



Wide Range Assessment of Memory and Learning, Third Edition (WRAML™3)

WRAML™3 Interpretive Report - Standard Form

Wayne Adams, PhD, ABPP and David Sheslow, PhD

Examinee Information

Name: WRAML3 Case Study
ID:
Gender: Male
Date of Birth: 04/17/2013
Age at Testing: 8 years 5 months
Race/Ethnicity:
Handedness:

Test Information

Date of Testing: 10/07/2021
Examiner Name: Examiner, Sample

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Interpretive Overview

Overview

The Wide Range Assessment of Memory and Learning (3rd ed., WRAML3) is an individually administered, standardized assessment of memory, learning, and cognitive functions that support memory and learning processes. Specifically, the WRAML3 provides information about WRAML3's verbal and visual immediate and delayed recall, recognition, attention and concentration, and working memory.

Disclaimer

The WRAML3 Interpretive Report assumes that the examiner has foundational skills including a thorough understanding of the WRAML3 psychometric characteristics, its structure, and its administration procedures. Basic properties of the assessment are explained in the WRAML3 Administration Manual (2021) including a description of subtests, subtest directions, administration requirements, and a brief interpretation of the test results. A more complete presentation of the research supporting the assessment, including its national standardization, interrelationships between various indexes, subtests, and process variables can be found in the WRAML3 Technical Manual (2021).

The results and interpretive analyses contained within the WRAML3 Interpretive Report are designed to be integrated with other sources about the examinee, including history, behavioral observations, emotional concerns, as well as psychometric data from other test instruments. This report cannot exhaust the interpretive and diagnostic possibilities of such a complex construct as memory. The WRAML3 Interpretive Report was designed to provide clinicians with a practical, wide range sample of learning and memory interpretations to generate useful clinical hypotheses.

This report is confidential and intended exclusively for the use of qualified clinicians and trainees under supervision. Reviewing the test results with the examinee, parents/guardians, or other stakeholders (e.g., school personnel) is appropriate and encouraged as proper assessment practice when following applicable federal and state guidelines. Do not release this report to any individuals who are not qualified to interpret its results.

Confidence Intervals and Statistical Significance Selections

Confidence intervals at the 90th percentile are reported for the index scores. Critical values at the $p < .10$ level are reported for process scores, when applicable.

Performance Validity Indicator

WRAML3's results on the Performance Validity Indicator were found to be acceptable. That is, WRAML3's scores on the Attention/Concentration Index and the sum of the first five items on the recognition subtests indicate that WRAML3 put forth acceptable effort during testing.

It is important to note the prevalence of low subtest and index scores in the normative sample when considering performance validity. For the WRAML3 28% of individuals in the normative sample achieved at least one subtest score of ≤ 4 and 13% of individuals achieved at least one index score of ≤ 70 . The prevalence of subtest and index scores in the very low range suggests that interpretive caution should be taken if just one score indicates low effort or invalid performance. WRAML3 achieved 1 subtest score that is ≤ 4 , and 0 index scores that are ≤ 70 .

Validity Indicator
Acceptable

Index Score Summary

Index	Sum of Scaled Scores	Index Score	Confidence Interval (90%)	Percentile Rank
Visual Immediate Memory	25	115	105 - 121	84
Verbal Immediate Memory	16	88	83 - 95	21
Attention/Concentration	17	91	84 - 101	27
General Immediate Memory	58	97	91 - 103	42
Screener Memory	41	101	95 - 107	53
Visual Delayed	26	118	107 - 123	88
Verbal Delayed	11	73	69 - 83	4
General Delayed	37	95	89 - 102	37
Visual Recognition	25	114	104 - 120	82
Verbal Recognition	24	112	101 - 118	79
General Recognition	49	115	106 - 121	84
Working Memory	21	102	94 - 109	55

Subtest Score Summary

Immediate Recall (Core)					
Subtest	Raw Score	Scaled Score			
		Visual Immediate Memory	Verbal Immediate Memory	Attention/Concentration	Screener Memory
Picture Memory	25	14			14
Design Learning	141	11			11
Story Memory	18		7		7
Verbal Learning	27		9		9
Finger Windows	13			11	
Number Letter	8			6	

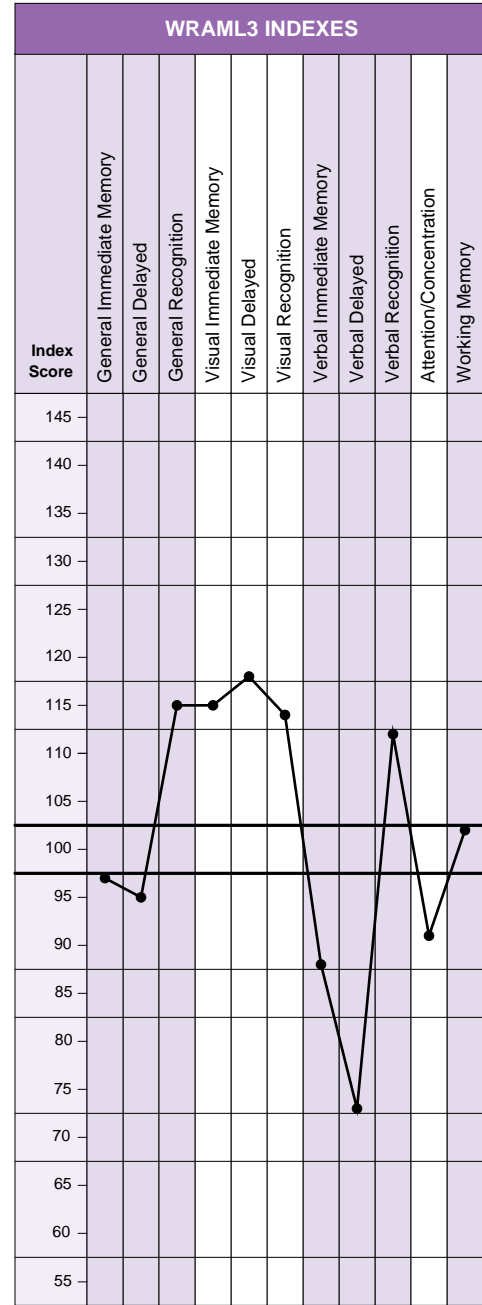
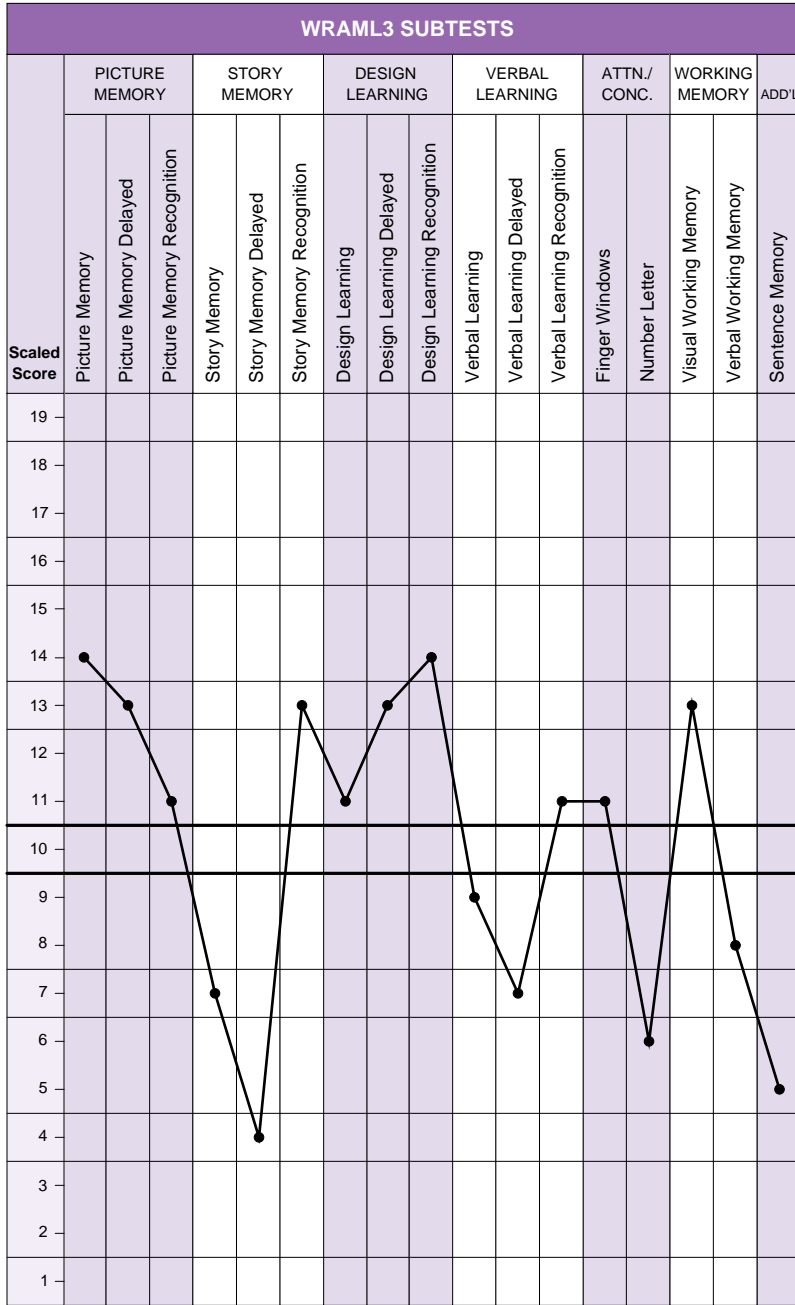
Delayed Recall (Supplementary)			
Subtest	Raw Score	Scaled Score	
		Visual Delayed	Verbal Delayed
Picture Memory Delayed	28	13	
Design Learning Delayed	55	13	
Story Memory Delayed	9		4
Verbal Learning Delayed	5		7

Recognition (Supplementary)			
Subtest	Raw Score	Scaled Score	
		Visual Recognition	Verbal Recognition
Picture Memory Recognition	31	11	
Design Learning Recognition	28	14	
Story Memory Recognition	28		13
Verbal Learning Recognition	17		11

Working Memory (Supplementary)		
Subtest	Raw Score	Scaled Score
Visual Working Memory	46	13
Verbal Working Memory	22	8

Additional Subtest (Supplementary)		
Subtest	Raw Score	Scaled Score
Sentence Memory	13	5

Score Summary Profiles



Index Discrepancy Analyses

Index Comparisons	Standard Score 1	Standard Score 2	Difference	Critical Value (.10)	Significant	Base Rate
Visual Immediate Memory vs. Verbal Immediate Memory	115	88	27	12.29	Y	<=5%
Verbal Immediate Memory vs. Attention/Concentration	88	91	-3	13.24	N	-
Visual Immediate Memory vs. Attention/Concentration	115	91	24	13.91	Y	<=10%
Visual Immediate Memory vs. Visual Delayed**	115	118	-3	13.69	N	-
Verbal Immediate Memory vs. Verbal Delayed**	88	73	15	13.24	Y	<=5%
Visual Delayed vs. Verbal Delayed	118	73	45	14.54	Y	<=2%
Visual Recognition vs. Verbal Recognition	114	112	2	15.36	N	-
Attention/Concentration vs. Working Memory	91	102	-11	13.69	N	-
General Immediate Memory vs. General Delayed	97	95	2	11.28	N	-
General Delayed vs. General Recognition	95	115	-20	12.54	Y	<=2%
Screeener Memory vs. Working Memory	101	102	-1	11.54	N	-
Screeener Memory vs. Attention/Concentration	101	91	10	12.78	N	-
Screeener Memory vs. General Delayed	101	95	6	11.28	N	-

**Information about these analyses can be found in the WRAML3 Technical Report, July 2021.

Subtest Discrepancy Analyses

Subtest Comparisons	Scaled Score 1	Scaled Score 2	Difference	Critical Value (.10)	Significant	Base Rate
Picture Memory vs. Design Learning	14	11	3	3.11	N	-
Story Memory vs. Verbal Learning	7	9	-2	2.69	N	-
Finger Windows vs. Number Letter	11	6	5	3.37	Y	<=10%
Picture Memory Delayed vs. Design Learning Delayed	13	13	0	3.40	N	-
Story Memory Delayed vs. Verbal Learning Delayed	4	7	-3	3.29	N	-
Picture Memory Recognition vs. Design Learning Recognition	11	14	-3	3.37	N	-
Story Memory Recognition vs. Verbal Learning Recognition	13	11	2	3.82	N	-
Visual Working Memory vs. Verbal Working Memory	13	8	5	2.99	Y	<=5%

Index, Subtest, and Process Score Interpretations

General Immediate Memory Index

The General Immediate Memory Index is an estimate of overall immediate recall, measured across a wide range of tasks. The General Immediate Memory Index is derived from the scores earned on the Verbal Immediate Memory Index, the Visual Immediate Memory Index, and the Attention/Concentration Index.

Performance between two or more of the indexes comprising the General Immediate Memory Index was found to be inconsistent (indicated by a statistically significant difference and a very low base rate). Suggesting that the use of the General Immediate Memory Index as an estimate of overall memory abilities may be questionable so interpret with extreme caution. In this case, WRAML3's Visual Immediate Memory Index vs. Verbal Immediate Memory Index scores were significantly discrepant. In general, the wider the discrepancy the more significant the difference between scores, clinical implications for these results are discussed in the Index Discrepancy Analyses section of this report. A more meaningful analysis may lie in examining the contributing index scores and the subtest scores for hypotheses as to WRAML3's relative strengths and weaknesses across memory demands.

WRAML3 earned a standard score of 97 on this index, which is in the average score range. WRAML3's overall age-appropriate performance suggests that acquiring skills dependent on new learning and immediate recall is consistent with same-age peers. WRAML3's immediate recall abilities across visual and verbal sensory modalities are consistent with same-age peers.

Visual Immediate Memory Index

The Visual Immediate Memory Index is an estimate of how well WRAML3 can learn and recall both meaningful and minimally-related rote visual information. The Visual Immediate Memory Index is derived from the scaled scores earned on Picture Memory and Design Learning.

Performance between the two subtests comprising the Visual Immediate Memory Index was found to be consistent (indicated by a statistically nonsignificant difference and a high base rate). Suggesting that this index may be considered a reasonable estimate of visual immediate recall abilities.

WRAML3 earned a standard score of 115 on this index, which is in the high average score range. WRAML3's performance in the high average score range on the Visual Immediate Memory Index suggests great strength in visual learning and immediate recall compared to same-age peers, and this may be noticeable with everyday visual memory demands found in academic, work, and home settings.

Picture Memory

The Picture Memory subtest measures immediate recall of contextual visual information. WRAML3 earned a scaled score of 14 on this subtest, which is in the very high score range. It is important to examine the Commission Errors score along with the scaled score for this subtest.

Given this level of performance, WRAML3 is expected to remember meaningful visual information noticeably better than same-age peers, and this may be evident for everyday tasks such as immediate recall of the content of pictures or diagrams on a prior page or a computer screen. Comparing Picture Memory performance with Design Learning and Finger Windows performance may yield hypotheses as to WRAML3's recall of meaningful versus nonmeaningful visual information.

Process Scores - Picture Memory

	Raw Score	Mean (SD)	Base Rate
Commission Errors	9	3.4 (2.5)	<=5%

Commission Errors

The Commission Errors score provides a measure of disinhibited responding or random responding. Because the Picture Memory subtest does not penalize examinees for errors, overresponding can inflate the Picture Memory score.

WRAML3 made a total of 9 commission error(s), which is very high compared to same-age peers and warrants caution when interpreting the Picture Memory score, because it is likely inflated due to excessive guessing or impulsive responding.

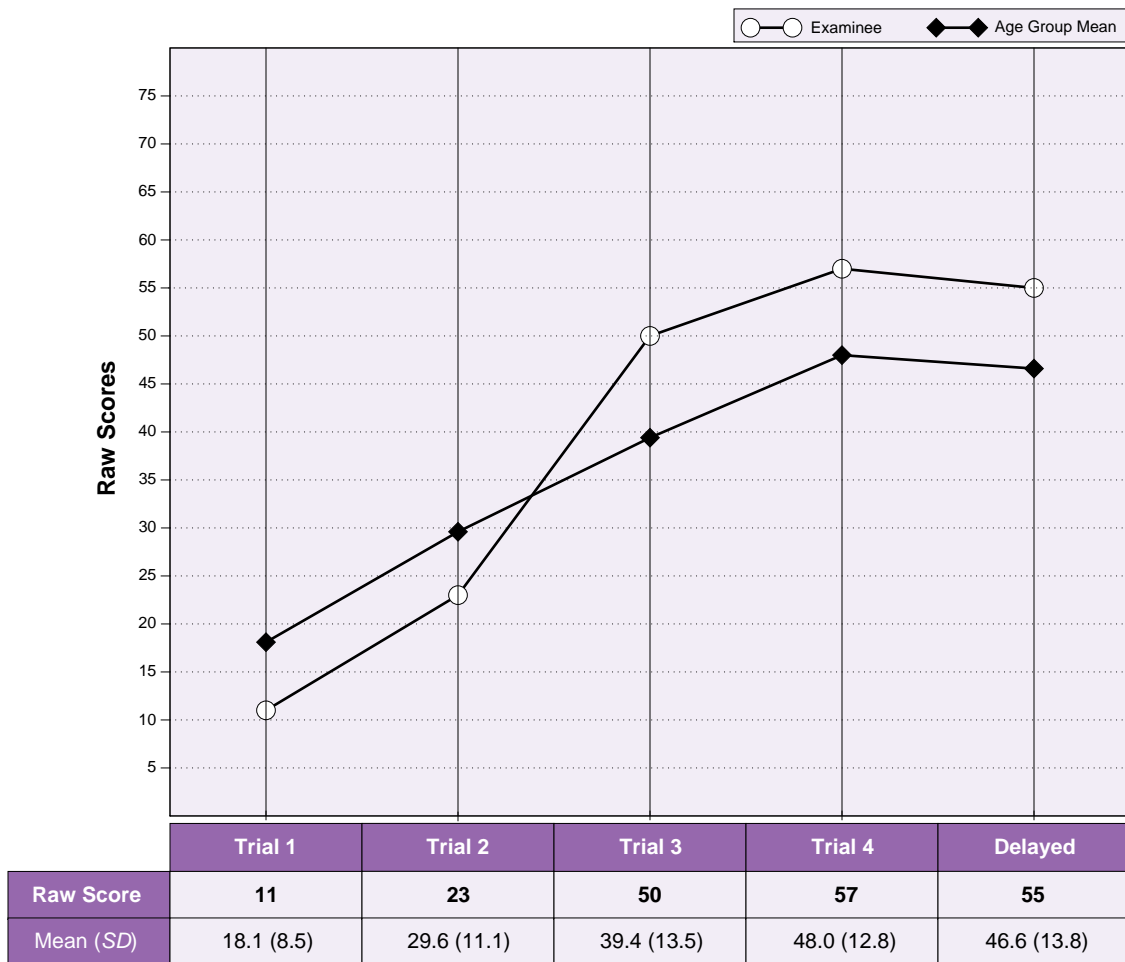
Design Learning

The Design Learning subtest provides an estimate of how well WRAML3 can learn and recall abstract visual information. WRAML3 earned a scaled score of 11 on this subtest, which is in the average score range.

Given this level of performance, WRAML3 is expected to learn and remember new, abstract visual information at levels comparable to same-age peers. This may be noticeable when WRAML3 performs everyday tasks with visual memory demands, such as accurately copying a diagram from a computer screen or white board, relocating a room just visited in a new building, or reproducing the letter sequence of a newly-learned phonetically-irregular word.

Process Scores - Design Learning

	Raw Score	Mean (SD)	Base Rate
Trial 1	11	18.1 (8.5)	<=15%
Trial 2	23	29.6 (11.1)	-
Trial 3	50	39.4 (13.5)	-
Trial 4	57	48.0 (12.8)	-
Delayed	55	46.6 (13.8)	-
Learning Slope (Trial 4 - Trial 1)	46	29.9 (11.0)	-
Upper Left Quadrant	57	31.7 (12.9)	-
Upper Right Quadrant	8	25.7 (15.1)	<=15%
Lower Left Quadrant	47	32.1 (13.9)	-
Lower Right Quadrant	11	28.0 (13.3)	<=15%



Quadrant Analysis

WRAML3's Design Learning performance is also reported by each quadrant. These data can be used to determine if WRAML3 performed noticeably better within one or more quadrants of the card. This information may be useful in identifying phenomena such as a visual field cut or neglect, as well as inefficient visual scanning and visual search strategies.

Learning Slope Analysis

This score is the difference between Trials 1 and 4 of Design Learning, and provides a quick estimate of WRAML3's rate of learning.

This score difference is within normal limits when compared to WRAML3's same-age peers. This suggests that WRAML3's pace of learning over the four Design Learning trials was at or above expected levels and is likely not a cause for clinical concern.

Learning Grid

The Design Learning trial scores can be used to create a learning curve that compares WRAML3's performance across trials to same-age peers. A curve that is consistently above or below same-age peers indicates learning of new visual information better or worse, respectively, than same-age peers. A relatively flat curve suggests difficulties learning despite repeated review. Conversely, a curve that starts out lower but then "catches up" with same-age peers suggests that WRAML3 may struggle with initial learning but improves with repeated exposures. Variable performance over trials may suggest some degree of attentional dysregulation, difficulties with executive function, or an irregular visual encoding system.

Verbal Immediate Memory Index

The Verbal Immediate Memory Index is an estimate of how well WRAML3 can learn and recall both contextually-meaningful and relatively less-meaningful verbal information. The Verbal Immediate Memory Index is derived from the scaled scores earned on Story Memory and Verbal Learning.

Performance between the two subtests comprising the Verbal Immediate Memory Index was found to be consistent (indicated by a statistically nonsignificant difference and a high base rate). Suggesting that the Verbal Immediate Memory Index may be considered a reasonable estimate of verbal memory abilities.

WRAML3 earned a standard score of 88 on this index, which is in the low average score range. Examinees performing within the low average range are expected to demonstrate immediate recall of verbal information at levels somewhat lower than same-age peers. This may be noticeable with everyday verbal memory demands found in academic, work, and home settings.

Beyond verbal memory weakness, consider other influences that could contribute to WRAML3's lower performance, such as attention, anxiety, language, organization, and hearing weaknesses.

Story Memory

The Story Memory subtest assesses immediate recall of extended, meaningful verbal content. WRAML3 earned a scaled score of 7 on this subtest, which is within the low average score range.

This level of immediate recall for contextualized information is somewhat lower than that of same-age peers. This suggests that WRAML3 will have some weakness with short-term recall of narrative tasks like remembering the content of conversations or news on the radio. In addition to memory weakness, also consider other possible contributing factors such as deficits in attention, receptive/expressive language, hearing, and aspects of executive functioning when formulating an interpretation of WRAML3's scores.

Process Scores - Story Memory

	Raw Score	Scaled Score
Story A	12	9
Story B	6	6
Verbatim	5	4
Gist	13	9

Process Scores - Individual Story Comparison

	Scaled Score 1	Scaled Score 2	Difference	Critical Value (.10)	Significant	Base Rate
Story A vs. Story B	9	6	3	3.31	N	-

Story A vs. Story B Comparison

Scaled scores are provided for each of the two stories administered for the subtest, which allows examination of consistency of narrative recall.

The performance between the stories is consistent, so the Story Memory subtest may be considered an appropriate estimate of WRAML3's immediate recall of contextual verbal material.

Verbatim and Gist Scores

Performance on Story Memory is, in part, related to recalling both specific details (verbatim) and details tending to preserve meaning (gist) of the stories presented. Individuals who achieve roughly equivalent Verbatim and Gist scores demonstrate comparable recall of both details and contextual meaning of an extended verbal narrative. Individuals who recall more verbatim than gist details may experience certain learning disorders such as language processing, developmental, and autistic spectrum disorders, as well as neurological conditions such as head injury. It is important to integrate assessment findings with clinical presentation. Individuals who recall more gist than verbatim details may experience attention and/or language-based learning weaknesses. This may have implication for such activities as recalling important details from a news show or recalling recipes from a book. When forming interpretations, note that these scores are less sensitive among very young and very old examinees.

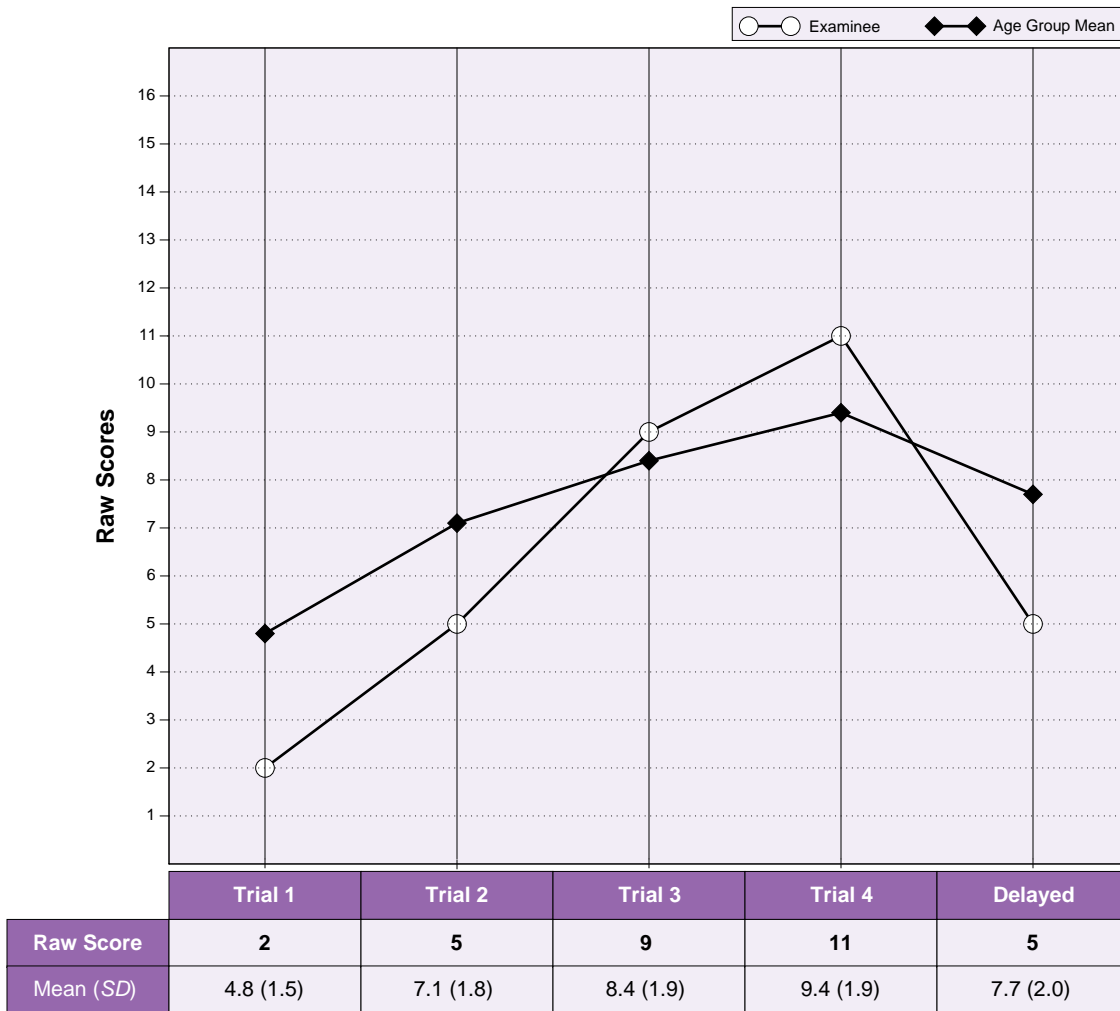
Verbal Learning

The Verbal Learning subtest provides an estimate of how well WRAML3 can learn relatively unrelated verbal information across multiple exposures. WRAML3 earned a scaled score of 9 on this subtest, which is in the average score range.

Given this level of performance, WRAML3 is expected to learn and remember relatively unrelated verbal information at levels comparable to same-age peers. This may be noticeable when WRAML3 performs everyday verbal memory tasks, such as remembering the ingredients to gather for a recipe after having them read aloud (adult), or remembering components of a dictated homework assignment (youth).

Process Scores - Verbal Learning

	Raw Score	Mean (SD)	Base Rate
Trial 1	2	4.8 (1.5)	<=5%
Trial 2	5	7.1 (1.8)	<=15%
Trial 3	9	8.4 (1.9)	-
Trial 4	11	9.4 (1.9)	-
Delayed	5	7.7 (2.0)	<=5%
Learning Slope (Trial 4 - Trial 1)	9	4.5 (2.0)	-
Intrusions	4	1.1 (1.9)	<=5%
Repetitions	3	1.7 (2.4)	<=15%
Primacy	30	30.5 (6.9)	-
Recency	30	29.2 (8.7)	-



Intrusions

In the process of recalling words recited by the examiner, sometimes the examinee mistakenly says words that are not on the list. These are intrusions.

WRAML3 demonstrated a significant number of intrusions compared to same-age peers. Intrusions may occur for a variety of reasons including difficulties with self-monitoring, perseverative thinking, or disorganized thinking. Qualitative examination of the intrusions may be helpful, including noting the presence of intrusions across all trials or just the first two, and whether the intrusions were semantically or phonetically related to recited words.

Repetitions

In the process of recalling words recited by the examiner, sometimes the examinee repeats words already said within a trial. These are repetitions.

WRAML3 demonstrated a significant number of repetitions compared to same-age peers. Repetitions may occur for a variety of reasons including difficulties with self-monitoring, perseverative thinking, or disorganized thinking. Qualitative examination of the repetitions may be helpful, including noting the presence of consistent repetitions across several trials, subjective recognition that a word may have been repeated, or the presence of repeated intrusions.

Primacy

When presented with a list of words, individuals generally remember the words from the beginning and end of the list better than words from the middle of the list. Primacy is the percentage of words recalled from the beginning of the list across all four trials, controlling for the total number of remembered words.

The percentage of words recalled by WRAML3 from the beginning of the word list was within normal limits and is not of clinical concern.

Recency

Recency is the percentage of words recalled from the end of the list across all four trials controlling for the total number of remembered words.

The percentage of words recalled by WRAML3 from the end of the word list was within normal limits and is not of clinical concern.

Learning Slope Analysis

This score is defined as the difference between Trials 1 and 4 of Verbal Learning, and provides a quick estimate of WRAML3's rate of verbal learning.

This score difference is within normal limits when compared to WRAML3's same-age peers, and suggests that the amount of learning over the four Verbal Learning trials was at or above expected levels and is not a cause for clinical concern.

Learning Grid

Verbal Learning trial scores create a learning curve that can be compared to the performance of WRAML3's same-age peers. A curve that is consistently above or below same-age peers indicates learning of new verbal information better or worse, respectively, than same-age peers. A relatively flat curve may suggest WRAML3 has difficulties learning despite repeated exposure. Conversely, a curve that starts out lower but then "catches up" with same-age peers, suggests that WRAML3 has difficulties with initial learning but improves with repeated exposures. A variable performance over trials may suggest WRAML3 has some degree of attentional dysregulation or difficulties with executive functioning. Such patterns have implications for recommendations related to review strategies.

Attention/Concentration Index

The Attention/Concentration Index provides an estimate of how well WRAML3 can learn and recall attentionally-demanding, relatively rote, sequential information. Both auditory and visual information are sampled. The Attention/Concentration Index is derived from the scaled scores earned on Finger Windows and Number Letter.

The difference between Finger Windows and Number Letter was found to be inconsistent (indicated by a statistically significant difference and a base rate of $\leq 10\%$). Interpret the Attention/Concentration Index as an overall estimate of attention and concentration abilities with caution. A more meaningful analysis may lie in examining the contributing subtest scores for generating hypotheses about WRAML3's relative strengths and weaknesses between visual and verbal domains.

WRAML3 earned a standard score of 91 on this index, which is in the average score range. An Attention/Concentration Index score within the average range suggests WRAML3 has age-expected abilities for processing and recalling rote information across verbal and visual sensory modalities. Such skills will likely be evident in academic, work, and home settings.

Finger Windows

The Finger Windows subtest measures rote, sequential, immediate recall of visual-spatial information. WRAML3 earned a scaled score of 11 on this subtest, which is in the average score range.

Given this level of performance, WRAML3 is expected to learn and remember sequences of rote visual information at levels comparable to same-age peers. This may relate to tasks such as the ability to scan one or more measures of music and accurately remember the sequence of notes, remembering the inter-related part of a blueprint or plans recently displayed, and view a map before leaving to find an unfamiliar, nearby location and not get lost.

Number Letter

The Number Letter subtest measures rote, sequential, immediate recall of auditory symbolic information. WRAML3 earned a scaled score of 6 on this subtest, which is in the low average score range.

Given this level of performance, WRAML3 is expected to learn and remember sequences of rote auditory information somewhat less well than same-age peers. For everyday tasks, this may relate to WRAML3's ability to recall sport scores, phone numbers, or zip codes immediately after hearing them. Academic tasks like reading recognition or spelling may be affected.

Finger Windows vs. Number Letter Discrepancy Analysis

WRAML3's higher performance on the Finger Windows subtest suggests better visual than verbal rote attention/concentration. Performances were relatively better for visual-spatial tasks than for recalling rote verbally-presented material. Difficulty recalling verbally-presented sequential symbolic information may be associated with weakness on such academic tasks as basic reading and spelling.

Sentence Memory

The Sentence Memory subtest evaluates immediate recall of limited amounts of meaningful verbal information. WRAML3 earned a scaled score of 5 on this subtest, which is in the very low score range.

Given this level of performance, WRAML3 is expected to perform noticeably less well than same-age peers when remembering the content of a spoken sentence, such as being able to follow a brief set of oral directions, and accurately relate a brief message. While this subtest is useful on its own, it may also be of diagnostic value when compared to Story Memory (containing lengthier meaningful verbal content) and Number Letter (requiring little meaningful verbal content).

Immediate/Delayed Recall Comparisons

Subtest Comparisons	Scaled Score 1	Scaled Score 2	Difference	Critical Value (.10)	Significant	Base Rate
Picture Memory vs. Picture Memory Delayed	14	13	1	3.69	N	-
Design Learning vs. Design Learning Delayed	11	13	-2	2.77	N	-
Story Memory vs. Story Memory Delayed	7	4	3	2.74	Y	<=5%
Verbal Learning vs. Verbal Learning Delayed	9	7	2	3.26	N	-

Note. Scaled scores for Verbal Learning Delayed and Design Learning Delayed may be restricted due to the skewed distributions of the raw scores for these subtests. Interpret significant discrepancies with Verbal Learning Delayed and Design Learning Delayed scores in the high average and above ranges with caution.

General Delayed Index

The General Delayed Index is an estimate of longer-term storage of the information WRAML3 learned on the four immediate memory subtests (i.e., Picture Memory, Story Memory, Design Learning, and Verbal Learning) and is derived from the scores earned on the Visual Delayed and Verbal Delayed Indexes.

WRAML3's performance on the indexes comprising the General Delayed Index was found to be inconsistent (indicated by a statistically significant difference and base rate of <=2%) so, consequently, the General Delayed Index should be interpreted with extreme caution as an estimate of overall longer-term recall. In general, the wider the discrepancy the more significant the difference between scores, clinical implications for these results are discussed in the Index Discrepancy Analyses section of this report. A more meaningful analysis may lie in examining the contributing index and subtest scores for forming hypotheses about WRAML3's relative strengths and weaknesses.

WRAML3 earned a standard score of 95 on this index, which is in the average score range. Examinees earning a General Delayed Index score within the average range typically demonstrate an ability to retain visual and verbal information over time comparable to same-age peers. This corresponds to an age-appropriate capacity to transfer information from short-term to long-term memory and retrieve it efficiently on demand.

Visual Delayed Index

The Visual Delayed Index is an estimate of how well WRAML3 can retain and retrieve both meaningful and minimally-related visual information after a 20-30 minute delay. The Visual Delayed Index is derived from the subtest scaled scores of Picture Memory Delayed and Design Learning Delayed.

Performance between the two subtests comprising the Visual Delayed Index was found to be consistent (indicated by a statistically nonsignificant difference and a high base rate). Suggesting that this index may be considered a reasonable estimate of WRAML3's visual delayed recall abilities.

WRAML3 earned a standard score of 118 on this index, which is in the high average score range. WRAML3's performance in the high average score range on the Visual Delayed Index suggests great strength in acquiring and subsequently recalling visual material compared to same-age peers. This may be noticeable with everyday visual memory demands found in academic, work, or home settings.

Picture Memory Delayed

The Picture Memory Delayed subtest provides an estimate of visual memory recall over a moderate period of time. WRAML3 earned a scaled score of 13 on this subtest, which is within the high average score range.

Given this level of performance, WRAML3 is expected to remember recently-learned meaningful visual information better than same-age peers. This may be noticeable during everyday tasks with longer-term recall demands, for example, subsequently recalling visual details of a painting, contents of a room visited earlier in the day, or a diagram on a computer screen.

Picture Memory vs. Picture Memory Delayed Comparison

Comparing WRAML3's performance on the Picture Memory subtest with that of the Picture Memory Delayed subtest provides an estimate of visual information retained with the passage of time.

WRAML3's performance between Picture Memory and Picture Memory Delayed was consistent (indicated by a statistically nonsignificant difference and a high base rate), suggesting that recall for contextual visual information after 20-30 minutes was at a similar level as immediate recall.

Design Learning Delayed

The Design Learning Delayed subtest provides an estimate of longer-term memory for abstract visual information learned using repeated exposures. WRAML3 earned a scaled score of 13 on this subtest, which is in the high average score range.

Given this level of performance, WRAML3 is expected to remember abstract visual content at levels markedly better than same-age peers. This may be noticeable during everyday memory tasks with longer-term demands, such as recalling details of a blueprint, a travel route devised earlier when studying a map (adult), or correctly spelling a previously-learned phonetically-irregular word (youth).

Process Score - Retention Score

Trial Comparison	Raw Score 1	Raw Score 2	Difference	Mean (SD)	Base Rate
Design Learning Delayed Total - Design Learning Trial 4	55	57	-2	-1.6 (5.5)	-

Retention

The Retention score is an estimate of visual memory decay (i.e., forgetting) over time. This score provides a direct comparison of what is learned on Design Learning Trial 4 with the Design Learning Delayed subtest administered 20-30 minutes later.

The amount of forgetting suggested by WRAML3's score falls within an acceptable range. However, it is also important to consider the amount of information recalled for the immediate and delayed recall conditions when considering the clinical significance of this Retention score. That is, an examinee may achieve low raw scores on Trial 4 that reflect encoding difficulties but may remember a consistent amount for the delayed recall condition to achieve an adequate Retention score.

Design Learning vs. Design Learning Delayed Comparison

Comparing WRAML3's performance on the Design Learning subtest with that of the Design Learning Delayed subtest provides an estimate of visual information retained with the passage of time.

WRAML3's performance between Design Learning and Design Learning Delayed was consistent (indicated by a statistically nonsignificant difference and a high base rate), suggesting that recall for non-meaningful visual information after 20-30 minutes was at a similar level as immediate recall.

Verbal Delayed Index

The Verbal Delayed Index is an estimate of how well WRAML3 can store and retrieve both meaningful and minimally-related verbal information after a 20-30 minute delay. The Verbal Delayed Index is derived from the subtest scaled scores of Story Memory Delayed and Verbal Learning Delayed.

Performance between the two subtests comprising the Verbal Delayed Index was found to be consistent (indicated by a statistically nonsignificant difference and a high base rate). Suggesting that this index may be considered a reasonable estimate of delayed verbal recall.

WRAML3 earned a standard score of 73 on this index, which is in the very low score range. Given this level of performance, WRAML3 is expected to subsequently recall previously-acquired verbal content at levels notably lower than same-age peers. This may be noticeable with everyday verbal memory demands found in academic, work, and home settings.

Story Memory Delayed

The Story Memory Delayed subtest measures the free recall of meaningful narrative following a 20-30 minute delay. WRAML3 attained a scaled score of 4 on the Story Memory Delayed subtest, which is in the very low score range.

WRAML3's level of performance is notably lower than expected compared to same-age peers. WRAML3 is expected to have difficulties recalling information in everyday tasks like subsequently remembering content of a conversation, podcast, or reading selection. In addition to academic and job implications, this may also impact WRAML3's social functioning. With this low level of performance, consider other nonmemory influences that may also be influencing this score, such as hearing difficulties, language weaknesses, lower cognitive ability, and lower motivation because of fatigue.

Story Memory vs. Story Memory Delayed Comparison

Comparing WRAML3's performance on the Story Memory subtest with that of the Story Memory Delayed subtest provides an estimate of verbal memory decay (i.e., forgetting) over time.

WRAML3's drop in performance between Story Memory and the Story Memory Delayed subtests is of clinical concern. Compare this result to WRAML3's performance on the Story Memory Recognition subtest to determine whether the apparent decay in recall is due to difficulties with information loss or with retrieval. If the Story Memory Recognition score suggests similar results, a more general concern about verbal memory storage is raised. Examine the difference between the Verbal Learning versus Verbal Learning Delayed subtests, as well as the Retention score, to see if a similar pattern of visual memory decay is found.

Verbal Learning Delayed

The Verbal Learning Delayed subtest provides an estimate of longer-term memory for relatively unrelated verbal information learned using repeated exposures. WRAML3 earned a scaled score of 7 on this subtest, which is in the low average score range.

Given this level of performance, WRAML3 is expected to remember previously-learned, unrelated verbal content at levels lower than same-age peers. This may be noticeable during everyday tasks with longer-term verbal memory demands, such as recalling items from a shopping list, or remembering specific factual content for a history test.

Process Score - Retention Score

Trial Comparison	Raw Score 1	Raw Score 2	Difference	Mean (SD)	Base Rate
Verbal Learning Delayed Total - Verbal Learning Trial 4	5	11	-6	-1.7 (1.7)	<=5%

Retention

The Retention score is an estimate of verbal memory decay (i.e., forgetting) over time. This score provides a comparison between what is learned on Verbal Learning Trial 4 with the Verbal Learning Delayed subtest administered 20-30 minutes later.

WRAML3's performance on Trial 4 of the immediate recall condition exceeded that of the delayed recall condition. The amount of forgetting suggested by this score may be noticeable in everyday situations when WRAML3 uses repeated exposures to learn new verbal information. It is also important to compare Verbal Learning and Verbal Learning Delayed for consistency.

Verbal Learning vs. Verbal Learning Delayed Comparison

WRAML3's levels of age-adjusted performance for the Verbal Learning and Verbal Learning Delayed subtests were consistent (indicated by a statistically nonsignificant difference and a high base rate), suggesting that WRAML3 recalled relatively-unrelated verbal information after a 20-30 minute delay at a similar level as immediate recall.

Delayed Recall/Recognition Comparisons

Subtest Comparisons	Scaled Score 1	Scaled Score 2	Difference	Critical Value (.10)	Significant	Base Rate
Picture Memory Delayed vs. Picture Memory Recognition	13	11	2	3.37	N	-
Design Learning Delayed vs. Design Learning Recognition	13	14	-1	3.40	N	-
Story Memory Delayed vs. Story Memory Recognition	4	13	-9	3.27	Y	<=2%
Verbal Learning Delayed vs. Verbal Learning Recognition	7	11	-4	3.84	Y	<=5%

Note. The scaled score range for the Recognition subtests are restricted due to the skewed distributions of the raw scores for these subtests. Interpret significant discrepancies with recognition subtest scores in the average range and above with caution.

General Recognition Index

The General Recognition Index is an estimate of how well WRAML3 retained information previously presented on the immediate recall subtests (i.e., Picture Memory, Story Memory, Design Learning, and Verbal Learning) and is derived from the scores earned on the Visual Recognition Index and Verbal Recognition Index.

Performance between Visual Recognition Index and Verbal Recognition Index was found to be consistent (indicated by a statistically nonsignificant difference and a high base rate). Suggesting that the General Recognition Index may be considered a reasonable estimate of overall recognition memory. However, as the General Recognition Index is a composite index, it is important to evaluate its contributing index and subtest scores for consistency when forming hypotheses as to WRAML3's longer-term memory strengths and weaknesses.

WRAML3 earned a standard score of 115 on this index, which is in the high average score range. WRAML3 demonstrates good storage of previously-learned visual and verbal information compared to same-age peers. This suggests that cueing supports WRAML3's ability to recognize previously-learned new information.

Visual Recognition Index

The Visual Recognition Index is an estimate of how well WRAML3 can recognize previously-learned meaningful- and minimally-related, rote visual information. The Visual Recognition Index is derived from the scaled scores earned on Picture Memory Recognition and Design Learning Recognition.

Performance between the two subtests comprising the Visual Recognition Index was found to be consistent (indicated by a statistically nonsignificant difference and a high base rate). Suggesting that this index may be considered a reasonable estimate of visual recognition abilities.

WRAML3 earned a standard score of 114 on this index, which is in the high average score range. Compared to same-age peers, earning a Visual Recognition Index score within this range typically demonstrates good ability to recognize previously-learned visual information. This suggests WRAML3 has good abilities with encoding and transferring visual information from short-term to long-term storage.

Picture Memory Recognition

The Picture Memory Recognition subtest provides a measure of recognition memory for meaningful or contextualized visual information. WRAML3 earned a scaled score of 11 on this subtest, which is in the average score range.

WRAML3 demonstrated an ability to recognize previously-learned meaningful visual information similar to same-age peers. This suggests age-appropriate abilities to encode and then transfer visual information from short-term to long-term storage.

Picture Memory Delayed vs. Picture Memory Recognition Comparison

In addition to knowing how much newly learned visual information is later retained using a free recall procedure (i.e., the Picture Memory Delayed subtest), it is sometimes important to determine how much of that information can be retrieved by cueing (i.e., Picture Memory Recognition subtest). This comparison is especially important if the Picture Memory Delayed score is significantly lower than the Picture Memory score, suggesting more forgetting than expected. A comparison between WRAML3's performance on Picture Memory Recognition and Picture Memory Delayed helps discern if the newly learned visual information has been forgotten or whether it is still stored but cannot be efficiently retrieved.

WRAML3's performance between the Picture Memory Delayed and Picture Memory Recognition was consistent (indicated by a statistically nonsignificant difference and a high base rate), suggesting that WRAML3 was able to recognize contextual visual information at a level consistent with Picture Memory Delayed performance.

Design Learning Recognition

The Design Learning Recognition subtest provides a measure of recognition of previously-learned abstract visual information. WRAML3 earned a scaled score of 14 on this subtest, which is in the very high score range.

Compared to same-age peers, WRAML3 demonstrated good ability to recognize previously-learned abstract visual information. This suggests WRAML3 has good ability to encode and then transfer visual information from short-term to long-term storage.

Design Learning Delayed vs. Design Learning Recognition Comparison

In addition to knowing how much newly-learned visual information the examinee can recall after a time delay, it is sometimes important to determine how much information can be retrieved by cueing (i.e., recognition). This comparison is especially important if the Design Learning Delayed score is significantly lower than the Design Learning score, which suggests more forgetting than expected. A comparison between WRAML3's performance on Design Learning Recognition and Design Learning Delayed helps determine if the newly-learned visual information has been forgotten or whether it is still stored but cannot be efficiently retrieved.

WRAML3's performance between the Design Learning Delayed and Design Learning Recognition was consistent (indicated by a statistically nonsignificant difference and a high base rate), suggesting that WRAML3 was able to recognize relatively-abstract visual information at a level consistent with Design Learning Delayed performance.

Verbal Recognition Index

The Verbal Recognition Index is an estimate of how well WRAML3 can recognize both meaningful- and minimally-related rote verbal information after a time delay. The Verbal Recognition Index is derived from the scaled scores earned on Story Memory Recognition and Verbal Learning Recognition.

Performance between the two subtests comprising the Verbal Recognition Index was found to be consistent (indicated by a statistically nonsignificant difference and a high base rate). Suggesting that this index may be considered a reasonable estimate of verbal recognition abilities.

WRAML3 earned a scaled score of 112 on this index, which is in the high average score range. Compared to same-age peers, examinees earning a Verbal Recognition Index within this range typically demonstrate good ability to recognize previously-learned verbal information. This suggests WRAML3 has strong abilities to encode and then transfer verbal information from short-term to long-term storage. Compare the Verbal Recognition Index with the Verbal Delayed Index to evaluate WRAML3's verbal retrieval versus storage capacity.

Story Memory Recognition

The Story Memory Recognition subtest provides a measure of recognition for a previously presented verbal narrative; the subtest assesses if verbal information is stored, even if it cannot be retrieved on demand. WRAML3 earned a scaled score of 13 on this subtest, which is in the high average score range.

Compared to same-age peers, WRAML3 demonstrates good ability to recognize previously-learned meaningful verbal information using a cued format. This suggests WRAML3 has good ability to encode and then transfer verbal information from short-term to long-term storage.

Story Memory Delayed vs. Story Memory Recognition Comparison

In addition to knowing how much newly learned verbal information the examinee can recall after a time delay, it is useful to determine how much information can be retrieved by cueing (i.e., recognition). This comparison is especially important if the Story Memory Delayed score is significantly lower than the Story Memory score, which suggests more forgetting than expected. A comparison between WRAML3's performance on Story Memory Recognition and Story Memory Delayed helps determine if the newly learned verbal information has been forgotten or whether it is still stored but cannot be efficiently retrieved.

The difference in performance between the Story Memory Recognition and the Story Memory Delayed subtests may be of some concern. Specifically, WRAML3's ability to recall meaningful verbal information is a relative weakness in comparison to the ability to retrieve this information. Therefore, it is likely that WRAML3 may give an impression of remembering less of this information than may actually be the case, especially in high demand situations. WRAML3's demonstration of verbal memory may appear inconsistent from situation to situation. Using a cueing system, such as a verbal multiple-choice approach, to assess everyday verbal retention may have beneficial value. To assess the pervasiveness of this weakness, compare this finding to the similar Verbal Learning Delayed versus Verbal Learning Recognition analyses.

Verbal Learning Recognition

The Verbal Learning Recognition subtest provides a measure of recognition memory for a previously presented word list; the subtest assesses if that verbal information is stored, even if it cannot be retrieved on demand. WRAML3 earned a scaled score of 11 on this subtest, which is in the average score range.

WRAML3 demonstrates an ability to recognize previously-learned relatively-unrelated verbal information similar to same-age peers. This suggests age-appropriate abilities to encode and then transfer verbal information from short-term to long-term storage.

Process Scores - Verbal Learning Recognition

	Raw Score	Mean (SD)	Base Rate
Semantic Errors	0	0.2 (0.5)	<=15%
Phonological Errors	0	0.0 (0.3)	<=15%

Verbal Learning Recognition Process Score

For most items on the Verbal Learning Recognition subtest, the words used in the multiple-choice questions include the correct word, a word with similar meaning (semantic error), and a word that sounds like the correct word (phonological error); there is also a "none" choice.

Semantic errors

Raw scores of 0 should not be interpreted as clinically significant, regardless of the base rate. When the level of semantic errors falls at or below a base rate of 5%, comprehension and language difficulties may be a concern.

Phonological errors

Raw scores of 0 should not be interpreted as clinically significant, regardless of the base rate. When the level of phonological errors falls at or below a base rate of 5%, sound discrimination, language, or hearing may be a concern.

Verbal Learning Delayed vs. Verbal Learning Recognition Comparison

In addition to knowing how much newly learned verbal information the examinee can recall after a time delay, it is useful to determine how much information can be retrieved by cueing (i.e., recognition). This comparison is especially important if the Verbal Learning Delayed score is significantly lower than the Verbal Learning score, which suggests more forgetting than expected. A comparison between WRAML3's performance on Verbal Learning Recognition and Verbal Learning Delayed helps determine if the newly learned verbal information has been forgotten or whether it is still stored but cannot be efficiently retrieved.

The difference in performance between Verbal Learning Recognition and Verbal Learning Delayed generates clinical concern. Specifically, WRAML3's ability to recall relatively-unrelated verbal information is a weakness in comparison to the ability to recognize this same information. Therefore, it is likely that WRAML3 may give an impression of having stored less of this information than may actually be the case, especially in high demand situations. WRAML3's demonstration of verbal memory retrieval may appear inconsistent from situation to situation. Using a cueing system, such as a verbal multiple-choice approach, to assess everyday verbal retention may have beneficial value. To assess the pervasiveness of this weakness, compare this finding to the corresponding Story Memory Delayed versus Story Memory Recognition analysis.

Working Memory Index

The Working Memory Index provides an estimate of short-term recall in which executive functions are needed to use and modify the original information. The Working Memory Index is derived from the scaled scores earned on Verbal Working Memory and Visual Working Memory.

Performance between the Verbal Working Memory and Visual Working Memory was inconsistent (indicated by a statistically significant difference and a base rate of <=5%). Interpret the Working Memory Index as an overall estimate of working memory with extreme caution. Information at the contributing subtest level may be helpful in further characterizing WRAML3's working memory functioning.

WRAML3 earned a standard score of 102 on this index, which is in the average score range. WRAML3's overall performance on the Working Memory Index suggests abilities in retaining and mentally manipulating visual and verbal information to complete a task similar to same-age peers.

Visual Working Memory

The Visual Working Memory subtest provides an estimate of short-term visual recall in which executive functions are utilized and manipulate information. WRAML3 earned a scaled score of 13 on this subtest, which is in the high average score range.

Compared to same-age peers, WRAML3 demonstrates strengths in the ability to recall and manipulate visual information. This suggests good functioning with tasks requiring visual reasoning, including some areas of mathematics (e.g., geometry) and early reading skills.

Verbal Working Memory

The Verbal Working Memory subtest provides an estimate of short-term verbal recall in which executive functions are utilized and modify information. WRAML3 earned a scaled score of 8 on this subtest, which is in the average score range.

WRAML3 demonstrates an ability to recall and mentally manipulate verbal information at levels consistent with same-age peers. This suggests adequate functioning with tasks requiring verbal reasoning including multi-step algebra problems and reorganizing information previously read while continuing to read.

Visual Working Memory vs. Verbal Working Memory Discrepancy Analysis

WRAML3's higher performance on the Visual Working Memory subtest suggests better visual than verbal working memory skills. Performances were relatively better for nonverbal visual-spatial tasks than for recalling rote verbally-presented material. Relative strengths in the area of recall and mental manipulation of visual-spatial information may be associated with strengths in visual memory and some areas of mathematics (e.g. geometry). Difficulty recalling and mentally manipulating verbally-presented information may be associated with weakness on such academic tasks as reading comprehension and note-taking during lectures.

Interpretations of Index Discrepancy Analyses

General Immediate Memory Index vs. General Delayed Index

WRAML3's performance on the General Immediate Memory Index and the General Delayed Index were comparable (indicated by a statistically nonsignificant difference and high base rate). This suggests that WRAML3's overall level of delayed recall is at a comparable level as overall immediate recall.

Screener Memory Index vs. Attention/Concentration Index

The difference between WRAML3's performance on the Screener Memory Index and Attention/Concentration Index was not found to be statistically or clinically significant. This finding suggests that, overall, WRAML3's level of immediate recall ability on sequential, rote visual and verbal tasks is commensurate to that on visual and verbal immediate memory tasks composed of more meaningful and complex material.

Screener Memory Index vs. Working Memory Index

WRAML3's performance on the Screener Memory Index and Working Memory Index is comparable (i.e., not statistically or clinically significant). This finding suggests that, overall, WRAML3's working memory skills are at a level commensurate with general immediate recall abilities.

Visual Immediate Memory Index vs. Verbal Immediate Memory Index

The difference between the Visual Immediate Memory Index and Verbal Immediate Memory Index standard scores is statistically and clinically significant with a base rate of $\leq 5\%$. This relative strength for WRAML3 in visual memory may be due to weaker verbal memory or in other processes associated with verbal memory, such as language impairment or hearing difficulties. Examine the contributing subtests and process scores, the Verbal Delayed and Verbal Recognition Indexes, and the Sentence Memory subtest to substantiate the uniformity of this finding. Implications of this discrepancy will likely be apparent for academic, work, and home settings.

Visual Immediate Memory Index vs. Attention/Concentration Index

The difference between the Visual Immediate Memory Index and Attention/Concentration Index standard scores is statistically and clinically significant with a base rate of $\leq 10\%$. This suggests that the Visual Immediate Memory Index score may be an underestimate of immediate visual memory capacity given WRAML3's relatively inefficient attention/concentration skills. Check Design Learning performance over the trials to see if there is inconsistent recall of specific elements from trial to trial, possibly due to erratic attention. Disproportionate gains on Trials 3 and 4 over Trials 1 and 2 may be indicative of attention difficulties. Relatively poor rote memory skills have implications for academic, work, and home settings when such demands are being made.

Visual Immediate Memory Index vs. Visual Delayed Index

Standard score differences on the Visual Immediate Memory Index and Visual Delayed Index were not statistically or clinically significant. This suggests that WRAML3's immediate visual memory ability is commensurate with delayed recall. That is, there is no deterioration of recall beyond what is expected for this age.

Verbal Immediate Memory Index vs. Attention/Concentration Index

The standard score difference between the Verbal Immediate Memory Index and Attention/Concentration Index was not statistically or clinically significant. This suggests that WRAML3's immediate verbal memory ability is commensurate with rote short-term memory tasks that especially make demands on attention.

Verbal Immediate Memory Index vs. Verbal Delayed Index

The difference between WRAML3's performance on the Verbal Immediate Memory Index and Verbal Delayed Index standard scores is statistically and clinically significant with a base rate of $\leq 5\%$. This suggests that with the passage of time, WRAML3 experiences more verbal memory decay than is expected based on immediate recall performance. As a consequence, the delayed index may be the better estimate of WRAML3's real world verbal memory, especially if both subtests of the index show the same pattern of marked forgetting. This deficit will likely have important clinical implications in academic, work, and home settings in which longer-term verbal memory demands are made.

Attention/Concentration Index vs. Working Memory Index

A similar level of performance was found between the standard scores on the Attention/Concentration Index and the Working Memory Index; there was no statistical significance and a high base rate. The consistency between WRAML3's performance on the Attention/Concentration Index and Working Memory Index suggests that tasks requiring more demanding organization and strategizing skills are commensurate with rote memory tasks that only require focus.

Screener Memory Index vs. General Delayed Index

The standard score difference between the Screener Memory Index and General Delayed Index was not statistically or clinically significant. This suggests that WRAML3 performed at the same level on immediate and delayed recall tasks. That is, no deterioration of recall was found beyond what is expected for WRAML3's age.

General Delayed Index vs. General Recognition Index

The difference in performance between the General Recognition Index and the General Delayed Index is of clinical concern. Specifically, WRAML3's ability to recall relatively-meaningful visual information is a weakness in comparison to the ability to recognize this information. WRAML3's demonstration of memory retrieval may appear inconsistent from situation to situation. Using a cueing system, such as a multiple-choice approach, to assess everyday retention may be helpful.

Visual Recognition Index vs. Verbal Recognition Index

The standard score difference between the Visual Recognition Index and Verbal Recognition Index is not statistically or clinically significant. This suggests that, with the passage of time, WRAML3's recognition of newly learned visual material is performed as well as recognition of verbal material.

Visual Delayed Index vs. Verbal Delayed Index

The difference between the Visual Delayed Index and Verbal Delayed Index standard scores is statistically and clinically significant with a base rate of $\leq 2\%$. This suggests that with the passage of time, WRAML3's retrieval of newly learned visual information is better than retrieval of verbal information. Assuming this is also reflected in WRAML3's immediate and recognition performance, these findings suggest weakness in verbal recall generally. In addition, consider other possible contributors to this result such as language delay/disorder or hearing impairment. This weakness may be apparent in verbal memory demands found in academic, work, and home settings.

Listing of Important Reported Findings

Index Comparisons	Standard Score 1	Standard Score 2	Difference	Base Rate
Visual Immediate Memory vs. Verbal Immediate Memory	115	88	27	<=5%
Visual Immediate Memory vs. Attention/Concentration	115	91	24	<=10%
Verbal Immediate Memory vs. Verbal Delayed**	88	73	15	<=5%
Visual Delayed vs. Verbal Delayed	118	73	45	<=2%
General Delayed vs. General Recognition	95	115	-20	<=2%
Subtest Comparisons	Scaled Score 1	Scaled Score 2	Difference	Base Rate
Finger Windows vs. Number Letter	11	6	5	<=10%
Visual Working Memory vs. Verbal Working Memory	13	8	5	<=5%
Immediate/Delayed Recall Comparisons	Scaled Score 1	Scaled Score 2	Difference	Base Rate
Story Memory vs. Story Memory Delayed	7	4	3	<=5%
Delayed Recall/Recognition Comparisons	Scaled Score 1	Scaled Score 2	Difference	Base Rate
Story Memory Delayed vs. Story Memory Recognition	4	13	-9	<=2%
Verbal Learning Delayed vs. Verbal Learning Recognition	7	11	-4	<=5%

End of Report