5 | The Neuropsychological Examination: Procedures

> Psychological testing is a . . . process wherein a particular scale is administered to obtain a specific score. . . . In contrast, psychological assessment is concerned with the clinician who takes a variety of test scores, generally obtained from multiple test methods, and considers the data in the context of history, referral information, and observed behavior to understand the person being evaluated, to answer the referral questions, and then to communicate findings to the patient, his or her significant others, and referral sources.
>
> *G.J. Meyers, S.E. Finn, L.D. Eyde, et al., 2001*

Two rules should guide the neuropsychological examiner: (1) *treat each patient as an individual;* (2) *think about what you are doing.* Other than these, the enormous variety of neurological conditions, patient capacities, and examination purposes necessitates a flexible, open, and imaginative approach. General guidelines for the examination can be summed up in the injunction: *Tailor the examination to the patient's needs, abilities, and limitations,* and to special examination requirements. By adapting the examination to the patient rather than the other way around, the examiner can answer the examination questions most fully at the least cost and with the greatest benefit to the patient.

The neuropsychological examination can be individually tailored in two ways. Examiners can select tests and examination techniques for their appropriateness to the patient and for their relevancy to those diagnostic or planning questions that prompted the examination and that arise during its course. They can also apply these assessment tools in a sensitive and resourceful manner by adapting them to suit the patient's condition and enlarging upon them to gain a full measure of information.

CONCEPTUAL FRAMEWORK OF THE EXAMINATION

Purposes of the Examination

Neuropsychological examinations may be conducted for any of a number of purposes: to aid in diagnosis; to help with management, care, and planning; to evaluate the effectiveness of a treatment technique; to provide information for a legal matter; or to do research. In many cases, an examination may be undertaken for more than one purpose. In order to know what kind of information should be obtained in the examination, the examiner must have a clear idea of the reasons for which the patient is being seen.

Although the reason for referral usually is the chief purpose for examining the patient, the examiner needs to evaluate its appropriateness. Since most referrals for neuropsychological assessment come from persons who do not have expertise in neuropsychology, it is not surprising that many of their questions are poorly formulated or beside the point. Thus, the referral may ask for an evaluation of the patient's capacity to return to work after a stroke or head injury when the patient's actual need is for a rehabilitation program and an evaluation of competency to handle funds. Frequently, the neuropsychological assessment will address several issues, each important to the patient's welfare, although the referral may have been concerned with only one. Moreover, few referrals are explicit enough to suggest a focus for the examination or are sufficiently broad to define its scope. A request for differential diagnosis between neurologically based and "functional" behavior disorders, for example, would rarely ask the examiner to give tests sensitive to frontal lobe dysfunction. The need to give such tests has to be determined by the examiner from the history, the interview, and the patient's performance in the course of the examination. In the final analysis, the content and direction of any neuropsychological examination that is adapted to the patient's needs and capacities must be decided by the examiner.

Examination Questions

The purpose(s) of the examination should determine its overall thrust and the general questions that need to be asked. The examiner will probably also address specific questions: about the level of performance of a particular skill—e.g., spelling when the patient mentions a loss from premorbid status; or about which impaired functions may account for the defective performance of a complex activity—e.g., whether spelling deficits are due to

a phonological impairment, defective recall of irregular words, or other disorder (see McCarthy and Warrington, 1990). Examination questions fall into one of two categories. *Diagnostic questions* concern the nature of the patient's symptoms and complaints in terms of their etiology and prognosis; i.e., they ask whether the patient has a neuropsychologically relevant condition and, if so, what it is. *Descriptive questions* inquire into the characteristics of the patient's condition; i.e., they ask how the patient's problem is expressed. Within these two large categories are specific questions that may each be best answered through somewhat different approaches.

Diagnostic questions

Diagnostic questions are typically asked when patients are referred for a neuropsychological evaluation following the emergence of a cognitive or behavioral problem without a known etiology. Questions concerning the nature or source of the patient's condition are always questions of *differential diagnosis*. Whether implied or directly stated, these questions ask which of two or more diagnostic pigeonholes suits the patient's behavior best. In neuropsychology, diagnostic categorization can consist of coarse screening to distinguish the probable "neurological impairment" from a "psychiatric or emotional disturbance," fine discriminations between cognitive deterioration due to onset of a dementing process or to a growing tumor, or even finer discriminations such as those between the behavioral effects of a specific focal lesion and the effects of a lesion that may have encroached on an adjacent part of the brain. In large part, diagnostic evaluations depend on syndrome analysis (Heilman and Valenstein, 2003; Mesulam, 2000c; Stringer, 1996). The behavioral consequences of many neurological conditions have been described and knowledge about an individual patient (history, appearance, interview behavior, test performance) can be compared to these well-described conditions. In other cases, an unusual presentation might be analyzed on the basis of a theoretical understanding of brain–behavior relationships (e.g., Farah and Feinberg, 2000; Ogden, 1996; Walsh, 1995).

In looking for neuropsychological evidence of brain disease, the examiner may need to determine whether the patient's level of functioning has deteriorated. Thus, a fundamental question will be, "How good was the patient at his or her best?" When the etiology of a patient's probable brain dysfunction is unkown, risk factors for brain diseases should be taken into account, such as predisposing conditions for vascular disease, exposure to environmental toxins, recent occurrence of a blow to the head, or presence of substance abuse. Differential diagnosis can sometimes hinge on data from the personal history, the nature of the onset of the condition, and circumstances surrounding its onset. In considering diagnoses the examiner needs to know whether anyone in the family had a condition similar to the patient's, how fast the condition is progressing, and the patient's mental attitude and personal circumstances at the time problems emerged. Another important diagnostic question asks whether the pattern of deficits exhibited by the patient fits a known or reasonable pattern of brain disease—or fits one pattern better than another. More specific diagnostic questions will ask which particular brain functions are compromised, which are intact, and how the specific deficits might account for the patient's behavioral anomalies.

The diagnostic process involves the successive elimination of alternative possibilities, or hypotheses (see also pp. 112–113). The examiner formulates the first set of hypotheses on the basis of the referral question, information obtained from the history or informants, and the initial impression of the patient. Each diagnostic hypothesis is tested by comparing what is known of the patient's condition (history, appearance, interview behavior, test performance) with what is expected for that particular diagnostic classification. As the examination proceeds, the examiner can progressively refine general hypotheses (e.g., that the patient is suffering from a brain disorder) into increasingly specific hypotheses (e.g., that the disorder most likely stems from a progressive dementing condition; that this progressive disorder is more likely to be an Alzheimer's type of dementia, multi-infarct dementia, or normal pressure hydrocephalus).

Neuropsychologists do not make a neurological diagnosis, but they may provide data and diagnostic formulations that contribute to the diagnostic conclusions. Neuropsychological findings assume particular diagnostic importance when neither a neurological nor a psychiatric evaluation can account for behavioral aberrations.

Descriptive questions

In cases where a diagnosis is established, many referral questions call for behavioral descriptions. Questions about specific capacities frequently arise in the course of vocational and educational planning. They become especially important when planning involves withdrawal or return of normal adult rights and privileges, such as a driving license or legal competency. In these cases, questions about the patient's competencies may be at least as important as those about the patient's deficits, and the neuropsychological examination may not be extensive, but rather will focus on the relevant skills and functions.

The effectiveness of remediation techniques and rehabilitation programs depends in part on accurate ap-

praisals of what the candidate patient can and cannot do (Ponsford, 1995, *passim;* Prigatano, 1999; Sohlberg and Mateer, 2001). Foremost, rehabilitation workers must know how aware the patients are of their condition and the patients' capacity to incorporate new information and skills (Eslinger, Grattan, and Geder, 1995; Prigatano, 1991b). For example, a learning-based program for a postanoxic patient whose learning ability is virtually nonexistent will necessarily fail, although certain kinds of patterned drilling may reduce some of the patient's care needs (Mazaux, Giroire, et al., 1991). As the sophistication of these programs increases along with limitations on their financial coverage, accurate and appropriate behavioral descriptions can reduce much of the time spent in figuring out a suitable program for the patient. Competent assessment can enable rehabilitation specialists to set realistic goals and expend their efforts efficiently (Ponsford, 1995; Wrightson and Gronwall, 1999).

Longitudinal studies involving repeated measures over time are conducted when monitoring the course of disease progression, assessing improvement from an acute event such as head injury or stroke, or documenting treatment effectiveness. In such cases, a broad range of functions usually comes under regular neuropsychological review. An initial examination, consisting of a full-scale assessment of each of the major functions in combinations of input and output modalities, is sometimes called a *baseline study,* for it provides the first set of data against which the findings of later examinations will be compared. Regularly repeated full-scale assessments give information about the rate and extent of improvement or deterioration and about relative rates of change between functions.

Most examinations address one or more questions concerning the presence of a brain disorder, the estimation of the original potential or premorbid level of functioning, and the status of current cognitive functioning. Many examinations also generate one or two questions relevant to the specific case. Few examinations should have identical questions and procedures. An examiner who does much the same thing with almost every patient may not be attending to the implicit part of a referral question, to the patient's needs, or to the aberrations that point to specific defects and particular problems.

CONDUCT OF THE EXAMINATION

Foundations

The examiner's background

The knowledge base in medicine, psychology, other health related disciplines, and the basic sciences is expanding at an increasing rate. Clinicans are thus becoming more and more specialized since their practice incorporates a smaller portion of clinical and research knowledge. It is harder than ever to be a well-rounded clinician. When seeing a patient for the first time or an established patient with new complaints and sometimes old ones, the examiner must conduct a thorough, up-to-date interview that can provide information pertinent to the diagnosis and treatment of the disorder as well as the interaction of various disorders and treatments. Clinicians cannot help but bring their own biases and preconceptions to the diagnostic process which may be based on out-of-date knowledge, experiences and views that are relevant for one population but not another, and even personal life events. Clinicians therefore have an ethical responsibility to update their knowledge and to be aware of their professional biases and of the impact of these and their personal experiences on the diagnostic process. Since a clinician can be an expert only in a relatively small area of knowledge, it is important to try to "know what you do not know" and thus, when to refer to someone with that knowledge.

In conducting neuropsychological assessments, in order to know what questions to ask, how particular hypotheses can be tested, or what clues or hunches to pursue, a strong background in neuropathology is necessary, including familiarity with neuroanatomy and neurophysiological principles. The neuropsychological examiner's background in cognitive psychology should include an understanding of the complex, multifaceted, and interactive nature of the cognitive functions; and in clinical psychology, the competent examiner requires knowledge of psychiatric syndromes and of test theory and practice. Even to know what constitutes a neuropsychologically adequate review of the patient's mental status requires a broad understanding of brain function and its neuroanatomical correlates. Moreover, the examiner must have had enough clinical training and supervised "hands on" experience to know what extratest data (e.g., personal and medical history items, school grades and reports) are needed to make sense out of any given set of observations and test scores, to weigh all of the data appropriately, and to integrate them in a theoretically meaningful and practically usable manner. These requirements are spelled out in detail in the Policy Statement of the Houston Conference on Specialty Education and Training in Clinical Neuropsychology (Hannay, Bieliauskas, Crosson, et al., 1998, pp. 160–165). Reference to further information can be found in the most recent report of Division 40 (Clinical Neuropsychology), American Psychological Association (Eubanks, 1997; see also Bush and Drexler, 2002, *passim;* J. T. Barth, Pliskin, et al., 2003).

The patient's background

In neuropsychological assessment, few if any single bits of information are meaningful in themselves. A test score, for example, takes on diagnostic or practical significance only when compared with other test scores, with academic or vocational accomplishments or aims, or with the patient's interview behavior. Even when the examination has been undertaken for descriptive purposes only, as after a head injury, it is important to distinguish a low test score that is as good as the patient has ever done from a similarly low score when it represents a significant loss from a much higher premorbid performance level. Thus, in order to interpret the examination data properly, each bit of data must be evaluated within a suitable context (Strub and Black, 1988; Vanderploeg, 1994; Walsh and Darby, 1999) or it may be misinterpreted. A study by Perlick and Atkins (1984), for example, showed how changes in a patient's reported age led clinicians to differ in their diagnostic impressions, as they are more likely to suspect dementia in elderly patients and depression in middle-aged ones, although the presented data were identical in each instance except for the attributed ages.

The relevant context will vary for different patients and different aspects of the examination. Usually, therefore, the examiner will want to become informed about many facets of the patient's life. Some of this information can be obtained from the referral source, from records, from hospital personnel working with the patient, or from family, friends, or people with whom the patient works. Patients who can give their own history and discuss their problems reasonably well will be able to provide much of the needed information. Having a broad base of data about the patient will not guarantee accurate judgments, but it can greatly reduce errors. Moreover, the more examiners know about their patients prior to the examination, the better prepared will they be to ask relevant questions and choose tests that are germane to the presenting problems.

Context for interpreting the examination findings may come from any of four aspects of the patient's background: (1) social history, (2) present life circumstances, (3) medical history and current medical status, and (4) circumstances surrounding the examination. Sometimes the examiner has information about only two or three of them. Korsakoff patients, for example, cannot give a social history or tell much about their current living situation. However, with the aid of informants and records, as possible, the examiner should inquire into each of these categories of background information. The practise of *blind analysis*—in which the examiner evaluates a set of test scores without benefit of history, records, or ever having seen the patient—may be useful for teaching or reviewing a case but is particularly inappropriate as a basis for clinical decisions.

1. Social history. Information about the patient's educational and work experiences may be the best source of data about the patient's original cognitive potential. Unexpected relationships do occur, such as when someone of low educational background performs well above the *average* range on cognitive tests. Social history will often show that these bright persons had few opportunities or little encouragement for more schooling. Military service history may contain important information, too. Military service gave some blue-collar workers their only opportunity to display their natural talents. A discussion of military service experiences may also unearth a head injury or illness that the patient had not thought to mention to a less experienced or less thorough examiner. When reviewing educational and work history, attention should be paid to how work and school performance relate to the medical history and other aspects of the social history.

A 45-year-old longshoreman, admitted to the hospital for seizures, had a long history of declining occupational status. He had been a fighter pilot in World War II, had completed a college education after the war, and had begun his working career in business administration. Subsequent jobs were increasingly less taxing mentally. Just before his latest job he had been a foreman on the docks. Angiographic studies displayed a massive *arteriovenous malformation* (*AVM*) that presumably had been growing over the years. Although hindsight allows us to surmise that his slowly lowering occupational level reflected the gradual growth of this space displacing lesion, it was only when his symptoms became flagrant that his occupational decline was appreciated as symptomatic of the neuropathological condition.

Knowledge of the socioeconomic status of the patient's family of origin as well as current socioeconomic status is often necessary for interpreting cognitive test scores—particularly those measuring verbal skills, which tend to reflect the parents' social class as well as academic achievement (Sattler, 2001a). The examiner usually needs to find out the highest socioeconomic status the patient had attained or the predominant adult socioeconomic status. In most cases, the examiner should also ask about the patient's school and work history and the occupational level and education of parents, siblings, and other important family members. Educational and occupational background may also influence patients' attitudes about their symptoms. Those who depend largely on verbal skills in their occupation become very distressed by a mild word finding problem, while others who are not accustomed to relying much on verbal skills may be much less disturbed by the same kind of impairment or may even be able to disregard it.

The patient's marital history may provide relevant information, including the obvious issues of number of spouses (or companions), length of relationship(s), and the nature of the dissolution of each significant alliance. The marital history may tell a great deal about the patient's long-term emotional stability, social adjustment, and judgment. It may also contain historical landmarks reflecting neuropsychologically relevant changes in social or emotional behavior.

Information about the present spouse's health, socioeconomic background, current activity pattern, and appreciation of the patient's condition is frequently useful for understanding the patient's behavior (e.g., anxiety, dependency) and is imperative for planning and guidance. The same questions need to be asked about whoever is the most significant person in an unmarried patient's life. Knowledge about the patient's current living situation and of the spouse's or responsible relative's condition is important both for understanding the patient's mood and concerns—or lack of concern—about the examination and the disorder that prompted it, and for gauging the reliability of the informant closest to the patient.

Other aspects of the patient's background should also be reviewed. When antisocial behavior is suspected, the examiner will want to inquire about confrontations with the law. A review of family history is obviously important when a hereditary condition is suspected. Moreover, awareness of family experiences with illness and family attitudes about being sick may clarify many of the patient's symptoms, complaints, and preoccupations.

If historical data are the bricks, then chronology is the mortar needed to reconstruct the patient's history meaningfully. For example, the fact that the patient has had a series of unfortunate marriages is open to a variety of interpretations. In contrast, a chronology-based history of one marriage that lasted for two decades, dissolved more than a year after the patient was in coma for several days as a result of a car accident, and then was followed by a decade filled with several brief marriages and liaisons suggests that the patient may have sustained a personality change secondary to the head injury. Additional information that the patient had been a steady worker prior to the accident but since has been unable to hold a job for long gives additional support to that hypothesis (e.g., for the classic example of a good worker whose head injury made him unemployable, see Macmillan's *An Odd Kind of Fame. Stories of Phineas Gage,* 2000). As another example, an elderly patient's complaint of recent mental slowing suggests a number of diagnostic possibilities: that the slowing followed the close occurrence of widowhood, retirement, and change of domicile should alert the diagnostician to the likelihood of depression.

2. Present life circumstances. When inquiring about the patient's current life situation, the examiner should go beyond factual questions about occupation, income and indebtedness, family statistics, and leisure activities to find out the patient's views and feelings about them. The examiner needs to know how long a working patient has held the present job, what changes have taken place or are expected at work, whether the work is enjoyed, and whether there are problems on the job. The examiner should attempt to learn about the quality of the patient's family life and such not uncommon family concerns as troublesome in-laws, acting-out adolescents, and illness or substance abuse among family members. New sexual problems can appear as a result of brain disease, or old ones may complicate the patient's symptoms and adjustment to a dysfunctional condition. Family problems, marital discord, and sexual dysfunction can generate so much tension that symptoms may be exacerbated or test performance adversely affected.

3. Medical history and current medical status. Information about the patient's medical history will usually come from a treating physician, a review of medical charts when possible, and reports of prior examinations as well as the patient's reports. When enough information is available to integrate the medical history with the social history, the examiner can often get a good idea of the nature of the condition and the problems created by it. Discrepancies between patients' reports of health history and the current medical condition or what medical records or physicians have reported may give a clue to the nature of their complaints or to the presence of a neuropsychological disorder. Medication records may prove significant in understanding the patient's functioning.

Some aspects of the patient's health status that are not infrequently overlooked in the usual medical examination may have considerable importance for neuropsychological assessment. These include visual and auditory defects that may not be documented or even examined when the patient is young and the defects are mild or when the patient is old or has other sensory deficits, motor disabilities, or mental changes. In addition, sleeping and eating habits may be overlooked in a medical examination, although impaired sleep and poor eating habits can be important symptoms of depression; increased sleep, childish or very limited food preferences, or an insatiable appetite may be symptomatic of brain disease.

4. Circumstances surrounding the examination. The test performance can be evaluated accurately only in light of the reasons for referral and the relevance of the examination to the patient. For example, does the pa-

tient stand to gain money or lose a custody battle as a result of the examination? May a job or hope for early retirement be jeopardized by the findings? Only by knowing what the patient believes may be gained or lost as a result of the neuropsychological evaluation can the examiner appreciate how the patient perceives the examination.

Procedures

> Patients' cooperation in the examination process is extremely important, and one of the neuropsychologist's main tasks is to enlist such cooperation.
>
> *A.-L. Christensen, 1989*

Referral

The way patients learn of their referral for neuropsychological assessment can affect how they view the examination, thus setting the stage for such diverse responses as cooperation, anxiety, distrust, and other attitudes that may modify test performance (J.G. Allen et al., 1986; Bennett-Levy, Klein-Boonschate, et al., 1994). Ideally, referring persons explain to patients, and to their families whenever possible, the purpose of the referral, the general nature of the examination with particular emphasis on how this examination might be helpful or, if it involves a risk, what that risk might be, and the patient's choice in the matter. Neuropsychologists who work with the same referral source(s), such as residents in a teaching hospital, a neurosurgical team, or a group of lawyers, can encourage this kind of patient preparation. When patients receive no preparation and hear they are to have a "psychological" evaluation, some may come to the conclusion that others think they are emotionally unstable or crazy.

Often it is not possible to deal directly with referring persons. Rather than risk a confrontation with a poorly prepared and negativistic or fearful patient, some examiners routinely send informational letters to new patients, explaining in general terms the kinds of problems dealt with and the procedures the patient can anticipate (see Kurlychek and Glang, 1984; J. Green, 2000, for examples of such a letter).

When to examine

Sudden onset conditions; e.g., trauma, stroke. Within the first few weeks or months following a sudden onset event, a brief examination may be necessary for several reasons: to ascertain the patient's ability to comprehend and follow instructions; to evaluate competency when the patient may require a guardian; or to determine whether the patient can retain enough new information to begin a retraining program.

As a general rule, formal assessment should not be undertaken during the acute or postacute stages. During this period—typically up to the first six to twelve weeks following the event—changes in the patient's neuropsychological status can occur so rapidly that information gained one day may be obsolete the next. Moreover, fatigue overtakes many of these early stage patients very quickly and, as they tire, their mental efficiency plummets making it impossible for them to demonstrate their actual capabilities. Both fatigue and awareness of poor performances can feed the depressive tendencies experienced by many neuropsychologically impaired patients. Additionally, as transient neuropsychological disturbances set in motion by the pathologic event may not yet have cleared up, many patients continue to be mentally sluggish for several months after the event, which also keeps them from performing up to their potential. Patients who were aware of doing poorly when examined when their deficits were most pronounced may be reluctant to accept a reexamination for fear of reliving that previously painful situation.

Following the postacute stage, when the patient's sensorium has cleared and stamina has been regained—usually some time within the third to sixth month after the event—an initial comprehensive neuropsychological examination can be given. In cases of minor impairment or rapid improvement, the goal may be to see if the patient can return soon to previous activities and, if so, whether temporary adaptations—such as reduced hours or a quiet environment—will be required (e.g., see Wrightson and Gronwall, 1999). When impairment is more severe, typical early assessment goals will be to identify specific remediation needs and the residual capacities that can be used for remediation; to make an initial projection about the patient's ultimate levels of impairment and improvement—and psychosocial functioning, including education and career potential; and to reevaluate competency when it had been withdrawn earlier.

Long-term planning for training and vocation when these seem feasible, or for level of care of patients who will probably remain socially dependent, can be done sometime within one to two years after the event. A relatively short examination, focusing mainly on potential problem areas, may suffice for older patients who are close to or in retirement, for then the purpose of the examination is to evaluate needs for further therapy, care, and counseling for patient and family. Most younger persons will benefit from a comprehensive neuropsychological examination.

Evolving conditions, e.g., degenerative diseases, tumor. Early in the course of an evolving condition when neu-

robehavioral problems are first suspected, the neuropsychological examination can contribute significantly to diagnosis (Bondi, Salmon, and Kaszniak, 1996; Chen et al., 2001; Derrer, Howieson, et al., 2001; Gómez-Isla and Hyman, 2003; see also pp. 212–213). Repeated examinations may then become necessary for a variety of reasons: When seeking a definitive diagnosis and early findings were vague and perhaps of psychological rather than neurological origin, a second examination six to eight months after the first may answer the diagnostic questions. With questions of dementia, after twelve to eighteen months the examination is more likely to be definitive (J.C. Morris, McKeel, Storandt, et al., 1991). In evaluating rate of decline as an aid to counseling and rational planning for conditions in which the rate of deterioration varies considerably between patients, such as multiple sclerosis or Huntington's disease, examinations at one to two year intervals can be useful. Timing for evaluations of the effects of treatment will vary according to how long the treatment takes and whether it is disruptive to the patient's mental status, such as treatments by chemotherapy, radiation, or surgery for brain tumor patients.

Initial planning

The neuropsychological examination proceeds in stages. In the first stage, the examiner plans an overall approach to the problem. The hypotheses to be tested and the techniques used to test them will depend on the examiner's initial understanding and evaluation of the referral questions and on the accompanying information about the patient.

Preparatory interview

The initial interview and assessment make up the second stage. Here the examiner tentatively determines the range of functions to be examined, the extent to which psychosocial issues or emotional and personality factors should be explored, the level—of sophistication, complexity, abstraction, etc.—at which the examination should be conducted, and the limitations set by the patient's handicaps. Administrative issues, such as fees, referrals, and formal reports to other persons or agencies, should also be discussed with the patient at this time.

The first 15–20 minutes of examination time are usually used to evaluate the patient's capacity to take tests and to ascertain how well the purpose of the examination is understood. The examiner also needs time to prepare the patient for the assessment procedures and to obtain consent. This interview may take longer than 20 minutes, particularly with anxious or slow patients, those who have a confusing history, or those whose misconceptions might compromise their intelligent cooperation. The examiner may spend the entire first session preparing a patient who fatigues rapidly and comprehends slowly, reserving testing for subsequent days when the patient feels comfortable and is refreshed. On questioning 129 examinees—mostly TBI and stroke patients—following their neuropsychological examination, Bennett-Levy, Klein-Boonschate, and their colleagues (1994) found that the participation of a relative in interviews, both introductory and for feedback, not only provided more historical information but helped clarify issues for the patient.

At least seven topics must be covered with competent patients before testing begins if the examiner wants to be assured of their full cooperation.[1] (1) *The purpose of the examination:* Do they know the reasons for the referral, and do they have questions about it? (2) *The nature of the examination:* Do patients understand that the examination will be primarily concerned with cognitive functioning and that being examined by a neuropsychologist is not evidence of craziness? (3) *The use to which examination information will be put:* Patients must have a clear idea of who will receive a report and how it may be used. (4) *Confidentiality:* Competent patients must be reassured not only about the confidentiality of the examination but also that they have control over their privacy except (i) when the examination has been conducted for litigation purposes and all parties to the dispute may have access to the findings, (ii) when confidentiality is limited by law (e.g., reported intent of harm to self or a stated person), or (iii) when insurance companies paying for the examination are entitled to the report. (5) *Feedback to the patient:* Patients should know before the examination begins who will report the test findings and, if possible, when. (6) *A brief explanation of the test procedures:* Many patients are very reassured by a few words about the tests they will be taking.

> I'll be asking you to do a number of different kinds of tasks. Some will remind you of school because I'll be asking questions about things you've already learned or I'll give you arithmetic or memory problems to do, just like a teacher. Others will be different kinds of puzzles and games. You may find that some things I ask you to do are fun and some seem silly; some of the tests will be very easy and some may be so difficult you won't even know what I'm talking about or showing you; but all of them will help me to understand better how your brain is working, what you are doing well, what difficulties you are having, and how you might be helped.

[1] In the United States, examining clinicians providing health-care services are now required by the Health Information Privacy Protection Act (HIPPA) to review items 1–5 with their patients or patients' guardians.

(7) *How the patient feels about taking the tests:* This can be the most important topic of all, for unless patients feel that taking the tests is not shameful, not degrading, not a sign of weakness or childishness, not threatening their job or legal status or whatever else may be a worry, they cannot meaningfully or wholeheartedly cooperate. Moreover, the threat can be imminent when a job, or competency, or custody of children is at stake. It is then incumbent upon the examiner to give patients a clear understanding of the possible consequences of noncooperation as well as full cooperation so that they can make a realistic decision about undergoing the examination. In addition, (8) *when the patient is paying for the services,* the (estimated in some cases) amount, method of payment, etc. should be agreed upon before the examination begins.

Following principles for ethical assessment—and now, in the United States, following the law—the neuropsychologist examiner will want to obtain the patient's informed consent before beginning the examination (Johnson-Greene et al., 1997; Macciocchi, 2000). While the patient's cooperation following a review of these seven—or eight—points would seem to imply informed consent, many patients for whom a neuropsychological examination is requested have a limited or even no capacity to acquiese to the examination. Others take the examination under various kinds of legal duress, such as inability to pursue a personal injury claim, threat of losing the right to make financial or medical decisions, or the risk of receiving a more severe punishment when charged with a criminal act. Moreover, the examiner can never guarantee that something in the examination or the findings will not distress the patient (e.g., a catastrophic reaction, identification of an early dementing process), nor is the examiner able to predict *a priori* that such an event may occur during the examination or such an outcome. Thus, in neuropsychology, informed consent is an imperative goal to approach as closely as possible. In the individual case, the neuropsychologist examiner must be cognizant of any limitations to realizing this goal and able to account for any variations from standards and requirements for informed consent.

Ideally, the introductory interview includes both the patient and a significant other person, enabling the examiner to identify consistencies and discrepancies in reported problems. Reports by collateral sources can offer important clues to the patient's insight and the disabilities the neuropsychologist will want to investigate. Both the patient and the accompanying person should be questioned about when and how the problems began and changes in problems over time.

The patient has an important role in this process: to provide accurate and detailed information, sometimes information that the clinician did not think to ask. I always ask patients if there is anything else that I should know about their life or current events that might be helpful [hjh].

A patient whose mental functioning is impaired may not be able to take an active, effective role in the interview. In such cases it may be necessary for a family member or close friend to participate. The patient and others need to feel free to express their opinions and to question the assumptions or conclusions voiced by the clinician. When this occurs the clinician must heed what is said since faulty assumptions and the conclusions on which they are based can lead to misdiagnosis and inappropriate treatment, sometimes with negligible but sometimes with important consequences.

The examiner can also conduct a brief mental status examination (MSE; see Chapter 18 for a detailed description) in this preliminary interview. The patient's contribution to the preliminary discussion will give the examiner a fairly good idea of the level at which to conduct the examination. When beginning the examination with one of the published tests that has a section for identifying information that the examiner is expected to fill out, the examiner can ask the patient to answer the questions of date, place, birth date, education, and occupation on the answer sheets, thereby getting information about the patient's orientation and personal awareness while doing the necessary record keeping. In asking for the date, be alert to the patient wearing a watch that shows the date. Ask these patients not to look at their watch when responding to date questions. (I ask patients to sign and date—again without checking their watch—all drawings, thus obtaining several samples of time orientation [mdl]).

Patients who are not competent may be unable to appreciate all of the initial discussion. However, the examiner should make some effort to see that each topic is covered within the limits of the patient's comprehension and that the patient has had an opportunity to express concerns about the examination, to bring up confusing issues, and to ask questions.

Observations

Observation is the foundation of all psychological assessment. The contribution that psychological—and neuropsychological—assessment makes to the understanding of behavior lies in the evaluation and interpretation of behavioral data that, in the final analysis, represent observations of the patient.

Indirect observations consist of statements or observations made by others or of examples of patient behavior. The latter typically consist of letters or notes, constructions, or art forms created by the patient but

could also include pictures of a TV screen the patient smashed or of a neatly groomed flower bed. Verbal reports may be the most common means by which family members, caregivers, teachers, and others convey their observations of the patient. However, grades, work proficiency ratings, and other scores and notes in records are also behavioral descriptions obtained by observational methods, although presented in a form that is more or less abstracted from the original observations.

The psychological examination offers the opportunity of learning about patients through two kinds of *direct observation.* Informal observations, which can be made from the moment the patient appears, provide invaluable information about almost every aspect of patient behavior: how they walk, talk, respond to new situations and new faces—or familiar ones, if this is the second or third examination—and leave-taking. Patients' habits of dressing and grooming become apparent, as do more subtle attitudes about people generally, about themselves and the people in their lives specifically. Informal observation can focus on patients' emotional status to find out how and when they express their feelings and what is emotionally important to them. The formal—test-based—examination provides a different kind of opportunity for informal observation, for here examiners can see how patients deal with prestructured situations in which the range of available responses is restricted, while observing their interaction with activities and requirements familiar to the examiner.

> Psychological tests provide formalized observational techniques. They are simply a means of enhancing (refining, standardizing) our observations. They can be thought of as extensions of our organs of perception—the "seven-league boots" of clinical behavioral observation. If we use them properly, as extensions of our observational end-organs, like "seven-league boots" they enable us to accomplish much more with greater speed. When tests are misused as substitutes for rather than extensions of clinical observation, they can obscure our view of the patient much as seven-league boots would get in the way if worn over the head. (Lezak, 1987a, p. 46)

Nontest observations, such as those obtained during an interview, can be systematized, either as an informal mental status examination or following one of the many standardized mental status formats (see Chapter 18). Some clinicians have drafted guidelines as an aid to systematizing their nontest observations and to guard against overlooking some important area (e.g., Brooks, Truelle, et al. 1994; Murrey, 2000a; Spreen and Strauss, 1998; Strub and Black, 2000).

Test selection

Selection of tests for a particular patient or purpose will depend on a number of considerations. Some have to do with the goal(s) of the examination, some involve aspects of the tests, and then there are practical issues that must be addressed.

1. The examination goals. The goal(s) of the examination will obviously contribute to test selection. A competency evaluation may begin and end with a brief mental status rating scale if it demonstrates the patient's incompetency. At the other extreme, appropriate assessment of a premorbidly bright young TBI candidate for rehabilitation may call for tests examining every dimension of cognitive and executive functioning to determine all relevant areas of weakness and strength. For most people receiving a neuropsychological assessment, evaluation of their emotional status and how it relates to neuropathology and/or their psychosocial functioning is a necessary component of the examination.

2. Validity and reliability. Tests of cognitive abilities are getting better at both meeting reasonable criteria for validity and reliability and having appropriate norms. Many useful examination techniques that evolved out of clinical experience or research now have published score data from at least small normal control groups (Mitrushina, Boone, and D'Elia, 1999; Spreen and Strauss, 1998).

Validity is the degree to which the accumulated evidence supports the specific interpretations that the test's developers, or users, claim (Retzlaff and Gibertini, 1994; Anastasi and Urbina, 1997). However, the tests used by neuropsychologists rarely measure one cognitive skill or behavior so that different interpretations show up in the literature. For example, the well-scaled and normed Visual Reproduction test of the Wechsler Memory Scale–Revised (which is almost identical with its newer version in the Wechsler Memory Scale-III) may be much more a measure of visuospatial reasoning and analysis than of memory (Leonberger et al., 1991), yet others have documented a prominent visual construction component (Chelune, Bornstein, and Prifitera, 1990). These findings make it a questionable test for neuropsychological assessment, as it neither appears to do what it purports to do nor, because of its memory components, does well what it apparently does best (see also Teng, Wimer, et al., 1989 for this confound in a similar visual "memory" test). Thus, not all tests used by neuropsychologists will meet all validity criteria, for even after years of use, what many of the most popular tests measure remains unclear (Dodrill, 1997; see also pp. 136–138). Moreover, validity will vary with the use to which a test is put: A test with good predictive validity when used to discriminate patients with Alzheimer's disease from elderly depressed persons may not identify which

young TBI patients are likely to benefit from rehabilitation (Heinrichs, 1990).

Besides the usual validity requirements to ensure that a test measures the brain functions or mental abilities it purports to measure, two kinds of evidence for validity hold special interest for neuropsychologists: *Face validity,* the quality of appearing to measure what the test is supposed to measure, becomes important when dealing with easily confused or upset patients who are thus more likely to reject tasks that seem nonsensical to them. This kind of reluctance has been particularly noted in elderly patients who will willingly tackle a test that appears relevant to their needs (Cunningham, 1986; Mahurin and Pirozzolo, 1986). *Predictive validity,* especially as it applies to practical, "real-life" situations, is a much sought-after test attribute which has been increasingly realized despite its somewhat elusive nature (see pp. 11–12).

Reliability of a test—the regularity with which it generates the same score under similar retest conditions or the regularity with which different parts of a test produce similar findings—can be ascertained only with normal control subjects. When examining brain damaged patients with cognitive deficits, test reliability becomes an important feature: repeated test performances by cognitively intact persons must be similar if that test can measure with any degree of confidence the common kinds of change that characterize performances of brain impaired persons (i.e., improvement, deterioration, instability, fatigue effects, diurnal effects, etc.). In choosing a test for neuropsychological assessment, the test's vulnerability to the vagaries of the testing situation must also be taken into account. For example, differences in the speed at which the examiner reads a story for recall can greatly affect the amount of material a patient troubled by slowed processing retains (Shum, Murry, and Eadie, 1997).

Reliability of test performances by patients with brain disorders may become practically nonexistent, given the changing course of most of these disorders and the vulnerability of many brain impaired patients to daily—sometimes even hourly—alterations in their level of mental efficiency (e.g., Bleiberg et al., 1997). In fact, because neuropsychological assessment is so often undertaken to document differences—improvement after surgery, for example, or further deterioration when dementia is suspected—the most useful tests can be those most sensitive to fluctuations in patient performances.

Moreover, many "good" tests that do satisfy the usual statistical criteria for reliability may be of little value for neuropsychological purposes. Test batteries that generate summed or averaged scores based on a clutch of discrete tests provide another example of good reliability (the more scores, the more reliable their sum) of a score that conveys no neuropsychologically relevant information unless it is either so low or so high that the level of the contributing scores is obvious (Lezak, 1988b; Walsh, 1995; see pp. 21–22).

3. Sensitivity and specificity. A test's *sensitivity* or *specificity* for particular conditions makes it more or less useful, depending on the purpose of the examination (L. Costa, 1988; Mapou, 1988; see also pp. 149–150). For general screening, as when attempting to identify persons whose mentation is abnormal for whatever reason, a sensitive test such as Wechsler's Digit Symbol will be preferred. However, since poor performance on this test can result from a variety of conditions—including a carpal tunnel syndrome or inferior education—such a test will be of little value to the examiner hoping to delineate the precise nature of a patient's deficits. Rather, for understanding the components of a cognitive deficit, tests that examine specific, relatively pure, aspects of neuropsychological functions—i.e., that have high specificity—are needed (Mapou, 1995; McCarthy and Warrington, 1990; Teng, Wimer, et al., 1989). Many sensitive examination techniques have evolved out of clinical experience or research, and while they are effective at eliciting abnormal phenomena in impaired patients, they have not been standardized on a large scale or even on small groups (Luria, 1966).

A test sensitive to unilateral inattention, when given to 100 randomly chosen normal adult control subjects, will prove both reliable and valid, for the phenomenon is unlikely to be elicited at all. Yet giving the same test to patients with documented left visuospatial inattention may elicit the phenomenon in only some of the cases, and if given more than once soon after onset of the pathological condition, might prove highly unreliable as patients' responses to this kind of test can vary from day to day.

4. Parallel forms. Perhaps more than any other area of psychological assessment, neuropsychology requires instruments designed for repeated measurements as so many examinations of persons with known or suspected brain damage must be repeated over time—to assess deterioration or improvement, treatment effects, and changes with age or other life circumstances (Freides, 1985). As yet, few commercially available tests have parallel forms suitable for retesting or come in a format that withstands practice effects reasonably well. McCaffrey, Duff, and Westervelt (2000a,b) have addressed this problem by publishing test–retest data for most of the tests in more or less common use by neuropsychologists. While such tables do not substitute for parallel forms, they do provide the examiner with a rational basis for evaluating retest scores.

5. Time and costs. Not least of the determinants of test selection are the practical ones of administration time (which should include scoring and report writing time as well) and cost of materials (Lezak, 2002). Prices put some tests out of reach of many neuropsychologists; when the cost is outrageously high for what is offered, the test deserves neglect. There may be a few neuropsychological functions or mental abilities that cannot be assessed by relatively inexpensive means even if the examiner shops around, reproduces tests in the public domain, and is imaginative in applying the tests that are available and affordable; but I do not know which they might be [mdl]. Barncord and Wanlass (1999) offer an "ecological" solution to the large amounts of paper consumed by neuropsychological examinations, suggesting use of "plastic sheet protectors . . . and fine-tipped washable markers" which would be applicable to such tests as the Trail Making Test and Symbol Digit Modalities Test. This would save not only paper but money as well. Barncord and Wanlass note that this technique would be applicable only when a complete record is not required. For clinical purposes, even when litigation is not an issue, the complete record is important for documenting patient errors—or absence of errors [mdl].

Administration time becomes an increasingly important issue as neuropsychological referrals grow while agency and institutional money to pay for assessments does not keep pace or may be shrinking. Moreover, patients' time is often valuable or limited: many patients have difficulty getting away from jobs or family responsibilities for lengthy testing sessions; those who fatigue easily may not be able to maintain their usual performance level much beyond two hours. These issues of patient time and expense and of availability of neuropsychological services together recommend that examinations be kept to the essential minimum.

6. Nonstandardized assessment techniques. Occasionally a patient presents an assessment problem for which no well-standardized test is suitable (B. Caplan and Shechter, 1995). Improvising appropriate testing techniques can then tax the imagination and ingenuity of any conscientious examiner. Sometimes a suitable test can be found among the many new and often experimental techniques reported in the literature. Some of them are reviewed in this book. These experimental techniques are often inadequately standardized, or they may not test the functions they purport to test. Some may be so subject to chance error as to be undependable. Patient data of others may be insufficient for judging the test's utility. However, these experimental and relatively unproven tests may be useful in themselves or as a source of ideas for further innovations. Rarely can clinical examiners evaluate an unfamiliar test's patient and control data methodically, but with experience they can learn to judge reports and manuals of new tests well enough to know whether the tasks, the author's interpretation, the reported findings, and the test's reliability are reasonably suitable for their purposes. When making this kind of evaluation of a relatively untried test, clinical standards need not be as strict as research standards.

A 38-year-old court reporter, an excellent stenographer and transcriber, sustained bilateral parietal bruising (seen on magnetic resonance imaging) when the train she was on derailed with an abrupt jolt. She had been sleeping on her side on a bench seat when the accident occurred. She was confused and disoriented for the next several days. When she tried to return to work, along with the more common attentional problems associated with TBI, she found that she had great difficulty spelling phonetically irregular words and mild spelling problems with regular ones. To document her spelling complaints, she was given an informal spelling test comprising both phonologically regular and irregular words. Evaluation of her responses—39% misspellings—was consistent with other reports of well-educated patients with *lexical agraphia* (Beauvois and Dérousné, 1981; Roeltgen, 2003; see Fig. 5.1). Since the issue concerned proportion of misspellings of com-

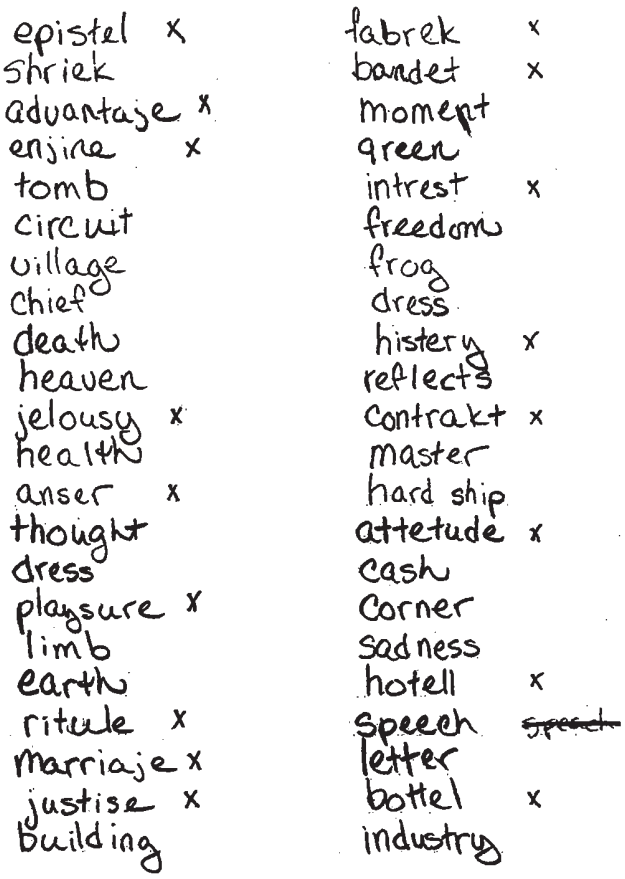

FIGURE 5.1 An improvised test for lexical agraphia.

mon words and the difference between phonetically regular and irregular words and not the academic level of spelling, this was an instance in which an informal test served well to document the patient's problem.

Beginning with a basic test battery

Along with the examination questions, the patient's capacities and the examiner's test repertory determine what tests and assessment techniques will be used. In an individualized examination, the examiner rarely knows exactly which tests will be given before the examination has begun. Many examiners start with a basic battery that touches upon the major dimensions of cognitive behavior (e.g., *Attention, Visuoperception and visual reasoning, Memory and Learning, Verbal functions and academic skills, Construction, Concept formation, Self-regulation [executive functions] and motor ability, and Emotional status).* They then drop some tests or choose additional tests as the examination proceeds. The patient's strengths, limitations, and specific handicaps will determine how tests in the battery are used, which must be discarded, and which require modifications to suit the patient's capabilities. As the examiner raises and tests hypotheses regarding possible diagnoses, areas of cognitive dysfunction or competence, and psychosocial or emotional contributions to the behavioral picture, it usually becomes necessary to go beyond a basic battery and use techniques relevant to this patient at this time.

When redundancy in test selection is avoided, such a battery of tests will generally take three to four hours when given by an experienced examiner. They can usually be completed in one session, depending on the subject's level of cooperation and stamina, but can be given in two sittings—preferably on two different days, if the patient fatigues easily.

This book reviews a number of paper-and-pencil tests that patients can take by themselves. These tests may be given by clerical or nursing staff; some of them may have computerized administrations available. Some of these tests were developed as timed tests: time taken can provide useful information. However, sometimes it is more important to find out what the patient can do regardless of time, and the test can be taken either untimed or the person proctoring the test can note how much was done within the time limit but allow the patient to proceed to the end of the test.

When working with outpatients who come from a distance or may have tight time schedules, it is often impractical to expect them to spend another several hours on the paper-and-pencil tests. Responsible patients who are fairly intact may take the paper-and-pencil materials home and mail them back or return them at a later appointment. Irresponsible, immature, easily confused, or disoriented and poorly motivated patients should be given the paper-and-pencil tests under supervision, as should patients whose families tend to be protective or overly helpful. The examiner may also deem it necessary to supervise the paper-and-pencil testing in some cases under litigation.

In deciding when to continue testing with more specialized assessment techniques or to discontinue, it is important to keep in mind that a *negative* (i.e., *within normal limits,* not abnormal) performance does not rule out brain pathology; it only demonstrates which functions are at least reasonably intact. However, when a patient's test and interview behavior are *within normal limits,* the examiner cannot continue looking indefinitely for evidence of a lesion that may not be there. Rather, a good history, keen observation, a well-founded understanding of patterns of neurological and psychiatric dysfunction, and common sense should tell the examiner when to stop—or to keep looking.

Test selection for research

Of course, when following a research protocol, the examiner is not free to exercise the flexibility and inventiveness that characterize the selection and presentation of test materials in the clinical situation. For research purposes, the prime consideration in selecting examination techniques is whether they will effectively test the hypotheses or demonstrate the phenomenon in question (e.g., see Fischer, Priore, et al., 2000). Other important issues in putting together a research battery include practicality, time, and the appropriateness of the instruments for the population under consideration. Since the research investigator cannot change instruments or procedures in midstream without losing or confounding data, selection of a research battery requires a great deal of care. In developing the *Minimal Assessment of Cognitive Function in Multiple Sclerosis (MACFIMS),* the working group noted the importance of flexibility to allow for supplanting the less satisfactory tests with newly developed tests that may be more suitable (Fischer, Rudick, et al., 1999).

Just as a basic battery can be modified for individuals in the clinical examination, so too tests can be added or subtracted depending on research needs. Moreover, since a research patient may also be receiving clinical attention, tests specific for the patient's condition can be added to a research battery as the patient's needs might require.

A note on ready-made batteries

The popularity of ready-made batteries attests to the need for neuropsychological testing and to a lack of knowledge among neuropsychologically inexperienced psychologists about how to do it (Lezak, 2002; Sweet,

Moberg, and Westergaard, 1996). The most popular batteries extend the scope of the examination beyond the barely minimal neuropsychological examination (which may consist of one of the WIS-A batteries, a drawing test, and parts or all of a published memory battery). They offer reliable scoring methods for gross diagnostic screening (see Chapter 17). Ready-made batteries can be invaluable in research programs requiring well-standardized tests.

When batteries are used as directed, most patients undergo more testing than is necessary but not enough to satisfy the examination questions specific to their problems. Also, like most psychological tests, ready-made batteries are not geared to the patient's handicaps. The patient with a significant perceptual or motor disability may not be able to perform major portions of the prescribed tests, in which case the functions normally measured by the unusable test items remain unexamined. However, batteries do acquaint the inexperienced examiner with a variety of tests and with the importance of evaluating many different behaviors when doing neuropsychological testing. They can provide a good starting place for some newcomers to the field, who may then expand their test repertory and introduce variations into their administration procedures as they gain experience and develop their own point of view.

Orsini, Van Gorp, and Boone (1988) pointed out that unless examiners feel free to introduce new assessment techniques into their testing repertory, they cannot take advantage of new knowledge and new developments in the cognitive neurosciences (see also, Lezak, 2002). By the same token, it is easier for some examiners to continue to use questionable or outmoded tests or scoring techniques when they seem validated by being part of a ready-made battery (e.g., see pp. 506–507 for a discussion of the Aphasia Screening Test, which the author—Joseph Wepman—repudiated in the 1970s). A ready-made battery may also seem to confer neuropsychological competence on its users, giving false complacency to naive examiners, particularly if it is popular and has accrued a long reference trail. However, no battery can substitute for knowledge—about patients, medical and psychological conditions, the nature of cognition and psychosocial conduct, and how to use tests and measurement techniques. Batteries do not render diagnostic opinions or behavioral descriptions, clinicians do; and without the necessary knowledge, clinicians cannot form reliably valid opinions, no matter what battery they use (see W.G. Snow, 1985).

Hypothesis testing

This stage of the examination usually has many steps. It begins as the data of the initial examination answer initial questions, raise new ones, and may shift the focus from one kind of question to another or from one set of impaired functions that at first appeared to be of critical importance in understanding the patient's complaints to another set of functions. Hypotheses can be tested in one or more of several ways: by bringing in the appropriate tests (see below), by testing the limits, and by seeking more information about the patient's history or current functioning. It may also involve changes in the examination plan, in the pace at which the examination is conducted, and in the techniques used. Changes in the procedures and shifts in focus may be made in the course of the examination. At any stage of the examination the examiner may decide that more medical or social information about the patient is needed, that it would be more appropriate to observe rather than test the patient, or that another person should be interviewed, such as a complaining spouse or an intact sibling, for adequate understanding of the patient's condition. This flexible approach enables the examiner to generate multistage, serial hypotheses for identifying subtle or discrete dysfunctions or to make fine diagnostic or etiologic discriminations.

Without knowing why a patient has a particular difficulty, the examiner cannot predict the circumstances in which it will show up. Since most neuropsychological examination techniques in clinical use elicit complex responses, the determination of the specific impairments that underlie any given lowered performance becomes an important part of many neuropsychological evaluations. This is usually done by setting up a general hypothesis and testing it in each particular condition.

If, for example, the examiner hypothesizes that a patient's slow performance on the Block Design test of one of the Wechsler Intelligence Scales (WIS-A) was due to general slowing, all other timed performances must be examined to see if the hypothesis holds. A finding that the patient is also slow on all other timed tests would give strong support to the hypothesis. It would not, however, answer the question of whether other deficits also contributed to the low Block Design score. Thus, to find out just what defective functions or capacities entered into the impaired performance requires additional analyses. This is done by looking at the component functions that might be contributing to the phenomenon of interest in other parts of the patient's performance (e.g., house drawing, design copying, for evidence of a problem with construction; other timed tests to determine whether slowing occurs generally) in which one of the variables under examination plays no role and all other conditions are equal. When the patient does well on the task used to examine the alternative variable (e.g., visuospatial construction), the hypothesis that the alternative variable also contributes to the phenomenon of interest can be rejected. If the patient performs poorly on the second task as well as the first, then the hy-

pothesis that poor performance on the first task is multiply determined cannot be rejected.

This example illustrates the method of *double dissociation* for identifying which components of complex cognitive activities are impaired and which are preserved (E. Goldberg, 2001, p. 52; Weiskrantz, 1991; see also p. 153).

These conceptual procedures can lead to diagnostic impressions and to the identification of specific deficits. In clinical practice, examiners typically do not formalize these procedures or spell them out in detail but apply them intuitively. Yet, whether used wittingly or unwittingly, this conceptual framework underlies much of the diagnostic enterprise and behavioral analysis in individualized neuropsychological assessment.

Selection of additional tests

The addition of specialized tests depends on continuing formulation and reformulation of hypotheses as new data answer some questions and raise others. Hypotheses involving differentiation of learning from retrieval, for instance, will dictate the use of techniques for assessing learning when retrieval is impaired. Finer-grained hypotheses concerning the content of the material to be learned—e.g., meaningful vs. meaningless or concrete vs. abstract or the modality in which it is presented—will require different tests, modifications of existing tests, or the innovative use of relevant materials in an appropriate test format (Fantie and Kolb, 1991). Every function can be examined across modalities and in systematically varied formats. In each case the examiner can best determine what particular combinations of modality, content, and format are needed to test the pertinent hypotheses.

The examination of a 40-year-old unemployed nursing assistant illustrates the application and value of a hypothesis-testing approach. While seeing a psychiatrist for a sleep disorder, she complained of difficulty learning and remembering all the medical procedures she had to perform. She had attempted suicide by carbon monoxide poisoning three years earlier. The attempt was aborted when she had to urinate. She reported that on leaving the car she found she had temporarily lost control of her limbs. She worked only sporadically after this. The question of a residual memory impairment due to hypoxia prompted the referral for a neuropsychological assessment. On the basis of this information, the planned examination focused on memory and learning.

In the interview preceding testing, she reported that her mind seemed to have "slowed down" and she "often felt disoriented," so much so that she had become dependent on her husband to take her to unfamiliar places. She also reported two head injuries, one as a child when a boulder struck her head without loss of consciousness. More recently, while hyperventilating, she fell on an andiron and was "knocked out."

Although she had difficulty subtracting serial threes, she performed well on every verbal and visual memory test (consonant trigrams, Digit Span, story recall, Auditory-Verbal Learning Test [AVLT], and recall trials of the Symbol Digit Modalities Test and the Complex Figure Test). She did have a decreased immediate recall span on the first (I) and interference (B) trials of the AVLT, a deficit implicating span of attention under conditions of stimulus overload rather than memory. The original hypothesis of memory disorder was not supported. However, her performances called for another hypothesis to be tested: Despite *average* scores on verbal skill tests and a *high average* performance on a visual reasoning task (Picture Completion), her Block Design scores were in the *low average* range and her copy of the Complex Figure was *defective* due to elongation, one omitted line, and poor detailing (although both recall trials were at an *average* level). These poor performances, taken with her complaints of spatial disorientation, suggested a visuospatial problem. To explore this hypothesis, further testing was required. The originally planned examination, which had included a test of verbal retrieval (Boston Naming Test) and one for sequential learning (Serial Digit Learning), was halted and other tests specific for visuospatial deficits were given, including the Location and Copy subtests of the MacQuarrie Test for Mechanical Ability, Judgment of Line Orientation, the Hooper Visual Organization Test, and a free drawing of a house. Scores on these tests ranged from *low average* to *borderline defective,* and the house drawing was childishly crude with a markedly distorted attempt at perspective. Thus a deficit pattern emerged that contrasted with her excellent memory and learning abilities and the *high average* Picture Completion performance.

As this patient seemed neither depressed nor unduly anxious in this examination, her somewhat histrionic emotional displays and complaints about having been ill-served by her parents did not appear to be contributing to her cognitive deficits; rather, the experiences of disorientation she reported could be a factor contributing to the stress for which she sought psychiatric help, and visuospatial deficits could contribute to difficulty assimilating the range of medical assistant procedures. No conclusive etiology for her attentional and visuospatial problems could be developed from the available history, although, given her reports of head injury, TBI was a likely candidate.

Concluding the examination

The final stage, of course, has to do with concluding the examination as hypotheses are supported or rejected, and the examiner answers the salient diagnostic and descriptive questions or explains why they cannot be answered (e.g., at this time, by these means). When it appears that assessment procedures are making patients aware of deficits or distressing patients because they assume—rightly or wrongly—that they performed poorly, the examiner can end the examination with a relatively easy task, leaving the patient with some sense of success (Nancy R. Bryant, personal com-

munication, 1999 [mdl]). The conclusions should also lead to recommendations for improving or at least making the most of the patient's condition and situation and for whatever follow-up contacts may be needed.

The examination is incomplete until the findings have been reported. Ideally, two kinds of reports are provided: one as oral feedback to patients and whoever they choose to hear it; the other one written for the referral source and, if the examination is performed in an institution such as a hospital, for the institution's records.

The interpretative interview. A most important yet sometimes neglected part of the neuropsychological examination is the follow-up interview to provide patients with an understanding of their problems and how their neuropsychological status relates to their future, including recommendations on how to ameliorate or compensate for their difficulties. Feedback generally is most useful when patients bring their closest family member(s) or companion(s), as these people almost always need understanding of and seek guidance for dealing with the patient's problems. This interview should take place after the examiner has had time to review and integrate the examination findings (which include interview observations) with the history, presenting problems, and examination objectives. Patients who have been provided an interpretation of the examination findings are more likely to view the examination experience positively than those not receiving it (Bennett-Levy, Klein-Boonschate, et al., 1994).

By briefly describing each test, discussing the patient's performance on it, indicating that individuals who have difficulty on some test might experience a particular everyday problem, and asking if that is the case for the patient, the clinician can elicit useful validating information. This interview can also help patients understand the events that brought them to a neuropsychological examination. The interpretive interview can in itself be part of the treatment process, a means of allaying some anxieties, conveying information about strengths as well as weaknesses to the patient, and providing future directions for further diagnostic procedures if necessary or for treatment. A lack of validation of the clinician's interpretation of the patient's performance(s) may lead the clinician in a new direction. In either case, useful information has been obtained by the clinician, while the patient has been given the opportunity to gain insight into the nature of the presenting problems or—at the very least—to understand why the various tests were given and what to do next. Often counseling will be provided in the course of the interpretive interview, usually as recommendations to help with specific problems. For example, for patients with a reduced auditory span, the examiner may tell the patient, "When unsure of what you've heard, ask for a repetition, or repeat or paraphrase the speaker (giving examples of how to do this and explaining paraphrasing as needed). Moreover, in a dispute over who said what in the course of a family conversation, your recall is probably the incorrect one." For the family members the examiner advises, "Speak slowly and in short phrases, pause between phrases, and check on the accuracy of what the patient has grasped from the conversation."

Occasionally, in reviewing the examination data, the examiner will discover some omissions—in the history, in following to completion a line of hypothesis testing—and will use some of this interview time to collect the needed additional information. In this case, and sometimes when informal counseling has begun, a second or even a third interpretive interview will be necessary.

Most referral sources—physicians, the patient's lawyer, a rehabilitation team—welcome having the examiner do this follow-up interview. In some instances, such as referral from a clinician already counseling the patient or treating a psychiatric disorder, referring persons may want to review the examination findings with their patients themselves. Neuropsychological examiners need to discuss this issue with referring clinicians so that patients can learn in the preparatory interview who will report the findings to them. Some other referrals, such as those made by a personal injury defense attorney, do not offer a ready solution to the question of who does the follow-up: An examiner hired by persons viewed by the patient as inimical to his or her interests is not in a position to offer counsel or even, in some instances, to reveal the findings. In these cases the examiner can ask the referring attorney to make sure that the patient's physician or the psychologist used by the patient's attorney receive a copy of the report with a request to discuss the findings, conclusions, and recommendations with the patient. This solution is not always successful. It is an attempt to avoid what I call "hit-and-run" examinations in which patients are expected to expose their frailties in an often arduous examination without receiving even an inkling of how they did, what the examiner thought of them, or what information came out that could be useful to them in the conduct of their lives [mdl].

Written reports. Like the examination, the written report needs to be appropriate for the circumstances. A brief bedside examination may require nothing more than a chart note. A complex diagnostic problem on which a patient's employment or legal status depends would require a much more thorough and explanatory report, always geared to the intended audience (see Ar-

mengol et al., 2001, for report-writing guidelines and samples of reports on a variety of cases for different situations).

An aid to test selection: a compendium of tests and assessment techniques, chapters 9–20

In the last 12 chapters of this book, most tests of cognitive functions and personality in common use, and many less common tests, are reviewed. These are tests and assessment techniques that are particularly well suited for clinical neuropsychological examination. Clinical examiners can employ the assessment techniques presented in these chapters for most neuropsychological assessment purposes in most kinds of work settings. Most of these tests have been standardized or used experimentally so that reports of the performances of control subjects are available (see Heaton, Grant, and Matthews, 1991; Mitrushina, Boone, and D'Elia, 1999; Spreen and Strauss, 1998). However, the normative populations and control groups for many of these tests may differ from individual patients on critical variables such as age, education, or cultural background, requiring caution and a good deal of "test-wiseness" on the part of the examiner who attempts to extrapolate from unsuitable norms.

PROCEDURAL CONSIDERATIONS IN NEUROPSYCHOLOGICAL ASSESSMENT

Testing Issues

Order of test presentation

The order of presentation of tests in a battery has not been shown to have appreciable effects on performance (Cassel, 1962). Neuger and his colleagues (1981) noted a single exception to this rule when they gave a battery containing many different tests. A slight slowing occurred on a test of manual speed, Finger Tapping, when administered later in the day. No important effects appeared when both WAIS-III and the Wechsler Memory Scale-III (WMS-III) batteries were given in different order; the most pronounced score difference was on Digit-Symbol Coding when the WAIS-III was given last, an effect that could be due to fatigue (Zhu and Tulsky, 2000). The examiner who is accustomed to a specific presentation sequence may feel somewhat uncomfortable and less efficient if it is varied. In an examination tailored to the patient's needs, the examiner varies the testing sequence to ensure the patient's maximum productivity (e.g., see Benedict, Fischer, et al., 2002). For example, tests that the examiner suspects will be difficult for a particular patient can be given at the beginning of a testing session when the patient is least fatigued; or a test that has taxed or discouraged the patient can be followed by one on which the patient can relax or feel successful. The latest revisions of the WIS-A (WAIS-R, Wechsler, 1981; WAIS-III, Wechsler, 1997a–c) alternate verbal tests with visuoperceptual or construction tests as a standard procedure. This presentation sequence increases the likelihood that a test that is easy for the patient follows one that was difficult so that the patient need not experience one failure after another.

Another consideration in sequencing the tests is the need to keep the patient busy during the interval preceding delayed trials on learning tests. A format which makes the most economical use of examination time varies succeeding tasks with respect to modalities examined and difficulty levels while filling in these delay periods. The choice of these interval tasks should rest in part on whether high or low levels of potential interference are desired: if the question of interference susceptibility is important, the examiner may select a vocabulary or verbal fluency test as an interference test for word list learning; otherwise, selection of a word generating task should be avoided.

Testing the limits

Knowledge of the patient's capacities can be extended by going beyond the limits of the test set by the standard procedures.

The WIS-A oral Arithmetic questions provide a good example. When patients fail the more difficult items because of an auditory span, concentration, or mental tracking problem—which becomes obvious when patients ask to have the question repeated or repeat question elements incorrectly—the examiner still does not know whether they understand the problem, can perform the calculations correctly, or know what operations are called for. If the examiner stops at the point at which these patients fail the requisite number of items without further exploration, any conclusion drawn about the patient's arithmetic ability is questionable. In cases like this, arithmetic ability can easily be tested further by providing pencil and paper and repeating the failed items. Some patients can do the problems once they have written the elements down, and still others do not perform any better with paper than without it but provide written documentation of the nature of their difficulty.

Testing the limits does not affect the standard test procedures or scoring. It is done only after the test or test item in question has been completed according to standard test instructions. This method not only preserves the statistical and normative meaning of the test scores but it also can afford interesting and often important information about the patient's functioning.

For example, a patient who achieves an arithmetic score in the *borderline defective* ability range on the standard presentation of the test and who solves all the problems quickly and correctly at a *superior* level of functioning after writing down the elements of a problem, demonstrates a crippling auditory span or mental tracking problem with an intact capacity to handle quite complex computational problems as long as they can be seen. From the test score alone, one might conclude that the patient's competency to handle sizeable sums of money is questionable; on the basis of the more complete examination of arithmetic ability, the patient might be encouraged to continue bookkeeping and other arithmetic-dependent activities.

Testing the limits can be done with any test. The limits should be tested whenever there is suspicion that an impairment of some function other than the one under consideration is interfering with an adequate demonstration of that function. Imaginative and careful limit testing can provide a better understanding of the extent to which a function or functional system is impaired and the impact this impairment may have on related functional systems (R.F. Cohen and Mapou, 1988). Much of the special testing done with handicapped patients is a form of testing the limits (see B. Caplan and Shechter, 1995; pp. 118–120).

A limit-testing procedure has been formalized for the WIS battery (the *WAIS-R as a Neuropsychological Instrument* [WAIS-RNI]) (E. Kaplan, Fein, et al., 1991). While WIS-A tests are the subject matter for the techniques Kaplan and her colleagues have devised, these techniques can serve as models for expanded assessments generally (see also E. Kaplan, 1988).

Practice effects

The effects of repeated examinations have been studied in both normal subjects and brain damaged patients (McCaffrey, Duff, and Westervelt, 2000a,b). In the former and many of the latter, an overall pattern of test susceptibility to practice effects emerges. By and large, tests that have a large speed component, require an unfamiliar or infrequently practiced mode of response, or have a single solution—particularly if it can be easily conceptualized once it is attained—are more likely to show significant practice effects (M.R. Basso, Bornstein, and Lang, 1999; Bornstein, Baker, and Douglass, 1987; McCaffrey, Ortega, et al., 1993). This phenomenon appears on the WIS-A tests as the more unfamiliar tasks on the Performance Scale show greater practice effects than do the Verbal Scale tests (Cimino, 1994). It has also been seen in PET studies as shifts in activition patterns with repeated practise of a task (Démonet, 1995). The problem of practice effects is particularly important in memory testing since repeated testing with the same tests leads to learning of the material in all but seriously memory-impaired patients (Benedict and Zgaljardic, 1998; Lezak, 1982c; B.A. Wilson, Watson, et al., 2000).

Numerous studies have also shown a general test-taking benefit in which enhanced performance may occur after repeated examinations, even with different test items (Benedict and Zgaljardic, 1998; B.A. Wilson, Watson, et al., 2000). The patient appears to learn how to approach the task more effectively, i.e., has acquired a test-taking set, or "test-wiseness." For many tests—particularly those with strong ceiling effects, such as digit span—the greatest practice effects are likely to occur between the first and second examinations (Benedict and Zgaljardic, 1998; Ivnik, Smith, Lucas, et al., 1999; Ivnik, Smith, Malec, et al., 1995; Rapport, Axelrod, et al., 1997). To bypass this problem, a frequently used research procedure provides for two or more baseline examinations before introducing an experimental condition (Fischer, 1999; McCaffery and Westervelt, 1995).

When a brain disorder renders a test, such as Block Design, difficult to conceptualize, the patient is unlikely to improve with practice alone (Diller, Ben-Yishay, et al., 1974). Improvements attributable to practice tend to be minimal, but this varies with the nature, site, and severity of the lesion and with the patient's age. B.A. Wilson, Watson, and their colleagues (2000) point out that test characteristics also determine whether brain injured patients' performances will improve with repetition. McCaffery, Duff, and Westervelt's (2000a,b) comprehensive and well-organized review of the hundreds of studies using repeated testing of both control and specified patient groups makes clear which tests are most vulnerable to practice effects and which patient groups tend to be least susceptible.

Except for single solution tests and others with a significant learning component, large changes between test and retest are not common among normal persons (Dikmen, Machamer, et al., 1990; McCaffery, Duff, and Westervelt, 2000a,b). On retest, WIS-A test scores have proven to be quite robust (Matarazzo, Carmody, and Jacobs, 1980; see McCaffery, Duff, and Westervelt, 2000a). For example, only 10% of the individual test scores obtained by 29 normal young adults on the WAIS changed more than two scaled score points in either direction on retest after a 20-week interval. Yet changes of three or more points occurred with sufficient frequency to lead the authors to caution against making inferences on the basis of any single score change "*in isolation*" (Matarazzo, Carmody, and Jacobs, 1980). These data illustrate how scores in the individual case may not follow group trends. Moreover, score stability when examined in healthy subjects can

vary with the nature of the test: verbal knowledge and skills tend to be most stable over a period of years; retention scores show the greatest variability (Ivnik, Smith, Malec, et al., 1995).

Age differentials with respect to tendencies to practice effects have been reported, but no clear pattern emerges. On WIS-A tests some authors note a greater tendency for practice effects among younger subjects (Shatz, 1981), and some find little difference between younger (25–54) and older (75+) age groups, except for a significant effect for Digit Span (J.J. Ryan, Paolo, and Brungardt, 1992). Moreover, on one test of attention (Paced Auditory Serial Addition Test), a practice effect emerged for the 40–70 age range with little effect for ages 20–39; and another (Trail Making Test B) produced a U-shaped curve with greatest effects in the 20s and 50s and virtually none in the 30s and 40s (Stuss, Stethem, and Poirier, 1987). Practice effects occurred for adults 65–79 years old on the WMS-R Logical Memory test administered once a year for 4 years but not for subjects 80 and older (Hickman, Howieson, et al., 2000). Mitrushina and Satz (1991) found that unlike younger adults, those 75 years and older did not benefit from yearly repeated testing on a battery of tests. In both these studies, age-related decline may have offset practice effects. Moreover, in diseases that occur with aging, such as Alzheimer's disease, the impact of age and the disease may be compounded resulting in no practice benefits for these patients (D.B. Cooper et al., 2001).

Absence of practice effects on tests when the effect is expected, such as memory tests, may also be clinically meaningful. For example, for patients who have undergone temporal lobectomy, retest scores at levels similar to preoperative scores may reflect an actual decrement in learning ability, and a small decrement after surgery may indicate a fairly large loss in learning ability (Chelune, Naugle, et al., 1991). When a dementing condition is suspected, progression of even mildly lowered scores on tests typically vulnerable to practice effects suggests a deteriorating process (R.G. Knight, 1992).

The number of tests with alternate forms is limited because of the need to produce tests with demonstrated interform reliability. If alternate forms do not have an equal level of difficulty, then changing forms may introduce more unwanted variance than practice effects (see Benedict and Zgaljardic, 1998).

Use of technicians

Reliance on technicians to administer and score tests expanded with the use of commercially available batteries, particularly the Halstead-Reitan Battery (HRB) (DeLuca, 1989). Some neuropsychologists base their reports entirely on what the technician provides in terms of scores and observations. Most neuropsychologists who use technicians have them give the routine tests; the neuropsychologist conducts the interviews and additional specialized testing as needed, writes reports, and consults with patients and referral sources.

The advantages of using a technician are obvious: Saving time enables the neuropsychologist to see more patients. In research projects, in which immutable test selection judgments have been completed before any subjects are examined and qualitative data are usually irrelevant, having technicians do the assessments is typically the best use of everyone's time and may contribute to objective data collection (NAN Policy and Planning Committee, 2000b). Moreover, as technicians are paid at one-third or less the rate of a neuropsychologist, a technician-examiner can reduce costs at savings to the patients or a research grant. When the technician is a sensitive observer and the neuropsychologist has also conducted a reasonably lengthy examination with the patient, the patient benefits in having been observed by two clinicians, thus reducing the likelihood of important information being overlooked.

However, there are disadvantages as well. They will be greatest for those who write their reports on the basis of "blind analysis," as these neuropsychologists cannot identify testing errors, appreciate the extent to which patients' emotional status and attitudes toward the examination colored their test performances, or have any idea of what might have been missed in terms of important qualitative aspects of performance or problems in major areas of cognitive functioning that a hypothesis-testing approach would have brought to light. In referring to the parallel between blind analysis in neuropsychology and laboratory procedures in medicine, John Reddon observed that "some neuropsychologists think that a report can be written about a patient without ever seeing the patient because Neuropsychology is only concerned with the brain or CNS. . . . Urine analysts or MRI or CT analysts do not see their patients before interpreting their test results so why should neuropsychologists?" He then answered this question by pointing out that neuropsychological assessment is not simply a medical procedure but requires "a holistic approach that considers the patient as a person . . . and not just a brain that can be treated in isolation" (Reddon, personal communication, 1989 [mdl]). Moreover, insensitive technicians who generate test scores without keeping a record of how the patient performs, or whose observations tend to be limited by inadequate training or lack of experience, can only provide a restricted data base for those functions they examine. Prigatano (2000) points out that when most of the patient's contact is with a technician who simply

tests in a lengthy examination, and the neuropsychologist—who has seen the patient only briefly, if at all—seems more interested in the test scores than in the patient, the patient is more likely to come away unhappy about the examination experience.

The minimal education and training requirements for technicians are spelled out in the report of the Division 40 (American Psychological Association) Task Force on Education, Accreditation, and Credentialing (1989; Bornstein, 1991) and have been further elaborated in an American Academy of Clinical Neuropsychology policy statement (1999) on "use of nondoctoral level personnel in conducting clinical neuropsychological evaluations." "These psychometric technicians, psychometrists, and other psychologist-assistants, as well as trainees enrolled in formal educational and training programs" typically hold nondoctoral degrees in psychology or related fields. Their role has been clearly defined as strictly limited to administering and scoring tests under the supervision of a licensed neuropsychologist whose responsibility it is to select and interpret the tests, do the clinical interviews, and communicate the examination findings appropriately (American Academy of Clinical Neuropsychology, 1999; see also McSweeny and Naugle, 2002; NAN Policy and Planning Committee, 2000b).

Examining Special Populations

Patients with sensory or motor deficits

Visual problems. Many persons referred for neuropsychological assessment will have reduced visual acuity or other visual problems that could interfere with their test performance. Defective visual acuity is common in elderly persons and may be due to any number of problems—such as blurring, *presbyopia* (age-related far-sightedness), cataract, and corneal disorders—and frequently to some combination of them (Godwin-Austen and Bendall, 1990; Matjucha and Katz, 1994; E. Wallace et al., 1994). M. Cohen and colleagues (1989) documented defective convergence—which is necessary for efficient near vision—in 42% of traumatically brain injured patients requiring rehabilitation services. These authors noted that other visual disturbances were also common after head injury, mostly clearing up during the first postinjury year.

A visual problem that can occur after a head injury, stroke, or other abrupt insult to the brain, or that may be symptomatic of degenerative disease of the central nervous system, is eye muscle imbalance resulting in double vision (*diplopia*). Patients may not see double at all angles or in all areas of the visual field and may experience only slight discomfort or confusion with the head tilted a certain way. For others the diplopia may compromise their ability to read, write, draw, or solve intricate visual puzzles altogether. Young, well-motivated patients with diplopia frequently learn to suppress one set of images and, within one to three years, become relatively untroubled by the problem. Other patients report that they have been handicapped for years by what may appear on examination to be a minor disability. Should the patient complain of visual problems, the examiner may want a neurological or ophthalmological opinion before determining whether the patient can be examined with tests requiring visual acuity.

Persons over the age of 45 need to be checked for visual competency as many of them will need reading glasses for fine, close work. Those who use reading glasses should be reminded to bring them to the examination. Not infrequently, hospitalized patients will not have brought their glasses with them. Examiners in hospital settings in particular should keep reading glasses with their testing equipment.

Hearing problems. Although most people readily acknowledge their visual defects, many who are hard-of-hearing are secretive about auditory handicaps. It is not unusual to find hard-of-hearing persons who prefer to guess what the examiner is saying rather than admit their problem and ask the examiner to speak up. It is also not unusual for persons in obvious need of hearing aids to reject their use, even when they own aids that have been fitted for them. Sensitive observation can often uncover hearing impairment, as these patients may cock their head to direct their best ear to the examiner, make a consistent pattern of errors in response to the examiner's questions or comments, or ask the examiner to repeat what was said. When hard-of-hearing patients come for the examination without hearing aids, the examiner must speak loudly, clearly, and slowly, and check for receptive accuracy by having these patients repeat what they think they have heard.

Patients coming for neuropsychological assessment are more likely to have hearing loss than the population at large. Along with cognitive and other kinds of deficits, hearing impairments can occur as a result of brain damage. Moreover, defective hearing increases with advancing age so that many patients with neurological disorders associated with aging will also have compromised hearing (E. Wallace et al., 1994; M. Vernon, 1989). Diminished sound detection is not the only problem that affects auditory acuity. Some patients who have little difficulty hearing most sounds, even soft ones, find it hard to discriminate sounds such as certain consonants. A commonly used but crude test of auditory acuity involving rattling paper or snapping fingers by the patient's ear will not identify this problem which can seriously interfere with accurate cognitive testing (Schear, Skenes, and Larson, 1988).

Lateralized sensory deficits. Brain impaired patients with lateralized lesions will have reduced vision or hearing on the side opposite the lesion with little awareness that they have such a problem. This is particularly true for patients who have *homonymous field cuts* (loss of vision in the same part of the field of each eye) or in whom nerve damage has reduced auditory acuity or auditory discrimination functions in one ear only. Their normal conversational behavior may give no hint of the deficit, yet presentation of test material to the affected side makes their task more difficult (B. Caplan, 1985).

The neuropsychologist is often not able to find out quickly and reliably whether the patient's sight or hearing has suffered impairment. Therefore, when the patient is known to have a lateralized lesion, it is a good testing practice for the examiner to sit either across from the patient or to the side least likely to be affected. The examiner must take care that the patient can see all of the visually presented material and the examiner should speak to the ear on the side of the lesion. Patients with right-sided lesions, in particular, may have reduced awareness of stimuli in the left half of space so that all material must be presented to their right side. Use of vertical arrays for presenting visual stimuli to these patients should be considered (B. Caplan, 1988; B. Caplan and Shechter, 1995).

Motor problems. Motor deficits do not present as great an obstacle to standardized and comprehensive testing as sensory deficits since most all but constructional abilities can be examined when a patient is unable to use either hand. Many brain injured patients with lateralized lesions will have use of only one hand, and that may not be the preferred hand. One-handed performances on construction or drawing tests tend to be a little slowed, particularly when performed by the nonpreferred hand. In one study, neurologically intact subjects using the nonpreferred hand in drawing tasks tended to make no more errors than with the preferred hand, although left-handed distortion errors were notably greater than those made by the right hand (Dee and Fontenot, 1969). Yet another study found that intact right-handed subjects tended to perform visuomotor tasks more accurately with their left than their right hands, "presumably because they were being more attentive and cautious" when using the nonpreferred hand (Y. Kim et al., 1984).

Meeting the challenge of sensory or motor deficits. Neuropsychological assessment of patients with sensory or motor deficits presents the problem of testing a variety of functions in as many modalities as possible with a more or less restricted test repertory. Since almost all psychological tests have been constructed with physically able persons in mind, examiners often have to find reasonable alternatives to the standard tests the physically impaired patient cannot use, or they have to juggle test norms, improvise, or, as a last resort, do without (B. Caplan and Shechter, 1995).

Although the examination of patients with sensory or motor disabilities is necessarily limited insofar as the affected input or output modality is concerned, the disability should not preclude at least some test evaluation of any cognitive function or executive capacity not immediately dependent on the affected modality. Of course, blind patients cannot be tested for their ability to organize visual percepts, nor can patients with profound facial paralysis be tested for verbal fluency; but patients with these deficits can be tested for memory and learning, arithmetic, vocabulary, abstract reasoning, comprehension of spatial relationships, a multitude of verbal skills, and other abilities.

Published tests that can be substituted for those ordinarily given are available for most general functions. Deaf patients can be given printed tests or the examiner can write out what is normally spoken; questions can be read to blind patients. For verbal and mathematical functions, there are many printed and orally administered tests of arithmetic skills, vocabulary, and abstract reasoning in particular that have useful norms. Other common tests of verbal functions, such as tests of background information, common sense reasoning and judgment, and verbal (reading) comprehension, do not have fully standardized counterparts in the other modality, whether it be visual or auditory. For some of these, similar kinds of alternative tests are available although formats, norms, or standardization populations may differ. For example, language responses of deaf patients are slower when signed than when spoken (A.B. Wolff et al., 1989).

There are fewer ready-made substitutes for tests involving pictures or designs although some test parallels can be found, and the clinician may be able to invent others. The *haptic* (touch) modality lends itself most readily as a substitute for visually presented tests of nonverbal functions. For example, to assess concept formation of blind patients, size, shape, and texture offer testable dimensions. To test pattern learning or searching behavior, tactile mazes may be used in place of visual mazes. Three-dimensional block constructions will test constructional functions of patients who cannot see painted designs or printed patterns. Even so, it is difficult to find a suitable nonvisual alternative for perceptual organization tests such as the Hooper Visual Organization Test or Picture Arrangement, for a visuoconstructive task such as drawing a house or a bicycle, or for many other tests requiring vision. However, for sighted patients, even older ones or those

whose near vision is below average, acuity does not seem to contribute importantly to performance on the visually presented WIS-A tests and others in general use (Schear and Sato, 1989; Storandt and Futterman, 1982).

The patient with a movement disorder presents similar challenges. Visuoperceptual functions in these patients can be relatively easily tested since most tests of these functions lend themselves to spoken answers or pointing. However, drawing tasks requiring relatively fine motor coordination cannot be satisfactorily evaluated when the patient's preferred hand is paralyzed or spastic. Even when only the nonpreferred hand is involved, some inefficiency and slowing on other construction tasks will result from the patient's inability to anchor a piece of paper with the nonpreferred hand or to turn blocks or manipulate parts of a puzzle with two-handed efficiency. After discussing some of the major issues in assessing patients with movement disorders (e.g., Huntington's disease, Parkinson's disease, cerebellar dysfunction), Stout and Paulsen (2003) identify the motor demands and suggest possible adaptations for a number of tests in most common use.

Some tests have been devised specifically for physically handicapped people. Most of them are listed in test catalogues or can be located through local rehabilitation services. One problem that these substitute tests present is normative comparability; but since this is a problem in any substitute or alternative version of a standard test, it should not dissuade the examiner if the procedure appears to test the relevant functions. Another problem is that alternative forms usually test many fewer and sometimes different functions than the original test. For example, multiple-choice forms of design copying tests obviously do not measure constructional abilities. What may be less obvious is the loss of the data about the patient's ability to organize, plan, and order responses. Unless the examiner is fully aware of all that is missing in an alternative battery, some important functions may be overlooked.

The severely handicapped patient

When mental or physical handicaps greatly limit the range of response, it may first be necessary to determine whether the patient has enough verbal comprehension for formal testing procedures. A set of questions and commands calling for one-word answers and simple gestures will quickly give the needed information. Those that are simplest and most likely to be answered are given first to increase the likelihood of initial success. Questions calling for "yes" or "no" answers will not be useful when patients with impaired speech cannot sound out the difference between "uh-huh" and "unh-unh" clearly, nor is it easy for weak or tremulous patients to nod or waggle their heads with distinct precision. However, when patients can say "yes" and "no" distinctly, a series of questions calling for these responses can assess many aspects of cognitive functioning since significantly more than 50% must be correct to exceed random responding (McMillan, 1996a; McMillan and Herbert, 2000).

A speaking patient might be asked the following kinds of questions:

What is your name?
What is your age?
Where are you now?
What do you call this (hand, thumb, article of patient's clothing, coin, button, or safety pin)?
What do you do with a (pen, comb, matches, key)?
What color is (your tie, my dress, etc.)?
How many fingers can you see (two or three trials)?
How many coins in my hand (two or three trials)?
Say the alphabet; count from one to twenty.

Patients who do not speak well enough to be understood can be examined for verbal comprehension and ability to follow directions.

Show me your (hand, thumb, a button, your nose).
Give me your (left, right [the nonparalyzed]) hand.
Put your (nonparalyzed) hand on your (left, right [other]) elbow.

Place several small objects (button, coin, etc.) in front of the patient with a request.

Show me the button (or key, coin, etc.).
Show me what opens doors. How do you use it?
Show me what you use to write. How do you use it?
Do what I do (salute; touch nose, ear opposite hand, chin in succession).

Place several coins in front of the patient.

Show me the quarter (nickel, dime, etc.).
Show me the smallest coin.
Give me (three, two, five) coins.

Patients who can handle a pencil may be asked to write their name, age, where they live, and to answer simple questions calling for "yes," "no," short word, or simple number answers; and to write the alphabet and the first twenty numbers. Patients who cannot write may be asked to draw a circle, copy a circle drawn by the examiner, copy a vertical line drawn by the examiner, draw a square, and imitate the examiner's gestures and patterns of tapping with a pencil. Word recognition can be tested by asking the patient to point to one of several words printed on a word card or piece of paper that is the same as a spoken word (e.g., "cat": cat, dog, hat), or that answers a question (e.g., "Which do you wear on your head?"). Reading comprehension can be tested

by printing the question as well as the answers or by giving the patient a card with printed instructions such as, "If you are a man (or "if it is morning"), hand this card back to me; but if you are a woman (or "if it is afternoon"), set it down." The Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1983b) and other tests for aphasia contain similar low-level questions that can be appropriate for nonaphasic but motorically and/or mentally handicapped patients. Adamovich and her colleagues (1985) describe a variety of tasks for low level assessment of nonspeaking patients.

Patients who respond to most of these questions correctly are able to comprehend and cooperate well enough for formal testing. Patients unable to answer more than two or three questions probably cannot be tested reliably. Their behavior is best evaluated by rating scales (see Chapter 18, *passim*).

A case report of a 22-year-old woman rendered quadriplegic and anarthric by a traffic TBI was dependent on a feeding tube to live, and considered to be in a vegetative state (McMillan, 1996a). Euthanasia was considered, but first the court required a neurobehavioral examination. It was found that she could press a button with her clenched right hand. She was instructed in a pattern of holding or withholding the button press for "yes" and "no" respectively. With this response capacity in place, she was given a set of questions of the order, "Is your sister's name Lydia?" "Is your sister's name Lucy?", with correct "yes" responses randomized among the "no" responses. By this technique, cognitive competency was established, which allowed further exploration into her feelings, insight into her condition, and whether she wanted to live. She did, and continued to want to live at least for the next several years, despite her report of some pain and depression. (McMillan and Herbert, 2000)

The severely brain damaged patient

With few exceptions, tests developed for adults have neither items nor norms for grading the performance of severely mentally impaired adults. On adult tests, the bottom 1% or 2% of the noninstitutionalized adult population can usually pass the simplest items. These items leave a relatively wide range of behaviors unexamined and are too few to allow for meaningful performance gradations. Yet it is as important to know about the impairment pattern, the rate and extent of improvement or deterioration, and the relative strengths and weaknesses of the severely brain damaged patient as it is for the less afflicted patient.

For patients with severe mental deficits, one solution is to use children's tests (e.g., see E.M. Taylor, 1959: despite its age, this book contains many tests applicable to very impaired adults). Tests developed for children examine many functions in every important modality as well as providing children's norms for some tests originally developed for adults (for example, the *Developmental Test of Visual-Motor Integration* or the *Snijders-Oomen Nonverbal Intelligence Test* [*SON-R* $5^1/_2$–17]). Most of the *Woodcock-Johnson III Tests of Cognitive Abilities* extend to those younger than 2 years, all go to prekindergarten levels, and almost all have norms going to adult levels. When given to retarded adults, children's tests require little or no change in wording or procedure. At the lowest performance levels, the examiner may have to evaluate observations of the patient by means of developmental scales.

Some simple tests and tests of discrete functions were devised for use with severely impaired adults. Tests for elderly patients suspected of having deteriorating brain diseases are generally applicable to very defective adults of all ages (K.J. Christensen, Multhaup, et al., 1991a; Fuld, 1980; Fuld, Masur, et al., 1990; Mattis, 1988; Saxton, McGonigle-Gibson, et al., 1990; Saxton and Swihart, 1989; and the CERAD battery, J.C. Morris, Heyman, Mohs, et al., 1989). A.-L. Christensen's (1979) systematization of Luria's neuropsychological investigation techniques gives detailed instructions for examining many of the perceptual, motor, and narrowly defined cognitive functions basic to complex cognitive and adaptive behavior. These techniques are particularly well suited for patients who are too impaired to respond meaningfully to graded tests of cognitive prowess but whose residual capacities need assessment for rehabilitation or management. Their clinical value lies in their flexibility, their focus on qualitative aspects of the data they elicit, and their facilitation of useful behavioral descriptions of the individual patient. Observations made by means of Luria's techniques or by means of the developmental scales and simple tests that enable the examiner to discern and discriminate functions at low performance levels cannot be reduced to numbers and arithmetic operations without losing the very sensitivity that examination of these functions and good neuropsychological practice requires.

Elderly persons

Psychological studies of elderly people have shown that, with some psychometrically important exceptions, healthy and active people in their seventies and eighties do not differ greatly in skills or abilities from the generations following them (Howieson, Holm, and Kaye, 1993; Tranel, Benton, and Olson, 1997; see also pp. 296–300, *passim*). However, the diminished sensory acuity, motor strength and speed, and particularly, flexibility and adaptability that accompany advancing age are apt to affect the elderly person's test performance adversely (Bondi, Salmon, and Kaszniak, 1996). These age-related handicaps can result in spuriously

low scores and incorrect conclusions about the cognitive functioning of older persons (Birren and Schaie, 1989, *passim;* Lindley, 1989). I.K. Krauss (1980) offered guidelines for evaluating the older worker's capacity to continue employment that can apply to neuropsychological assessment of the elderly as well. Among them are recommendations that print be large and of high contrast; that answer sheets, which typically add a visual search dimension to whatever else is being tested, be eliminated; that tests have as high face validity as possible; and that norms be appropriate.

When examining elderly people, the clinician needs to determine whether their auditory and visual acuity is adequate for the tests they will be taking and, if not, to make every effort to correct the deficit or assist them in compensating for it (Lezak, 1986; Schear and Skenes, 1991; M. Vernon, 1989). Some conditions that can adversely affect a person's neuropsychological status are more common among the elderly. These include fatigue, central nervous system side effects due to medication, and lowered energy level or feelings of malaise associated with a chronic illness (Lawton, 1986). A review of the patient's recent health history should help the examiner to identify these problems so that testing will be appropriate for the patient's physical capacities and test interpretation will take such problems into account.

A pattern of slowly paced speech using words of low complexity, called "Elderspeak" has been recommended to clinicians working with older persons (L.C. McGuire et al., 2000). This should come easily to sensitive examiners who have already been modifying their speech patterns for their more severely impaired patients. Although McGuire and her colleagues recommend "Elderspeak" when important information is given to older persons—and by implication, when examining them—the examiner must judge when it is appropriate and when a sophisticated and alert patient would feel demeaned by such simplified speech.

Since age-related slowing affects the performance of timed tasks, the examiner who is interested in how elderly patients perform a given timed task can administer it without timing (e.g., see Storandt, 1977). Although this is not a standardized procedure, it will provide the qualitative information about whether they can do the task at all, what kinds of errors they make, how well they correct them, etc. This procedure will probably answer most of the examination questions that prompted use of the timed test. Since older persons are also apt to be more cautious (Schaie, 1974), this too may contribute to performance slowing. When the examiner suspects that patients are being unduly cautious, an explanation of the need to work quickly may help them perform more efficiently.

Often the most important factor in examining elderly persons is their cooperation (Aiken, 1980; Holden, 1988b). With no school requirements to be met, no jobs to prepare for, and usually little previous experience with psychological tests, retired persons may very reasonably not want to go through fatiguing mental gymnastics that may well make them look stupid to the youngster in the white coat sitting across the table. Particularly if they are not feeling well or are concerned about diminishing mental acuity, elderly persons may view a test as a nuisance or an unwarranted intrusion into their privacy. Thus, explaining to elderly persons the need for the examination and introducing them to the testing situation will often require more time than with younger people. When the patient is ill or convalescing, the examiner needs to be especially alert to signs of fatigue and sensitive to testing problems created by an unusually short attention span or increased distractibility. It has been suggested that some of these problems can be avoided by examining elderly people with familiar materials such as playing cards or popular magazines, and designing tasks that are obviously meaningful and nonthreatening (Holden, 1988b; Krauss, 1980).

When examinee and examiner speak different languages

Migration—of refugees, of persons seeking work or rejoining their displaced families—has brought millions of people into cultures and language environments foreign to them. When understanding or treatment of a brain disorder would benefit from neuropsychological assessment, the examiner must address a new set of issues if the patient is to be treated appropriately.

Translators and interpreters. In many big cities with relatively large populations of foreign language speakers, medical centers provide interpreters, e.g., in our medical center, besides Spanish and Russian, translators are available for several Asian languages and the common European ones [dbh, mdl]. Metropolitan court systems also will have a pool of interpreters available. However, even when the interpreter can provide a technically accurate rendition of test questions and patient responses, slippages in the interpreter's understanding of what is actually required or some of our terms of art can result in an inadequate or biased examination, especially when the examiner's language is the interpreter's second—or even third—language (see pp. 313, 314).

Ideally, when working with an interpreter, the examiner reviews the assessment procedures, including intentional and idiomatic aspects of the wording of instructions and test questions, so that the interpreter has a practical idea of the normal response expectations for any item or test. In practice, this can rarely be accom-

plished because of time and cost limitations. Thus, when working with a neuropsychologically naive interpreter who is also unfamiliar with tests and test culture, the examiner must be on the lookout for unexpected aberrations in the patient's responses as these could indicate translation slippage in one or the other direction. Slippages may be easiest to recognize on such tests as Wechsler's Arithmetic, Digit Span or Block Design tests, or word fluency, confrontation naming, or design copying tests in which little cultural bias enters into the task and most people in most cultures are equipped to respond appropriately given the correct instructions.

Some tests will be more susceptible to cultural bias than others: Wechsler's Comprehension and Picture Arrangement tests, for example, both require fairly subtle social understandings to achieve a high score; a request to draw a bicycle is asking for failure from a refugee raised in a hill village—but may be an effective way of examining an urban Chinese person. Still, for a Spanish language battery developed for Hispanics of Latin American background or birth in the United States, education turned out to be an overriding variable despite efforts to make the tests culture-compatible (Pontón, Satz, et al., 1996). All tests were affected, both word-based and predominantly visual ones, including Block Design, the Complex Figure Test, and a test of fine motor dexterity. Lowest correlations with education occurred where least expected—on the WHO-UCLA Auditory Verbal Learning Test (Maj, D'Elia, et al., 1993).

Examiners need also be aware that bilingualism can alter normal performance expectations (Ardila, 2000a). A group of community living Spanish–English speakers performed speed and calculation tasks better in their first language (Ardila, Rosselli, Ostrosky-Solis, et al., 2000), but bilinguals' production on a semantic fluency task fell below that of monolinguals and their own phonetic fluency (Rosselli, Ardila, Ostrosky-Solis, et al., 2000). Adults fully fluent in their second language performed memory and learning tasks at the same level as monolingual subjects; but those who were weaker in their second language had lower rates of learning and retention (J.G. Harris, Cullum, and Puente, 1995).

Clinicians practising independently or in smaller communities may not have access to trained interpreters and thus face a dilemma: to examine, however crudely, or to refer to someone who can provide for translation or who speaks the patient's language. Nonverbal tests are available for examining these patients, but they require the subject to have an understanding of Western culture and at least a modicum of formal education, which makes these tests unsuitable for use with many migrants throughout the world. These tests have typically been developed to examine the mental abilities of children but, with age ranges into the late teens, they are applicable to adults (e.g., Bracken and McCallum, 1998; Hammill et al.; P.J. Tellegen et al., 1998). Artiola i Fortuny and Mullaney (1998) point out the ethical hazards when an examiner has only a superficial knowledge of the patient's language. They advise examiners not well-grounded in a language to get an interpreter or make an appropriate referral. LaCalle (1987) warns against casual interpreters, usually family members or friends, who may be ill-equipped to translate accurately or protective of the patient.

Cultural factors

The patient's cultural background should be considered when planning and interpreting assessment data (see pp. 310–312). Awareness of cross-cultural influences and bias becomes essential for the assessment of people who come from cultural backgrounds other than those of a test's developers and original standardization population (Ardila, 1995; Loewenstein, Arguelles, et al., 1994; Perez-Arce, 1999). A leading assessment problem is the lack of well-standardized, culturally relevant tests for minority groups. One approach to the problem is to use tests that show the least cross-cultural differences (e.g., Levav et al., 1998; Maj et al., 1993). Other workers have focused on the need to develop tests and normative data appropriate for distinct cultural groups (e.g., D.M. Jacobs et al., 1997; Mungas and Reed, 2000; Rey et al., 1999).

Common Assessment Problems with Brain Disorders

The mental inefficiency that often prompts a referral for neuropsychological assessment presents both conditions that need to be investigated in their own right and obstacles to a fair assessment of cognitive abilities. Thus the examiner must not only document the presence and nature of mental inefficiency problems but must attempt to get as full a picture as possible of the cognitive functions that may be compromised by mental inefficiency.

Attentional deficits

Attentional deficits can obscure the patient's abilities in almost every area of cognitive functioning. Their effects tend to show up in those activities that provide little or no visual guidance and thus require the patient to perform most of the task's operations mentally. While some patients with attentional deficits will experience difficulty in all aspects of attention, the problems of many other patients will be confined to only one or two of them.

Reduced auditory span. Many patients have a reduced auditory attention span such that they only hear part of what was said, particularly if the message is relatively long, complex, or contains unfamiliar or unexpected wording. These are the patients who, when given a 23-syllable request to subtract a calculated sum from "a half-dollar," subtract the correct sum correctly from a dollar, thus giving an erroneous response to the question and earning no credit. When asked to repeat what they heard, these patients typically report, "a dollar," the "half" getting lost in what was for them too much verbiage to process at once. Their correct answers to shorter but more difficult arithmetic items and their good performances when given paper and pencil will further demonstrate the attentional nature of their error.

Mental tracking problems. Other patients may have mental tracking problems; i.e., difficulty juggling information mentally or keeping track of complex information. They get confused or completely lost performing complex mental tracking tasks such as serial subtraction, although they can readily demonstrate their arithmetic competence on paper. These problems often show up in many repetitions on list-learning or list-generating tasks when patients have difficulty keeping track of their ongoing mental activities, e.g., what they have already said, while still actively conducting a mental search.

Distractibility. Another common concomitant of brain impairment is distractibility: some patients have difficulty shutting out or ignoring extraneous stimulation, be it noise outside the testing room, test material scattered on the examination table, or a brightly colored tie or flashy earrings on the examiner. This difficulty may exacerbate attentional problems and increase the likelihood of fatigue and frustration. Distractibility can interfere with learning and cognitive performances generally (Aks and Coren, 1990). The examiner may not appreciate the patient's difficulty, for the normal person screens out extraneous stimuli so automatically that most people are unaware that this problem exists for others. To reduce the likelihood of interference from unnecessary distractions, the examination should be conducted in what is sometimes referred to as a "sterile environment." The examining room should be relatively soundproof and decorated in quiet colors, with no bright or distracting objects in sight. The examiner's clothing too can be an unwitting source of distraction. Drab colors and quiet patterns or a lab coat are recommended apparel for testing. The examining table should be kept bare except for materials needed for the test at hand.

Clocks and ticking sounds can be bothersome. Clocks should be quiet and out of sight, even when test instructions include references to timing. A wall or desk clock with an easily readable second indicator, placed out of the patient's line of sight, is an excellent substitute for a stopwatch and frees the examiner's hands for note taking and manipulation of test materials. An efficient way to use a watch or regular clock for unobtrusive timing is to pay attention only to the second marker, noting in seconds the times at which a task was begun and completed. Minutes are marked with a slash. Total time is then 60 sec for each slash plus the number of seconds between the two times. For example, $53 \;//\; 18 = ([60 - 53] + 18) + 120 = 145$ seconds. The examiner can count times under 30 seconds with a fair degree of accuracy by making a dot on the answer sheet every 5 seconds.

Street noises, a telephone's ring, or a door slamming down the hall can easily break an ongoing train of thought in many brain damaged patients. If this occurs in the middle of a timed test, the examiner must decide whether to repeat the item, count the full time taken—including the interruption and recovery—count the time minus the interruption and recovery time, do the item over using an alternate form if possible, skip that item and prorate the score, or repeat the test again another day. Should there not be another testing day, then an alternate form is the next best choice, and an estimate of time taken without the interruption is a third choice. A prorated score is also acceptable.

A record of the effects of interruptions due to distractibility on timed tasks gives valuable information about the patient's efficiency. Comparisons between *efficiency* (performance under standard conditions) and *ability* (performance under optimal conditions) are important for understanding both competencies and deficits, as well as for rehabilitation and vocational planning (Corkin, Growdon, Desclos, and Rosen, 1989; Gronwall and Sampson, 1974). The actual effect of the distraction, whether it be in terms of increased response time, lowered productivity within the allotted time, or more errors, should also be noted and reported. Moreover, Nemec's (1978) identification of differences in susceptibility to auditory-verbal or visual pattern distractors in left and right hemisphere damaged patients, respectively, has practical implications for testing in terms of the kinds of distractors most likely to disturb a particular patient.

The sensitive examiner will document attention lapses and how they affect the patient's performance generally and within specific functional domains. Whenever possible, these lapses need to be explored, usually through testing the limits, to clarify the level of the patient's actual ability to perform a particular kind of task and how the attentional problem(s) interferes.

Memory disorders

Many problems in following instructions or correctly comprehending lengthy or complex test items read aloud by the examiner seem to be due to faulty memory but actually reflect attentional deficits. However, memory disorders too can interfere with assessment procedures.

Defective working memory. A few patients have difficulty retaining information, such as instructions on what to do, for more than a minute or two. They may fail a task for performing the wrong operation rather than because of inability to do what was required. This problem can show up on tasks requiring a series of responses. For example, on the Picture Completion test of the WIS-A battery, rather than continuing to indicate what is missing in the pictures, some patients begin reporting what they think is *wrong;* yet if reminded of the instructions, many will admit they forgot what they were supposed to do and then proceed to respond correctly. If not reminded, they would have failed on items they could do perfectly well, and the low score—if interpreted as due to a visuoperceptual or reasoning problem—would have been seriously misleading. Similar instances of forgetting can show up on certain tests of the ability to generate hypotheses (e.g., Category Test, Wisconsin Card Sorting Test, and Object Identification Task) in which patients who have figured out the response pattern that emerges in the course of working through a series of items subsequently forget it as they work through the series. In these latter tasks the examiner must note when failure occurs after the correct hypothesis has been achieved as these failures may indicate defective working memory.

Defective retrieval. A not uncommon source of poor scores on memory tests is defective retrieval. Many patients with retrieval problems learn well but are unable to recall at will what they have learned. When learning is not examined by means of a recognition format or by cueing techniques, a naive examiner can easily misinterpret the patient's poor showing on free recall as evidence of a learning problem. Perhaps more than any other sin against patients committed by naive and inadequately trained examiners is that of mistaking defective retrieval for a learning disorder.

Fatigue

Patients with brain disorders tend to fatigue easily, particularly when an acute condition occurred relatively recently (Lezak, 1978b; van Zomeren and Brouwer, 1990). Easy fatigability can also be a chronic problem in some conditions, such as multiple sclerosis (R.H. Paul et al., 1998b), Parkinson's disease (Karlsen et al., 1999) and, of course, chronic fatigue syndrome (Tiersky et al., 1997). Once fatigued, the patients take longer to recuperate than do normal persons.

The cognitive effects of fatigue have been studied in association with a variety of medical conditions including cancer (Cull et al., 1996; C.A. Meyers, 2000a,b), chemotherapy (Caraceni et al., 1998; P.B. Jacobsen et al., 1999; Valentine et al., 1998), respiratory disease (P.D. White et al., 1998), and post-polio syndrome (Bruno et al., 1993). When associated cognitive impairments have been found, they involve sustained attention, concentration, reaction time, and processing speed (Groopman, 1998; Tiersky et al., 1997). Several research groups have studied people after fatigue-producing exercise or sleep deprivation. In one study, healthy young males had slower choice reaction times following heavy exercise compared to lighter exercise (Fery and Ferry, 1997). Four administrations of the Paced Auditory Serial Addition Test (PASAT) (pp. 364–365), chosen because it requires mental exertion, were given within three hours to patients whose condition tends to make them fatigue-prone (S.K. Johnson et al., 1997). Patient groups performed consistently below control level, with chronic fatigue and depressed patients showing significant fatigue effects despite intervening rest periods. Studies of sleep deprivation have found deficits in hand–eye coordination (D. Dawson and Reid, 1997), psychomotor vigilance (Dinges et al., 1997), executive function (Fluck and File, 1998), psychomotor speed and accuracy, and visuospatial reasoning and recall (Verstraeten et al., 1996).

However, some studies report no association between complaints of fatigue and neuropsychological impairment (e.g., Schagen et al., 1999; C.E. Schwartz et al., 1996) or an association with one condition (chronic fatigue syndrome) but not with others (multiple sclerosis, depression; S.K. Johnson et al., 1997). Stuss, Stethem, Hugenholtz, and their colleagues (1989) reported that TBI patients performing reaction time tasks for 90 minutes did not show fatigue effects, regardless of injury severity. Complaints of poor concentration and memory in some patients may be related to mood disorders (Cull, Hay, et al., 1996) or fatigue-related distress (C.E. Schwartz et al., 1996) rather than associated fatigue. TBI patients with complaints of mental fatigue were compared with controls on a divided attention task under conditions of increasing attentional demands, with no differences appearing between the two groups (H. Riese, Hoedemaeker, Brouwer, et al., 1999).

Many brain impaired patients will tell the examiner when they are tired, but others may not be aware themselves or may be unwilling to admit fatigue. Therefore, the examiner must be alert to such signs as slurring of

speech, an increased droop on the paralyzed side of the patient's face, motor slowing increasingly apparent as the examination continues, or restlessness. Patients who are abnormally susceptible to fatigue are most apt to be rested and energized in the early morning and will perform at their best at this time. Even the seemingly restful interlude of lunch may require considerable effort from a debilitated patient and increase fatigue. Physical or occupational therapy is exhausting for many postacute patients. Therefore, in arranging test time, the patient's daily activity schedule must be considered if the effects of fatigue are to be kept minimal. When necessary, the examiner may insist that the patient take a nap before being tested. For patients who must be examined late in the day, in addition to requesting that they rest beforehand, the examiner should recommend that they have a snack.

Some patients fatigue so quickly that they can only work for brief periods. Their examination may continue over days if their performance begins to suffer noticeably after 10–15 minutes of concentrated effort. On occasion, a patient's fatigue may require the examiner to stop testing in the middle of a test in which items are graduated in difficulty or arranged to produce a learning effect. When the test is resumed, the examiner must decide whether to start from the beginning and risk overlearning or pick up where they left off, taking a chance that the patient will have lost the response set or forgotten what was learned on the first few items.

Pain

Certain pain syndromes are common in the general population, particularly headache and back pain. Many patients with traumatic brain injury experience pain whether from headaches or bodily injuries, and pain may result from other brain disorders such as thalamic stroke, multiple sclerosis, or disease involving cranial or peripheral nerves.

Patients with pain often have reduced attentional capacity, processing speed, and psychomotor speed (Grigsby, Rosenberg, and Busenbark, 1995). When comparing TBI patients with and without pain complaints and TBI noncomplainers with neurologically intact chronic pain patients, those complaining of pain tended to perform more poorly (see R.P. Hart, Martelli, and Zasler, 2000, for a review of recent studies). Deficits in learning and problem solving too occur in some neurologically intact pain patients (Blackwood, 1996; Jorge et al., 1999), and their cognitive deficits may be exacerbated by emotional distress (Iezzi et al., 1999; Kewman et al., 1991; S. Thomas et al., 2000). Heyer and his colleagues (2000) found both processing speed and problem solving reduced in cognitively intact elderly patients the day after spinal surgery; poorer performances correlated with higher scores on a pain scale. Grigsby and his coworkers (1995) hypothesized that pain may disrupt speed-dependent cognitive functions. Understanding performance deficits by patients with pain may be confounded with the effects of pain medication (Banning and Sjøgren, 1990).

However, the presence of pain does not necessarily affect cognitive functioning negatively (B.D. Bell et al., 1999; J.E. Meyers and Diep, 2000). Performances by chronic pain patients on tests of attentional functions, memory, reasoning, and construction were directly related to their general activity level, regardless of extent of emotional distress (S. Thomas et al., 2000). While pain reduced cognitive functioning in some patients (P. Sjøgren, Olsen, et al., 2000), it may heighten "working memory" (PASAT performance, pp. 364–365) in others (P. Sjøgren, Thomsen, and Olsen, 2000).

The interpretation of the relationship between pain and cognitive dysfunction is complicated by a variety of symptoms that are often highly associated with pain and may be key factors in this relationship, including anxiety, depression, sleep disturbance, and emotional distress (Cripe, Maxwell, and Hill, 1995; Jorge et al., 1999). Cripe and his colleagues (1995) further point out that the chronicity of the problem (neurologic symptoms, pain, and/or emotional distress) may be a relevant factor in the patient's behavior as "neurologically impaired patients . . . might experience more acute emotional distress in the acute phase of their illness" than at later stages (p. 265). Women, particularly those who tend to be fearful, experience lower pain thresholds compared to men (Keogh and Birkby, 1999).

R.P. Hart, Martelli, and Zasler (2000) stress the importance of attempting to minimize the effects of pain on test performance when chronic pain is one of the patient's presenting complaints. They suggest postponing neuropsychological assessment until aggressive efforts aimed at pain reduction have been tried. In cases where pain treatment is not successful, they offer a variety of suggestions. It may be possible to alter physical aspects of the testing situation to ensure optimal comfort. Frequent breaks allowing the patient to move about, brief "stand up and stretch breaks," or short appointments may be helpful. Pain assessment scales may indicate the degree of suffering experienced by the patient, and mood assessment scales and symptom checklists may help clarify the role of emotional factors in the patient's experience of pain. Cripe (1996b) cautions against using inventories designed to assist in psychiatric diagnosis (e.g., the Minnesota Multiphasic Personality Inventory [MMPI]) to identify patients for whom pain is a significant problem. Measures of the

patient's ability to muster and sustain effort may provide insight into the role of low energy and fatigue associated with pain. When patients report that their pain is in the moderate to intense range, interpretation of test scores that are below expectation requires consideration of the role of pain on test performance.

Performance inconsistency

It is not unusual for patients with cerebral impairments to report that they have "good days" and "bad days," so it should not be surprising to discover that in some conditions the level of an individual's performances can vary noticeably from day to day (Bleiberg et al., 1997) and even hour to hour (A. Smith, 1993), especially with lapses of attention (Stuss, Pogue, et al., 1994; van Zomeren and Brouwer, 1990). The Stuss group found no relationship between the extent of performance fluctuations on a graded set of reaction time tests and TBI severity, nor did they find consistency in how individual patients performed on different days (see also Stuss, Stethem, Hugenholtz, et al., 1989).

Performance variability may be most obvious in patients with seizure disorders, as seizure frequency, severity, duration, and after effects can greatly influence performance in the hours or days just before or after a seizure episode (Freides, 1985). Alterations in alertness, fatigue levels, and sense of well-being are not uncommon in many other conditions as well (Fischer, 2003). Nespoulous and Soum (2000), noting that in aphasic patients "variability is the rule," recommend giving the patient different kinds of test to aid in determining the conditions under which the patient can sustain or lose performance stability. This recommendation presupposes that performance variability reflects to some extent a coherent dysfunction pattern. Repeated examinations using—in so far as possible—tests that are relatively resistant to practice effects will help to identify best performance and typical performance levels in patients with these kinds of ups and downs.

Motivation

The motivational capacity of some brain impaired patients, particularly those with damage to the limbic system or prefrontal areas, may be diminished or lost (Stuss, Van Reekum, and Murphy, 2000; see also pp. 49–51, 79, 83). This condition often reflects the patient's inability to formulate meaningful goals or to initiate and carry out plans. Behaviorally, motivational defects appear as more or less pervasive and crippling apathy (Lezak, 1989; Walsh and Darby, 1999). Because of their general lack of involvement and a behavioral presentation that Lishman (1973) calls "sluggishness," such patients may perform significantly below their capacities unless cajoled or goaded or otherwise stimulated to perform. On the other hand, a monetary incentive did not improve the cognitive performances of college students with histories of mild TBI whose motivational capacity was essentially intact (Orey et al., 2000; see also pp. 765, 766).

Anxiety, stress, and distress

It is not unusual for the circumstances leading to a neuropsychological examination to have been experienced as anxiety-producing or stressful. Persons involved in litigation frequently admit to anxiety and other symptoms of stress (Gasquoine, 1997a; Murrey, 2000b). Patients who have acquired neuropsychological and other deficits altering their ability to function normally in their relationships and/or their work and living situations have been going through significant and typically highly stressful and anxiety-producing life changes (T.H. Holmes and Rahe, 1967). Negative expectations about one's potential performance or abilities can affect the test performance (Suhr and Gunstad, 2002). Moreover, the examination itself can be a source of anxiety (Bennett-Levy, Klein-Boonschate, et al., 1994).

A 60-year-old minister appeared anxious during memory testing. He had requested a neuropsychological examination because he was no longer able to recall names of his parishioners, some of whom he had known for years. He feared that an examination would reveal Alzheimer's disease, yet he realized that he had to find out whether this was the problem.

High anxiety levels may result in such mental efficiency problems as slowing, scrambled or blocked thoughts and words, and memory failure (Buckelew and Hannay, 1986; G.D. King et al., 1978; J.E. Mueller, 1979; Sarason et al., 1986); they enhance distractibility (Eysenck, 1991) and are exacerbated by depression (Kizilbash et al., 2002, see p. 128). High levels of test anxiety have been shown to affect adversely performance on many different kinds of mental ability tests (C. Fletcher et al., 1998; Minnaert, 1999; Musch and Broder, 1999; Oliver, 1999). Specific memory dysfunction in some combat survivors (Yehuda et al., 1995) and exacerbation of cognitive deficits following TBI (Bryant and Harvey, 1999a,b; McMillan, 1996b) have been associated with posttraumatic stress disorder (see also p. 175). However, these effects—and posttraumatic stress disorder—are far from common responses to difficult situations (M. Bowman, 1997). Some studies found that anxiety and emotional distress (in TBI patients, Gasquoine, 1997b; in "healthy men," Waldstein et al., 1997; in open-heart surgery candidates, Vingerhoets, De Soete, and Jannes, 1995) and "emotional disturbances"

(in psychiatric patients without brain damage as well as TBI patients, Reitan and Wolfson, 1997b) do not appear to affect cognitive performances. When anxiety contributes to distractibility, anxiety effects may be reduced by instructions that help to focus the examinee's attention on the task at hand (Sarason et al., 1986) or by tasks which so occupy the subject's attention as to override test anxiety (J.H. Lee, 1999).

Depression and frustration

Depression is associated with many brain disorders and may be due to any combination of "neuroanatomic, neurochemical, and psychosocial factors" (Rosenthal, Christensen, and Ross, 1998; Sweet, Newman, and Bell, 1992; see pp. 329–331, 332–333). It can interfere with the motivational aspects of memory in that the patient simply puts less effort into the necessary recall. Prospective memory may be particularly vulnerable to this aspect of a depressed mental state (Hertel, 2000). Moreover, depression and frustration are often intimately related to fatigue in many ill patients, with and without brain disorders (Akechi et al., 1999); and the pernicious interplay between them can seriously compromise the patient's performance (Kaszniak and Allender, 1985; Lezak, 1978b). Fatigue-prone patients will stumble more when walking, speaking, and thinking and become more frustrated, which in turn drains their energies and increases their fatigue. This results in a greater likelihood of failure and leads to more frustration and eventual despair. Repeated failure in exercising previously accomplished skills, difficulty in solving once easy problems, and the need for effort to coordinate previously automatic responses can further contribute to the depression that commonly accompanies brain disorders. After a while, some patients quit trying. Such discouragement usually carries over into their test performances and may obscure cognitive strengths from themselves as well as the examiner.

When examining brain injured patients it is important to deal with problems of motivation and depression. Encouragement is useful. The examiner can deliberately ensure that patients will have some success, no matter how extensive the impairments. Frequently the neuropsychologist may be the first person to discuss the patient's feelings and particularly to give reassurance that depression is natural and common to people with this condition and that it may well dissipate in time. Many patients experience a great deal of relief and even some lifting of their depression by this kind of informational reassurance.

The examiner needs to form a clear picture of a depressed patient's state at the time of testing, as a mild depression or a transiently depressed mood state is less likely to affect test performance than a more severe one. Depression can—but will not necessarily—interfere with performance due to distracting ruminations (Sarason et al., 1986) and/or response slowing (Kalska et al., 1999) and, most usually, some learning deficits (Goggin et al., 1997; D.A. King and Caine, 1996; Rosenstein, 1998). However, cognitive performances by most depressed patients, whether brain damaged or not, may not be affected by the depression (Reitan and Wolfson, 1997b; Rohling et al., 2002), and even major depression may not add to neuropsychological impairments (Crews et al., 1999; J.L. Wong, Wetterneck, and Klein, 2000). In TBI patients, depressive effects on cognition tend to appear as very mild diminution of "visual attention and psychomotor skills," but the more severely injured the patient, the less likely will there be such effects (E.M.S. Sherman et al., 2000). However, when depression is compounded by anxiety, learning efficiency was compromised for a large sample of noninjured Vietnam veterans (Kizilbash et al., 2002). Sweet and his colleagues (1992) caution examiners not to use mildly depressed scores on tests of attention or memory as evidence of a brain disorder in depressed patients, but rather to look for other patterns of disability or signs of dysfunction.

Patients in litigation

Providing evaluations for legal purposes presents special challenges. Because the findings in forensic cases are prepared for nonclinicians, the conclusions should be both scientifically defensible and expressed or explained in lay terms. Moreover, at least the major portion of the examination procedures should have supporting references available (see Daubert v. Merrell Dow Pharmaceuticals, 509 US 579 [1993]). Fulfilling these requirements may be difficult because of the nature of the patient's impairment. The most important data may be behavioral or qualitative, such as apathy or changes in comportment associated with frontal lobe injuries, and thus appear "subjective." In these cases, conclusions can be supported by information obtained from persons close to the patient, such as a spouse or intimate friend, and should be explainable in terms of known brain–behavior relationships and reports in the literature rather than deviant test scores. The following discussion summarizes assessment issues and does not cover testifying as an expert witness, court proceedings, or other legal issues (for a full discussion, see Murrey, 2000a).

When a psychologist is retained to examine a person involved in litigation, this arrangement may alter the examiner's duties to the patient as well as the rules of confidentiality (L.M. Binder and Thompson, 1995). Examiners may be asked to have an observer during the

examination. Having a third party present can change the climate of the examination by making the patient self-conscious, inducing the patient to perform in a manner expected by the observer, or producing the possibility of distractions that normally would not exist (McCaffrey, Fisher, et al., 1996; McSweeny, Becker, et al., 1998). Kehrer and her colleagues (2000) found "a significant observer effect . . . on tests of brief auditory attention, sustained attention, speed of information processing, and verbal fluency." These workers recommend "caution . . . when any observer is present (including trainees)." For these reasons, the National Academy of Neuropsychology (NAN) Policy and Planning Committee (2000a) strongly recommends that third party observers be excluded from the examination. Additionally, the NAN committee pointed out that having a nonpsychologist present violates test security, which is also a concern of test publishers.

In my experience [mdl], if the examiner is adamant about not allowing an observer into the examining room and explains the reasons for protecting the subject and the test materials from an invasive intrusion, most lawyers will usually agree to these requirements and, if the issue must be adjudicated, the court will usually support this protection. If not, the examiner must decide whether to accede to this request or not; and if not, the examiner must be willing to relinquish this case to another who would accept such an intrusion (see also McCaffrey, Fisher, et al., 1996). Although recording the examination on tape may seem to be a realistic alternative to having an observer present, test security is necessarily compromised by such an arrangement and the possibly distractive effects of taping on the patient are unknown.

Often, forensic evaluations are lengthy due to the perceived need to be thorough. It is particularly important in injury cases that the premorbid status of the patient be established with as much evidence as possible. The examiner should have an understanding of the base rates of the neurobehavioral symptoms relevant to the case at hand (Lees-Haley, 1997; Rosenfeld et al., 2000; Yedid, 2000b).

In choosing tests, preference should be given to well-known ones with appropriate normative data and, as much as possible, known rates of error. As is true for clinical evaluations, when performance below expectation is observed on one test, the reliability of the finding should be assessed using other tests requiring similar cognitive skills. Every effort should be made to understand discrepancies so that spurious findings can be distinguished from true impairment. Emotional problems frequently complicate the patient's clinical picture. The patient's emotional and psychiatric status should be assessed in order to appreciate potential contributions of depression, anxiety, or psychotic thinking to test performance.

When performance below expectation is observed, the examiner should assess the patient's motivation and cooperation and, most notably, the possibility that the subject has wittingly (i.e., malingering) or unwittingly exaggerated present symptoms or introduced imagined ones (Yedid, 2000a). Intentionally feigning or exaggerating symptoms typically occurs in the context of potential secondary gain, which may be financial or psychological (e.g., perpetuating a dependency role) (Pankratz, 1998).

Tests have been developed to measure response bias and, especially, deliberate malingering (see Chapter 20). However, the determination of malingering or other response bias must be based on overall clinical evaluation (Frederick et al., 1994). Alternative explanations for poor performance on these tests should be considered, such as anxiety, perplexity, fatigue, misunderstanding of instructions, or fear of failure. Moreover, for some patients—and especially with some tests—poor performance may only reflect a significant memory or perceptual disorder. Estimates of base rates of malingering vary from clinician to clinician but average around 17% in the forensic setting, about 10% in some clinical settings (Rosenfeld et al., 2000). When base rates are this low, the positive predictive accuracy of tests can be unacceptably low, so caution is advised in interpreting scores of malingering tests.

Most tests of motivation examine one or another aspect of memory because of the prevalence of memory complaints in patients who have had any kind of damage to the brain. Tests of motivation involving other cognitive domains are scarce, although data from research studies suggest models (see Pankratz, 1983, 1998).

Neuropsychological evaluations may be requested to provide evidence for competency determinations, which are made by the court. The purpose of the evaluation and the consequences of impaired performance should be explained to the examinee. Although the risk of antagonizing some people exists, they need to understand that it is important for them to give their best effort in the examination. Test selection should be based on the particular competency in question (see p. 700ff for a discussion of tests for competency). Most competency judgments require that the person has good reality contact, general orientation to time, memory for pertinent personal information, and intact reasoning and judgment including appreciation of one's condition, situation, and needs. Competency evaluations in criminal cases may involve assessing culpable state of mind or competency to stand trial. The former requires assessment of a defendant's intent to do something wrong while the latter involves assessing whether a defendant is able to understand the nature of the charges and assist in the defense of the case.

The same person may be examined by more than one psychologist within a short period of time when attorneys are seeking to make their case as convincing as possible or when opposing attorneys each request an examination. Since practice effects can be substantial, the second psychologist will want to know which tests have already been given so that alternate tests may be selected, or areas of underrepresentation at the first examination may be appropriately explored. When this information is not available, the examiner needs to ask the patient if the test materials are familiar, and if so, arrange to see the previous examination's data before preparing a report. Interpretation of repeated tests is more accurate if their practice effects are known (McCaffery, Duff, and Westervelt, 2000a,b).

Neuropsychologists are bound to provide an objective evaluation and to present the findings and conclusions in an unbiased manner. Awareness of the pressures in the forensic setting can help them avoid bias (Van Gorp and McMullen, 1997).

MAXIMIZING THE PATIENT'S PERFORMANCE LEVEL

> The goal of testing is always to obtain the best performance the patient is capable of producing.
>
> *S.R. Heaton and R.K. Heaton, 1981*

It is not difficult to get a brain damaged patient to do poorly on a psychological examination, for the quality of the performance can be exceedingly vulnerable to external influences or changes in internal states. All an examiner need do is make these patients tired or anxious, or subject them to any one of a number of distractions most people ordinarily do not even notice, and their test scores will plummet. In neuropsychological assessment, the difficult task is enabling the patient to perform as well as possible.

Eliciting the patient's maximum output is necessary for a valid behavioral assessment. Interpretation of test scores and of test behavior is predicated on the assumption that the demonstrated behavior is a representative sample of the patient's true capacity in that area. Of course, it is unlikely that all of a person's ability to do something can ever be demonstrated; for this reason many psychologists distinguish between a patient's level of test performance and an estimated ability level. The practical goal is to help patients do their best so that the difference between what they can do and how they actually perform is negligible.

Optimal versus Standard Conditions

In the ideal testing situation, both *optimal* and *standard* conditions prevail. Optimal conditions are those that enable patients to do their best on the tests. They differ from patient to patient, but for most brain injured patients they include freedom from distractions, a nonthreatening emotional climate, and protection from fatigue. Standard conditions are prescribed by the test-maker to ensure that each administration of the test is as much like every other administration as possible so that scores obtained on different test administrations can be compared. To this end, many test-makers give detailed directions on the presentation of their test, including specific instructions on word usage, handling the material, etc. Highly standardized test administration is necessary when using norms of tests that have a fine-graded and statistically well standardized scoring system, such as the Wechsler Intelligence Scale tests. By exposing each patient to nearly identical situations, the standardization of testing procedures also enables the examiner to discover the individual characteristics of each patient's responses.

Normally, there need be no conflict between optimal and standard conditions. When brain impaired patients are tested, however, a number of them will be unable to perform well within the confines of the standard instructions.

For some patients, the difficulty may be in understanding the standard instructions. Instructional problems can occur on memory tests with concrete-minded or poorly inhibited brain injured patients. When given a list of numbers or words, some patients are apt to begin reciting the items one right after the other as the examiner is still reading the list. Additional instructions must be given if the patient is to do the test as originally conceived and standardized. In these cases, patients' immediate repetition may spoil the ready-made word or number series. When giving these kinds of memory tests, it is helpful to have a substitute list handy, particularly if the examiner does not plan to see the patient at a later date. Otherwise, the identical list can be repeated later in the examination, with the necessary embellishments to the standard instructions.

To provide additional information on immediate memory and allow the examiner to verify comprehension of test questions, the examiner can ask patients to repeat the question when erroneous responses sound as if they have forgotten or misheard elements of the question. It is particularly important to find out what patients understood or retained when their response is so wide of the mark that it is doubtful they were answering the question the examiner asked. In such cases, subtle attention, memory, or hearing defects may emerge; or if the wrong answer was due to a chance mishearing of the question, the patient has an opportunity to correct the error and gain the credit due.

Many other comprehension problems of these kinds are peculiar to brain injured patients. A little more flexibility and looseness in interpreting the standard procedures are required on the examiner's part to make the most of the test and elicit the patient's best performance. "The same words do not necessarily mean the same thing to different people and it is the meaning of the instructions which should be the same for all people rather than the wording" (M. Williams, 1965, p. xvii).

The examination of these patients can pose still other problems. Should a patient not answer a question for 30 seconds or more, the examiner can ask the patient to repeat it, thus finding out if lack of response is due to inattention, forgetting, slow thinking, uncertainty, or unwillingness to admit failure. When the patient has demonstrated a serious defect of attention, immediate memory, or capacity to make generalizations, it is necessary to repeat the format each time one of a series of similar questions is asked. For example, if the patient's vocabulary is being tested, the examiner must ask what the word means with every new word, for the subject may not remember how to respond without prompting at each question.

Scoring questions arise when the patient gives two or more responses to questions that have only one correct or one best response. When one of the patient's answers is correct, the examiner should invite the patient to decide which answer is preferred and then score accordingly.

Timing presents even greater and more common standardization problems than incomprehension in that both brain impaired and elderly patients are likely to do timed tests slowly and lose credit for good performances. Many timing problems can be handled by testing the limits. With a brain damaged population and with older patients (Storandt, 1977), many timed tests should yield two scores: the score for the response within the time limit and another for the performance regardless of time (e.g., see Corkin, Growdon, Desclos, and Rosen, 1989).

Nowhere is the conflict between optimal and standard conditions so pronounced or so unnecessary as in the issue of emotional support and reassurance of the test-taking patient. For many examiners, standard conditions have come to mean that they have to maintain an emotionally impassive, standoffish attitude toward their patients when testing. The stern admonitions of test-makers to adhere to the wording of the test manual and not tell the patient whether any single item was passed have probably contributed to the practice of coldly mechanical test administration.

From the viewpoint of any but the most severely regressed or socially insensitive patient, that kind of test experience is very anxiety-provoking. Almost every patient approaches psychological testing with a great deal of apprehension. Brain injured patients and persons suspected of harboring a brain tumor or some insidious degenerative disease are often frankly frightened. When confronted with an examiner who displays no facial expression and speaks in an emotionally toneless voice, who never smiles, and who responds only briefly and curtly to the patient's questions or efforts at conversation, patients generally assume that they are doing something wrong—failing or displeasing the examiner—and their anxiety soars. Such a threatening situation can compromise some aspects of the test performance. Undue anxiety certainly will not be conducive to a representative performance (Bennett-Levy, Klein-Boonschate, et al., 1994).

Fear of appearing stupid may also prevent impaired patients from showing what they can do. In working with patients who have memory disorders, the examiner need be aware that in order to save face many of them say they cannot remember not only when they cannot remember but also when they can make a response but are unsure of its correctness. When the examiner gently and encouragingly pushes them in a way that makes them feel more comfortable, most patients who at first denied any recall of test material demonstrate at least some memory.

Although standard conditions do require that the examiner adhere to the instructions in the test manual and give no hint regarding the correctness of a response, these requirements can easily be met without creating a climate of fear and discomfort. A sensitive examination calls for the same techniques the psychologist uses to put a patient at ease in an interview and to establish a good working relationship. Conversational patter is appropriate and can be very anxiety-reducing. The examiner can maintain a relaxed conversational flow with the patient throughout the entire test session without permitting it to interrupt the administration of any single item or task. The examiner can give continual support and encouragement to the patient without indicating success or failure by smiling and rewarding the patient's *efforts* with words such as "Good," "Fine," and "You're doing well" or "You're really trying hard!" Examiners who distribute praise randomly and not just following correct responses are no more giving away answers than if they remained stonily silent throughout (M.B. Shapiro, 1951). However, the patient feels comforted, reassured about doing something right and pleasing—or at least not displeasing—the examiner.

The examiner who has established this kind of warmly supportive atmosphere can discuss with patients their strengths, weaknesses, and specific problems as these appear in the course of the examination. Interested, comfortable patients will be able to provide the examiner with information about their functioning that they might otherwise have forgotten or be unwill-

ing to share. They will also be receptive to the examiner's explanations and recommendations regarding the difficulties that they are encountering and are exploring with the examiner. The examination will have been a mutual learning and sharing experience.

When Optimal Conditions Are Not Best

Some patients who complain of significant problems attending, learning, and responding efficiently in their homes or at work perform well in the usual protective examination situation. Their complaints, when not supported by examination findings, may become suspect or be interpreted as signs of some emotional disturbance brought on or exacerbated by a recent head injury or a chronic neurologic disease. Yet the explanation for the discrepancy between their complaints and their performance can lie in the calm and quiet examining situation in which distractions are kept to a minimum. This contrasts with their difficulties concentrating in a noisy machine shop or buzzing busy office, or keeping thoughts and perceptions focused in a shopping mall with its flashing lights, bustling crowds, and piped-in music from many—often conflicting—sources. Of course an examination cannot be conducted in a mall. However, the examiner can usually find a way to test the effects of piped-in music or distracting street or corridor noises on a patient's mental efficiency. Those examiners whose work setting does not provide a sound-proofed room with controlled lighting and no interruptions may not always be able to evoke their patients' best performance, but they are likely to learn more about how the patients perform in real life.

Talking to Patients

With few exceptions, examiners will communicate best by keeping their language simple. Almost all of the concepts that professionals tend to communicate in technical language can be conveyed in everyday words. It may initially take some effort to substitute "find out about your problem" for "differential diagnosis" or "loss of sight in the left half of each of your eyes" for "left homonymous hemianopsia" or "difficulty thinking in terms of ideas" for "abstract conceptualization." Examiners may find that forcing themselves to word these concepts in their native tongue may add to their understanding as well. Exceptions to this rule may be those brain damaged patients who were originally well endowed and highly accomplished, for whom complex ideation and an extensive vocabulary came naturally, and who need recognition of their premorbid status and reassurance of residual intellectual competencies. Talking at their educational level conveys this reassurance and acknowledges their intellectual achievements implicitly and thereby even more forcefully than telling them.

Now for some "don'ts." Don't "invite" patients to be examined, to take a particular test or, for that matter, to do anything they need to do. If you invite people to do something or ask if they would care to do it, they can say "no" as well as "yes." Once a patient has refused you have no choice but to go along with the decision since you offered the opportunity. Therefore, when patients must do something, tell them what it is they need to do as simply and as directly as you can.

I have a personal distaste for using expressions such as "I would like you to . . . " or "I want you to . . . " when asking patients to do something [mdl]. I feel it is important for them to undertake for their own sake whatever it is the clinician asks or recommends and that they not do it merely or even additionally to please the clinician. Thus, I tell patients what they need to do using such expressions as, "I'm going to show you some pictures and your job is to . . . " or, "When I say 'Go,' you are to. . . . "

My last "don't" also concerns a personal distaste, and that is for the use of the first person plural when asking the patient to do something: "Let's try these puzzles" or "Let's take a few minutes' rest." The essential model for this plural construction is the kindergarten teacher's directive, "Let's go to the bathroom." The usual reason for it is reluctance to appear bossy or rude. Because it smacks of the kindergarten and is inherently incorrect (the examiner is not going to take the test nor does the examiner need a rest from the testing), sensitive patients may feel they are being demeaned.

CONSTRUCTIVE ASSESSMENT

Every psychological examination can be a personally useful experience for the patient. Patients should leave the examination feeling that they have gained something for their efforts, whether it was an increased sense of dignity or self-worth, insight into their behavior, or constructive appreciation of their problems or limitations.

When patients feel better at the end of the examination than they did at the beginning, the examiner has probably helped them to perform at their best. When they understand themselves better at the end than at the beginning, the examinations were probably conducted in a spirit of mutual cooperation in which patients were treated as reasoning, responsible individuals. It is a truism that good psychological treatment requires continuing assessment. By the same token, good assessment will also contribute to each patient's psychological well-being.