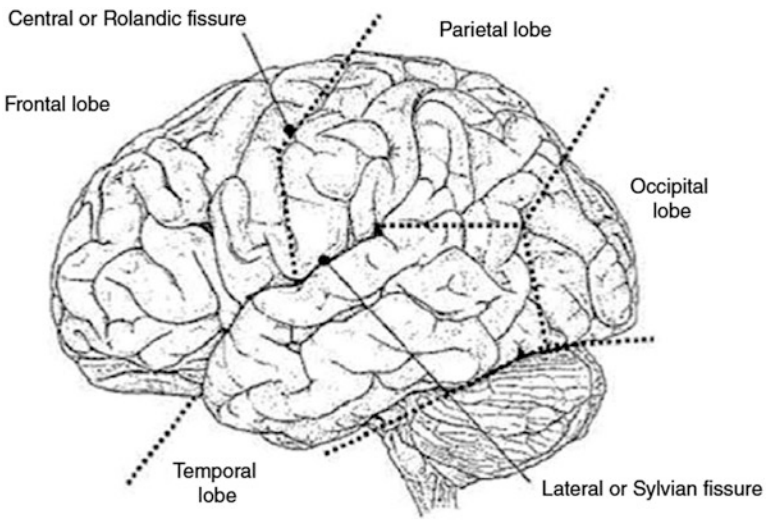

Fig. 9.1 Lobes of the Brain. (*Source*: Reprinted with permission from Power & D'Amato, 2018)

The other lobes of the brain are the occipital, temporal, and parietal lobes. Figure 9.1 shows the lobes of the brain, in addition to the central and lateral fissures. See Chap. 3 for discussion of functional neuroanatomy. Recent research has shown that many disorders that were originally thought to be related to behavior really have a neuropsychological foundation (Lezak et al., 2012). Table 9.3 illustrates various disorders that have neuropsychological underpinnings.

History of Neuropsychological Assessment for Evidence-Based Intervention

Qualitative and Quantitative Approaches to Practice

Two distinct approaches – *qualitative* and *quantitative* – have been utilized in helping us understand the biological basis of each individual's functioning. Many credit Halstead (1947) as developing the approach to using comprehensive and standardized measures for all individuals with neuropsychological impairment. He advocated a comprehensive, wide-range battery which he developed with his student Reitan (Reitan & Wolfson, 1985) and then at one point, these measures were the most widely used neuropsychological batteries in the world. There are several factors that need to be evaluated and each person who undergoes this evaluation is administered the batteries in the same fashion (Johnson & D'Amato, 2011).

Table 9.3 Disorders found to have neuropsychological underpinnings

Alcoholism	Language disorders
Alzheimer disease	Learning disorders: Reading, mathematics, written expression
Asthma	Malnutrition
Aphasia	Migraines/headaches
Attention deficit disorder (ADD) and attention deficit/hyperactivity disorder (ADHD)	Motor skill disorders
Behavioral/personality disorders	Multiple sclerosis
Cancer	Muscular dystrophy
Dementia not otherwise specified	Parkinson disease
Diabetes	Perceptual disorders
Eating disorders	Pervasive developmental disorders
Epilepsy	Pick disease
Fetal alcohol syndrome	Prematurity
Genetic and chromosomal disorders: Phenylketonuria (PKU), Down syndrome	Seizure disorders
Hearing/auditory disorders	Traumatic brain injuries (as a result of motor vehicle accidents, pedestrian-vehicle accidents, contact/noncontact spores, accidental injuries, abuse, assault)
HIV/AIDS	Vascular disorders
Huntington disease	Vision problems
Hypertension	Zika virus
Infants' exposure to prenatal toxins	

Coronavirus-19 (COVID)

The Need for Innovation in Clinical Neuropsychology

Understanding the brain is a quandary because every brain is unique and standardized instruments including neuropsychological testing, as well as use of an MRI, do not easily differentiate the unique or impaired brain components. Therefore, we need to use informal and qualitative assessments to help us determine a client's strengths and weaknesses (D'Amato et al., 2011). For example, Rhodes, D'Amato, and Rothlisberg (2008) have advocated using the Thematic Apperception Test (TAT) in unique ways such as having clients write stories or having clients tell stories, and then interpreting data from a neuropsychological perspective. The uniqueness of the brain requires this type of approach. Similarly, Teglasi (2015) has called for the use of storytelling which collects information which may not be offered in any other format. To be an effective health service psychologist, one must approach neuropsychological needs armed with innovative assessment for intervention skills (D'Amato et al., 2005). Another example is van Schalkwyk's collage technique for understanding the core of a client's neuropsychological profile. See Chap. 7 for more in-depth coverage of related techniques.

How Qualitative Data Should Link to the Biological Basis of Behavior

To understand an individual's neuropsychological strengths and weaknesses, a practitioner must use an ecological approach. An ecological framework is based on evidence that no single factor can explain or predict behaviors (Perfect & D'Amato, 2020; Spooner & Pachana, 2006). Neuropsychologists spend a great deal of time using informal and formal methods that inform clinical decisions. In addition to standardized test batteries, the collection of qualitative information, such as one's developmental history, provide critical details to assist in impression formulation and/or diagnosis. Historically, organic and environmental variables are considered essential within an evaluation (D'Amato et al., 2011; D'Amato, 1990). The *nature* versus *nurture* debate is one of the oldest issues in the field of psychology (Hartlage & D'Amato, 2008b). While many are divided on the issue of which contributes more to our development, it is often assumed that both neurobiology and environment influence our thoughts and behavior (Collins et al., 2000). Figure 9.2 illustrates the systems, contexts, settings, sources, and methods from which we should draw information regarding a client. As displayed, social, developmental, and medical historical data provide rich information regarding a client's systems, contexts, and settings. D'Amato and colleagues have developed a questionnaire that helps one know what questions to ask in an interview; the questionnaire is availabe in both pediatric and adult formats (for children see Tincup et al, 2005; for adults see

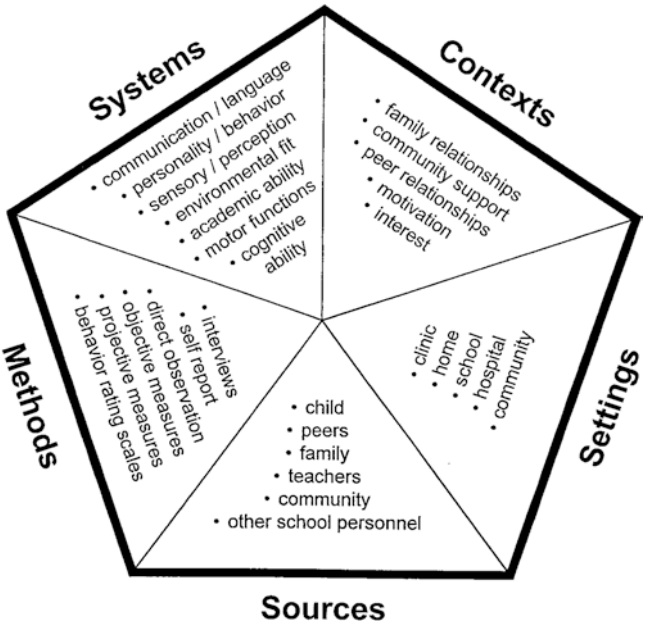

Fig. 9.2 Organic and environmental areas to consider during an evaluation

Appendix A, D'Amato et al., 2021) during a comprehensive neuropsychological evaluation. This questionnaire covers all relevant areas in detail and is completed using a multi-step process which includes some one-to-one interviewing and some completion of the form in advance by the patient. This questionnaire includes sentence completion tasks, self-ratings of behavior, and short response questions. The authors recommend that readers practice using the form prior to conducting a formal evaluation. Neuropsychologists also use informal approaches to determine a client's current functioning and status, such as a neurological examination, mental status examination, and other direct behavioral observations of a client.

Behavioral Observations

During any psychological evaluation, it is necessary to observe and document behavior that occurs during testing. Observations of individuals during the evaluation process can provide valuable insight into qualitative information, such as how one approaches a problem. Each person approaches test items differently, and such behaviors can offer information regarding self-esteem, frustration, communication skills, academic approaches, and more. During an evaluation, it is common for health service psychologists to keep track of motor skills, activity level, and language. It is also beneficial to document consistency in performance, mood, frustration tolerance, cognitive flexibility, motivation, degree of cooperativeness, anxiety, and the need for redirection (Aylward & Carson, 2005). Entire book chapters have been offered that deal with *how* and *what* to observe with individuals during the evaluation process (see e.g., Sattler & D'Amato, 2002a, 2002b). Observations are perhaps the most important aspect of the psychological evaluation process and behaviors displayed during this greatly influence the outcome of the evaluation. For example, if an individual has difficulty sitting still for too long, they may be likely to rush through test items resulting in lower performance. Many view the "*relationship*" as essential to success and the client-psychologist interactions are vital to understanding the dynamics and uniqueness of each client (D'Amato & Rothlisberg, 1997/1992; Gaddes & Edgell, 1994; Luria, 1970, 1980). Another related example is *The Boston Process Approach*, developed by Kaplan (1988) which emphasizes the importance of watching clients approach problems during assessment. This process-oriented approach allows for neuropsychologists to consider qualitative aspects rather than solely considering a client's quantitative numerical test scores. Qualitative aspects of behavior should always be considered when results are interpreted and impressions are formulated. Related to behavioral observations of a client, it is necessary to consider a client's motivation during an evaluation. This can be one of the most critical areas when conceptualizing a client. Figure 9.3 demonstrates which components of motivation should be considered. Ornstein and Sobel (1987) have claimed that what a person can learn is also affected and organized by emotions and motivation – so to understand the voice of a client, an understanding of aspects such as the client's motivation, attention, relevance, satisfaction, and confidence will be

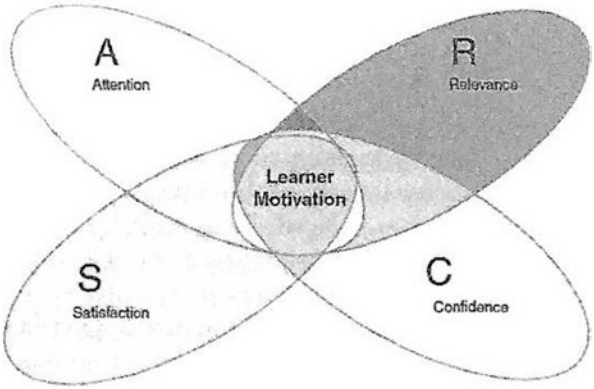

Fig. 9.3 Visual display of the components of a client's motivation

needed to determine future learning. Figure 9.3 shows how learner motivation must be understood within the context of attention (A), relevance (R), satisfaction (S), and confidence (C).

Visual display of the components of a learner's motivation. From D'Amato and Wang (2015). Copyright © John Wiley & Sons, Inc. Reprinted with permission

Review of History/Clinical Interview

To understand a client comprehensively involves the collection of an individual's detailed history. This history provides a professional with information, such as medical/ health history, developmental milestones, and social functioning (see D'Amato et al., 2005, Appendix A, p. 859, for an example). The history is also essential for gathering information about an individual's culture. Cultural factors, such as age, gender, education, income, and other related factors, should always be taken into consideration during a neuropsychological evaluation. Such implications assist the clinician in determining outcomes. There are different ways of collecting this information. Historically, a neuropsychological understanding of a client seemed to represent a continuum with organic (factors within the child) at one end and environmental factors (outside the child) at the other. What makes neuropsychology unique is that we consider environmental outcomes, biogenetic factors, and outcome behaviors and how these influence/are influenced by one's perceptions, memory, affect, and problem-solving (see Fig. 9.4).

A detailed social, developmental, and medical history is one of the most critical elements of a neuropsychological evaluation (Davis, 2011). This information is typically collected during a clinical interview with a client, family, and/or child (D'Amato et al., 2005). This interview is typically conducted prior to the administration of formal assessments and assists in the development of a practitioner-client

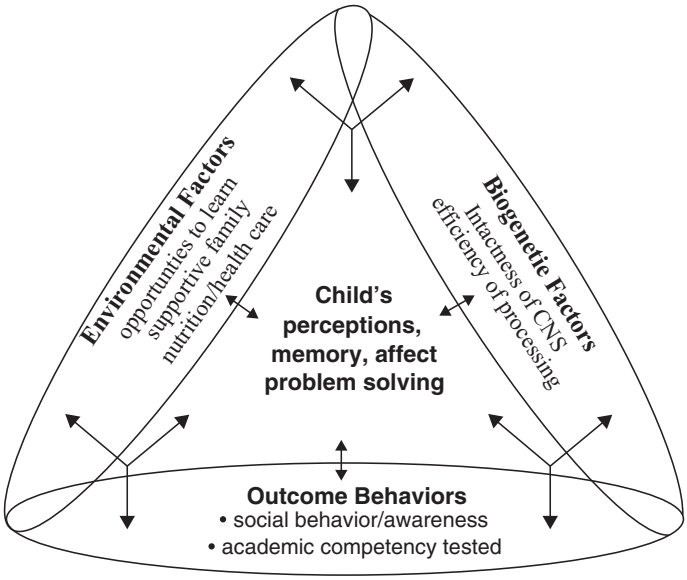

Fig. 9.4 Impact of environmental, biogenetic, and outcome factors

relationship. As previously discussed, many medical specialists and psychological practitioners view the clinical interview and process as the most important activity with a client (Lezak et al., 2012). Clinical interviews may be unstructured, structured, or semistructured (Jones, 2011). During unstructured interviews, questions are not standardized and can be asked in any order. Practitioners usually determine the questions to ask and allow the clients to answer in any format they choose. Structured interviews consist of a standardized list of questions that are asked in a sequence (First, 2014). Semistructured interviews are a mix of both structured and unstructured formats, in that questions are pre-determined, but are asked in a less-uniformed manner. Detailed history collection can take a significant amount of time, which is often why neuropsychologists will ask clients/guardians to complete forms prior to the initial interview. Questions during the interview process or on forms will vary depending on the age of the client. For example, if a neuropsychologist is conducting a pediatric evaluation, they might ask questions that relate more to marital status of parents and/or custody/supervision. Questions on forms, and during the interview process, will often pertain to one's medical (e.g., history of medical/psychiatric disorders), developmental (e.g., ages at which developmental milestones were reached), and social (e.g., current relationship and social status) history. If the client is school-age, additional information about academic and/or school functioning will also be considered. A comprehensive clinical interview is typically the first step in determining initial diagnosis and treatment. While current functioning and environment are often essential in determining impressions, a detailed family and medical history can assist in differential diagnosis. Questions asked during a clinical interview, in addition to administration of assessments, can

assist in determining if any such disorders might be the cause of weaknesses in neuropsychological functioning (Hartlage & D'Amato, 2008a, b; Davis, 2011; Lezak et al., 2012). It also allows the clinical to determine the informal and formal assessments that will be administered during the evaluation.

Neuropsychological Models of Assessment for Intervention

Luria and His Functional Integrative Systems

Deciding how to comprehend behavior and relate it to brain functioning is a difficult undertaking at best (Reynolds & French, 2005). Few researchers agree how this should be done and numerous models are available historically (e.g., Orton, Halstead) to help us understand brain functioning (D'Amato et al., 2005; Davis, 2011; Reynolds, 1981a, 1981b). One of the most prominent models offered in the literature is by Luria (1966, 1970, 1973, 1980) and this is the model the authors advocate learning for a comprehensive understanding of how the brain processes information. Luria reported that he was influenced by others such as Vygotsky and Piaget although he had a clear focus on the frontal lobes and informal, data-based procedures (Reynolds & French, 2005). Luria proposed a functional system view of the brain dividing it into three major components he termed *blocks of the brain*. **Block I**, often called the arousal and attention unit, is concerned with energy level, and tone, and is composed of the brainstem, including the reticular formation, the midbrain, pons, and medulla, and relates to basic life functions. **Block II** is composed of the parietal, occipital, and temporal lobes, called the association areas of the cortex, and relates to information processing. **Block III** is composed of the remaining area including the sensorimotor strip and the frontal lobes, and corresponds with executive functioning, including the formation of intentions and programming behavior (Luria, 1970, 1980). The most critical component of this theory is the fact that each block of the brain is *not* seen as functioning independently (Reynolds, 1981a, 1981b). Moreover, there is a dynamic interaction between the areas, and a weakness in one area of the brain may interact and affect the functioning of other brain areas (Christian, 1975). A popular quote from Luria (1964) explains:

When one or another link has been lost, the whole functional system will be disturbed in a particular way, and systems of disturbance of one or another higher (mental) function will have a completely different structure, depending on the location of the damage (Luria, 1964, p. 6).

Luria's work influenced the development of many cognitive and neuropsychological tests including those of the *Kaufman-Assessment Battery for Children*, *The Cognitive Assessment System*, and the *NEPSY* (Flanagan & McDonough, 2018; Kaufman & Kaufman, 1983; Naglieri & Das, 1996).

Hemispheric Processing or Cerebral Specialization

Since the beginning of time individuals have sought to understand the brain and its relationship to behavior (Lezak et al., 2012; Schultz & Schultz, 2016). Initially, scientists believed the essence of our abilities were controlled by our heart. While this makes intuitive sense, they quickly discovered that the brain was the moderator of our functioning. Early on, researchers noted that the brain had two sides or hemispheres. Chapter 1 covers in-depth these many initial historical neuropsychological theories. Beginning in the late 1950s and moving into the 1960s, a number of prominent researchers sought to understand the differences between the *Right hemisphere* of the brain and the *Left hemispheric* of the brain (Carmon & Bechtoldt, 1969; Reitan, 1955; Sperry, 1974; Stark, 1961; Wada, 1949). In fact, many popular brain-based books have been written relating our hemispheric processing styles to learning, relationship success, and job accomplishments (Sattler & D'Amato, 2002a, 2002b). For example, see Dweck (2015; *Mindset: The new psychology of success*). Clearly, understanding the brain and how it works is critical to successful learning and living (Sousa, 2005, 2006). Some authors have even advocated that women tend to be more verbal and men tend to be more nonverbal while others have seen men as being less emotional and women as being more expressive (Zaroff & D'Amato, 2015).

It seems that most individuals have preferential processing modes or styles which may be assessed at simple and complex levels. Perhaps the simplest level is to assess if individuals prefer to be *verbal* or *nonverbal* processers. Some have advocated that traditional Western society tends to be more verbal and abstract whereas Eastern society tends to be more nonverbal, visual, and tactical (Reynolds, 1981a, 1981b; van Schalkwyk & D'Amato, 2015a, 2015b). Processing modes have been applied to learning with reading instruction seen as relating to a simultaneous/wholistic or whole word approaches to learning in contract to those who learn best sequentially and phonetically (Reynolds & French, 2005). Kaufman and his colleagues (e.g., Kaufman & Horn, 1996; Kaufman & Kaufman, 2014; Power & D'Amato, 2018) have developed cognitive, educational, and executive functioning measures that relate to processing style while Naglieri and colleagues (2014), and others have made similar attempts (Flanagan & McDonough, 2018; Reynolds, 1981a, 1981b). Both research groups have found promising results related to both assessment of individuals and intervention using specialized research-based techniques (Power & D'Amato, 2018; Work & Hee-Sook, 2005). While we have made great strides in these areas we still have much to learn. It would seem necessary to establish if different patient brain processing style may relate to the ability of individuals to profit from various therapies based on neuropsychological profiles. For example, will patients with certain learning styles profit from using a computer-based-phonetic reading approach, would individuals with certain personality profiles profit most from dialectic behavioral therapy, or would patients with an autism spectrum disability do best in a small group opposed to a traditional classroom approach? (Gisi & D'Amato, 2000; Rothlisberg et al., 2003; Sattler & D'Amato, 2002a, 2002b; Work & Hee-Sook, 2005; Table 9.4).

Table 9.4 Right hemisphere and left hemisphere processing modes, functions, and memory/learning[a]

Function	References
Right hemisphere	
Processing modes	
Simultaneous	Sperry (1974)
Holistic	Sperry (1969); Dimond and Beaumont (1974)
Visual/nonverbal	Sperry (1974); Savage and Thomas (1993)
Imagery	Seamon and Gazzaniga (1973)
Spatial reasoning	Sperry (1974); Polzner et al. (1990)
Nonverbal functions	
Depth perception	Carmon and Bechtoldt (1969)
Melodic perception	Shankweller (1966)
Tactile perception (integration)	Boll (1974b)
Haptic perception	Witelson (1974)
Nonverbal sound recognition	Milner (1962)
Motor integration	Kimura (1967)
Visual constructive performance	Parsons et al. (1969)
Pattern recognition	Eccles (1973)
Memory/learning	
Nonverbal memory	Stark (1961)
Face recognition	Milner (1967)
	Hecaen and Angelergues (1962)
Left hemisphere	
Processing modes	
Sequential	Sperry et al. (1969)
Temporal	Mills (1977); Efron (1963)
Analytic	Morgan et al. (1971); Eccles (1973)
Verbal functions	
Speech	Wada (1949); Reitan (1955); Posner et al. (1988)
General language/verbal abilities	Gazzaniga (1970); Smith (1974)
Calculation/arithmetic	Reitan (1955); Eccles (1973); Gerstmann (1957)
Abstract verbal thought	Gazzaniga and Sperry (1962)
Writing (composition)	Sperry (1974); Hecaen and Marcie (1974)
Complex motor functions	Dimond and Beaumont (1974)
Body orientation	Gerstmann (1957)
Vigilance	Dimond and Beaumont (1974)
Memory/learning	
Verbal paired associates	Dimond and Beaumont (1974)
Short-term verbal recall	Kimura (1961)
Abstract and concrete words	McFarland et al. (1978); Seamon and Gazzaniga (1973)
Verbal mediation/rehearsal	Dean (1983); Seamon and Gazzaniga (1973)
Learning complex motor functions	Dimond and Beaumont (1974)

[a]Adapted from Power and D'Amato (2018). Please see the original source of the table for a listing of all references cited above

Understanding Multicultural Issues in a Neuropsychological Context

In recent years, there has been a push for more social justice in the world, including the acceptance of diverse views of relationships and changing societal mores. An understanding of these changes must lead to the consideration of important environmental and familial factors – if not considered, subjective perspectives can lead to misdiagnosis and erroneous understanding of clients. Recently the definition of a *typical family* has changed. For example, health service providers should no longer assume that every client has a mother and a father. Historically, while some may refer to a *mother* as the individual who solely produced the child, others may consider this person a primary caretaker, nurturer, and provider. Parents might be composed of two mothers or two fathers, which is an essential detail to consider as part of a comprehensive neuropsychological evaluation. Details of egg or sperm donorship are crucial to share with a health service provider as that can mean the difference in a diagnosis. Genetic features of disorders may go overlooked if not sought out thoroughly. Additionally, health psychology service providers need to more carefully consider the aspect of gender when writing reports and working in therapeutic environments. For instance, many individuals who identify as transgender prefer to be referred to by pronouns that do not correspond with their biological sex organs. Other individuals who are transgender prefer more ambiguous pronouns, such as *ze* or *they.*

Many neuropsychologists don't consider multicultural components and end up making recommendations for certain populations that are inappropriate and ineffective. Within certain Asian cultures, family is considered to be one of the highest priorities (van Schalkwy & D'Amato, 2015a, b). If an elderly man who is Asian requires memory interventions and significant care, it is very important to consider the setting in which the care is offered. For example, a neuropsychologist might recommend that this client receive clinical care outside of the home instead of considering that the care takes place under the family's guidance and within the home. It is necessary to consider multicultural factors when making recommendations for neuropsychological interventions (Davis & D'Amato, 2014). The future must focus on evidence-based interventions with a *multicultural* lens.

Understanding and Comparing Quantitative and Qualitative Interventions

Health service psychologists that can provide comprehensive neuropsychological practices often utilize more than a single approach. In fact, the authors of this chapter advocate that all skilled neuropsychological practitioners must understand and be able to utilize both quantitative and qualitative models of assessment (D'Amato et al., 2005). The qualitative Lurian/Eastern approach is considered an

informal, skill-driven, and client-centered model, whereas the Actuarial/Western approach advocates a statistical, standardized, and test-score based model (Power & D'Amato, 2018).

Which Approach is Best?

Both approaches are quite inimitable and erudite practitioners will be able to select tasks or tests from each approach and integrate them to understand, diagnose, and offer evidence-based services to clients (Traughber & D'Amato, 2005). Table 9.3 compares and contrasts both approaches with detailed words describing each unique paradigm. As is true with most of psychology, it is best to consider these paradigms as *ends of a continuum* with both ends being distinctly different but with integration of both methods possible; the authors of this chapter advocate selection of techniques from both ends of the continue and offer such an approach as a *best practice* in neuropsychological assessment for evidence-based practice (Kratochwill & Stoiber, 2002; Sattler & D'Amato, 2002a, 2002b). Thus, one should work to understand and utilize data from patients, selected from *both ends* of the model to offer wide-ranging assessments. In total, practitioners should use an integrated or mixed battery *collecting data* that is most relevant to understanding behavior and working for evidence-based change. For instance, following Luria's model, one may begin with observations and use flexible and informal tasks to understand patient functioning (Luria, 1966, 1970, 1973). Then this basic understanding of the patient could be used to select objective, psychometric tests that offer fixed data which can be used to diagnose, monitor, and program plan for rehabilitation. This model demonstrates how services from both ends of the continuum may be integrated to offer sophisticated neuropsychological services (e.g., biofeedback, counseling, adaptive skill evaluations) that can track psychological progress. The most important part of such an integrated examination is the appropriate diagnosis of the patient (Power & D'Amato, 2018), and the selection of suitable rehabilitation techniques (Rothlisberg et al., 2003; Sattler & D'Amato, 2002a, 2002b), which may be documented behaviorally (Burns, 2008). Psychological and/or behavioral change must be the focus of any evidence-based neuropsychological interventions (D'Amato & Rothlisberg, 1997/1992) (Table 9.5).

Depth of Neuropsychological Examinations

The most unique feature of the clinical neuropsychological perspective in both assessment and intervention is its comprehensive and in-depth nature. It integrates both internal (i.e., what the client is feeling) and external (i.e., how the client is behaving) aspects of behavior. It also integrates the medical aspects of functioning in tandem with a psychological and historical understanding of behavior. Accordingly, neuropsychological evaluations are one of the most time-consuming

Table 9.5 Lurian/Eastern versus Actuarial/Western approach

Lurian/Eastern approach:	North American/Western approach:
Theory-driven	Not overall a priority theory; data-driven
Attempts to support or confirm a theory	Attempts to disconfirm specific hypotheses
Synthetical	Analytical
Observation-oriented	Evaluation-oriented
Single-case-oriented	Group comparison-oriented
Describe behaviors	Evaluates behaviors
Subjective	Objective
Looks for patterns of functioning	Looks for differential diagnosis
Qualitative in nature	Quantitative in nature
Flexible	Fixed
Process-oriented	Product-oriented
Focuses on individualized activities	Focuses on multiple tests/procedure
Links behavioral data to functioning	Links psychometric data to diagnoses
Considers the functional system	Considers discrete brain-related areas
Clinical-theoretical	Actuarial-standardized

and most expensive in the field of psychology. Many insurance agencies track and dictate how long neuropsychologists may spend with clients given the complexity of neuropsychological functioning. For instance, for an individual referred for an evaluation of dementia, the insurance company approved only 1 hour of historical interview, 2 hours of testing, and 1 hour for a report/summary. In reality, neuropsychologists require up to 12–15 hours to complete a wide-band comprehensive evaluation, which includes historical intake, testing, data interpretation, report/summary, and client feedback. Given the extensive administration time of some of the batteries, neuropsychologists have trained psychometrists to ensure efficiency. Most psychometrists have a college-level or Master's degree in psychology. Often neuropsychologists will use extensively trained psychometrists to assist in assessment administration, which may be video recorded.

Each health service neuropsychologist must dissect human behavior into areas that can be evaluated and integrated to understand the complexity of each unique individual. We advocate that human behavior be understood within nine major domains. For heuristic purposes, we advocate that each of these nine major sections be viewed as pieces of a puzzle and when put together, an individual's functioning can be understood. Table 9.6 demonstrates the areas that should be assessed during a neuropsychological evaluation, which include **(1) Perceptual/sensory, (2) Motor functions, (3) Intelligence/cognitive abilities, (4) Executive functioning/attention, (5) Memory, (6) Communication/language, (7) Academic achievement, (8) Personality/behavior/family, and (9) Classroom/work environment.** Perceptual/sensory systems refer to visual, auditory, and kinesthetic behaviors, such as touch discrimination or sense of smell. Motor functions include strength, speed, coordination, and lateral preference (i.e., right versus left). Intelligence/cognitive abilities encompass verbal and nonverbal capabilities, such as language skills, concept

Table 9.6 What areas should be assessed from a neuropsychological perspective?

1. Perceptual/sensory	**6. Communication/language skills**
Visual	Phonological processing (awareness and phonics)
Auditory	Listening comprehension
Tactile/kinesthetic	Expressive vocabulary
Integrated	Receptive vocabulary
	Speech/articulation
	Pragmatics
2. Motor functions	**7. Academic achievement**
Strength	Preacademic skills
Speed	Academic skills
Coordination	Rapid automatic naming
Lateral preference	Reading decoding
3. Intelligence/cognitive abilities	Reading fluency
Verbal functions	Reading comprehension
Language skills	Arithmetic computation
Concepts/problem-solving	Arithmetic concepts and applications
Numerical abilities	Social studies
Integrative functioning	Language arts
Nonverbal functions	Science
Receptive perception	Written language
Expressive perception	**8. Personality/behavior/family**
Abstract reasoning	Adaptive behavior
Spatial manipulation	Daily living
Construction	Development
Visual	Play/leisure
Integrative functions	Environmental/social
	Parental/family
	School/work environment
	Peers
	Community
	Patient history
	Coping/tolerance
	Family interpersonal style
	Happiness/resiliency
	Internalizing/externalizing symptoms
	Psychopathology
	Social skills
	Projective/expressive
4. Executive functioning/attention	**9. Classroom/work environment**
Sustained attention	Learning environment fit
Inhibition	Peer reactions
Shifting set	Community reactions

(continued)

Table 9.6 (continued)

Planning	Teacher/staff reactions
Flexibility	Classroom dispositions
Initiation	Direct behavioral observations
Organization	
5. Memory	
Short-term memory	
Long-term memory	
Working memory	
Retrieval fluency	

problem-solving, and reasoning. Executive functioning/attention refers to abilities such as sustained attention, inhibition, organization, and cognitive flexibility. Memory encompasses short-term, long-term, and working memory, in addition to retrieval fluency. Communication/language skills refers to all aspects of language, including phonological processing, listening comprehension, expressive language, receptive language, speech/articulation, and pragmatic language. Academic achievement refers to all academic skills, including those related to reading, mathematics, written language, and other relevant subjects in schools. The personality/behavior/family domain refers to adaptive behavior, environment, social skills, patient history, and internalizing/externalizing behaviors. Classroom/work environment refers to learning environments, reactions from various systems, classroom dispositions, and direct behavioral observations. Within the field of neuropsychology, there is much disagreement about exactly which areas should be evaluated. Each author calls for specific areas that they find critical to functioning. Authors may argue about how they would define memory (short-term vs. long-term) or how they would identify executive functioning (shifting set vs. planning). However, in general, most functional neuropsychological areas overlap in some type of systematic fashion.

Understanding a Qualitative Model to Guide Assessment for Interventions

As previously detailed, the qualitative approach should direct how a patient is approached, what questions are asked, which data are collected, how data are organized, and how such data are understood – these ideas were first introduced in Table 9.3. The conceptualization of the patient, differential diagnosis, and rehabilitation development and/or interventions will also be driven by the approach selected (Hynd & Semrud-Clikeman, 1990). This section of the chapter offers and explains specific questions which may be used to collect information from this approach. In addition, some tests have been built from this approach and although controversial, some of these instruments will be discussed (D'Amato et al., 2005; Davis, 2011; Power & D'Amato, 2018).

The best known advocate of this approach for assessment and rehabilitation was Luria (1970, 1973, 1980). It is clear from his accounts with patients that Luria gleaned a great deal of information from his informal clinical interactions with his patients. This led him to a selection of assessment tasks and tests that explained patient strengths, difficulties, cerebral impairment, and an approach to rehabilitation. He clearly linked all of his assessment procedures to his intervention/rehabilitation activities. Much like working with behavioral approaches (e.g., applied behavioral analysis), the data collected in this approach is used for direct interventions (Nicholson et al., 2011; D'Amato & Rothlisberg, 1997/1992). Luria argued for the collection of information based on 12 areas and they are briefly discussed:

1. The preliminary conversation (attention and care to detail linked to purposeful investigation)
2. The determination of cerebral dominance (processing modes and functions of hemispheres)
3. Investigation of motor functions (including the hands and speech)
4. Investigation of acoustic-motor organization (including perception, reproduction, regulation of pitch relationships, and rhythmic structures)
5. Investigation of the higher cutaneous and kinesthetic functions (including cutaneous sensation, muscle, and joint sensation)
6. Investigation of higher visual functions (including visual perception of objects, spatial orientation, and intellectual operations)
7. Investigation of impressive speech (including phonemic hearing, word comprehension, and understanding grammatical structures)
8. Investigation of expressive speech (including speech sounds, repetitive speech, and narrative speech)
9. Investigation of writing and reading (including phonetic analysis and writing and reading)
10. Investigation of arithmetical skills (including number structures and arithmetical operations)
11. Investigation of mnestic (memory) processing (including the learning process, retention, retrieval, and logical memorization)
12. Investigation of intellectual processes (including understanding of thematic pictures and texts, concept formation, and discursive intellectual activity)

(Christensen & Luria, 1975; Hynd & Semrud-Clikeman, 1990). For a more comprehensive review, please see Luria, 1966, 1973, 1980 or Christensen, 1975.

The qualitative approach focuses on the distinctiveness of the individual under evaluation and seeks to match the procedures used with the individual's unique profile. Glozman (1999) has argued that "Luria's neuropsychological assessment is recognized today by the world's scientific community to be the most comprehensive and flexible method of neuropsychological evaluation available, which is also based on an understanding of the factors underlying complex psychological activities" (p. 23). Sample tasks that could be used in a neuropsychologically based model have also been offered by others including Gaddes and Edgell (1994). Gaddes and Edgell offer tasks to evaluate auditory processes and aphasic signs in oral speech

(17 questions; p. 411), visual processes (13 questions; pp. 411–412), tactile processes (6 questions; p. 412), and motor-expressive processes (6 questions; pp. 412–413). For example, to evaluate auditory processes/abilities, the 6 questions Gaddes and Edgell use are reprinted below:

1. Can he recite all the letters of the alphabet?
2. Can he associate all the phonetic sounds of all the letters?
3. Can he name common objects without hesitation?
4. Can he describe the use of common objects?
5. How many nouns can the child produce in one minute?
6. Can he construct a meaningful sentence if given three words?

Reprinted from Gaddes and Edgell (p. 411).

Similarly, Luria (1970) provided a list of evaluation activities that Gaddes and Edgell (1994) advocated have used to assess the neuropsychological processes that underlie arithmetic. These steps included asking the student (1) to count aloud (to check memory of number in the correct sequence), (2) to recognize quantities, (3) to read and write single digits, (4) to read and write multidigit numbers (to show an understanding of the decimal system), (5) to recognize relative values, (6) to show competence in the basic arithmetic skills, and (7) to attempt more complex calculations (Luria, 1970, as cited in Gaddes & Edgell, 1994, p. 419).

These approaches can be used to understand a client and offer psychological interventions based on neuropsychological principals principles at primary, secondary, and tertiary levels. It should be obvious that this type of data collection may provide a wealth of information that can be used to understand the complete neuropsychological functioning of a client for rehabilitation or intervention. It is important to use the client's strengths to support his or her needs. Clearly, client individualization and uniqueness is the focus of evaluation for intervention in this distinctive approach.

Understanding a Quantitative Model to Guide Assessment for Interventions

In contrast to a qualitative model, the North American/Western Approach focuses on hypothesis-testing and data collection. This standardized model is evaluation-oriented, uses group norms, is fixed, product-oriented, and links psychometric data to use for diagnosis and intervention. This approach fits well with the current Western psychological paradigm which is statistical, data-based, and research-oriented (Flanagan & McDonough, 2018; Schultz & Schultz, 2016). These assessments offer many data collection tools, including structured interviews, questionnaires, and norm-referenced tests. Clinical neuropsychologists are taught the importance of using quantitative assessments because with these measures it is easier to generalize results to a broader audience (D'Amato et al., 2005).

Additionally, quantitative assessments offer more evidence or clear proof of neuropsychological impairment. Table 9.7 provides examples of quantitative assessments that fall under each of the neuropsychological domains.

Within a comprehensive evaluation, clinical neuropsychologists will typically choose between a *fixed*- and/or *flexible*-battery approach. A fixed-battery approach refers to a systematic administration of a consistent and standardized battery to all individuals, regardless of the referral question. A practitioner using a flexible-battery approach determines assessments based on individual referral problems and uses different batteries each time (Sattler & D'Amato, 2002a, 2002b). Often, many clinical neuropsychologists will choose to use an **integrative model**, allowing them to incorporate unique elements from each approach. By selecting an integrative model, a clinical neuropsychologist can emphasize the person being assessed, as

Table 9.7 Quantitative assessments for neuropsychological evaluation

Neuropsychological domains	Example of quantitative assessment
Perceptual/sensory	*Dean-Woodcock Sensory Motor Battery*
	Bender Visual-Motor Gestalt Test, Second Edition
	Wide Range Assessment of Visual Motor Abilities
Motor functions	*Bruininks-Oseretsky Test of Motor Proficiency, Second Edition*
	Bayley Scale of Infant and Toddler Development, Third Edition
	Grooved Pegboard
Intelligence/cognitive abilities	*Wechsler Adult Intelligence Scale, Fourth Edition*
	Kaufman Assessment Battery for Children, Second Edition
	Cognitive Assessment System, Second Edition
Executive functioning/ attention	*Delis-Kaplan Executive Function System*
	The NEPSY, Second Edition
	Tests of Variables of Attention
Memory/learning	*Children's Memory Scale*
	Wide Range Assessment of Memory & Learning, Second Edition
	Test of Memory and Learning, Second Edition
Communication/language skills	*Peabody Picture Vocabulary Test, Fourth Edition*
	Expressive One-Word Picture Vocabulary Test, Fourth Edition
	Comprehensive Assessment of Spoken Language, Second Edition
Academic achievement	*Wechsler Individual Achievement Test, Third Edition*
	Woodcock-Johnson Fourth Edition, Tests of Achievement
	Kaufman Test of Educational Achievement, Third Edition
Personality/behavior/family	*Behavior Assessment System for Children, Third Edition (parent, teacher, & child versions)*
	Autism Spectrum Rating Scale (parent and teacher ratings)
	Minnesota Multiphasic Personality Inventory – 2 (MMPI-2)
Classroom/work environment	*Time on-task observations*
	Structured teacher interview
	Dynamic Indicators of Basic Early Literacy Skills

well as their fit with their environment. The authors advocate for using an integrative model as it allows for the efficiency of selecting instruments that will be most likely to facilitate treatment planning (Power & D'Amato, 2018).

Qualitative and quantitative approaches represent both the different views of neuropsychological services and demonstrate how data can be used in a unique fashion to achieve similar or identical progress (Power & D'Amato, 2018). Health service psychologists typically select assessment approaches from one end of the quantitative/qualitative continuum and do not understand that best interventions stem from an *integration* of both ends of services. For example, one can assess the perceptual/sensory system from Eastern and Western approaches using diverse assessments. Using an Eastern approach, a clinical neuropsychologist can gain understanding about a client's sensory system by asking questions about sensory responses to stimuli, such as clothing. From a Western perspective, a clinical neuropsychologist can administer the *Sensory Processing Measure* (Miller-Kuhaneck et al., 2007) to determine an individual's sensory processing when compared to a normative sample. Using an **integrative model** ensures a comprehensive approach that will lead to more accurate clinical formulations.

Why Health Service Providers Need to Select an Assessment Model for Intervention

Within the fields of clinical and counseling psychology clinical psychology, most practitioners treat one client at a time based on a specific referral problem. This model stems from a medical/deficit model, in that assessments and interventions are completed at the time of the initial presentation of the problem (D'Amato et al., 2005a). From this view, psychology is a deficit model and a problem must occur before a solution is offered. Some researchers have advocated that the medical/deficit model should be changed to reflect a more ecological approach to individual and systemic change focusing on **positive mental health** (See Perfect & D'Amato, 2020). Nonetheless, many comprehensive health service psychologists, such as school and community-based psychologists, use a multitiered approach to assess and provide services to clients who have a need for services at increasing levels of intensity.

Primary, Secondary, and Tertiary Prevention for Intervention

The authors of this chapter not only advocate for using an **integrative model** for assessment, but a model that also allows prevention and intervention for individuals at-risk and clinically significant for neuropsychological weaknesses (Nicholson et al., 2011). Using a multitiered approach to assessment and intervention allows for psychologists to provide academic, behavioral, and social/emotional screening with

valid assessment measures and ongoing monitoring if improvement has not been made (Semrud-Clikeman, 2005). This inclusive health service psychology model focuses on three levels of service which all help service provider psychologists study in social and community psychology. See Fig. 9.5 for a visual representation of tiers of psychological service delivery.

By using an integrative, comprehensive, and multitiered approach, clinical neuropsychologists can ensure that services are provided for preventative and intervention at all levels. *Primary prevention* refers to a psychological activity that is offered to all individuals. Stated another way, it may be viewed as preventing a problem with **healthy** individuals (Walker & Shinn, 2002). An example of this would be the screening of all children in the first few years of life for developmental delays. Another example is the education of breast cancer for communities through flyers, television commercials, the use of national spokespeople, and the wearing of ribbons during breast cancer awareness month. The goal is to reach 100% of the population through these preventative means. *Secondary prevention* focuses on a targeted group based on unique characteristics relating to an activity or identified issue (Løberg, 1989). For instance, blood pressure screening for those who have relatives with high blood pressure risk factors. Another example of secondary prevention is using adult mentors who meet with at-risk youth twice a week in an after-school program for an academic year (Walker & Shinn, 2002). *Tertiary intervention* refers to targeted intervention, or reducing the severity of a problem once it has occurred. An example would be offering an evidence-based psychological intervention (Hardy et al., 2017) for those who have a disability or disorder, such as those who manifest with depression. Most clinical, counseling, and school psychologists operate primarily at the tertiary level, which restricts the type of outreach psychologists can have. It is important to provide primary, secondary, and tertiary evidence-based services if a health service psychologist hopes to impact societal change (D'Amato

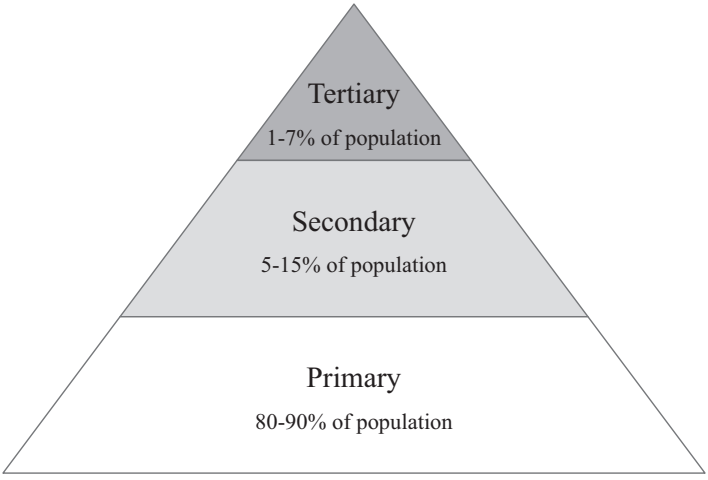

Fig. 9.5 Tiers of psychological service delivery

et al., 2011). For example, a clinical psychologist may conduct a neuropsychological evaluation of a client and offer treatment, including medication management, through an inpatient psychiatric facility (Walker & Shinn, 2002). A counseling psychologist may diagnose an individual with depression and offer dialectal behavior therapy (DBT) as a treatment. A school psychologist might find a student eligible under the educational criteria of an emotional disability and offer comprehensive educational services, including behavioral therapy through an individualized education plan.

As stated previously, psychologists who work in schools typically operate using a multitiered approach referred to as multitiered system of supports (MTSS), formerly referred to as response to intervention (Power & D'Amato, 2018). The **MTSS model** allows school psychologists to assess and monitor all students at primary, secondary, and tertiary levels. The primary tier offers screening for all students in academic, behavioral, and social/emotional functioning. If students are performing well, depending on how the institution defines their standards, they continue to receive the traditional, research-based curriculum. Typically, about 80% of students in a school system will fall at the primary level (Walker & Shinn, 2002). Some students, usually between 10% and 15%, will require a little extra assistance in meeting their goals. Within this secondary tier, these students are delivered interventions and support in small group settings, such as reading groups. Students receiving support at the tertiary level are those who present with significant challenges and who have not responded to interventions at the primary or secondary levels. Students, usually about 5% of the school population, at the tertiary level typically require individualized assistance from counselors or therapists (Walker & Shinn, 2002). Within the secondary and tertiary tiers, all students are progress monitored to determine their response to evidence-based interventions. Power and D'Amato (2018) advocate for using a neuropsychologically driven approach to MTSS, referred to as the *Neuropsychologically-Based Multi-Tiered System of Supports (NB-MTSS) model*. The NB-MTSS model assists practitioners in analyzing ***why*** skill weaknesses exist and evaluates the specific brain-based abilities that are needed for these unique skills. This approach also focuses on processing both strengths and weaknesses. This model consists of assessment of specific neuropsychological processes, as well as considering the standardized information from a school curriculum.

Integrating Clinical Neuropsychological Batteries into Interventions

The purpose of this chapter has been to explain how neuropsychological assessment should relate to appropriate evidence-driven interventions. As an example, Table 9.8 lists specific neuropsychological assessment procedures across the quantitative and qualitative areas which cover primary, secondary, and tertiary components of comprehensive health service psychology providers. A neuropsychological evaluation

assists health service providers in understanding how the brain impacts behavior (Davis, 2011). Throughout a neuropsychological evaluation, multiple components of brain-based behavior are assessed, including: memory/learning, language, attention/executive functioning, visual-motor functioning, perceptual/sensory, intelligence/cognitive abilities, academic achievement, personality/behavior, and classroom/work environment. When completing such an evaluation, a health service provider must consider the referral problem and determine which assessments will be administered. For example, Table 9.8 demonstrates areas that might be assessed if someone was referred for deficits in reading. Not only is this academic area assessed, but other related abilities, such as executive function, memory/learning, and language are evaluated since these processes impact reading skills. This model is appropriate to use at all levels, from pediatric to geriatric cases. For example, individuals who have sustained brain damage from strokes may require neuropsychological assessment and intervention for deficits in language, reading, motor, and attention/executive functioning. Related to the area of reading, individuals with strokes may struggle with vocabulary, reading fluency, and reading comprehension activities. Assessments described in section "Neuropsychological models of assessment for intervention" will assists health service psychologists in determining appropriate evaluation procedures that can then be linked to evidence-based interventions. Assessment is a wide-ranging multistage process which starts with understanding the areas that need to be evaluated and then developing a system to utilize measures related to the areas under consideration. As an example, if a health service psychologist does not have a working understanding of the five components of reading (Witsken et al., 2008), they will not know the appropriate areas in which to evaluate. If an individual with a stroke has difficulty recalling words to use in conversation, an appropriately trained clinician will know to assess the area of vocabulary. It is essential that health service psychologists have extensive knowledge of test batteries, including specific skill-focused assessments (e.g., *Gray Oral Reading Test, Fifth Edition*) and broad measures (e.g., *Woodcock Johnson, Fourth Edition, Tests of Achievement*) to select time-efficient measures or batteries. Assessment in neuropsychology allows health service psychologists to better understand their client's needs through diagnosis, treatment, and intervention.

Evidence-Based Neuropsychological Interventions

A comprehensive neuropsychological evaluation will provide a rich amount of data to assist practitioners in determining recommendations for treatment. This chapter focuses on how client data can be organized both quantitatively and qualitatively to offer a standardized neuropsychological approach to assessment, covering case conceptualization, and treatment planning. Recommendations for interventions should always be linked to the significant weaknesses revealed within the evaluation. Recommendations should be clear, solution-focused, tailored to specific clients, and proven effective based on research (Power & D'Amato, 2018). Evidence-Based

Table 9.8 Neuropsychological evaluation procedures related to evidence-based reading intervention

Areas that should be evaluated, With relevant references	Evaluation tools
	Reading
Phonemic Awareness (eg., sound comparison, segmentation, blending):	**DIBELS Initial Sound Fluency, Phoneme Fluency***
	• **aimsweb: Test of Early Literacy***
	• **IGDI: Alliteration, Rhyming***
	• **Rigby Read***
D'Amato, Fletcher-Janzen, and Reynolds (2005); Fletcher, Lyon, Fuchs, & Barnes (2007); Joseph (2005); Shaywitz (2003)	• CTOPP-2: Elision, Blending Words**
	• KTEA-3: Nonsense Word Decoding**
	• WIAT-III: Pseudoword Decoding **
	• WJ IV COG: Sound Blending***
	• HRNB: Speech Sounds Perception Test***
	• NEPSY- II: Phonological Processing***
Phonological awareness/ Phonics (letter names/ sounds and word recognition):	**DIBELS: Letter Naming Fluency, Nonsense Word Fluency***
	• WJ IV ACH: Letter-Word Identification**
	• WIAT-III: Word Reading, Psuedoword Decoding**
	• WRAT4: Reading/ Word Calling**
Fletcher et al. (2007); Shaywitz (2003); Sousa (2005)	• GORT-5**
	• WJ IV COG: Word Attack***
	• TOWER-2***
	• DAS-II: Phonological Processing***
	• NEPSY-II: Phonological Processing***
Vocabulary:	**DIBELS: Word Use Fluency, Word Naming***
	• **IGDI: Picture Naming***
D'Amato, Fletcher-Janzen And Reynolds (2005); Joseph (2005); Shaywitz (2003); Sousa (2005)	• **Rugby Read***
	• KTEA-3: Reading Vocabulary**
	• WJ IV ACH: Oral Reading, Sentence Reading Fluency**
	• CREVT-3***
	• CELF-5***
	• DAS-II: Word Definition***
	• KABC-II: Expressive Vocabulary, Verbal Knowledge***
	• PPVT-4***
	• NEPSY-II: Word Generation***
	• WISC-V: Vocabulary, Word Reasoning***
Reading fluency:	**Classroom words correct per minute***
	• **Informal assessment of words read correct/per minute***
Fletcher et al. (2007); Shaywitz (2003); Sousa (2005)	• **aimsweb: Reading CBM***
	• **DIBELS: Oral Reading Fluency***
	• **WJ IV ACH: Reading Fluency***
	• **WIAT-II: Oral Reading Fluency***
	• GORT-5**
	• TOWRE-2**
	• Test of Reading Fluency**

(continued)

Table 9.8 (continued)

Reading Comprehension:	**DIBELS: Retell Fluency, Daze***
	• **AIMSweb: Reading Maze passage***
Fletcher et al. (2007); Shaywitz (2003); Sousa (2005)	• **WJ IV ACH: Passage Comprehension, Reading Recall***
	• **Rigby Read***
	• TORC-4**
	• OWLS-2: Reading Comprehension**
	• WIAT-III: Reading Comprehension**
	• KTEA-3: Silent Reading Fluency, Reading Comprehension**
	• GORT-5**
Phonological access (rapid Automatic naming):	**Timed naming activities: Naming numbers, letters, animals, foods***
	• **IGDI: Picture Naming***
	• CTOPP-2: Rapid Letter Naming, Rapid Number Naming**
Hale and Fiorello (2004)	• KTEA-3: Associational Fluency, Object Naming Facility, Letter Naming Facility**
	• WJ IV OL: Rapid Picture Naming**
	• DAS-II: Speeded Naming***
	• NEPSY-II: Speeding Naming***
Oral Language/ listening comprehension:	**DIBELS: Retell Fluency***
	• WIAT-II: Oral Expression**
	• KTEA-3: Oral Expression**
Semrud-Clickeman (2005); Shaywitz (2003); Sousa (2005)	• CELF-5***
	• EOWPVT-4***
	• OWLS-2: Oral Expression**
	• WJ IV ACH: understanding directions**
	• WJ IV OL: understanding directions**
	• PPVT-4***
	• NEPSY-II: Comprehension of Instructions, Word Generation***
	• WIAT-III: Listening Comprehension**
	• KTEA-3: Listening Comprehension**
	• OWLS-2: Listening Comprehension**
	• DAS-II: Verbal Comprehension***
	• KABC-II: Expressive Vocabulary, Verbal Knowledge, Riddle***
	Additional neuropsychological areas to evaluate for reading
Short-/long -term and working memory:	**Ability to follow two- and three-part directions***
	• WJ IV ACH: Reading Recall/ Reading Recall-Delayed**
	• NEPSY-II Sentence Repetition, Narrative Memory***
Fletcher et al. (2007); Hale And Fiorello (2004); Shaywitz (2003)	• HRNB: Speech Sounds perception Test***
	• DAS-II: Recall of Digits, Recall of Objects***
	• WISC-V: Naming speed literacy, Naming Speed Quantity***
	• KABC-II: Number Recall, Hand Movements, Atlantis/Atlantis-Delayed, Rebus/Rebus-Delayed, Word Order***

(continued)

Table 9.8 (continued)

Receptive/expressive language:	**Observations of conversation: turn taking, tangential conversation,time to process information***
Shaywitz (2003); Semrud-Clikeman (2005); Sousa (2005)	• PPVT-4*** • EOWPVT-4, ROWPVT-4*** • CELF-5*** • **Comprehensive Assessment of Spoken Language*** • WJ IV ACH: understanding directions, Reading Recall** • NEPSY-II: Body Part Naming and Identification*** • HRNB: Aphasia Screening Test***
Areas that should be evaluated, With relevant references	Evaluation tools
Attention/executive functions:	**Informal classroom observations (e.g., time on task)*** • **Performance on N-backs***
Fletcher et al. (2007); Hale And Fiorello (2004); Semrud-Clickeman (2005)	• WJ IV ACH: Understanding directions** • WJ IV COG: Numbers reversed, Planning*** • WISC-V: Working Memory subtests*** • NEPSY-II: Animal Sorting Inhibition, Auditory Attention, Response Set*** • HRNB: Category Test*** • Tower of London*** • D-KEFS*** • Task of Executive Control*** • Conners CPT 3*** • Trail Making Test/Stroop Test*** • TEA-Ch*** • CAS2: Planning Subsets*** • KABC-II: Rover, World Order, Pattern Reasoning, Story Completion***
Visual-motor functioning:	**Classroom observations: tracing; copying from board or from paper on desk***
D'Amato, Fletcher-Janzen, and Reynolds (2005); Fletcher et al. (2007); Hale and Fiorello (2004)	• Bender Gestalt-II*** • Beery VMI-6*** • Rey-Osterrieth Complex Figure Test*** • WISC-V: Visual Spatial Subsets*** • KABC-II: Triangles, Block Counting, Gestalt Closure*** • DTVP-2*** • MVPT-3*** • BOT-2*** • NEPSY-II: Arrows, Design Copying*** • HRNB: Finger Tapping Test*** • HRNB: Trails A***
	Math
Math computation:	**Classroom problems correct per minute*** • **aimsweb: Math Computation*** • **Review of assignments/homework***
D'Amato. Fletcher-Janzen, and Rynolds (2005); Fletcher et Al. (2007)	• KeyMath3: Basic Concepts, Operations** • KTEA-3: Math Computation, Math Fluency** • WJ IV ACH: Calculations**

(continued)

Table 9.8 (continued)

	• WIAT-III: numerical Operations** • WRAT4: Arithmetic** • WISC-V: Arithmetic**
Math problem solving: D'Amato, Fletcher-Janzen, and Reynolds (2005); Fletcher et al. (2007)	**Classroom exercises correct per minute*** • **aimsweb: Math Concepts and Applications*** • **Review of assignments/homework*** • WJ IV ACH: Applied Problems** • WIAT-III: Math Reasoning** • KTEA-3: Math Concepts and Applications** • KeyMath3: Applications** • WISC-V: Arithmetic***
	Additional neuropsychological areas to evaluate for math
Attention/executive functions Short-/long-term and working memory	See this category for reading See this category for reading
	Writing
Handwriting: D'Amato, Fletcher-Janzen, and Reynolds (2005); Fletcher et al. (2007)	**Classroom work samples*** • **aimsweb: Written Expression CBM*** • WJ IV ACH: Writing Fluency, Writing Samples** • KTEA-3: Written Expression, Writing Fluency** • WIAT-III: Alphabet Writing Fluency, Sentence Composition, Essay Composition** • TOWL-4** • OWLS-2** • NEPSY-II: Design Copying***
Spelling: Fletcher et al. (2007)	**Classroom words correct per timing*** • **aimsweb: Spelling CBM*** • KTEA-3: Spelling** • WJ IV ACH: Spelling** • WIAT-III: Spelling** • WRAT-IV: Spelling**
Written composition: Fletcher et al. (2007)	**Classroom timed work sample*** • **aimsweb: Written Expression CBM*** • WIAT-III: Essay Composition** • KTEA-3: Written Expression** • TOWL-4** • OWLS-II** • NEPSY-II: Design Copying***

Interventions (EBIs) refer to treatments that have been shown to be effective after an analysis of statistical outcomes (Kratochwill & Stoiber, 2002). Outcome data must demonstrate that the effects are clearly linked to the activities and not to unrelated, external events. Many students-in-training, as well as practitioners, focus on collecting EBIs as part of their professional growth and development (Kazdin, 2011; Løberg, 1989). EBIs can be found by searching through scholarly peer-reviewed journal articles to determine treatment effectiveness. Many books and book chapters are also available that focus on EBIs related to various paradigms, such as neuropsychology (D'Amato & Rothlisberg, 1997/1992; Davis & D'Amato, 2014; Power & D'Amato, 2018; Zaroff & D'Amato, 2015).

Furthermore, various databases, such as those created by the Institute of Education Science (IES), the Evidence-Based Practices (EPB) Resource Center provide a wide range of intervention resources that have been reviewed using thorough systematic guidelines. For example, the IES created a database called ***What Works Clearinghouse*** (WWC) which provides critical features of EBIs that aide in determining effectiveness (Traughber & D'Amato, 2005). According to WWC, the results of an intervention study can fall into three categories: (1) meets WWC standards without reservations, (2) meets WWC standards with reservations, or (3) does not meet WWC standards (US Department of Education, n.d.). For the study to meet WWC standards, the study must make clear that it had the following characteristics: groups randomly assigned, low sample attrition, and low/no confounding factors or concerns with outcomes. By selecting EBIs, clinical neuropsychologists can be expected to produce desirable, measurable outcomes in psychological practice areas (Traughber & D'Amato, 2005). The **future** of health service psychology will relate to understanding, offering, and documenting the growth of clients based on EBIs.

Developing and Monitoring Client Goals

To ascertain if an intervention is effective for a client, a clinical neuropsychologist should also determine how to monitor if a treatment has been successful (US Department of Education, n.d.). Similar to initial comprehensive evaluations, assessment data should relate directly to **progress monitoring** techniques, which should then drive the choice of an intervention for a client. Progress monitoring techniques assist in quantifying the rate of improvement or response to the intervention. For example, if a client is undergoing treatment for depression, not only should the clinical neuropsychologist keep detailed notes of a person's affect and presentation, but they should also consider using a quantitative method, such as a self-rating scale during every therapeutic session (Sattler & D'Amato, 2002a, 2002b). The use of treatment goals should also be utilized by clinical neuropsychologists to aide in determining intervention effectiveness (Cooper & Law, 2018). Goals refer to general statements of what the clinical neuropsychologist and client want to accomplish within sessions (Burns, 2008). Goals can be broken down into achievable objectives, which refer to specific strategies or steps that need to happen to attain the defined goals.

Numerous acronyms may be used to aid in analyzing, documenting, monitoring, and planning in this area. Many practitioners use **SOAP** (Subjective, Objective, Analysis, Plan) notes for summarizing, documenting, reviewing, and planning treatment. **S = Subjective Statements** are notes about the individual with examples such as *Ethan appeared distracted but worked diligently to remain focused*; **O = Objective Data** focus on test scores, and percentages of goals/objectives achieved. *Ethan was able to appropriately express his anger 2 of the 4 times discussed (50%)*; **A = Analysis of Session** includes documentation of how the client responded to treatment; *Ethan struggled with* discussing his anger but did complete two emotional processing STOP worksheets. **P = Plan for the Future** reminds the therapist what needs to be addressed in upcoming sessions. *Ethan needs additional practice* i*n dealing with anger in group situations*. Heuristicially, the SOAP approach can be remarkable for documentation, analysis, and planning of critical therapeutic activities. Often, Another example of a popular acronymn that clinical neuropsychologists use is **SMART** goal setting to verify clear objectives. The acronym SMART stands for: Specific, Measurable, Attainable, Relevant, and Timely (O'Neill & Conzemius, 2006). Goals that are written in this format allow for objective evidence to be demonstrated when monitoring the progress of interventions. Examples of SMART goals for various settings can be found in Table 9.9. It is impossible to monitor progress if clear goals are not established and data are not collected to support progress in a comprehensive health service psychology capacity. Without goals, practitioners and clients do not understand what is being accomplished. It is crucial that goals are related directly to assessment for intervention with data that should stand on an evidence-based intervention foundation.

Table 9.9 Examples of SMART goals by setting

Setting	Goal example
Schools	By May 2020, when given four paragraphs of expository material at the third-grade level, Jacob will read the text aloud at 112 words correct per minute with 95% accuracy in 3 out of 5 opportunities
Therapy	By April 2021, Jose will make 10 requests for items using visual support (e.g., worksheets, menu choices) in a therapy session
	By June 2021, without visual support or adult guidance, Steven will verbally identify five coping strategies in a therapy session that he can use instead of hitting another peer to get attention
Home	Janet will lose 5 pounds by June 1 by eliminating sugar from her diet
	Janet will lose 5 pounds by June 1 by walking 10,000 steps each day

Conclusions

Neuroscience research has made clear that a comprehensive understanding of client behavior cannot be developed without considering how the **brain processes** information. Although they may not realize it, each health service psychologist subscribes to following a practice model; these are unique and individualized models that drive how clients are undersood and services are offered. Through a comprehensive **neuropsychological paradigm**, health service psychologists can use qualitative and quantitative assessments to determine a client's strengths and weaknesses *for* intervention. Through such a model, practitioners can yield richer assessment results with clients, that assists in driving brain-based interventions and progress monitoring tools to document clinical goals. This richness should stem from an integration of Eastern and Western models to assist in identifying appropriate EBIs. The goal of health service psychology, particularly with those who practice from a neuropsychological perspective, should be to help *improve the well-being* of all individuals in society.

Discussion Questions

1. Why is it critical to understand the biological basis of behavior when approaching assessment?
2. Although many psychologists report using an eclectic approach to service, why is it essential to choose a specific model of practice as a health service provider?
3. What are the benefits and limitations of using Eastern/qualitative assessment paradigm for intervention?
4. What are the benefits and limitations of using Western/quantitative assessment paradigm for intervention?
5. What are the differences between primary, secondary, and tertiary prevention/intervention? How would you conceptualize a case demonstrating knowledge of primary, secondary, and tertiary assessment and intervention?
6. What are the advantages of using a flexible-battery over a fixed-battery in a neuropsychological evaluation?
7. Why is it important to consider the relationship between assessment and intervention during a neuropsychological evaluation?

EPPP Sample Questions

1. The right hemisphere of the brain primarily controls all the following functions except for:

   (a) Body orientation
   (b) Pattern recognition
   (c) Depth perception
   (d) Nonverbal memory

2. A client with a traumatic brain injury who received a Level 4 rating on the Rancho Los Amigos Scale of Cognitive Functioning:.

   (a) Is nonresponsive to visual or auditory stimuli and seems to be in a state of deep sleep.
   (b) Is confused and incoherent, may exhibit bizarre behavior, and is unable to care for him/herself.
   (c) Is alert and oriented and can remember and integrate remote and recent events but may have some impairment in judgment, planning, and abstract reasoning.
   (d) Is functioning at an intellectual level that is superior for their age, education, and demographic background.

3. Programs designed to prevent the development of a physiological or psychological disorder are mainly described as:

   (a) Primary intervention
   (b) Tertiary prevention
   (c) Secondary prevention
   (d) Crisis prevention

4. Achieving a score indicating no coma and appropriate brain functioning on the Glasgow Coma Scale suggests that:

   (a) The individual definitively has no long-term effects of a TBI
   (b) The individual definitively has long-term effects of a TBI
   (c) The individual has minor effects of a TBI
   (d) The individual may have effects of a TBI

5. According to the Neuropsychologically-Based Multi-Tiered System of Supports (NB-MTSS) model, the following assessment can be used to assess phonemic awareness:

   (a) WISC-V comprehension
   (b) DAS-II word definitions
   (c) DIBELS initial sound fluency
   (d) NEPSY-2 word generation

Answers: A, B, B, D, C

Proactive Readings

Transcending the Past

- Gaddes, W. H., & Edgell, D. (1994). *Learning disabilities and brain function: A neuropsychological approach* (3rd ed.). Springer-Verlag.
- Halstead, W. C. (1947). *Brain and intelligence: A qualitative study of the frontal lobes*. University of Chicago Press.
- Luria, A. R. (1966). *The working brain: An introduction to neuropsychology*. Basic Books.

Excelling in the Present

- D'Amato, R. C., Fletcher-Janzen, E., & Reynolds, C. R. (Eds.). (2005b). *Handbook of school neuropsychology*. Wiley.
- Davis, A. S. (2011). (Ed.). *Handbook of Pediatric Neuropsychology*. Springer.
- Lezak, M. D., Howieson, D. B., Bigler, E. D., & Tranel, D. (2012). *Neuropsychological Assessment*. Oxford University Press.

Transforming the Future

- Casaletto, K. B., & Heaton, R. K. (2017). Neuropsychological assessment: Past and future. *Journal of the International Neuropsychological Society*, 23(9–10), 778–790. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6296381/
- Power, E., & D'Amato, R. C. (2018). Should our future include the integration of evidence-based neuropsychological services into school settings? In D. P. Flanagan & E. M. McDonough (Eds.), Contemporary intellectual Assessment: Theories, tests, and issues (4th ed.; pp. 1017–1045). Guilford.
- Perfect, M., & D'Amato, R. C. (2020). Introduction to special issue on the history of the future of proactive school psychology: Transcending the past, excel in the present, and transform the future. *School Psychology*, *35*(6), 363–366.

References

Apgar, V. (1966). The newborn (APGAR) scoring system. *Pediatric Clinics of North America, 13*(3), 645–650. https://doi.org/10.1016/S0031-3955(16)31874-0

Aylward, G. P., & Carson, A. D. (2005, April). Use of the test observation checklist with the Stanford-Binet intelligence scales for early childhood, 5th Ed (early SB5). Symposium conducted at the meeting of the National Association of School Psychologists, Atlanta, Georgia.

Brugha, T. S., Bebbington, P. E., & Jenkins, R. (1999). A difference that matters: Comparisons of structured and semi-structured psychiatric diagnostic interviews in the general population. https://doi.org/10.1017/S0033291799008880

Burns, D. D. (2008). *Feeling good: The new mood therapy*. Harper.

Caplan, G., Caplan, R. B., & Erchul, W. P. (1995). A contemporary view of mental health consultation: Comments on 'Types of Mental Health Consultation' by Gerald Caplan (1963). *Journal of Educational and Psychological Consultation, 6*(1), 23–30. https://doi.org/10.1207/s1532768xjepc0601_2

Carmon, A., & Bechtoldt, H. P. (1969). Dominance of the right cerebral hemisphere for stereopsis. *Neuropsychologia*, *7*(1), 29-39. https://doi.org/10.1016/0028-3932(69)90042-6

Casaletto, K. B., & Heaton, R. K. (2017). Neuropsychological assessment: Past and future. *Journal of the International Neuropsychological Society, 23*(9–10), 778–790. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6296381/

Christensen, A. L. (1975). *Luria's neuropsychological investigation*. Spectrum.

Collins, W. A., Maccoby, E. E., Steinberg, L., Hetherington, E. M., & Bornstein, M. H. (2000). Contemporary research on parenting: The case for nature and nurture. *American Psychologist, 55*(2), 218–232. https://doi.org/10.1037/0003-066X.55.2.218

Cooper, M., & Law, D. (2018). *Working with goals in psychotherapy and counselling*. Oxford.

D'Amato, R. C., Crepeau-Hobson, F. C., Huang, L. V., & Geil, M. (2005a). Ecological neuropsychology: An alternative to the deficit model for conceptualizing and serving students with learning disabilities. *Neuropsychology Review, 15*(2), 97–103. https://doi.org/10.1007/s11065-005-7092-5

D'Amato, R. C., Fletcher-Janzen, E., & Reynolds, C. R. (Eds.). (2005b). *Handbook of school neuropsychology*. Wiley.

D'Amato, R. C., & Hartlage, L. C. (Eds.). (2008a). *Essentials of neuropsychological assessment: Rehabilitation planning for intervention* (2nd ed.). Springer.

D'Amato, R. C. E., & Rothlisberg, B. A. E. (Eds.) (1997/1992). *Psychological perspectives on intervention: A case study approach to prescriptions for change.* Waveland Press.

D'Amato, R. C., Zafiris, C., McConnell, E., & Dean, R. S. (2011). The history of school psychology: Understanding the past to not repeat it. In M. A. Bray & T. J. Kehle (Eds.), *The Oxford handbook of school psychology* (pp. 9–46). Oxford University Press.

D'Amato, R. C. (1990). A neuropsychological approach to school psychology. *School Psychology Quarterly, 5*(2), 141–160. https://psycnet.apa.org/doi/10.1037/h0090608

D'Amato, R. C., & Dean, R. S. (1988). School psychology practice in a department of neurology. *School Psychology Review, 17*(3), 416–420. https://doi.org/10.1080/02796015.1988.12085356

D'Amato, R. C., & Wang, Y. Y. (2015). Using a brainbased approach to collaborative teaching and learning with Asians. *New Directions in Teaching and Learning, 143*, 41–60. https://doi.org/10.1002/tl.20135

Davis, A. S. (Ed.). (2011). *Handbook of pediatric neuropsychology*. Springer.

Davis, A. S. (2008). Understanding and using the Dean-Woodcock Neuropsychological Battery with children, youth, adults, and in geriatrics. In R. C. D'Amato & L. C. Hartlage (Eds.), *Essentials of neuropsychological assessment: Treatment planning for rehabilitation* (pp. 173–205). Springer.

Davis, J. M., & D'Amato, R. C. (Eds.). (2014). *Neuropsychology of Asians and Asian-Americans: Practical and theoretical considerations* (Part of the issues of diversity in clinical neuropsychology series). Springer.

Dean, R. S. (1978). Reliability and predictive validity of the Dean laterality preference schedule with preadolescents. *Perceptual and Motor Skills, 47*(3 Pt 2), 1345–1346. https://doi.org/10.2466/pms.1978.47.3f.1345

Dean, R. S. (1979, August). *Lateral preference and reading comprehension*. Paper presented at the annual meeting of the 88th American Psychological Association Convention, New York, NY.

Dean, R. S. (1982). Assessing patterns of lateral preference. *Clinical Neuropsychology, 4*(3), 124–128.

Dean, R. S. (1984). Functional lateralization of the brain. *The Journal of Special Education, 18*(3), 239–256. https://doi.org/10.1177%2F002246698401800306

Dean, R. S. (1986a). Neuropsychological aspects of psychiatric disorders. In J. E. Obrzut & G. W. Hynd (Eds.), *Perspectives in neurolinguistics, neuropsychology, and psycholinguistics: A series of monographs and treatises. Child neuropsychology (*Vol. 2, pp. 83-112). Academic Press. https://doi.org/10.1016/B978-0-12-524042-0.50010-3

Dean, R. S. (1986b). *Perspectives on the future of neuropsychological assessment.* https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1008&context=burosfuturetesting

Dean, R. S., Schwartz, N. H., & Smith, L. S. (1981). Lateral preference patterns as a discriminator of learning difficulties. *Journal of Consulting and Clinical Psychology, 49*(2), 227–235. https://doi.org/10.1037/0022-006X.49.2.227

Dean, R. S., & Smith, L. S. (1981). Personality and lateral preference patterns in children. *Clinical Neuropsychology, 3*(4), 22–28.

Dean, R. S., & Reynolds, C. R. (1997). Cognitive processing and self-report of lateral preference. Neuropsychology Review, 7(3), 127-142.

Finster, M., & Wood, M. (2005). The Apgar score has survived the test of time. *Anesthesiology: The Journal of the American Society of Anesthesiologists, 102*(4), 855–857. https://doi.org/10.1097/00000542-200504000-00022

First, M. B. (2014). Structured clinical interview for the DSM (SCID). *The Encyclopedia of Clinical Psychology*, 1–6. https://doi.org/10.1002/9781118625392.wbecp351

Flanagan, D. P., & McDonough, E. M. (Eds.). (2018). *Contemporary intellectual assessment: Theories, tests, and issues* (4th ed.). Guilford.

Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2018). *Learning disabilities: From identification to intervention.* Guilford.

Gaddes, W. H. (1985). *Learning disabilities and brain function: A neuropsychological approach* (2nd ed.). Springer-Verlag.

Gaddes, W. H., & Edgell, D. (1994). *Learning disabilities and brain function: A neuropsychological approach* (3rd ed.). Springer.

Gisi, T. M., & D'Amato, R. C. (2000). What factors should be considered in rehabilitation: Are anger, social desirability, and forgiveness related in adults with traumatic brain injuries? *International Journal of Neuroscience, 105*, 121–133. https://doi.org/10.3109/00207450009003271

Glozman, J. M. (1999). Russian neuropsychology after Luria. *Neuropsychology Review, 9*(1), 33-44.

Gray, J. W., & Dean, R. S. (Eds.). (1991). *Neuropsychology of perinatal complications*. Springer.

Hale, J. B., & Fiorello, C. A. (2004). *School neuropsychology.* Guilford.

Halstead, W. C. (1947). *Brain and intelligence: A qualitative study of the frontal lobes*. University of Chicago Press.

Hardy, K. K., Olson, K., Cox, S. M., Kennedy, T., & Walsh, K. S. (2017). Systematic review: A prevention-based model of neuropsychological assessment for children with medical illness. *Journal of Pediatric Psychology, 42*(8), 815–822.https://doi.org/10.1093/jpepsy/jsx060

Hartlage, L. C., & D'Amato, R. C. (2008a). Understanding the etiology of neurological and psychiatric disorders. In A. MacNeil Horton Jr. & D. Wedding (Eds.), *The neuropsychology handbook* (3rd ed., pp. 87–108). Springer.

Hartlage, L. C., & D'Amato, R. C. (2008b). Understanding the etiology of neurological and psychiatric disorders. In A. MacNeil Horton Jr. & D. Wedding (Eds.), *The neuropsychology handbook* (3rd ed.; pp. 87–108). Springer.

Hynd, G. W., & Willis, W. G. (1988). *Pediatric neuropsychology*. Grune & Stratton.

Hynd, W. G., & Semrud-Clikeman, M. (1990). Neuropsychological assessment. In A. S. Kaufman (Ed.), *Assessing adolescent and adult intelligence* (pp. 638–696). Allen & Bacon.

Johnson, J. A., & D'Amato, R. C. (2011). Evaluating and using the Halstead-Reitan neuropsychological battery: Is it our future or our past? In A. Davis (Ed.), *Handbook of pediatric neuropsychology* (Vol. I, pp. 353–366). Springer.

Jones, K. D. (2011). The unstructured clinical interview. *Journal of Counseling & Development, 88*(2), 220–226. https://doi.org/10.1002/j.1556-6678.2010.tb00013.x

Joseph, L. M. (2005). Understanding and implementing neuropsychologically based literacy interventions. In R. C. D'Amato, E. Fletcher-Janzen, & C. R. Reynolds (Eds.), *Handbook of school neuropsychology* (p. 738–757). Wiley.

Kaplan, E. (1988). The process approach to neuropsychological assessment. *Aphasiology, 2*(3–4), 309–311. https://doi.org/10.1080/02687038808248930

Kaufman, A. S., & Horn, J. L. (1996). Age changes on tests of fluid and crystallized ability for women and men on the Kaufman Adolescent and Adult Intelligence Test (KAIT) at ages 17–94 years. *Archives of Clinical Neuropsychology, 11*(2), 97–121. https://doi.org/10.1016/0887-6177(95)00003-8

Kaufman, A. S., & Kaufman, N. L. (1983). *Administration and scoring model for the Kaufman assessment battery for children*. American Guidance Service.

Kaufman, A. S., & Kaufman, N. L. (2014). *Kaufman test of educational achievement* (3rd ed.). Pearson.

Kaufman, D. M. (2001). *Clinical neurology for psychiatrists*. Saunders.

Kazdin, A. E. (2011). *Single-case research design: Methods for clinical and applied settings* (2nd ed.). Oxford University Press.

Kolb, B., & Whishaw, I. Q. (2003). *Fundamentals of human neuropsychology* (5th ed.). Worth Publishers.

Kratochwill, T. R., & Stoiber, K. C. (2002). Evidence based interventions in school psychology: Conceptual foundations of the procedural and coding manual of division 16 and the Society for the Study of school psychology task force. *School Psychology Quarterly, 17*(4), 341–389. https://psycnet.apa.org/doi/10.1521/scpq.17.4.341.20872

Lezak, M. D., Howieson, D. B., Bigler, E. D., & Tranel, D. (2012). *Neuropsychological assessment*. Oxford University Press.

Lin, K., & Dulebohn, S. C. (2017). *Ranchos los amigos.* Treasure Island.

Løberg, T. (1989). The role of neuropsychology in secondary prevention. In T. Løberg, W. R. Miller, P. E. Nathan, & G. A. Marlatt (Eds.), *Addictive behaviors: Prevention and early intervention* (pp. 69–86). Swets & Zeitlinger Publishers.

Luria, A. R. (1964). Neuropsychology in the local diagnosis of brain damage. *Cortex*, 1(1), 3-18. https://doi.org/10.1016/S0010-9452(64)80010-1

Luria, A. R. (1966). *The working brain: An introduction to neuropsychology*. Basic Books.

Luria, A. R. (1970). The functional organization of the brain. *Scientific American, 222*, 66–78.

Luria, A. R. (1973). *The working brain*. Penguin.

Luria, A. R. (1980). *Higher cortical functions in man* (2nd ed.). Basic Books.

Martin, D. C. (1990). The mental status examination. In H. K. Walker, W. D. Hall, & J. W. Hurst (Eds.), *Clinical Methods: The History, Physical, and Laboratory Examinations (3rd ed.)*. Ch. 207. Butterworths.

McGrath, R. E., Wiggins, J. G., Sammons, M. T., Levant, R. F., Brown, A., & Stock, W. (2004). Professional issues in pharmacotherapy for psychologists. *Professional Psychology: Research and Practice, 35*(2), 158–163. https://doi.org/10.1037/0735-7028.35.2.158

Miller-Kuhaneck, H., Henry, D. A., Glennon, T. J., & Mu, K. (2007). Development of the sensory processing measure–school: Initial studies of reliability and validity. *American Journal of Occupational Therapy, 61*(2), 170–175. https://doi.org/10.5014/ajot.61.2.170

Montgomery, K. S. (2000). Apgar scores: examining the long-term significance. *The Journal of Perinatal Education*, *9*(3), 5-9. https://dx.doi.org/10.1624%2F105812400X87716

Naglieri, J. A., & Das, J. P. (1996). *Das Naglieri cognitive assessment system*. Riverside.

Naglieri, J. A., Das, J. P., & Goldstein, S. (2014). *Cognitive assessment system* (2nd ed.). PRO-ED.

Nelson, K. B., & Ellenberg, J. H. (1981). Apgar scores as predictors of chronic neurologic disability. *Pediatrics, 68*(1), 36-44.

Nicholson, H., Kehle, T. J., Bray, M. A., & Heest, J. V. (2011). The effects of antecedent physical activity on the academic engagement of children with Autism spectrum disorder. *Psychology in the Schools, 48*(2), 198-213. https://doi.org/10.1177/0145445514552891

O'Neill, J., & Conzemius, A. (2006). *The power of smart goals. Using goals to improve student learning*. Solution Tree.

Perfect, M., & D'Amato, R. C. (2020). Introduction to special issue on the history of the future of proactive school psychology: Transcending the past, excel in the present, and transform the future. *School Psychology, 35*(6), 363–366.

Power, E., & D'Amato, R. C. (2018). Should our future include the integration of evidence-based neuropsychological services into school settings? In D. P. Flanagan & E. M. McDonough (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (4th ed., pp. 1017–1045). Guilford.

Reitan, R. M. (1955). Certain differential effects of left and right cerebral lesions in human adults. *Journal of Comparative and Physiological Psychology, 48*(6), 474. https://doi.org/10.1037/h0048581

Reitan, R. M., & Wolfson, D. (1985). *The Halstead-Reitan neuropsychological test battery: Theory and clinical interpretation*. Neuropsychology Press.

Reynolds, C. R. (1981a). Neuropsychological assessment and the habilitation of learning: Considerations in the search for the aptitude x treatment interaction. *School Psychology Review, 10*(3), 343–394. https://doi.org/10.1080/02796015.1981.12084914

Reynolds, C. R. (1981b). The neuropsychological basis of intelligence. In G. Hynd & J. Obrzut (Eds.), *Neuropsychological assessment and the school-aged child*. Grune & Stratton.

Reynolds, C. R., & French, C. L. (2005). The brain as a dynamic organ of information processing and learning. In R. C. D'Amato, E. Fletcher-Janzen, & C. R. Reynolds (Eds.), *Handbook of school neuropsychology* (pp. 86–119). Wiley.

Rhodes, R. L., D'Amato, R. C., & Rothlisberg, B. A. (2008). Utilizing a neuropsychological paradigm for understanding educational and psychological tests. In C. R. Reynolds & E. Fletcher-Janzen (Eds.), *Handbook of clinical child neuropsychology* (3rd ed., pp. 321–348). Plenum.

Rothlisberg, B. A., D'Amato, R. C., & Palencia, B. N. (2003). Assessment of children for intervention planning following traumatic brain injury. In C. R. Reynolds & R. W. Kamphaus (Eds.), *Handbook of psychological and educational assessment of children: Personality, behavior and context* (2nd ed.). Guilford.

Rothlisberg, B. A., & Dean, R. S. (1985). Reading comprehension and lateral preference in normal readers. *Psychology in the Schools, 22*, 337–342.

Sattler, J. M., & D'Amato, R. C. (2002a). Brain injuries: Theory and rehabilitation programs. In J. M. Sattler (Ed.), *Assessment of children: Behavioral and clinical applications* (4th ed., pp. 401–439). Jerome M. Sattler.

Sattler, J. M., & D'Amato, R. C. (2002b). Brain·injuries: Formal batteries and informal measures. In J. M. Sattler (Ed.), *Assessment of children: Behavioral and clinical applications* (4th ed., pp. 440–469). Jerome M. Sattler.

Schultz, D. P., & Schultz, S. E. (2016). *A history of modern psychology* (11th ed.). Cengage.

Semrud-Clikeman, M., & Hynd, G. W. (1990). Right hemispheric dysfunction in nonverbal learning disabilities social, academic, and adaptive functioning in adults and children. *Psychological Bulletin, 107*(2), 196–209. https://doi.org/10.1037/0033-2909.107.2.196

Semrud-Clikeman, M. (2005). Neuropsychological aspects for evaluating learning disabilities. *Journal of Learning Disabilities, 38*(6), 563-568. https://doi.org/10.1177%2F00222194050380061301

Shaywitz, S. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level.* Knopf.

Sobel, D., & Ornstein, R. (1987). Healthy pleasures. *Reading*.

Sousa, D. A. (2005). *How the brain learns to read*. Sage.

Sperry, R. W. (1974). Lateral specialization in the surgically separated hemispheres. *The neurosciences third study program*, 5-19.

Spooner, D. M., & Pachana, N. A. (2006). Ecological validity in neuropsychological assessment: A case for greater consideration in research with neurologically intact populations. *Archives of Clinical Neuropsychology, 21*(4), 327–337. https://doi.org/10.1016/j.acn.2006.04.004

Stark, R. (1961). An investigation of unilateral cerebral pathology with equated verbal and visual-spatial tasks. *The Journal of Abnormal and Social Psychology, 62*(2), 282. https://psycnet.apa.org/doi/10.1037/h0048661

Sternbach, G. L. (2000). The Glasgow coma scale. *The Journal of Emergency Medicine, 19*(1), 67–71. https://doi.org/10.1016/s0736-4679(00)00182-7

Teasdale, G., Maas, A., Lecky, F., Manley, G., Stocchetti, N., & Murray, G. (2014). The Glasgow coma scale at 40 years: Standing the test of time. *The Lancet Neurology, 13*(8), 844–854. https://doi.org/10.1016/s1474-4422(14)70120-6

Teglasi, H. (2015). *Essentials of TAT and other storytelling assessments* (2nd ed.). Wiley.

Tincup, M. J., D'Amato, R. C., Titley, J. E., & Dean, R. S. (2005). Appendix A: Sample neuropsychological questionnaire. In R. C. D'Amato, E. Fletcher-Janzen, & C. R. Reynolds (Eds.), *Handbook of school neuropsychology* (pp. 859–873). Wiley.

Traughber, M. C., & D'Amato, R. C. (2005). Integrating evidence-based neuropsychological services into school settings: Issues and challenges for the future. In R. C. D'Amato, E. Fletcher-Janzen, & C. R. Reynolds (Eds.), *Handbook of school neuropsychology* (pp. 827–857). Wiley.

U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, What Works Clearinghouse. https://ies.ed.gov/ncee/wwc

van Schalkwyk, G. J., & D'Amato, R. C. (Eds.). (2015a). *From the Confucian way to collaborative knowledge co-construction: New directions for teaching & learning*. Jossey-Bass/Wiley.

van Schalkwyk, G. J., & D'Amato, R. C. (Eds.). (2015b). *Facilitative collaborative knowledge co-construction: New directions for teaching & learning*. Jossey-Bass/Wiley.

Wada, J. (1949). A new method of determining the side of cerebral speech dominance: a preliminary report on the intracarotid injection of sodium amytal in man. *Igaku to Seibutsugaku*, 14, 221–222. https://doi.org/10.3171/jns.1960.17.2.0266

Walker, H. M., & Shinn, M. R. (2002). Structuring school-based interventions to achieve integrated primary, secondary, and tertiary prevention goals for safe and effective schools. In M. R. Shinn, H. M. Walker, & G. Stoner (Eds.), *Interventions for academic and behavior problems II: Preventive and remedial approaches* (pp. 1–26). NASP Publications.

Wechsler, D. (1928). Psychometric tests. In I. S. Wechsler (Ed.), *A textbook of clinical neurology* (pp. 104–116). Saunders.

Work, L. P., & Hee-Sook, C. (2005). Developing classroom and group intervention programs based on neuropsychological principles. In R. C. D'Amato, E. Fletcher-Janzen, & C. R. Reynolds (Eds.), *Handbook of school neuropsychology* (pp. 663–683). Wiley.

Zaroff, C., & D'Amato, R. C. (Eds.). (2015). *The neuropsychology of men: From neurodevelopment to evidence-based interventions* (Part of the issues of diversity in clinical neuropsychology series). Springer.