

INTERNATIONAL NEUROPSYCHOLOGICAL SOCIETY

Educational Learning Objectives for Dr. Lezak

If you are a 3-hour course presenter, include at least three statements of learning objectives. If you are a seminar presenter, include two statements of learning objectives. Objectives indicate what the participant should expect to learn and often begin with words such as cite, describe, recognize, and identify. These objectives will be included on evaluation sheets and the participant needs to know what they can expect in the summary so that they can evaluate their learning after the presentation.

Differentiate memory complaints resulting from attentional disorders from memory system defects.

1. _____

Be able to provide at least two counseling recommendations that can help patients with diffuse cerebral disorders reduce verbal communication problems.

2. _____

3. _____

MEMORY COMPLAINTS THAT ARE NOT MEMORY PROBLEMS:

IDENTIFICATION, EVALUATION, & COUNSELING

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I. THE DISORDERS UNDER CONSIDERATION

- A. TRAUMATIC BRAIN INJURY (TBI)
- B. MULTIPLE SCLEROSIS
- C. DIFFUSE ENCEPHALOPATHIES
 - ▶ toxic conditions
 - ▶ infectious diseases

II. THE CONDITION UNDERLYING MEMORY COMPLAINTS IN THE ABSENCE OF MEMORY SYSTEM DISORDERS

SLOWED MENTAL PROCESSING -->
ATTENTIONAL DEFICITS

III. FREQUENCY OF THESE COMPLAINTS WHEN THE MEMORY SYSTEM IS INTACT

Patients without motor problems or aphasia, ages 17-69: $n = 50$
Patients who complain of memory problems: $n = 46/50$

Etiology	MVA	Falls & blows	Toxic	Infection
Mem OK				
Yes	12	8	3	1
No	14	3	1	2
%OK	46	73	75	33

Total complainers without memory problems = 24, % = 55

IV. ATTENTIONAL DEFICITS COMMON TO PATIENTS WITH DIFFUSE CEREBRAL DISORDERS

- A. REDUCED ATTENTION SPAN
- B. CONCENTRATION PROBLEMS, WHICH INCLUDE DISTRACTIBILITY
- C. IMPAIRED WORKING MEMORY
- D. MENTAL TRACKING DEFICITS

* IN ADDITION: COMPROMISED VERBAL RETRIEVAL ABILITY

A. REDUCED ATTENTION SPAN

1. SOME INDICES OF A NORMAL ATTENTION SPAN

- ▶ ADULTS UP TO AGE 70 CAN . . .
 - repeat at least six digits forward
 - repeat at least 6 or 7 words out of a list of 15
 - repeat a sentence of at least 20 or 21 syllables

2. A REDUCED ATTENTION SPAN CAN SHOW UP IN MANY WAYS

EXAMPLE: *Arithmetic Test* (Wechsler Intelligence Scales)

QUESTION: "How much change will you receive if you buy
7 two-cent stamps and give the clerk a half-dollar?"

ANSWER: "86 cents!"

3. EXAMINING THE SPAN OF ATTENTION

- ▶ USE TESTS CALLING FOR IMMEDIATE REPETITION:
numbers, words, sentences, little stories
- ▶ CONFIRM THE FINDINGS BY:
 - observations of the patient
 - the details of the patient's complaints
 - reports from persons close to the patient

4. TO AMELIORATE PROBLEMS DUE TO A REDUCED ATTENTION SPAN

▶ ADVICE FOR PATIENTS

- You have a tendency to make mistakes in what you hear
- Ask people close to you to speak slowly and in short sentences
- When in doubt about what you have heard--or when it is important to be accurate--repeat what you think you have heard so that the speaker can correct you if needed

▶ ADVICE FOR PERSONS CLOSE TO THESE PATIENTS

- Don't argue about "who said what;" rather try to clarify misunderstandings
- Speak slowly and in short sentences
- Repeat important information and ask patients to repeat what they heard so that misunderstandings can be corrected

B. CONCENTRATION PROBLEMS, INCLUDING DISTRACTIBILITY

1. THESE PATIENTS COMPLAIN THAT THEY

- can't remember where they put (keys, glasses, etc.)
- are no longer able to shop in a bustling supermarket
- are no longer able to enjoy being in a noisy pub or lounge
- no longer enjoy social affairs (e.g., cocktail parties)

2. EXAMINING FOR CONCENTRATION AND DISTRACTIBILITY PROBLEMS

- ▶ the importance of OBSERVATIONS
- ▶ the *Stroop Test*

3. TO AMELIORATE CONCENTRATION AND DISTRACTIBILITY PROBLEMS

▶ ADVICE FOR PATIENTS:

- Don't do more than one thing at a time
- Work (as is possible) in a quiet environment
- Turn off the television and radio when not using them
- Continue your social life but in quiet places and with not more than six people at a time

▶ ADVICE FOR PERSONS CLOSE TO THESE PATIENTS

- Don't interrupt the patient when he/she is involved in an activity
- Keep the sound level down at home
- Turn off the television and radio when not using them
- Plan social activities for no more than six people and in quiet places

C. IMPAIRED WORKING MEMORY

1. THESE PATIENTS COMPLAIN THAT
 - they can no longer do or think of two or more things at a time
 - they have memory problems
 - they make more errors than normally expected
2. EXAMINING FOR WORKING MEMORY IMPAIRMENTS
 - ▶ note repetitions when reciting lists
 - ▶ *Consonant Trigrams*
3. TO AMELIORATE AN IMPAIRED WORKING MEMORY
 - ▶ Encourage these patients to check their work product for errors
 - ▶ Remind them to avoid doing more than one thing at a time

D. MENTAL TRACKING DEFICITS

1. THESE PATIENTS COMPLAIN THAT
 - ▶ they can't do or think of two or more things at a time
 - ▶ they have memory problems
 - ▶ they make more errors than normally expected
2. EXAMINING FOR MENTAL TRACKING DEFICITS
 - ▶ these patients have difficulty registering what they said while they are saying it, and will repeat themselves
 - ▶ tracking tests:
 - Mental: serial calculations, *PASAT*
 - Complex: Trail Making Test
3. TO AMELIORATE MENTAL TRACKING PROBLEMS
 - ▶ Help these patients to develop habitual routines
 - ▶ Advise them to use the computer as a visual guide

* FOR COMPROMISED VERBAL RETRIEVAL ABILITY

1. IDENTIFYING VERBAL RETRIEVAL PROBLEMS
 - ▶ observations: these patients tend to
 - hesitate in the middle of a sentence
 - use circumlocutions or generalizable words (e.g., "things")

- substitute a reference to its use for the missing word
- are not able to answer questions for which they know the answer (e.g.: a high school graduate who can not locate Brazil)

2. EXAMINING FOR VERBAL RETRIEVAL PROBLEMS

- ▶ give a naming test (e.g., *Boston Naming Test*)
- ▶ use recognition techniques when patients cannot name what they say they know

EXAMPLE: *Information Test* (Wechsler Intelligence Scales)

QUESTION: "What is capital of Italy"

PATIENT: "I know it; I just can't think of it."

EXAMINER WRITES OUT: Naples Rome Paris Milan

AND ASKS PATIENT TO POINT TO THE ANSWER

3. TO AMELIORATE VERBAL RETRIEVAL PROBLEMS

- ▶ Encourage patients to:
 - practice the art of circumlocation
 - try to find a substitute word
 - avoid anxiety and fatigue

V. EMOTIONAL CONSEQUENCES OF SLOWED PROCESSING/ATTENTIONAL DEFICITS

A. EMOTIONAL DISTRESS

- ▶ Perplexity
- ▶ Anxiety
- ▶ Fatigue
- ▶ Irritability
- ▶ Social withdrawal
- ▶ DEPRESSION

B. COUNSELING FOR EMOTIONAL DISTRESS ASSOCIATED WITH PSEUDO-MEMORY PROBLEMS

- ▶ Emphasize: your problem is due to **mental inefficiency**, not **stupidity!**
- ▶ Avoid fatigue
- ▶ "Sterilize" workplace as much as possible
- ▶ Let people know about the problem & how they can help you to maximize your efficiency
- ▶ Emphasize: YOU ARE NOT CRAZY!

ONE IMPORTANT *DO* AND *DON'T* FOR ALL PATIENTS WITH MEMORY COMPLAINTS:

DO USE A MEMORANDA-DATE BOOK TO AID RECALL

DON'T USE STICKIES

* * * *

REGARDLESS OF THE ETIOLOGY OF MEMORY COMPLAINTS,

EXAMINE ATTENTIONAL FUNCTIONS CAREFULLY

- * Attentional deficits may be contributing to the severity of the problem
- * When attentional deficits are identified, approaches to ameliorating the patient's memory complaints have also been identified

MEMORY COMPLAINTS THAT ARE NOT MEMORY PROBLEMS:
IDENTIFICATION, EVALUATION, & COUNSELING

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Several commonly occurring brain disorders may produce similar cognitive deficits which patients--and people close to them--tend to interpret as memory problems. Probably the most common is **traumatic brain injury**: these complaints arise primarily when the trauma is relatively mild such that damage is mostly limited to concussive effects without significant compromise of either the memory system or self-awareness. **Multiple sclerosis** patients, too, frequently complain of memory disorders when formal memory testing demonstrates intact or relatively intact information acquisition and storage abilities. What these two disorders have in common are small lesions diffused throughout cerebral white matter. Other kinds of diffuse encephalopathies--such as certain **neurotoxic** and **infectious** conditions--may also result in cognitive dysfunctions which patients frequently believe are disorders of memory.

Assessment of these patients typically demonstrates slowed mental processing (Filley, 1995; Van Zomeren & Brouwer, 1994). Slowing shows up primarily in attentional deficits which are experienced by the patient--and interpreted by the patient's family--as memory problems (Gronwall, 1991). When these patients' ability for verbal learning and retention was assessed by the Recognition trial of the *Auditory Verbal Learning Test* (Lezak, 1995) or the *California Verbal Learning Test* (Delis, Kramer, Kaplan, & Ober, 1987), they performed within normal limits for their age (Schmidt, 1996). (In using only the Recognition trial, patient problems with retrieval, auditory span, concentration, and other attentional components--i.e., with the problems giving rise to their memory complaints--were essentially bypassed.) Of 50 patients with presumed diffuse brain damage (24 MVA; 11 other brain trauma; 4 toxic encephalitis; 3 infections), 46 complained of memory problems; and of these, 24 (55%) did not have verbal learning deficits. However, they all did have one or more of the following attentional deficits: reduced attention span; concentration problems, including distractibility, impaired working memory, mental tracking deficits. In addition, some had compromised verbal retrieval ability.

Reduced attention span

This is among the most common problems presented by these adult patients. Reduced attention span shows up in inability to perform one or more of the following tasks, at least until age 70: repeat at least six digits forward; repeat at least 6 or 7 words of a list of 15 read at a one/sec rate; repeat a sentence of at least 20 or 21 syllables--most usually when required to repeat a sentence accurately (Spren & Strauss, 1998). On formal testing, this problem becomes evident when the patient mishears a fairly lengthy or complex statement. One example, from the

WAIS-R Arithmetic Test: when asked how much change to expect from a half-dollar after making a 14¢ purchase, these patients unhesitatingly say, 86¢, missing the critical word **half** but performing the problem correctly.

Tests calling for immediate repetition of what is heard provide a good evaluation of attention span. Thus, digit repetition, word lists, sentence recall, and little stories are the most usual techniques for the clinical examination of attention span and all four testing formats should be used when the patient complains of a memory problem or the patient's condition probably involves diffuse white matter dysfunction. When testing suggests an attention span problem, this should be confirmed in interview with the patient and, whenever possible, with persons close to the patient. The examiner can ask the patient and family member or friend whether they have disagreements about who said what; typically, the family member or friend will report such disagreements, which til now have been interpreted as "forgetting" on the part of the patient. The examiner must explain to the patient and family/friend how reduced attention span--typically, reduced auditory span--results in the patient simply **not grasping** all of the information that is relayed. These patients remember what they have been able to process, but critical items--dates, times, negatives--often slip by due to slowed processing, and result in misunderstandings. After experiencing enough of these misunderstandings, both patients and their families become convinced that they are dealing with a memory problem.

To ameliorate problems due to a reduced attention span:

- ▶ **ADVICE FOR PATIENTS**
 - You have a tendency to make mistakes in what you hear
 - Ask people close to you to speak slowly and in short sentences
 - When in doubt about what you have heard--or when it is important to be accurate--repeat what you think you have heard so that the speaker can correct you if needed

- ▶ **ADVICE FOR PERSONS CLOSE TO THESE PATIENTS**
 - Don't argue about "who said what"; rather, try to clarify misunderstandings
 - Speak slowly and in short sentences
 - Repeat important information and ask patients to repeat what they heard so that misunderstandings can be corrected

Concentration problems, including distractibility

These patients can usually be identified within minutes of their complaint recital, as they frequently begin by reporting that they can't remember where they put keys, glasses, checkbooks, etc. On questioning these are the patients who can no longer tolerate being in a supermarket or

mall, who don't enjoy being in noisy restaurants or pubs as they once had, and who find large family gatherings or cocktail parties unpleasant and fatiguing. They "lose" things because their attention switches to something else as they lay down the "lost" object (e.g., spouse calling to them as they walk into the house with the keys in hand, telephone ringing as they go to the bookcase holding their glasses). On observation, their train of thought may be interrupted by a slamming door or outside siren; questioning by the examiner may distract them from their topic; and when problem of concentration/distractibility is severe, they may interrupt themselves or frequently lose track of what they were saying.

By and large, the generally low levels of extraneous stimuli in neuropsychological examination facilities are very different from stimulus levels in these patients' more normal--noisy, bustling, potentially distracting--environments, i.e., environments in which they work or carry on many of their family activities. Thus neuropsychologist examiners do not have much opportunity to see patients' efforts and failures in dealing with the source of their problem: their difficulty in processing complex information from a variety of simultaneous and competing stimuli when slowed processing has limited their processing capacity to **one thing at a time**.

Beyond observations and the diagnostic import of their complaints, probably the most useful examination technique is the *Stroop Test** as it gets at the problem of distraction by presenting a stimulus (a color word, such as "red") in a color different than the word: the word shape tends to be prepotent relative to the color, so that when asked to name colors, the printed words interfere with naming fluency, even in cognitively intact persons (Pashler, 1998). "In addition to assessing lexical response speed to printed words and color, the measure evaluates the ability to focus attention on one aspect of a stimulus, while inhibiting a normally more automatic response" (Mirsky, Fantie, & Tatman, 1995). However, this interference effect is much greater in patients with concentration and/or distractibility problems than in normal control subjects (Dodrill, 1999; Sohlberg & Mateer, 1994; Van Zomeren & Brouwer, 1994).

*Patients who display abnormal slowing on the interference trial typically do not differ greatly from persons who perform within normal limits for the first minute or so, but rather slowing and errors become increasingly evident only after this. Thus, tests with only 100 or fewer items will be relatively insensitive to this phenomenon. Dodrill's 176 item format is more likely to demonstrate this problem. This test format can be ordered from Carl Dodrill, Ph.D., Epilepsy Ctr., Box 359745, Harborview Hospital, 325 Ninth Ave., Seattle, WA 98104-2499; \$30 for all the necessary material including norms.

To ameliorate concentration and distractibility problems:

- ▶ ADVICE FOR PATIENTS:
 - Don't do more than one thing at a time
 - Work (as is possible) in a quiet environment
 - Turn off the television and radio when not using them
 - Continue your social life but in quiet places and with not more than six people at a time

- ▶ ADVICE FOR PERSONS CLOSE TO THESE PATIENTS
 - Don't interrupt the patient when he/she is involved in an activity
 - Keep the sound level down at home
 - Turn off the television and radio when not using them
 - Plan social activities for no more than six people and in quiet places

Impaired working memory

Along with their memory complaints, these patients report that they can no longer do or think of two or more things at a time. They also tend to be abnormally error-prone, a problem of which they may or may not be aware. Again, slowed processing appears to play a significant role in the degradation of working memory (D'Esposito, Onishi, Thompson, Robinson, Armstrong, & Grossman, 1996; Salthouse, 1994; Van Zomeren & Brouwer, 1994, see esp. pp. 180-181).

The direct examination of working memory uses tests such as *Consonant Trigrams*, which require the subject to keep one small set of items in mind (e.g., three consonants, three one-syllable words) while engaging briefly in a different mental activity (e.g., counting backwards) (Butters, Sax, Montgomery, & Tarlow, 1978; Eustache, Desgranges, Lalevée, 1998; Stuss, Stethem, & Poirier, 1987). (Some tests purportedly designed to elicit evidence of poor cooperation actually are tests of working memory in that they require the subject to retain some bits of information while counting backwards for designated period of time. For patients with impaired working memory, these tests inadvertently provide information about this problem although a naive examiner believing the test roots out malingerers can misinterpret findings, much to the patient's disadvantage.)

Working memory impairments also tend to show up as repetitions on tests calling for recitation of a string of words, such as the *Auditory Verbal Learning Test* or *California Verbal Learning Test*, or on verbal fluency tests, as these patients have difficulty remembering what they had said 5 or 20 secs earlier while concentrating on trying to retrieve words as directed. These repetitions should not be confused with perseverations nor should they be called perseverations: the perseverating patient will produce only a very limited range of responses and repeat them over and over again, as they have difficulty **switching** to another word. Patients

with a working memory deficit will produce a wide range of words--may even recite all of the words read to them on a learning test, and repeat only intermittently as they have difficulty keeping track of what they had just recently said. An abnormal number of repetitions may also appear on design fluency tests (e.g., *Ruff Figural Fluency Test* [Ruff, Light & Evans, 1987]; *Design Fluency* [Jones-Gotman & Milner, 1977; Varney, Roberts, Struchen, Hanson, Franzen, & Connell, 1996]), a problem shared with patients with mental tracking deficits (see below).

These patients may also make errors--unexpected for their education or career accomplishments--on written work. I find this most commonly occurring on a page of arithmetic problems I give as homework. Invariably these patients demonstrate knowledge of arithmetic procedures and numerical values; their errors result from uncorrected carelessness as they have difficulty checking their work for accuracy as they solve the problems--here, difficulty keeping in mind two mental activities at once. Errors on a paper-and-pencil arithmetic test can occur for many reasons; thus errors on such a task in themselves do not identify a working memory problem, but raise the question which the examiner must answer by evaluating the nature of the errors in the context of the patient's arithmetic competency, history, complaints, and overall test performances and examination observations.

TO AMELIORATE AN IMPAIRED WORKING MEMORY

- ▶ Encourage these patients to check their work product for errors
- ▶ Remind them to avoid doing more than one thing at a time

Mental tracking deficits

These patients too complain that they can't do or think of two or more things at a time and that they have memory problems. They are more likely to be aware of their error-prone tendencies than patients with working memory disorders. Their problem differs from a working memory deficit in that they have difficulty when required to juggle more than one idea or item--as in performing oral arithmetic sequences or mentally reversing a string of digits or the alphabet (Lezak, 1995; Williams, LaMarche, Alexander, Stanford, Fielstein, & Boll, 1996); yet they may be able to keep one idea in mind briefly while performing a different mental operation.

Formal testing may use tests involving purely mental tracking, such as asking for serial calculations (addition or subtraction, *Paced Auditory Serial Addition Test* [Gronwall, 1977]) or alternating recitation of the number and alphabet series (Grigsby, Kaye, & Busenbark, 1994), or giving a test of oral arithmetic. A visuomotor test with a mental tracking component such as the *Trail Making Test* (Lezak, 1995; Mitrushina, Boone, D'Elia,

1999) or one of its recently developed variants can also elicit mental tracking deficits. Like patients with impaired working memory, those with mental tracking deficits will tend to repeat themselves when retrieving information on verbal list learning or fluency tests.

TO AMELIORATE MENTAL TRACKING PROBLEMS

- ▶ Help these patients to develop habitual routines (e.g., always place keys in a box or drawer near the entry so that putting keys there becomes automatic)

- ▶ Advise them to use the computer as a visual guide

Verbal retrieval problems

While these do not result from attentional deficits, impaired verbal retrieval troubles many of these patients. (It is also the problem that afflicts many aging persons, frightening them into thinking they have Alzheimer's disease. This benign memory problem among older persons is easily distinguished from the more broad-ranging memory, executive, and personality symptoms that characterize even early Alzheimer's disease.) When the retrieval problem is sufficiently severe as to interfere with smooth conversation and recall of familiar names and places, patients accustomed to good verbal functioning may withdraw socially to avoid what for them has become a constant source of embarrassment. Patients who depend on verbal facility for a living, such as salespersons or teachers/trainers, may find their jobs at risk when this problem is severe.

This problem is readily observed in interview when patients stop in midsentence, talk around a missing word, or use circumlocutions or vague and generalizable substitute words for the one they can't immediately bring to mind. It also becomes apparent during testing, particularly when the response calls for a name or place; e.g., on the *Information Test (Wechsler Intelligence Scales)* a reasonably well-educated patient may be unable to say who wrote Hamlet or what city is the capital of Italy. In such cases the examiner can write out several choices (e.g., Jonson, Marlowe, Sheridan, Shakespeare; Paris, Rome, Naples, Milan) to see whether the patient can recognize the answer. Most high school graduates will identify the correct response immediately, demonstrating that they possess information they cannot retrieve reliably. Formal testing requires a naming test in which pictures of common and not-so-common objects are shown with the request to give the name. The *Boston Naming Test* format is very useful for this purpose as it offers both semantic and phonetic cues when patients cannot say the correct word within 20 secs. (Kaplan, Goodglass, & Weintraub, 1983; Spreen & Strauss, 1998). With a phonetic cue, patients with a retrieval problem will typically be able to recall five or more words they had been unable to name within the 20 sec. time limit (see Tombaugh & Hubley, 1997, for norms on cued responses).

TO AMELIORATE VERBAL RETRIEVAL PROBLEMS

- ▶ Encourage patients to:
 - practice the art of circumlocation
 - try to find a substitute word
 - avoid anxiety and fatigue

Emotional consequences of slowed processing/attentional deficits

Patients with these disorders tend to experience a considerable amount of emotional distress. This is not surprising since these problems interfere with effective communication, may jeopardize academic achievement or employability, and can have unfortunate effects on important personal relationships. Patients experiencing these problems of mental inefficiency typically interpret them not merely as memory deficits but as evidence of stupidity; they feel "stupid" and mentally inferior no matter what is their actual level of knowledge, skills, judgment, reasoning power--all those aspects of cognitive functioning that may have remained intact. Many patients with a sudden onset of this condition, as occurs in traumatic brain injuries, fearfully interpret their altered cognitive experiences as signs that they are going "crazy", exacerbating their distress.

Slowed mental processing gives rise to perplexity, the sometimes frightening sense of unsureness about what comes to mind. Anxiety seems to come with this territory: fears of becoming demented, worries about job or school, baffling misunderstandings in interpersonal interactions are just some of the reasons these patients are frequently troubled by anxiety. Because processing is slowed, it has become more effortful resulting in abnormally great vulnerability to fatigue. Irritability is a common complaint which, on questioning, typically increases as the day progresses, thus--understandably--reflecting the level of fatigue as it mounts in the course of a day. Given the self-consciousness resulting from perplexity, embarrassment over errors and diminished verbal facility, frustrations and bewilderment arising from misunderstood verbal interactions, and low tolerance for noise and bustle, social withdrawal is a natural and protective response for many of these patients. Unfortunately, poorly understood anxiety, irritability, and fatigue coupled with social withdrawal set the stage for depression which many of these patients experience at least for some time in the course of their condition.

COUNSELING FOR EMOTIONAL DISTRESS ASSOCIATED WITH PSEUDO-MEMORY PROBLEMS

- ▶ Emphasize: your problem is due to **mental inefficiency**, not **stupidity!**
- ▶ Avoid fatigue
- ▶ "Sterilize" workplace as much as possible
- ▶ Let people know about the problem & how they can help you to maximize your efficiency
- ▶ Emphasize: **YOU ARE NOT CRAZY!**

THE ONE IMPORTANT DO AND DON'T FOR ALL PATIENTS WITH MEMORY COMPLAINTS

DO USE A MEMORANDA-DATE BOOK TO AID RECALL

DON'T USE STICKIES: you'll never be able to find them

* * * *

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