Wide Range Assessment of Memory and Learning Second Edition™

Interpretive Report

by

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Client Information

Name:	Sample Client
Gender:	Female
Test Date:	04/09/2009
Birthdate:	01/01/1985
Age:	24 Years 3 Months

Use of this Interpretive Report requires a thorough understanding of the Wide Range Assessment of Memory and Learning, 2nd Ed.(WRAML2), including its administration and the various interpretations, applications, and limitations, as presented in the *WRAML2 Administration and Technical Manual*. Users should be familiar with the standardization and psychometric characteristics of the WRAML2 found in the *WRAML2 Administration and Technical Manual.* This report should be used as only one source of information about the individual being evaluated. In this respect, no decisions should be based solely on the information contained in this report. The findings and interpretive statements contained in this report should be integrated with other sources of information when making clinical decisions. The primary purpose of this report is to provide a general interpretation of the data collected to assist the clinician in the development of hypotheses about the client's learning processes and memory functioning. This report is confidential and is intended for use only by qualified professionals who have sufficient knowledge of individual testing, of cognition, and of the WRAML2. *This report should not be released to the respondent or to any individuals who are not qualified to interpret the results.*

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Version: (2.00.018)

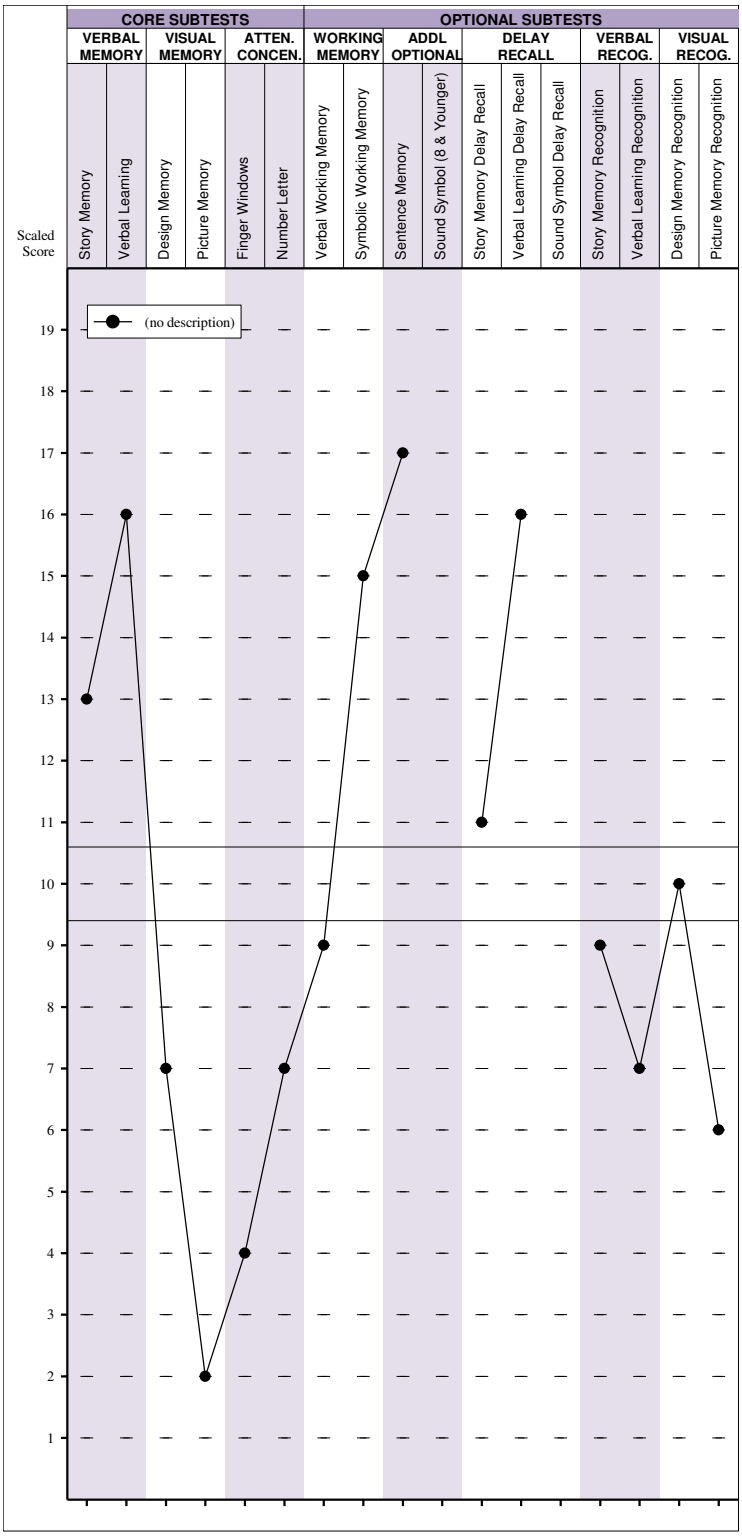
Overview

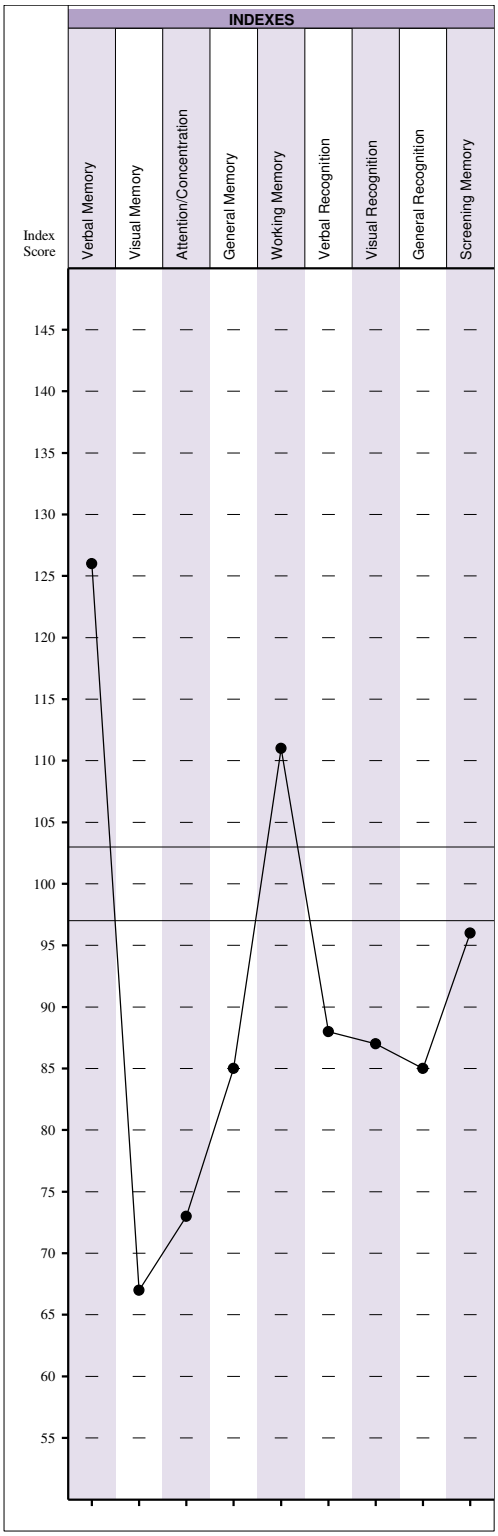
The WRAML2 is a reliable, norm-referenced test that has been nationally standardized to assess a wide range of clinical issues related to learning and memory functions. The WRAML2 is composed of six core subtests that yield three indexes: (a) the Verbal Memory Index, (b) the Visual Memory Index and (c) the Attention/Concentration Index. Together, these indexes form the General Memory Index, which is a composite of all assessed memory functions. In addition, there are several optional subtests and diagnostic procedures.

It is recommended that the WRAML2 be administered in its entirety to improve the reliability and the validity of the test results. However, time constraints sometimes may dictate that only portions of the WRAML2 can be administered. Accordingly, less confidence in results should be assumed when only a portion of the WRAML2 is administered. As indicated in the *WRAML2 Administration and Technical Manual*, reliability is highest for the General Memory Index, followed by the individual index scores and, lastly, by the individual subtest scores. When there are significant differences between index scores or when there is significant variability between subtests within an index, caution is required in interpreting the respective index, including the General Memory Index. It is important to note that the standard scores presented in this report are based on a mean of 100 and a standard deviation of 15, and scaled scores presented in this report are based on a mean of 10 and a standard deviation of 3. In addition, the following qualitative classification ranges have been created for both standard scores (Very Superior [>129], Superior [120-129], High Average [110-119], Average [90-109], Low Average [80-89], Borderline [70-79], and Impaired [<70]) and scaled scores (High Average [>12], Average [8-12], Borderline/Low Average [4-7], and Impaired [<4]).

Sample Client is a 24-year-old Female. She was administered subtests of the WRAML2 on 04/09/2009.

This administration of the WRAML2 included the following subtests:	
Core subtests	
Story Memory	Administered
Verbal Learning	Administered
Design Memory	Administered
Picture Memory	Administered
Number Letter	Administered
Finger Windows	Administered
Optional subtests	
Delay Recall subtests	
Story Memory Delay Recall	Administered
Verbal Learning Delay Recall	Administered
Sound Symbol Delay Recall	Not appropriate for age
Recognition subtests	
Story Memory Recognition	Administered
Verbal Learning Recognition	Administered
Design Memory Recognition	Administered
Picture Memory Recognition	Administered
Working Memory subtests	
Verbal Working Memory	Administered
Symbolic Working Memory	Administered
Additional subtests	
Sound Symbol	Not appropriate for age
Sentence Memory	Administered


CORE SUBTESTS
OPTIONAL SUBTESTS
VERBAL MEMORY
VISUAL MEMORY
ATTEN. CONCEN.
WORKING MEMORY
ADDL OPTIONAL
DELAY RECALL
VERBAL RECOG.
VISUAL RECOG.
Scaled Score
Story Memory
Verbal Learning
Design Memory
Picture Memory
Finger Windows
Number Letter
Verbal Working Memory
Symbolic Working Memory
Sentence Memory
Sound Symbol (8 & Younger)
Story Memory Delay Recall
Verbal Learning Delay Recall
Sound Symbol Delay Recall
Story Memory Recognition
Verbal Learning Recognition
Design Memory Recognition
Picture Memory Recognition
(no description)
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1


INDEXES
Index Score
Verbal Memory
Visual Memory
Attention/Concentration
General Memory
Working Memory
Verbal Recognition
Visual Recognition
General Recognition
Screening Memory
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55

Core Index Scores

Index	Sum of scaled scores	Index score	Confidence interval	Percentile rank
Verbal Memory	29	126	118-132	96
Visual Memory	9	67	61-77	1
Attention/Concentration	11	73	66-84	4
General Memory	49	85	79-92	16

General Memory Index (GMI)

The General Memory Index is the sum of three separate indexes: the Verbal Memory Index, the Visual Memory Index, and the Attention/Concentration Index. Each index is composed of two subtest scores. Thus, if all six core subtests were administered, individual indexes and the General Memory Index were calculated.

Sample Client's General Memory Index of 85 (90% CI: 79-92; Percentile rank: 16) was found to be within the Low Average range. This suggests overall memory functioning was found to be performing at lower levels than those of adults of similar age. That is, the General Memory Index suggests that Sample Client will perform at lower levels than her age group for tasks that require verbal and visual memory skills and across tasks that are dependent on contextualized and rote memory. Generally, compared with Sample Client's age group, new learning and retention will be weak and will have a noticeable impact on memory demands of everyday life. Note that within this range, the higher the estimate of general memory abilities, the greater is the likelihood that overall memory abilities will approach those of the client's age group. Similarly, as overall memory skills present at the lower end of this range, the greater is the likelihood that memory abilities will appear weaker than those of the client's age group, and will present as more pronounced areas of weakness. Individuals who are functioning at this lower end of the range will typically present with deficits that have a noticeable impact on the memory demands of everyday life.

Although Sample Client obtained a General Memory Index score in the Low Average range, there is significant variability among the Verbal Memory Index, Visual Memory Index, and Attention/Concentration Index. Differences between the component index scores may indicate that the General Memory Index score is not a good estimate of an individual's overall memory. It may be more appropriate to utilize the individual index scores as an estimate the client's performance. With such index inconsistency, it is important to consider factors such as differences between verbal or visual processing/memory abilities and/or dysregulated concentration or weak executive functioning. For additional information on the resulting discrepancy between index scores, see the discussion within the Index Discrepancy section that follows.

Verbal Memory Index

The Verbal Memory Index is an estimate of how well the client can learn and recall both meaningful verbal information and relatively rote verbal information. It is derived from the sum of the Story Memory subtest and the Verbal Learning subtest. When consistent performance exists between the two subtests comprising this index, the index presents a reasonable estimate of verbal memory abilities.

More specifically, Verbal Memory Index performance is correlated with abilities for everyday tasks (e.g., remembering stories, conversations, or information from lectures; following directions; recalling items from a "things to do" list). Related academic tasks can include the ability to recall the content of information that was read earlier, the ability to learn lists of scientific terms, or the ability to remember vocabulary words.

Sample Client's Verbal Memory Index of 126 (90% CI: 118-132; Percentile rank: 96) was found to be within the Superior range. Generally, within this range on the Verbal Memory Index, Sample Client should be expected to learn and remember verbal information considerably better than adults of similar age and this strength should be noticeable in everyday verbal memory demands. Within this range, the higher the estimate of verbal memory abilities, the greater is the likelihood that verbal memory abilities will exceed those of the client's age group and will present as an area of particular strength.

Visual Memory Index

The Visual Memory Index is an estimate of how well the client can learn and recall both meaningful (i.e., pictorial) and minimally related, rote (i.e., design) visual information. It is derived from the sum of the Picture Memory subtest and the Design Memory subtest. When consistent performance exists between the two subtests comprising this index, the index presents a reasonable estimate of visual memory ability.

More specifically, visual memory abilities may be related to day-to-day tasks (e.g., remembering the layout of the town visited a while ago, identifying different car models, remembering the location of states on a map). Related academic tasks can include the recall of information from the chalkboard, some aspects of math problems (e.g., graphs, spatial problems), and processing/recalling less verbal or nonverbal aspects of science/technology like a circuit diagram).

Sample Client's Visual Memory Index of 67 (90% CI: 61-77; Percentile rank: 1) was found to be within the Impaired range. Generally within this range on the Visual Memory Index, Sample Client should be expected to remember visual information at levels significantly lower than those of adults of similar age and this should be noticeable on everyday visual memory tasks. Attentional and organizational issues also should be considered because the short viewing time available for visual subtest stimuli render these subtests vulnerable to dysregulated attention and dysregulated executive abilities. Although marked deficits in nonverbal memory abilities are to be expected, the lower the estimate of visual memory abilities, the more significant will be the difficulty in learning and in recalling visual information, which, in turn, will have a greater impact on everyday nonverbal learning and day-to-day functioning.

Although Sample Client obtained a Visual Memory Index score in the Impaired range, there is a significant difference between the Picture Memory subtest and the Design Memory subtest. A difference of more than 3 scaled score points between these component subtest scores may indicate that the Visual Memory Index score is an inappropriate estimate of Sample Client's overall visual memory abilities. It is important to consider if Sample Client may manifest differences in recalling meaningful information versus less meaningful visual information. In such cases, performance may differentially affect the recall of details of a diagram (i.e., less contextual) versus remembering the layout of furniture in the room (i.e., more contextual). In addition, subtest inconsistencies may be related to such work style factors as dysregulated attention or dysregulated executive functioning. It may be more appropriate to utilize the individual subtest scores as an estimate of the client's performance**.** For additional information on the scores obtained on the Picture Memory subtest and Design Memory subtest, see the specific subtest descriptions.

Attention/Concentration Index

The Attention/Concentration Index is an estimate of how well the client can learn and recall relatively nonmeaningful rote, sequential information. It is the sum of two subtests, Finger Windows and Number Letter. When consistent performance exists between the two subtests comprising this index, the index presents a reasonable estimate for tasks requiring brief attentional demands and/or immediate rote recall abilities.

More specifically, performance on the Attention/Concentration Index is correlated with performance on everyday tasks (e.g., remembering a dictated telephone number until it can be written down, remembering visual details of a highway sign or a billboard that one has driven by in the car). Related academic tasks can include learning phonetically irregular spelling words and following the specific details and/or a sequence of oral directions.

Sample Client's Attention/Concentration Index of 73 (90% CI: 66-84; Percentile rank: 4) was found to be within the Borderline range. Generally, within this range on the Attention/Concentration Index, Sample Client should perform rote memory tasks at a less efficient level to that of adults of similar age. Within this range, the lower the estimate of rote memory abilities, the greater is the likelihood that these memory deficits will have a negative impact that is noticeable on many areas of everyday functioning. Although the subtests on the Attention/Concentration Index only require short episodes of attention, performances at this level suggest the importance of considering such work style factors as distractibility, impulsivity, and/or issues with executive abilities. In addition, at this level of performance, it is important to rule out potential deficits in peripheral vision and hearing.

Core Index Discrepancy Analysis

Index comparison	Score[1]	Score[2]	Discrepancy	Significance level	Prevalence
Verbal Memory and Visual Memory	126	67	59	.05	0.4
Verbal Memory and Attention/Concentration	126	73	53	.05	0.1
Visual Memory and Attention/Concentration	67	73	-6	N.S.	40.0

Verbal Memory Index and Visual Memory Index

Sample Client's Verbal Memory Index performance and Visual Memory Index performance were found to be statistically different from each other at the .05 significance level. Generally, compared to her ability to recall newly learned verbal information, Sample Client has a relative weakness in her ability to recall newly learned visual information. It is important to note that this discrepancy may affect the utility of the General Memory Index as a summary of overall memory.

In terms of impact, with the Verbal Memory Index found within the High Average range and the Visual Memory Index found within the Impaired range, the obtained discrepancy suggests a significant weakness in Visual Memory Index abilities sufficient to have "real life" impact. The Prevalence of this discrepancy was 0.4%. Note that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important weakness in Visual Memory Index. As well, behavioral factors such as executive abilities, organizational skills or sustained attention may have differentially affected performances on the Visual Memory Index.

Verbal Memory Index and Attention/Concentration Index

Sample Client's Verbal Memory Index performance and Attention/Concentration Index performance were found to be statistically different from each other at the .05 significance level. Generally, compared to her ability to recall newly learned verbal information, Sample Client has a relative weakness in her ability to recall rote, sequential information. It is important to note that this discrepancy may affect the utility of the General Memory Index as a summary of overall memory ability.

In terms of impact, with the Verbal Memory Index found within the High Average range and the Attention/Concentration Index found within the Borderline/Low Average range, the obtained discrepancy suggests a weakness in Attention/Concentration Index abilities that may have "real life" impact. The Prevalence of this discrepancy was 0.1%. Note that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important weakness in Attention/Concentration Index. As well, behavioral factors such as executive abilities, organizational skills or sustained attention may have differentially affected performances on the Attention/Concentration Index.

Visual Memory Index and Attention/Concentration Index

Sample Client's Visual Memory Index performance and Attention/Concentration Index performance were not found to be statistically different from each other.

Optional Index Scores

Optional index	Sum of scaled scores	Index score	Confidence interval	Percentile rank
Working Memory	24	111	103-118	77
Verbal Recognition	16	88	79-98	21
Visual Recognition	16	87	73-107	19
General Recognition	32	85	75-98	16

Working Memory

The Working Memory Index is an estimate of how well the client can operate on and retain information that is held in the short-term memory buffer. The index is derived from the sum of the Verbal Working Memory subtest and the Symbolic Working Memory subtest. When consistent performance exists between the two subtests comprising this index, the index presents a reasonable estimate of Sample Client's working memory ability.

More specifically, performance on the Working Memory Index is required when an individual is asked to add to, reorganize, or manipulate information held as a memory trace. For example, working memory skills are required to reorganize and remember when listening to an automated operator (e.g., bank, credit card company, airline) and choosing from a listing of options or when an individual is asked to solve a verbal math problem (e.g., "Two trains are leaving the station at different speeds…"). In addition, performance on working memory tasks are related to attentional skills, executive skills, and, more specifically, to meta-memory abilities (i.e., the ability to know how to learn and to memorize).

Sample Client's Working Memory Index of 111 (90% CI: 103-118; Percentile rank: 77) was found to be within the High Average range. Generally, within this range on the Working Memory Index, Sample Client should be expected to have well-developed working memory skills. It is likely that Sample Client will demonstrate good attention to task and efficient learning and memory strategies. Sample Client likely exhibits good cognitive and executive skills to facilitate retention, suggesting that she will remember verbal information considerably better than adults of similar age and that this strength should be noticeable on everyday memory tasks.

Although Sample Client obtained a Working Memory Index score in the High Average range, there is a significant difference between the Verbal Working Memory subtest and Symbolic Working Memory subtest. A difference of more than 3 scaled score points between these component subtest scores may indicate that the Working Memory Index is an inappropriate

estimate of Sample Client's working memory abilities. It may be more appropriate to utilize the individual subtest scores as an estimate of the client's performance. For additional information on the scores obtained on the Verbal Working Memory subtest and the Symbolic Working Memory subtest, see the specific subtest descriptions.

Verbal Recognition Index

The Verbal Recognition Index is an estimate of how well the client can recognize specific verbal information that was presented previously during this testing session (i.e., approximately 15-20 minutes earlier). This index is derived from the sum of the Story Memory Recognition subtest and the Verbal Learning Recognition subtest. Both subtests comprising the Verbal Recognition Index are presented in a cued format. When consistent performance exists between the two subtests comprising this index, the index presents a reasonable estimate of Sample Client's verbal recognition abilities.

Sample Client's Verbal Recognition score of 88 (90% CI: 79-98; Percentile rank: 21) was found to be within the Low Average range. Generally, with consistent Verbal Recognition performances within this range, Sample Client demonstrated weak recognition (i.e., cued) memory abilities for verbal information. Such a score is suggestive of relative difficulties attending to and organizing language-based tasks and indicates that prompting and repetition might be needed to consolidate learning. However, when interpreting this index, it also is important to note the consistency between the individual core subtests (i.e., Story Memory, Verbal Learning) and the Recognition subtests (i.e., Story Memory Recognition, Verbal Learning Recognition). These differences are discussed in more detail later in this report (see Core Subtest/Recognition Differences.)

Visual Recognition Index

The Visual Recognition Index is an estimate of how well the client can recognize specific nonverbal or visual information that was presented previously in the session (i.e., approximately 15-20 minutes earlier). This index is derived from the sum of the Picture Memory Recognition subtest and the Design Memory Recognition subtest. Both subtests comprising the Visual Recognition Index are presented in a cued format. The Visual Recognition Index requires recognizing both contextual (i.e., pictures) and relatively context-free (i.e., designs) visual information.

Sample Client's Visual Recognition score of 87 (90% CI: 73-107; Percentile rank: 19) was found to be within the Low Average range. Generally, with consistent Visual Recognition performances within this range, Sample Client demonstrated weak recognition (i.e., cued) memory abilities for nonverbal information. Such a score is suggestive of relative difficulties attending to and organizing visual information and indicates that prompting and repetition might be needed to consolidate learning. However, when interpreting this index, it also is important to note the consistency between the individual core subtests (i.e., Picture Memory, Design Memory) and the Recognition subtests (i.e., Picture Memory Recognition, Design Memory Recognition). These differences are discussed in more detail later in this report (see Core Subtest/Recognition Differences).

Although Sample Client obtained a Visual Recognition score in the Low Average range, there is a significant difference between the Picture Memory Recognition and Design Memory Recognition scores. A difference of more than 3 scaled score points between these component scores it may indicate that the Visual Recognition Index score is an inappropriate estimate of Sample Client's overall visual recognition abilities. The wider the differences between subtest scores, the more likely it is that variability in visual recognition memory abilities will be evident across tasks. In addition, subtest inconsistencies may be related to such work style factors as dysregulated attention or dysregulated executive functioning. It may be more appropriate to utilize the individual subtests scores as an estimate the client's performance. For additional information on the scores obtained on the Picture Memory Recognition subtest and the Design Memory Recognition subtest, see the specific subtest descriptions.

General Recognition Index

In contrast to memory retrieval reflected in the Verbal Memory Index and the Visual Memory Index scores, the General Recognition Index is an estimate of how well the client can recognize specific verbal and visual information that was presented previously (i.e., approximately 15-20 minutes earlier). This index is derived from the sum of the Verbal Recognition Index and the Visual Recognition Index. All subtests comprising the General Recognition Index are presented in a cued format.

Sample Client's General Recognition Index score of 85 (90% CI: 75-98; Percentile rank: 16) was found to be within the Low Average range. Finally, it should be noted that recognition memory is relatively robust compared to retrieval and, therefore, tends to be a better measure of weakness than of strength. Generally, with consistent General Recognition performances within this range, Sample Client demonstrated Low Average/Borderline recognition (i.e., cued) memory abilities for both verbal and nonverbal information. It should be noted that much of the utility of the General Recognition Index is derived from its comparison with the General Memory Index. Thus, consistency between the Verbal Recognition Index and the Visual Recognition Index, as well as consistency between their respective subtests, is important for a clinically useful comparison (see the discussion of Verbal Core Index, Visual Core Index, and Recognition Index Discrepancies later in this report). The more consistent the performances between the General Recognition Index and the General Memory Index, the more confident one can be that general recall and cued recall abilities are below to significantly below the mean. With differential performance between the General Recognition Index and the General Memory Index, when the General Recognition Index is elevated, cuing typically supports recall and general recall abilities may be markedly deficient; when the General Memory Index is elevated, there is a relative decay in memory over time that is not aided by cuing. Additional information is provided in the discussion of the individual Recognition Indexes.

Optional Index Discrepancy Analysis

Index comparison	Score[1]	Score[2]	Discrepancy	Significance level	Prevalence
General Memory and General Recognition	85	85	0	N.S.	N/A
Verbal Memory and Working Memory	126	111	15	.05	14.9
Visual Memory and Working Memory	67	111	-44	.05	0.7
Attention/Concentration and Working Memory	73	111	-38	.05	0.2
General Memory and Working Memory	85	111	-26	.05	1.1
Verbal Recognition and Visual Recognition	88	87	1	N.S.	46.4

General Memory Index and General Recognition Index

Sample Client's General Memory Index performance and General Recognition Index performance were not found to be statistically different from each other.

Verbal Memory Index and Working Memory Index

Sample Client's Verbal Memory Index performance and Working Memory Index performance were found to be statistically different from each other at the .05 significance level. Generally, compared to her ability for immediate verbal recall, Sample Client has a relative weakness in her working memory, possibly due to greater deficits in rote short-term memory, attention, and/or executive functioning.

In terms of impact, with the Verbal Memory Index score found within the High Average range and the Working Memory Index score found within the same range, any obtained difference likely suggests an equivalent level of strength. The Prevalence of this difference was 14.9%. Note that, within this range the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically meaningful difference.

Visual Memory Index and Working Memory Index

Sample Client's Visual Memory Index performance and Working Memory Index performance were found to be statistically different from each other at the .05 significance level. Generally, compared to her working memory skills, Sample Client has a relative weakness in her ability for the immediate recall of visual information, possibly suggesting a spatial processing/organizational deficit affecting memory. Note that the working memory tasks tend to be verbal and symbolic in nature.

In terms of impact, with the Visual Memory Index found within the Impaired and the Working Memory Index found within the High Average range, the obtained discrepancy suggests a significant weakness in Visual Memory Index abilities sufficient to have "real life" impact. The Prevalence of this discrepancy was 0.7%. Note, that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important weakness in Visual Memory Index. As well, behavioral factors such as executive abilities, organizational skills or sustained attention may have differentially affected performances on the Visual Memory Index.

Attention/Concentration and Working Memory Index

Sample Client's Attention/Concentration Index performance and Working Memory Index performance were found to be statistically different from each other at the .05 significance level. Although tasks comprising both indexes make demands on rote memory, generally, Sample Client demonstrated a relative strength on the Working Memory Index subtests, possibly indicative of dysregulated attention or dysregulated work style. The greater novelty of the Working Memory Index subtests may have better captured Sample Client's attention and motivation. It is important to substantiate this finding with tasks making more extended demands on working memory abilities.

In terms of impact, with the Attention/Concentration Index found within the Borderline/Low Average range and the Working Memory Index found within the High Average range, the obtained discrepancy suggests a weakness in Attention/Concentration Index abilities that may have "real life" impact. The Prevalence of this discrepancy was 0.2%. Note that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important weakness in Attention/Concentration Index.

General Memory Index and Working Memory Index

Sample Client's General Memory Index performance and Working Memory Index performance were found to be statistically different from each other at the .05 significance level. Generally, compared to her ability with working memory, Sample Client has a relative weakness in completing tasks demanding immediate recall. This is an unusual finding, suggesting the need to examine subtest consistency. The greater novelty of the Working Memory Index subtests may have better captured Sample Client's attention and motivation. It is important to substantiate this finding with tasks making more extended demands on her working memory abilities.

In terms of impact, with the General Memory Index found within the Borderline/Low Average range and the Working Memory Index found within the High Average range, the obtained discrepancy suggests a weakness in General Memory Index abilities that may have "real life" impact. The Prevalence of this discrepancy was 1.1%. Note that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important weakness in General Memory Index.

Verbal Recognition and Visual Recognition Index

Sample Client's Verbal Recognition Index performance and Visual Recognition Index performance were not found to be statistically different from each other.

Core Subtest Scores

Subtest	Raw score	Scaled score
Story Memory	55	13
Story Memory Recall	41	11
Story Memory Recognition	32	9
Design Memory	30	7
Design Recognition	32	10
Verbal Learning	56	16
Verbal Learning Recall	16	16
Verbal Learning Recognition	34	7
Picture Memory	12	2
Picture Memory Recognition	30	6
Finger Windows	12	4
Number Letter	12	7

Story Memory

The Story Memory subtest provides a measure of contextualized or meaningful verbal information. Given the need to remember extended, meaningful verbal information in everyday life (e.g., conversations, lectures, reading comprehension), performance on this subtest may be particularly important. Of the two stories read, the first story is somewhat less difficult than the second. Although individual scaled scores are available for each story (see Story Memory Qualitative Analyses), the core subtest score is derived from performance using both stories. Sample Client attained a scaled score of 13 on the core Story Memory subtest, which is within the High Average range.

Sample Client's Story Memory performance suggests that she generally will be able to recall more than the usual amount of meaningful verbal information that is expected for her age group. Note that within this range, the higher the estimate of this subtest score, the greater is the likelihood that memory abilities within this area will exceed those of Sample Client's age group.

Qualitative Analysis

Story Memory	Raw score	Scaled score
Story B Fish Story	27	13
Story C Job Story	28	13

Individual Story Scaled Scores
Clinical analysis may aid in developing hypotheses when there are differences between subtests. Important factors to consider include (a) very high or very low performance on Story Memory because overall performance lessens the significance of subtest differences, (b) developmental differences in stories may be important because the initial story tends to be less complex than the second story, (c) difficulty with language processing may underlie subtest differences, and (d) an inconsistent pattern of responses within each story or an absence of recalling an important story section (e.g., the beginning or the middle section) may suggest relative difficulty regulating attention.

On the Story Memory subtest, Sample Client obtained a scaled score of 13 for Story B (i.e., Fishing Story). Therefore, her performance on Story B was found to be within the High Average range.
On the Story Memory subtest, Sample Client obtained a scaled score of 13 for Story C (i.e., Job Story). Therefore, her performance on Story C was found to be within the High Average range.

Story Memory	Raw score	Scaled score
Verbatim Total	21	13
Gist Total	22	15

Story Memory performance can be examined based on memory for items recalled exactly (i.e., Verbatim) as well as on memory for preserved meaning of the essence of the story content (i.e., Gist). Generally, there is good correlation between Gist and Verbatim recall performance (i.e., *r*s range from .78 - .82 for the standardization sample). It is important to interpret Verbatim and Gist scores in light of overall scaled score level of performance found on the core Story Memory subtest itself. It also is important to examine and interpret Verbatim and Gist scores in relation to each other and in light of overall Story Memory performance.

Verbatim
Sample Client obtained a Story Memory Verbatim scaled score of 13 for both stories. Therefore, her ability to recall exact details from the stories read was found to be within the High Average range.

Gist
Sample Client obtained a Story Memory Gist scaled score of 15 for both stories. Therefore, her ability to recall thematic information from the stories read was found to be within the High Average range.

Story Memory Recall

The Story Memory Recall subtest provides a measure of memory ability for meaningful verbal narrative over a 10-15 minute delayed interval. Given the need to remember extended, meaningful information in everyday life, performance on this subtest may be particularly important. It is important to compare the Story Memory Recall score with the core Story Memory subtest performance (see Retention score). The larger the difference between performance on the Story Memory subtest and the Story Memory Recall score, the greater is the problem with forgetting and/or retrieval. Although unusual, immediate Story Memory performance sometimes will be at a lower level than Story Memory Recall performance—this result may suggest that the passing of time helps to consolidate memory.

Sample Client attained a Story Memory Recall scaled score of 11, which is within the Average range. Sample Client's Story Memory Recall performance generally suggests that, with a brief time delay, she will be able to recall the usual amount of meaningful verbal information expected for her age group.

Qualitative Analysis

Story Memory	Raw score	Scaled score	Percentile
Retention	-14	4	≤5th

Retention
The Retention score provides a measure of memory decay over time. On the Delayed Recall Trial, the client is asked to recall each of the stories read without any additional exposure to the stories. The Retention score compares the story content remembered on the Delayed Recall Trial with that from the original Recall Trial on the core subtest. Somewhat lower raw score performance on the delayed component is typical; the Retention score indicates the magnitude of this delay compared to an individual's age group (i.e., compares the difference between the scaled scores for immediate recall vs. delayed recall). Sample Client obtained a Retention scaled score of 4, which is within the Borderline/Low Average range.

The corresponding percentile range for the Retention score suggests a meaningful difference exists between the Immediate Recall scaled score and the Delayed Recall scaled score, suggesting significant forgetting of meaningful verbal information over time. Although this may represent a frank memory deficit, it is important to consider the various qualitative analyses for the Story Memory subtest before coming to such a conclusion (e.g., the original level of performance on the core subtest; scores for individual stories, the Story Memory Recognition subtest, Verbatim Recall score, Gist Recall score).

Story Memory Recognition

The Story Memory Recognition subtest provides a measure of recognition memory. A multiple choice format with questions from each story is used, providing an interesting comparison

between free recall (i.e., in the immediate recall and the delayed recall Story Memory formats) and recognition. Sample Client attained a scaled score of 9, which is within the Average range.

Sample Client's Story Memory Recognition performance suggests that, compared to her age group, Sample Client will be able to recognize about the usual amount of meaningful verbal information that was presented previously. This suggests that Sample Client will likely perform up to age-expectations on multiple choice tests or will remember previous conversations when reminded.

Core Subtest Difference
Story Memory and Story Memory Recognition
Sample Client's Story Memory score and Story Memory Recognition score were found to be statistically different from each other at the .05 significance level. This may indicate that Sample Client's ability on tasks demanding immediate verbal memory is disproportionately better than her ability to store and maintain the same information over time. If this is the case, Sample Client's score for Story Memory Delayed also should be noticeably lower than one would expect. Depending on the level of story loss on the Recognition subtest—despite prompting—this finding can be quite significant, given the importance of remembering content-oriented information. In addition, an alternate explanation to consider is a weakness in sustained attention and/or a lack of stamina, both of which are required to perform adequately on the Story Memory Recognition task. In this case, the Story Memory Delayed score may be higher than the Story Memory Recognition score.

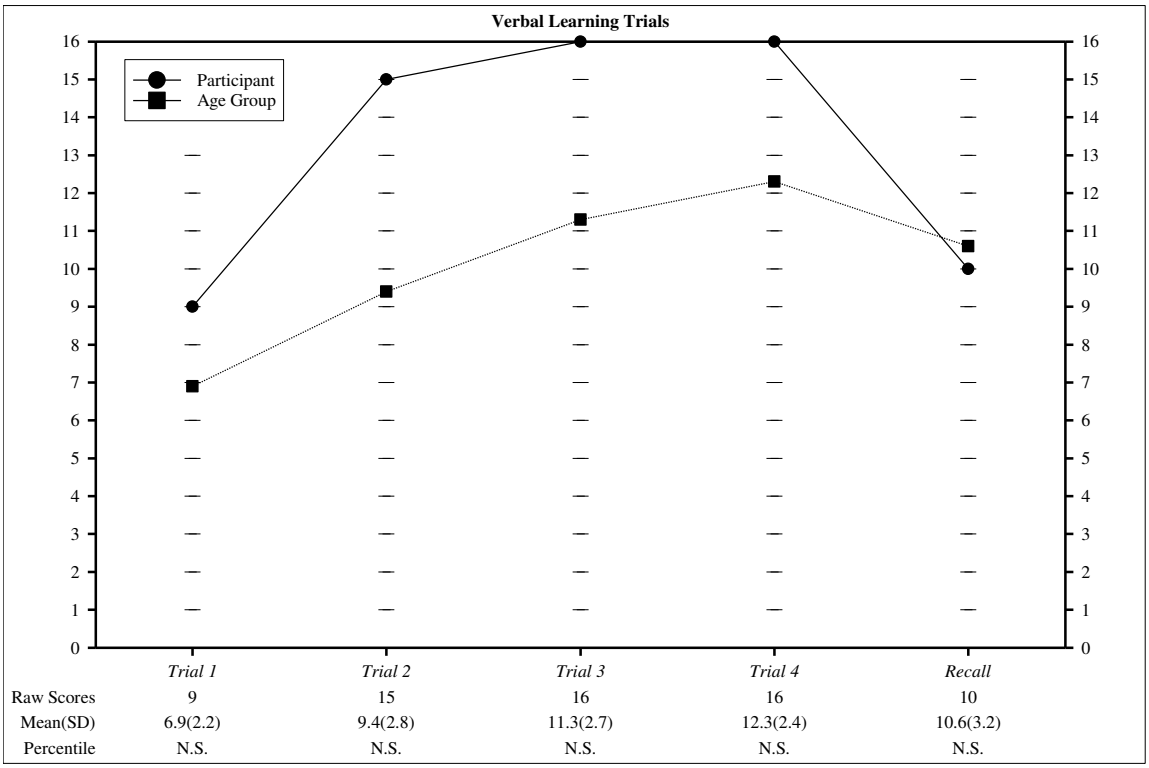
In terms of impact, with the Story Memory found within the High Average range and the Story Memory Recognition found within the Average range the obtained discrepancy may suggest a naturally occurring *relative* pattern of strength and weakness and have limited "real life" impact. The Prevalence of this discrepancy was 4.7%. Note that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important difference. Given the prevalence of less than 10% for this discrepancy, the findings should be closely evaluated.

Verbal Learning

The Verbal Learning subtest evaluates how well the client actively learns and is able to recall initially unrelated verbal information with practice opportunities. A list of common nouns is repeated across four trials so that the Examiner can evaluate her ability to learn incrementally and then recall rote verbal information (e.g., remembering a grocery list, remembering the U.S. presidents of the 19th century). Sample Client attained a scaled score of 16, which is within the High Average range. Therefore, Sample Client's Verbal Learning performance suggests that her learning and immediate recall of this type of verbal information exceeds that which is expected for her age group.

Qualitative Analysis

Verbal Learning	Raw score	Mean(SD)	Percentile
Slope	7	5.4(2.0)	N.S.
Intrusion Errors	0	1.4(2.0)	N.S.



	Trial 1	*Trial 2*	*Trial 3*	*Trial 4*	*Recall*
Raw Scores	9	15	16	16	10
Mean(SD)	6.9(2.2)	9.4(2.8)	11.3(2.7)	12.3(2.4)	10.6(3.2)
Percentile	N.S.	N.S.	N.S.	N.S.	N.S.

Slope

Slope is operationally defined as the number of words recalled on Trial 4 minus the number of words recalled on Trial 1. That is, slope is a convenient estimate of the verbal learning trajectory from Trial 1 to Trial 4, comparing the client's performance to that of her age group's performance. It is important to consider the core Verbal Learning subtest score and the individual trial data to evaluate overall learning. Sample Client's slope score was above the 15th percentile. Sample Client's rate of verbal learning between Trial 1 and Trial 4 is within normal

limits, compared to adults of similar age. The core Verbal Learning subtest score could be used to verify this interpretation further.

Intrusion Errors
On the Verbal Learning subtest, Sample Client made 0 Intrusion Errors. An intrusion error occurs when a word is reported that was not on the list read by the Examiner. Although there is an inverse developmental trend in the frequency of these errors, a high number of intrusion errors is rare at any age. For Sample Client's age group, the total number of intrusion errors over Trial 1 through Trial 4 was found to be above the 15th percentile.

Sample Client's Verbal Learning subtest score represents approximately the same number of errors typical for adults of similar age and, therefore, is considered to be within normal limits. The client performing in this manner usually monitors her verbal performance adequately and profits from feedback.

Verbal Learning Recall

The Verbal Learning Recall subtest provides a measure of memory retrieval after the initial learning of new verbal information (approximately 15 minutes after initial learning). It is important to compare Verbal Learning Recall performance with core Verbal Learning subtest performance (see Retention score). The larger the difference between Verbal Learning performance and Verbal Learning Recall performance, the greater is the problem with forgetting and/or retrieval. Although unusual, Verbal Learning performance sometimes will be at a lower level than Verbal Learning Recall performance—and this result may suggest that the passing of time helps to consolidate memory. Sample Client attained a Verbal Learning Recall scaled score of 16, which is within the High Average range. Sample Client's Verbal Learning Recall performance suggests that she is able to store and later retrieve this information better than most others her age.

Qualitative Analysis

Verbal Learning	Raw score	Mean(SD)	Percentile
Retention	-6	-1.7(1.9)	≤5th

Retention
The Retention score provides a measure of memory decay over time. Operationally, it represents the difference between the client's raw score on Trial 4 of the core Verbal Learning task and the her raw score on the Delayed Trial. Somewhat lower raw score performance on the delayed component is typical; the Retention score indicates the magnitude of this delay compared to the client's age group (i.e., compares the difference between the scaled scores for immediate recall vs. delay recall). Sample Client obtained a Retention raw score of -6, which is within the ≤5th percentile.

The corresponding percentile range for the Retention score indicates a meaningful difference exists between the Immediate Recall scaled score and the Delayed Recall scaled score, which suggests that the client experiences significant forgetting of relatively rote verbal information over time. Although this may represent a frank memory deficit, it is important to consider the various qualitative analyses for the Verbal Learning subtest before coming to such a conclusion (e.g., the original level of performance on the core subtest, the Verbal Learning Recognition subtest).

Verbal Learning Recognition

The Verbal Learning Recognition subtest provides a measure of recognition recall of verbal information presented previously (15 - 20 minutes prior). The Verbal Recognition score needs to be interpreted within the context of the core Verbal Learning subtest score and additional Verbal Learning measures. Sample Client attained a Verbal Learning Recognition scaled score of 7, which is within the Borderline/Low Average range. Sample Client's Verbal Learning Recognition performance suggests that she will struggle to recognize recently learned familiar words or verbal terms as compared to her adults of similar age.

Core Subtest Difference
Verbal Learning and Verbal Learning Recognition
Sample Client's Verbal Learning performance and Verbal Learning Recognition performance were found to be statistically different from each other at the .05 significance level. Generally, this suggests that memory for tasks demanding immediate verbal recall decays over time, even with cuing. It is important to consider the level of performance on the Verbal Learning subtest and, if it was administered, the level of performance on the Verbal Learning Delayed subtest. For example, support for a memory decay hypothesis would be provided if Verbal Learning Delayed performance—and therefore the Retention score—also is noticeably lower than expected. Marked differences between the core Verbal Learning subtest. the Recall subtest, and Recognition subtest suggest significant problems with long-term verbal information storage and/or retrieval. An adequate Verbal Learning Delayed performance with a weak Recognition performance might suggest memory issues, but also might suggest concerns with sustained attention and/or lack of stamina because the Verbal Learning Recognition task comes relatively late in the testing sequence.

In terms of impact, with the Verbal Learning found within the High Average range and the Verbal Learning Recognition found within the Borderline/Low Average range, the obtained discrepancy suggests a weakness in Verbal Learning Recognition abilities that may have "real life" impact. The Prevalence of this discrepancy was 0.2%. Note that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important weakness in Verbal Learning Recognition. As well, behavioral factors such as executive abilities, organizational skills or sustained attention may have differentially affected performances on the Verbal Learning Recognition.

Design Memory

The Design Memory subtest provides a measure of memory of visual material that is minimally meaningful. Five cards, each with an array of geometric shapes, are exposed and then after a

brief delay the client is asked to draw what is remembered. Copying rote information from a chalkboard or remembering the shapes and locations of newly learned countries on a map are examples of everyday tasks tapping this type of visual memory. For this task, performance also is affected by attention, efficient scanning strategies, spatial skills, and executive skills. Sample Client attained a Design Memory scaled score of 7, which is within the Borderline/Low Average range. Sample Client's Design Memory performance suggests that she will have noticeable difficulty recalling the usual amount of minimally meaningful visual information expected for her age group.

Design Recognition

The Design Recognition subtest provides a measure of recognition recall of visual information that was viewed approximately 20 minutes earlier. The client is asked to look at and distinguish between designs that were and were not presented earlier in the testing session. Attention to visual detail and executive skills are involved in this task. Sample Client attained a Design Recognition scaled score of 10, which is within the Average range.

Sample Client's Design Recognition performance suggests that she generally will be able to recognize visual details to which she has been recently exposed as well as many others in her age group. The client with a Design Recognition score at this level often performs in a typical fashion on tasks like recognizing details from charts and demonstrations. In addition, she is often sensitive to changes in her environment (e.g., noticing a new haircut, noticing a new pair of glasses).

Design Memory and Design Recognition

Sample Client's Design Memory performance and Design Memory Recognition performance were not found to be statistically different from each other.

Picture Memory

The Picture Memory subtest provides a measure of nonverbal immediate memory for contextualized information or meaningful information. On this subtest, Sample Client was asked to recall information presented in four picture scenes. Performance on this subtest may be noted in situations such as remembering where people sat around a table during a meeting earlier in the day or recalling the content of a photograph in a newspaper article that was read previously. Good search strategies and sustained attention are important skills for this subtest. Sample Client attained a Picture Memory scaled score of 2, which is within the Impaired range. Sample Client's Picture Memory performance generally suggests that she will show significantly less ability for immediate recall of meaningful visual information as compared to her age group.

Qualitative Analysis

Picture Memory	Raw score	Mean(SD)	Percentile
Commission Errors	5	2.6(2.1)	≤15th

Commission Errors
The Picture Memory subtest exposes the respondent to four complex pictures and then requires the identification of altered aspects of the pictures. The Commission Errors score provides a measure of overresponding or misidentifying items that have not been altered. Because the Picture Memory scaled score is based on the total number of correct items identified over the four stimuli that are presented, overresponding can inflate the subtest score. In general, Commission Errors are rare. Grossly, young children produce one commission error per picture stimulus, whereas young adults produce half that number. In addition to significant memory problems, a large number of commission errors may be associated with a high level of disinhibition or impulsive responding. For Sample Client's age group, the total number of Commission Errors was found to be within the ≤15th percentile.
This Picture Memory score represents approximately the same number of errors typical for her adults of similar age and, therefore, is likely to be within normal limits.

Picture Memory Recognition

The Picture Memory Recognition subtest provides a measure of recognition of meaningful visual information or contextualized visual information, such as that found in pictures, in scenes, or in the environment. An example would be correctly recognizing a place in a new city where one has been recently. Picture Recognition scores are best interpreted in comparison with performance on the core Picture Memory subtest. Stronger Recognition scores compared with the Picture Memory subtest score suggest the visual content is stored but retrieval may be inefficient, and priming may be important to aid recall. Weaker Recognition scores compared with the Picture Memory subtest score may suggest that the visual memory trace erodes relatively quickly over time. It also is important to note that because recognition often is a relatively preserved memory process, recognition performance tends to be a better indicator of weakness rather than of strength. Therefore, note that a strong core Picture Memory subtest performance may be associated with an average to above average Recognition score, and it may not connote a weakness in recognition. Sample Client attained a Picture Memory Recognition scaled score of 6, which is within the Borderline/Low Average range.

Sample Client's Picture Memory Recognition performance suggests that she generally will not be able to recognize meaningful and contextualized visual details to which she has been recently exposed as compared to others in her age group.

Core Subtest Difference
Picture Memory and Picture Memory Recognition
Sample Client's Picture Memory performance and Picture Memory Recognition performance were found to be statistically different from each other at the .15 significance level. Generally, this suggests that cuing is helpful in aiding the recall of meaningful visual information. To determine if this is an isolated finding, examine other Core Recognition tasks to evaluate if cuing facilitates recall over time. It is important to consider the level of performance on the Picture Memory subtest and the extent of the aid on the better performed Picture Recognition subtest. It may be that that the picture information was not organized sufficiently or was not deeply processed for a free recall trial but, when prompted, the information was more easily recognized.

In terms of impact, with the Picture Memory found within the Impaired range and Picture Memory Recognition found within the Borderline/Low Average range, the obtained discrepancy suggests a deficit in Picture Memory. The Prevalence of this discrepancy was 15.0%. Note that the lower the prevalence of the discrepancy, the more likely the discrepancy identifies a clinically important or "real life" impact of Sample Client's weaker Picture Memory. As well, behavioral factors such as executive abilities, organizational skills or sustained attention may have differentially affected performances on the Picture Memory Recognition.

Number Letter

The Number Letter subtest is a measure of auditory, rote sequential recall. Sample Client was asked to repeat a series of items composed of progressively longer number and letter sequences that were dictated by the Examiner. Although the Number Letter subtest is a measure of auditory rote recall, it is heavily dependent on brief episodes of directed attention. An individual performing well on this subtest also should perform well recording phone numbers, class assignments, or sporting team scores accurately. It is interesting to contrast the auditory Number Letter score with the visual Finger Windows score because both are rote, sequential, immediate memory tasks, but each one uses different perceptual modalities. A contrast of Number Letter performance with Sentence Memory performance will allow comparison of relatively rote, auditory, immediate memory tasks that have differing amounts of language content. Sample Client attained a Number Letter scaled score of 7, which is within the Borderline/Low Average range. Sample Client's Number Letter performance generally suggests that she will have difficulty recalling the usual amount of rote, sequential auditory information expected for her age group.

Finger Windows

The Finger Windows subtest is a measure of nonverbal, rote sequential recall. Sample Client was asked to imitate gradually more difficult sequential patterns demonstrated by the Examiner. Although the Finger Windows subtest is a measure of visual rote recall, it also is heavily dependent on brief episodes of directed attention. An individual performing well on this subtest also may perform well learning an internal map to a new location or remembering sequential information from construction diagrams. It is interesting to contrast the Finger Windows score with the Letter Numbers score because both are rote recall tasks, but the latter task requires auditory sequential recall. Sample Client attained a Finger Windows scaled score of 4, which is within the Borderline/Low Average range. Sample Client's Finger Windows performance generally suggests that she will have difficulty recalling the usual amount of rote, sequential visual information expected for her age group.

Interpretation of Optional Subtests

Optional & Additional Subtest Scores

Subtest	Raw score	Scaled score
Verbal Working Memory	25	9
Symbolic Working Memory	27	15
Sentence Memory	40	17

Verbal Working Memory

The Verbal Working Memory subtest measures how well an individual retains information that is manipulated while it is in the short-term memory buffer. On this subtest, the client listens to a list of nouns that are both animals and nonanimals and, immediately thereafter, must recall the words in a specified reorganized order. Two levels of difficulty are utilized. An individual performing well on this subtest also should perform well on tasks making heavy demands on verbal working memory, such as comprehending meanings in an extended reading passage, or listening to a radio sports broadcast and being able to figure out who won last night's games as pairs of team nicknames are announced followed by their final scores. Executive skills are thought to be necessary for the successful completion of working memory tasks. It is sometimes interesting to contrast the Verbal Working Memory score with performance on Number Letter or Sentence Memory, each of which requires auditory immediate memory but makes minimal demands on working memory. Sample Client attained a Verbal Working Memory scaled score of 9, which is within the Average range.

Sample Client's Verbal Working Memory performance suggests that she generally will be able to hold and manipulate the usual amount of verbal information in the short-term memory buffer at a level that is expected for her age group.

Symbolic Working Memory

The Symbolic Working Memory subtest measures how well a person actively operates on and retains symbolic information (e.g., numbers, letters) prior to recall. On this subtest, the client first listens to a random list of numbers and then to a random list of numbers and letters. After each section, numbers are recalled in appropriate numerical order and then numbers and letters are recalled in numerical and alphabetical order. Although memory and attention are important for this task, executive skills also are important in finding an appropriate learning strategy. Rote sequential memory may be needed for solving some math problems or in learning irregularly spelled words. It is interesting to contrast the Symbolic Working Memory subtest with the Number Letter subtest because the latter relies more heavily on immediate, rote sequential recall of symbols. Sample Client attained a Symbolic Working Memory scaled score of 15, which is within the High Average range.

Sample Client's Symbolic Working Memory performance suggests that for immediate recall, she generally will be able to manipulate and retain more than the usual amount of symbolic information expected for her age group.

Interpretation of Additional Subtests

Sentence Memory

The Sentence Memory subtest requires the client to repeat dictated single sentences of increasing length. This subtest evaluates immediate verbal memory skills similar to those needed to follow novel verbal directions or to relay a brief phone message accurately. Adequate language abilities often are necessary to perform well on this task. Frequently of interest is comparing performance on this subtest with performance on Number Letter (with less linguistic, yet rote immediate memory demands) and/or performance on Story Memory (with more linguistic and lengthy contextual recall demands). Sample Client attained a Sentence Memory scaled score of 17, which is within the High Average range.

Sample Client's Sentence Memory performance suggests that she generally will be able to remember a brief amount of exact verbal information better than most individuals in her age group.

In Conclusion

The WRAML2 is most appropriately used to obtain a picture of a broad range of memory abilities in order to develop hypotheses about strengths and concerns. It is important to consider all of the data that is presented in this report. Because the WRAML2 was designed to be used with other psychometric instruments, it is important to integrate the obtained information with other measures of cognition, information processing, and emotion.

End of Report