A Judge's Introduction to Neuropsychological Assessments

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When you want to know how something works, you put it through its paces, making it do what it was designed to do. You can look at the structure of the thing, open it, take pictures and x-rays, but you won't know how well it works until you test its *function*. This principle is true for cars, radios, and body organs. Just because there is no detectable damage of the structure does *not* mean there is no detectable dysfunction.

The brain's function is behavior: that's what it does for a living. It consists of three parts—going upward, they are the subcortex, the white matter, and the cortex, the part of the brain closest to the skull. The subcortex handles basic functions like breathing and heart rate; diseases of the subcortex are assessed and treated by physicians such as neurologists and psychiatrists. Physicians use neuroimaging methods like the electroencephalogram (EEG), computed tomography (CT), or magnetic resonance imaging (MRI) to evaluate changes in the structure; they use more controversial methods, like the quantitative EEG (qEEG), single-photon emission computed tomography (SPECT), functional MRI (fMRI), and positron emission tomography (PET) to measure functioning.[1]

The cortex's function, however, is those behaviors we think of as voluntary—thinking, moving, and perceiving. Psychologists have been measuring such behavior for decades with tests. Along the way, we've collected bits of behavior that tell us where the cortex is having problems; the measurement of cortical functions as expressed by such bits of behavior is called neuropsychological assessment. Neuropsychological tests measure cortical dysfunctions that are the result of damage rather than normal aging, personality traits, or a host of psychiatric conditions. Such damage or intellectual deficits can be the result of such neurological insults as head trauma, infection, toxins, substance abuse, bleeding, or tumor.

Neuropsychological issues can arise whenever psychologists are brought into civil or criminal proceedings,[2] and can be raised by either psychologists or neuropsychologists. In personal injury and disability cases, the presence and extent of cortical damage may be central. In competency hearings, the question of ability to dispose of property, make contracts, revise a will, testify, parent, waive Miranda rights, stand trial, or be executed could involve the results of neuropsychological testing. In criminal trials, evidence of brain damage could be used to support a plea of insanity, a defense of lesser intent, or in mitigation.[3] If not summarized in a brief, the results of the testing would be presented as a declaration, report, or testimony.

READING A NEUROPSYCHOLOGICAL DECLARATION OR REPORT

Neuropsychologists are trained to write for other doctors, not for judges. As a result, their written productions may not be as clear as expected. The process of deciphering reports can be simplified, however.

Step One: What's the referral question? What question has the psychologist been asked to answer: Need for treatment or further testing? Competency on a given issue? Diagnosis? Does the doctor's notion of the referral question agree with yours?

Step Two: Bases of opinion. The second step is to establish what the psychologist considered and relied upon in coming to an opinion. There should be at least an interview and testing, and perhaps some records. If the records are listed, check to see whether they include the relevant ones, especially if the report was done early in the case, before some of the relevant records were produced.

Establishing the tests given can sometimes be difficult, even when the neuropsychologist lists them. There are four approaches to neuropsychological batteries: giving screening tests; giving the Halstead-Reitan Battery (HRB) or a variant, the Halstead-Russell Neuropsychological Evaluation System (HRNES); giving the Luria-Nebraska Neuropsychological Battery (LNNB); and giving an idiosyncratic battery (the flexible battery approach).

The neuropsychologist may have given one or more screening tests. For example, look for the Trail Making Test, Category Test, Bender-Gestalt, or, rarely, the Screening Test for the LNNB. Screening tests are quickly given and scored; their primary use is to decide whether a more comprehensive battery should be given. Screening tests are favored by clinical psychologists who do not have specialized neuropsychological expertise. The primary disadvantages to screening tests are their lesser accuracy than the more comprehensive batteries and their limited ability to describe the nature of the dysfunctions.

If the neuropsychologist has given the LNNB, it will be stated clearly. There may also have been other tests given as supplements.

If the neuropsychologist has given the HRB or HRNES, it may or may not be stated clearly. The core of these batteries is

Footnotes

1. Because these testing methods are rarely referred to by their full names, further reference in this article will be by their acronyms.
2. *See* DANIEL W. SHUMAN, PSYCHIATRIC AND PSYCHOLOGICAL EVIDENCE (1999).
3. *See* R. K. McKinzey, *Neuropsychological Assessment in Capital Cases*, 22 CACJ FORUM 50 (1995).

the Category Test, Tactual Performance Test, Seashore Rhythm Test, Speech-sounds Perception Test, and Finger Tapping Test. *It is only this core that gives the HRB any added accuracy over one or more screening tests*. Again, supplemental tests may have been given.

When the flexible battery approach is used, there will be a long list of tests that have been given. This may or may not include the HRB core (the LNNB will usually not be mentioned). Look for the Rey-Osterreith Complex Figure, Auditory-Verbal Learning Test, Boston Naming Test, and Wisconsin Card Sorting Test.

Regardless of the approach used, there may be other kinds of tests given, including Intelligence Quotient (IQ) testing, such as the Wechsler Adult Intelligence Scale (WAIS-III), Raven, Shipley, or Kaufman; academic achievement testing, such as the Woodcock-Johnson; or personality testing, such as the Minnesota Multiphasic Personality Inventory (MMPI-2), the Millon Clinical Multiaxial Inventory (MCMI-III), the Personality Assessment Inventory (PAI), or the Rorschach. *None of these should be used to determine damage*, although they may help in describing the deficits. Some psychologists are giving tests for malingering, and several tests are listed in the Appendix to this article. Unfortunately, most are highly inaccurate, as is discussed in more detail later.

Step Three: Is damage present? If the neuropsychologist has given screening tests, an opinion should be given on whether or not a complete battery of tests is necessary. If the history and testing is normal, further testing would be unnecessary. If the history reveals clear damage and the screening is abnormal, a screening might answer the referral question. If the history or testing is equivocal or the stakes high, a complete battery will be recommended.

If the neuropsychologist has given the LNNB, one or more rules will be used to decide whether or not the profile is abnormal. These decision rules are age and education corrected, and among the most sensitive of all tests for neuropsychological dysfunction. Before describing the results as normal or abnormal, however, the LNNB manual requires both a quantitative analysis of the decision rules and a qualitative item analysis.[4] A description of deficits indicated by the profile usually follows.

If the neuropsychologist has given the HRB, one or more of several decision rules has been used, and only then followed by a description of deficits. The most common decision rule used is the Impairment Index, derived from the core tests (described in the Appendix). The Average Impairment Rating (AIR) adds five other tests. The General Neuropsychological Deficit Scale (GNDS) adds 35 to the core. The Average Impairment Scale (AIS) drops two and adds five. Other norms that are available will correct the scores for age and education and the norms used should be mentioned in the report.[5] Properly used, these decision rules are considered quite sensitive, and should not be ignored or supplanted.

Some neuropsychologists decline to use any test or decision rule, even when included in the battery, to opine on the presence or absence of damage. These neuropsychologists simply describe the pattern of test results, noting intellectual strengths and weaknesses. This approach is entirely appropriate in some settings, where the cause, or etiology, of the underlying neurological disorder is undisputed. When the etiology or presence of any disorder is part of the dispute, however, such an approach could prove problematic.

Step Four: What is the etiology, location, and nature of the damage? The finding of abnormality is bolstered by a documented etiology for the damage. Examples include head trauma (sometimes multiple, from fights, abuse, or car or motorcycle accidents), neurotoxins (e.g., childhood lead poisoning), parasite infestation, missile wounds (gunshots, pellets), tumors, genetic abnormalities (Huntington's, Alzheimer's), anoxia (carbon monoxide poisoning, strangulation, glue sniffing), stroke, progressive infections (AIDS, syphilis, encephalitis), or nutritional deficits (severe childhood neglect, Korsakov's).

Fetal Alcohol Syndrome, epilepsy, drug or alcohol intoxication or withdrawal, and retardation are special cases, and a complete discussion of the extensive literature on each is beyond the scope of this article. Some points should be kept in mind, however.

Fetal Alcohol Syndrome is defined as a cause of *retardation*, which will normally be diagnosed by first grade, and accompanied by an IQ score of less than 70. Fetal Alcohol Effect is used to describe those people whose mothers were drinking heavily, yet the infant was not clearly damaged or retarded.

Epilepsy is sometimes used in an "unconsciousness" defense. Seizures are said to arise from the temporal lobe, giving rise to complex behavior without conscious thought, and variously called psychomotor or complex partial seizures. Neuropsychological and neurological test results can be normal, but the diagnosis gains credibility when accompanied by an abnormal EEG.

The effects of drug and alcohol intoxication are well known. Acute withdrawal may cause intellectual clouding for hours to months, depending on a host of factors. The attribution of long-term damage to intoxicant abuse can be disputed, however, depending on the substance and the test used.

Retardation (developmental disability) is not an etiology—it is a description of intellectual and social functioning. By definition, it does not exist without an IQ test score of below 70 *and* accompanying limits in functioning. Efforts to use test inaccuracies to make a score fit the definition usually fail. "Borderline Intellectual Functioning" is still not retardation. In any case, a cause for the retardation should be available.

The credibility of the etiology and damage will be enhanced if the neurologic insult is documented and consistent with the available neurological imaging, neuropsychological testing, and history. The fit of the available information has been called "ecological validity," which essentially means "it just makes sense." The intellectual impairments from the damage should

4. *See* CHARLES J. GOLDEN, ET AL., LURIA-NEBRASKA NEUROPSYCHOLOGICAL BATTERY: FORMS I & II MANUAL (1995); CHARLES J. GOLDEN, ET AL., LNNB HANDBOOK: 20TH ANNIVERSARY (1999).

5. *See* ROBERT K. HEATON, ET AL., COMPREHENSIVE NORMS FOR AN EXPANDED HALSTEAD-REITAN BATTERY (1991).

be apparent from the time of the insult, without a long period of asymptomatic functioning in between the insult and the testing. Damage described as "marked" or "severe" ought to be apparent on neurological imaging, although subtle deficits often are not.

Having found an etiology, the neuropsychologist might suggest a specific spot for the damage ("localization"), which should have ecological validity as well. The damage will be said to be some combination of: subcortical; white matter; right, left, or bilateral; anterior (front half), posterior (back half), frontal (underneath the forehead), parietal (back and top), temporal (over the ears), occipital (far back of the head), some combination (e.g., parieto-occipital), or diffuse (the entire cortex).

There are some points to remember:

(1) Localization should not usually be attempted using screening tests alone.
(2) Not all brain damage leads to the same symptoms. For example, impulse control is a function of the frontal lobes, not those parts of the cortex in the back of the head. There must be a connection between the intellectual impairments caused by a given localization and the issue at hand.
(3) Mild and moderate head blows cause damage limited to focused areas ("focal"), not diffuse. A punch might cause "coup-contrecoup" damage, in which the locus of damage is matched by the brain bruising on the opposite side of the skull in the line of the blow's vector. The severity of the blow should have some connection to the severity of deficits: a low-speed, rear-end auto accident should not cause marked damage.
(4) Neurotoxins (drugs, lead, poisons, etc.) generally cause diffuse damage, not focal.

At some point, the neuropsychologist will describe the intellectual impairments ("neuropsychological deficits") shown by the testing. Again, these should have some ecological validity. The neuropsychologist may organize these according to "domains," or different kinds of functioning. These domains include attention and concentration, moving, touch, verbal and nonverbal listening, seeing, speech, academics, memory (verbal and nonverbal, immediate and delayed), and general intellectual tasks such as abstraction, reasoning, problem solving, and concept formation.

One especially complex domain is called "executive functions," defined as "those capacities that enable a person to engage successfully in independent, purposive, self-serving behavior."[6] Since volition is often affected, disorders of executive functions have long been central to legal issues.[7]

Within this domain are such notions as judgment, initiative, inhibition, impulse control, planning, self-monitoring, and maturity. Executive dysfunctions are often inferred from tasks that demand the ability to change ongoing behavior. For example, Trail Making Test B asks the testee to connect circles changing back and forth between circles with numbers and circles with letters ("1 to A to 2 to B") and an LNNB item described as a "change-of-set coordination task" asks the testee to tap once with one hand and twice with the other. These tests might indicate executive dysfunction; these are often ascribed to frontal lobe damage, although other areas have been implicated as well.[8]

Step Five: What is the relationship to the legal question? Having reported the results of the testing, the neuropsychologist will then opine on the legal question at hand. Faust, among others, has pointed out the gap that often exists between neuropsychological test results and legal issues, and the neuropsychologist may strain to make the connection.[9] The Appendix lists four common opinions:

(1) Due to anterior, frontal, or diffuse damage, the testee is impulsive, which in turn affects level of intent or mitigation.
(2) Due to posterior, parietal, occipital, temporal, or diffuse damage, comprehension is impaired, resulting in poor competency.
(3) Temporal or diffuse damage has caused rages or an unconscious act, allowing a lower level of intent or a complete defense.
(4) Whatever damage is present is grounds for monetary compensation, disability benefits (usually by affecting employability), or mitigation.

MAKING SENSE OF DIRECT EXAMINATION

In some settings, no report or declaration is ever written. The court is presented with testimony, perhaps preceded only by a brief offer of proof. The flow of testimony will go according to the procedures for any expert witness: the neuropsychologist will be qualified like any other expert, and the qualifications and possible bias explored as usual. The recitation of records read should be compared to what is available and necessary to understand the case. Listen carefully for neurological imaging (CT, MRI, EEG, qEEG, SPECT, PET) reports. One doctor will obviously opine that there is some sort of damage (as from a head blow) or dysfunction (as in epilepsy), and that the neuropsychological deficits found have something to do with the question before the court. Another doctor may present a rebuttal, and the trier-of-fact will be asked to reconcile or choose between the two opinions.

The steps to understanding the direct are the same as reading a report. Use the Appendix to keep track of the tests the doctor gave and whether or not each was abnormal. Was there a test for malingering? Do the etiology, location of damage, nature of deficits, and symptoms agree with the neuropsychological testing and neuroimaging? Does the ecological validity of the damage support the legal question at hand? If the doctors disagree, did one do a better job than the other? Ignoring them both just because they disagree is a victory for the rebuttal doctor, who may have done the worse job!

MAKING SENSE OF THE CROSS-EXAMINATION

Cross-examinations can be done crisply, yielding a maximum of information in a minimum of time. They can also be done

6. *See* MURIEL LEZAK, NEUROPSYCHOLOGICAL ASSESSMENT 42 (1995).
7. *See, e.g.,* ISAAC RAY, A TREATISE ON THE MEDICAL JURISPRUDENCE OF INSANITY (Harvard University Press 1838, 1963).
8. *See* LEZAK, *supra* note 6, at 650.
9. *See* DAVID FAUST, ET AL., BRAIN DAMAGE CLAIMS: COPING WITH NEUROPSYCHOLOGICAL EVIDENCE (1991).

tediously and sloppily, yielding a minimum of information in a maximum of time. How crisply the cross is done depends in part on whether the discovery was timely enough for proper preparation. In civil cases, discovery is usually done with sufficient time for depositions and preparation with a knowledgeable consultant. Criminal cases do not always have that luxury, and the morass of esoteric data suddenly produced may overwhelm an attorney with little experience with neuropsychological testimony. If discovery has not been timely, expect a request for a continuance. Pity the poor attorney who has not planned ahead and arranged for a consultant to be on call.

Once the cross starts, the usual approach to examining experts will be followed. If not done earlier, the doctor's qualifications and possible biases are explored. The records relied upon will be compared to those available. If any questions remain about the neuropsychological tests given (such as whether or not the test result is abnormal), these can be clarified. The cross-examiner then has to make a tactical decision on whether to go straight to the legal questions, try to do a "learned treatise" attack, or to just call a rebuttal neuropsychologist.

CHALLENGES TO THE OPINION

There are many ways of challenging a neuropsychologist's opinion, as exhaustively described by Faust,[10] and the doctor will be prepared to deftly defend against the mundane ones. If properly prepared, however, the attorney may nevertheless decide to challenge the presence or absence of damage during cross. The challenge stands the best chance of being worthwhile if (a) the damage is described as mild or subtle or (b) the known level of functioning is not clearly impaired and (c) the etiology is either not well-documented or is inconsistent with the severity of the purported results (for example, a low-speed car accident causing severe damage). The potential for a misinterpretation of the test results is high in such cases. The process of such a challenge involves the concepts of decision rules, accuracy rates, norms, alternate etiologies, and malingering.

By definition, all tests use decision rules. The test has been given to many people with and without the disorder the test was designed to measure. Some decision rule has been devised to separate the two groups, with varying levels of accuracy. False positive refers to the frequency the given measure identifies the patient as having a condition the patient does not in fact have, according to a given criterion measure. For example, if an IQ test calls 60% of college graduates retarded, the test would be useless.

False negative refers to the frequency the measure misses a condition the patient has, according to another criterion measure. For example, if a blood test designed to detect an infection misses the infection 50% of the time, its utility would be greatly limited.

Hit rate refers to the combined percentages of correct diagnoses (hits), or true positives and true negatives. The perfect test has a 100% hit rate, with 0% false positives and 0% false negatives. Some psychologists prefer to use the term sensitivity for true positives and specificity for true negatives. The false negative rate is 1 minus sensitivity and the false positive rate is 1 minus specificity. (If these terms are used in a jury trial, make sure the definitions are clearly given.)

Over the years, researchers have developed multiple sets of decision rules for some tests. Psychologists have trouble remembering a well-known fact: increasing the number of tests also increases the chances of finding something wrong. This goes for multiple decision rules created by multiple normative sets as well. This problem has been corrected for the LNNB, but not for the other approaches. At the moment, the HRB has 7 different sets of norms, and 8 different decision rules. The effect on the false positive rate of combining these rules, *even when applied in the recommended manner*, is unknown.

Interestingly, neuropsychologists sometimes do not calculate any of the rules! For example, although the core tests of the HRB have been given, there will be no mention of the HRB or of which rule has been used. As a result, goes the challenge, the doctor has no idea of the accuracy of the battery, and it might be quite high or low. The doctor who has used a battery whose accuracy is known might be able to achieve credibility over a doctor whose test battery has an unknown accuracy.

Another challenge uses the concept of multiple norms, rather than decision rules. After a psychologist gives a test to a person, the test is scored, and a number, the raw score, is obtained. The raw score is then compared to the compiled scores of people whose condition is known, including normal people. The compilation is known as norms. The raw score is converted via norms to a statistically derived number (e.g., t-scores, standard scores, scaled scores, percentiles), which is then interpreted. *It is only the normed score that has any meaning.*

But to whom is the person compared? As it turns out, tests usually need to consider more than one characteristic (or variable), such as age, to be useful. The same raw score means one thing when done by a child, another when produced by an adult. In neuropsychological assessment, age, education, and gender are common variables. The daunting task of giving the same test to a sample large enough to be representative (referred to as the standardization) is usually undertaken by the authors of a given test, who are also responsible for updating the norms when necessary. Thus, such updated tests as the Wechsler IQ tests (W-B, WAIS, WAIS-R, and WAIS-III) and MMPI (now the MMPI-2) have had normative updates consisting of hundreds of people. However, many neuropsychological tests do not have authors capable of such large-scale efforts, and have much more limited norms available.

What is a psychologist to do when the available norms are insufficient? The answer, in practice, became: gather your own. In 1970 and 1984, Bert W. Russell, wanting to improve on the 1947 norms for the Halstead-Reitan Battery, published two sets of his own. By 1991, it was clear that none of the three sets adequately accounted for age, education, and gender, so another two sets (one in book form, another computerized) was produced.[11] In response, Reitan and Russell produced two more sets of their own, making a total of seven different sets of norms, *all of which are still in use*. None of these norms, includ-

10. *See* FAUST, *supra* note 9.

11. *See* HEATON, ET AL., *supra* note 5.

ing the oldest set, have been unequivocally declared as superior to the others.

A new book by Maura Mitrushina and others has documented the explosion of available norms for a wide variety of neuropsychological tests.[12] For example, Mitrushina and her coauthors list 19 different normative sets for the Category Test, 24 for the Trail Making Test, and 37 for the Finger Tapping Test. Some of these norms are crude, with too few people to make them representative. This has not stopped neuropsychologists from using them, however.

The problem with having multiple neuropsychological norms available is that, in some cases, the use of a different normative set dramatically changes the interpretation: a normal score becomes abnormal, or vice versa. An abnormal score becomes better or worse. A testee goes from being tragically demented to perfectly normal, depending *entirely* upon which set of norms the psychologist chooses to use.

For example, one criminal defendant, age 67, was sent to a neuropsychologist in hopes of finding a defense. Three weeks prior to the crime, the defendant suffered a blow from a falling heavy box at an acquaintance's home. He had no loss of consciousness and drove himself to the emergency room, where the wound was cleaned and he was released. The neuropsychological exam, done five months later, found sufficient intellectual deficits to challenge the defendant's ability to form intent. However, to support such a finding, the neuropsychologist had to use non-age-corrected norms, despite explicit test manual instructions to the contrary. When age norms were applied by a rebuttal expert, the test results became quite normal, and the defense was gutted.[13]

A less esoteric challenge asks whether the neuropsychologist considered other reasons for the abnormal results. Such alternative reasons include psychiatric conditions, medication, post-arrest trauma, or malingering.

Psychiatric conditions like the psychoses (e.g., schizophrenia, manic-depression) and serious depression also *sometimes* produce abnormal neuropsychological test results. So far, no undisputed actuarial method exists to rule out all psychiatric conditions as the cause of abnormal neuropsychological test results, leaving clinical judgment and ecological validity.

Medication (or the lack of it) may need to be considered as alternative etiologies. A patient in chronic pain may be using codeine to ease the pain, and may get abnormal results due to the sedation. Too little thyroid medication may disrupt thinking. Too much caffeine can cause anxiety that seems like impulsiveness. Confusion may be shown by the secret imbiber of alcohol.

Another challenge asks a simple question: "Doctor, how do you know the patient wasn't faking?" We've long known our tests are easily faked, but detecting malingering on neuropsychological testing has proven to be fairly difficult. It has taken 20 years to produce such procedures, and they are only now finding their way into routine use. The race was won by the stand-alone Test for Malingered Memory (TOMM), but other successful tests followed, and more are on the way. Of course, giving a special test to detect malingering has a weakness, as the procedure might be spotted, especially if the testee's attorney warns the testee ahead of time. This aspect of the problem has been addressed by the development of procedures embedded within a test that measures other functions. Such internal validity scales have now been validated and cross-validated for the LNNB and Raven Progressive Matrices.

It is thus now possible to give a comprehensive neuropsychological battery with multiple checks for malingering, and some neuropsychologists are arguing that such methods should be routinely given in both clinical and forensic settings. Considerable resistance remains, however, as does the use of inadequate tests. There are common variants of three errors:

(1) Using various arguments, some psychologists resist giving any malingering test or procedure at all, even when the forensic nature of the referral is clear. One doctor simply rejected the vast literature as being "unsettled," arguing that, since some tests in the battery were normal, the patient couldn't possibly be faking. This argument is contradicted by the research. Some psychologists may simply argue that the patient's tests are internally consistent. Although inconsistency has been cited as a hallmark of fakers, the rule has never been validated, and the psychologist will be unable to provide a specific false negative rate.

(2) Some psychologists will use malingering tests that are known to be inaccurate. One well-known measure, the Fifteen Item Test (also known as Rey's Memory Test,) remains in use despite research showing it to be completely insensitive to malingering. Some try to use personality tests like the MMPI, despite decades-old research showing it to be unsuitable as a measure of *neuropsychological* malingering.

(3) Some psychologists will use tests that are insufficiently validated. There are many tests and procedures that have been tried with one sample (the initial validation), but not with a second, independent sample (the cross-validation). The research has repeatedly shown that cross-validation is essential, as most measures fail to maintain the accuracy levels obtained in the initial validation.

Now that specific, accurate, easily given malingering tests are available, such errors and resistance are no longer defensible, unless the ecological validity is of such clarity that malingering simply is not credible in the case at hand.

If there is damage, so what? On direct, the neuropsychologist may have argued that there was a connection between the intellectual deficits and the legal issue at hand. The argument must be made at a level understandable to the trier-of-fact, and it takes no specialized knowledge to challenge the relationship: What does intellectual impairment of any sort have to do with the legal question at hand? It is at this point that the real issue before the court can be addressed. The sometimes bewildering mass of neuropsychological details should never be allowed to obscure a yawning gap between the test results and the decision to be made, nor to obscure a perfectly reasonable connection.

12. MAURA N. MITRUSHINA, ET AL., HANDBOOK OF NORMATIVE DATA FOR NEUROPSYCHOLOGICAL ASSESSMENT (1999).

13. *See* R. K. McKinzey & Thomas Ziegler, *Challenging a Flexible Neuropsychological Battery under* Kelly/Frye*: A Case Study*, 17 BEHAV. SCI. & L. 543 (1999).

SOME UNSOLICITED ADVICE: JUDICIAL DECISIONS AND LOGISTICS

Funding. If the court controls indigent funding, the first decision will be whether to allow a neuropsychologist to be hired. The request will come after the attorney has gotten some history of neurological insult or a recommendation from a psychiatrist or psychologist, who may have given a screening test. In capital cases, however, the request ought to be made even *without* a currently known history, as the frequency of neuropsychological impairments rises with the level of violence.[14]

Extent of testimony. Neuropsychologists have training and experience in the evaluation of some medical conditions. They routinely make diagnoses, devise treatment plans, and establish etiologies. In some jurisdictions, however, the extent of their testimony is an appellate matter, and some research prior to the testimony will be necessary. The American Psychological Association often files amicus briefs on such issues, and their positions can be found at http://www.psyclaw.org/issues.html. The primary issue seems to be the reluctance of some jurisdictions to allow a nonphysician the ability to make judgments about the etiology of a given disorder. This issue can perhaps be avoided by simply rephrasing the question as, "Doctor, are the test results most consistent with" a given etiology.

Attorney presence. Sometimes, an attorney demands to be present during an evaluation. Neuropsychologists worry that the presence of a third party or videotape affects the security and validity of the tests, which were never designed to be used with a third party in the room. They therefore balk at the demand, citing the policy statement of the National Academy of Neuropsychologists.[15] If no compromise can be agreed upon, a decision by the court may be necessary. But in most cases a judge can treat this as a nonissue. The attorney is extremely unlikely to uncover anything untoward in the interview and testing, and is equally unlikely to pay another neuropsychologist to watch the entire exam on the off chance that something useful will be spotted. On the other hand, having the attorney on-call in the waiting room can do much to reduce the natural anxiety a testee feels during an adversarial exam.

Raw protocols. Sometimes, a psychologist will balk at releasing the testing materials ("raw protocols") to anyone other than an appropriately trained psychologist, citing the ethical code of the American Psychological Association[16] and of the National Academy of Neuropsychologists[17] on maintaining test security and copyrights. This is usually handled by the raw protocols being sent to the consulting psychologist. Sometimes, the requesting attorney refuses to name the psychologist for some obscure tactical reason. In the end, the psychologist will release records to whomever the court orders, asking only that the test forms being copied do not become part of the public record. This policy has been called "silly," however,[18] and is in the process of revision.

Testimony logistics. When testimony is planned, some points should be made to the presenting attorney. To avoid tedious delays, make sure the doctor has a recent vita and can easily recite what records have been read. Ask if the doctor plans to use a poster as an exhibit to present the test results. If the doctor plans to use an exhibit, has it been presented for discovery in a timely manner? Most importantly, make sure the doctor understands that court schedules unavoidably change with *no* warning, and the doctor might have to change scheduled obligations to accommodate the court's schedule. If the court's budget is responsible for the doctor's hourly fees, try to minimize the time the doctor waits in the hall.

SUMMARY

Neuropsychological assessment is the testing of cortical functioning designed to diagnose neurological disorders that cause psychological symptoms. The results may not agree with neuroimaging, which are tests of structure. Neuropsychologists will appear in the same settings as psychologists and are subject to the same rules. Understanding a neuropsychologist's opinion includes the steps of deciphering which tests have been given, whether other sources for abnormal results have been considered, and the logic of the application of the results to the legal question at hand. The latter will always be attacked by the adversary, but more-sophisticated "learned treatise" attacks are possible as well. The testimony will be smoothest, of course, if proper planning and preparation have been undertaken by the presenting and cross-examining attorneys. Judges and attorneys listening to a neuropsychological expert or reviewing such an expert's report may find the Appendix that follows a useful tool in understanding and considering the testimony.

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14. *See* MCKINZEY, *supra* note 13.
15. *See* National Academy of Neuropsychology, *Presence of Third Party Observers during Neuropsychological Testing*, in 15 ARCHIVES OF CLINICAL NEUROPSYCHOLOGY 370 (2000) (found on line at http:nanonline.org/nan/subpages/professional/policies.html).
16. The APA code can be found online at http://www.apa.org/ethics/code.html.
17. *See* National Academy of Neuropsychology, *Test Security*, in 15 ARCHIVES OF CLINICAL NEUROPSYCHOLOGY 383 (2000) (found online at http:nanonline.org/nan/subpages/professional/policies.html).
18. *See* Paul R. Lees-Haley & John C. Courtney, *Disclosure of Tests and Raw Test Data to the Courts: A Need for Reform*, 10 NEUROPSYCHOLOGY REV. 169 (2000).

Appendix
Exam Checklist

Use x for abnormal, o for normal, underline for given but result not clear

Luria-Nebraska Neuropsychological Battery

Halstead-Reitan Battery Decision Rule Used:

Norms used:	• Heaton '91	• HRNES '93	• Reitan '93	• Russell ('70? '84?)
Severity	• AIR	• AIS	• GNDS	• AIR
Impairment Index	• II	• II	• II	

Core (Impairment Index)
- Category Test
- Tactual Perception Test
  - Total Time
  - Location
  - Memory
- Seashore Rhythm
- Speech-sounds Perception
- Tapping (Dominant Hand, usually right)

Additional (AIR)

Trails A	Trails B
Aphasia Screening	Spatial Relations
Sensory Perceptual	AV-1

Screening Tests (these are the most common, but there are many others)

• Bender Gestalt • Screening Test for the LNNB • Cognistat • MicroCog • Quick Neuropsychological Screening Test

Flexible Battery: Common Tests (but there are many others)

• Wisconsin Card Sorting Test	• Symbol Digit Modalities	• Hooper
• Auditory-Verbal Learning Test	• Rey-Osterreith Complex Figures	• Conner's CPT
• Wechsler Memory Scale (R? III?)	• Boston Naming Test	• Memory Assessment Scale
• Peabody Picture Vocabulary Test	• Boston Diagnostic Aphasia Exam	• Stroop (whose norms?)

IQ Tests (can be used to describe deficits, but not determine damage)

• Wechsler Adult Intelligence Scale (WAIS) (R? III? NI?)	• Raven Progressive Matrices (faking formula scored?)
• Shipley ILS (heavily influenced by culture)	• Kaufman Brief Intelligence Test

Malingering Tests

• Rey's 15 Item Test	• TOMM	• PDRT
• 21 Word Test	• Victoria	• HRB formula (whose?)
• LNNB formula	• SIRS (not used for brain damage!)	• CARB
• Symptom Validity Testing	• "Just makes sense"	• VIP

Personality Tests (none should be used to determine brain damage)

• MMPI (I? II?) • MCMI (I? II? III?) • PAI • SCL-90-R • TAT

• Beck Depression Inventory • Rorschach • Draw-A-Person, Human Figure Drawing • Sentence Completion

Achievement Tests (none should be used to determine brain damage)

• Wide Range Achievement Test (WRAT, R? III?)	• North America Reading Test
• Peabody Individual Achievement Test	• Woodcock-Johnson

Severity of Deficits

• Normal • Borderline • Mild/Subtle • Moderate • Marked/Severe/Profound (neuroimaging should be positive)

Diagnosis (DSM-IV)

• Dementia Due to (etiology)	• Personality Change Due to (Etiology)	• Retardation	• Cognitive Disorder NOS
• Postconcussion Syndrome	• Attention Deficit/Hyperactivity Disorder (ADHD)	• Antisocial Personality Disorder	
• Substance-induced Mood or Withdrawal Disorder	• Substance Dependence/Abuse		

Etiology: • Head Trauma • Infection • Poisoning • Substance Abuse • Tumor • Genetic

Documented?

When?

How?

Confirmed by neuroimaging tests of: • structure • CT • MRI • EEG

• function • qEEG (BEAM, Brain Mapping) • SPECT • PET • fMRI

Dr's Opinion on legal issue

- Unclear (Clarify)
- Anterior/Frontal/Diffuse causes impulsivity/substance abuse/lower level of intent
- Posterior/Parietal, Occipital, Temporal/Diffuse causes poor comprehension
- Temporal/Diffuse causes rages/unconsciousness/lack of intent
- Damage is grounds for mitigation (Why?)
- Other