

## Interpretive Report of WMS-IV Testing

### Examinee and Testing Information

Examinee Name	Sofia Estrange	Date of Report	10/27/2009
Examinee ID		Years of Education	
Date of Birth	6/20/1969	Home Language	English
Gender	Female	Handedness	Right
Race/Ethnicity	Hispanic	Examiner Name	Jayne Tijerina
Test Administered		WMS-IV (10/15/2009)	Age at Testing
		40 years 3 months	Retest?
			No

WMS-IV Comments

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### Index Score Summary

Index	Index Score
Auditory Memory	AMI 98
Visual Memory	VMI 95
Visual Working Memory	VWMI 103
Immediate Memory	IMI 105
Delayed Memory	DMI 88

### Interpretation of WMS-IV Results

Sofia was administered 10 subtests of the Adult battery of the Wechsler Memory Scale-Fourth Edition (WMS-IV), from which her index scores were derived. Sofia's scores on the WMS-IV indexes are discussed in the following sections of this report, as are discrepancies in performance across different modalities and categories of memory processes. In addition, specific strengths and deficits within modalities are discussed.

#### Auditory Memory

The Auditory Memory Index (AMI) is a measure of Sofia's ability to listen to oral information, repeat it immediately, and then recall the information after a 20 to 30 minute delay. Compared to other individuals her age, Sofia's auditory memory capacity is in the Average range (AMI = 98, 95% Confidence Interval = 92-104) and exceeds that of approximately 45 percent of individuals in her age group.

The interpretation of Sofia's AMI score should account for the significant inconsistency in performance on specific measures within this domain. A closer look at these subtests is warranted. Within auditory memory, Sofia exhibited a strength on the Logical Memory I subtest. At the same time, she displayed a weakness on the Verbal Paired Associates II subtest. Logical Memory I required Sofia to recall specific details of information presented orally in a story format after only a single exposure. This subtest measures the ability to recall verbal information that is conceptually organized and semantically related immediately after hearing it (Logical Memory I scaled score = 13). On Verbal Paired Associates II, Sofia was required to recall novel and semantically related word pairs after a 20 to 30 minute delay. This subtest provides a measure of delayed cued recall for word associations (Verbal Paired Associates II scaled score = 7).

### Visual Memory

On the Visual Memory Index (VMI), a measure of memory for visual details and spatial location, Sofia performed in the Average range (VMI = 95, 95% Confidence Interval = 90-101). Sofia's visual memory capacity exceeds that of approximately 37 percent of individuals in her age group.

The interpretation of Sofia's VMI score should account for the significant inconsistency in performance on a measure within this domain. A closer look at this subtest is warranted. Within visual memory, Sofia exhibited a strength on the Visual Reproduction I subtest. On Visual Reproduction I Sofia was required to view a series of designs and to draw each one from memory immediately after seeing it. This subtest measures recall for visual information, including the details and relative spatial relationship among elements of a drawing (Visual Reproduction I scaled score = 12).

### Modality-Specific Memory Strengths and Weaknesses

Some individuals are better at recalling visual information than recalling auditory information, while for others the reverse is true. Compared to individuals with similar auditory memory capacity, Sofia's visual memory performance is in the Average range (37th percentile), indicating no significant difference between her levels of visual and auditory memory functioning.

### Visual Working Memory

On the Visual Working Memory Index (VWMI), a measure of her ability to temporarily hold and manipulate spatial locations and visual details, Sofia performed in the Average range (VWMI = 103, 95% Confidence Interval = 96-110). Sofia's visual working memory ability exceeds that of approximately 58 percent of individuals in her age group.

Sofia's performance on the Spatial Addition subtest was significantly better than her performance on the Symbol Span subtest, suggesting that her profile of memory functioning within visual working memory exhibits significant variability. Therefore, a closer look at these two subtests is warranted. On Spatial Addition, Sofia was shown patterns of blue and red circles on two grids presented consecutively. She was then required to place cards with different colored circles in a grid according to a set of rules, based on the grids that she had been shown. This subtest measures spatial working memory and requires storage, manipulation, and the ability to ignore competing stimuli (Spatial

Addition scaled score = 12). Symbol Span required Sofia to identify a series of novel symbols, in order from left to right, immediately after seeing the symbols in their correct order. This subtest measures the capacity to keep a mental image of a symbol and its relative spatial position on the page in mind (Symbol Span scaled score = 9).

## Specificity of Episodic Visual Memory Abilities Compared to Visual Working Memory Abilities

Comparing episodic visual memory to visual working memory performance can help determine the relative influence of visual memory on visual working memory (e.g., to determine if a low VMI score is due to deficits in visual working memory or to episodic visual memory deficits). Compared to individuals with similar visual working memory capacity, Sofia's visual memory performance is in the Average range (25th percentile), indicating no significant difference between her levels of visual memory and visual working memory functioning.

## Immediate and Delayed Memory

The Immediate Memory Index (IMI) is a measure of Sofia's ability to recall verbal and visual information immediately after the stimuli is presented. Compared to other individuals her age, Sofia's immediate memory capacity is in the Average range (IMI = 105, 95% Confidence Interval = 99-111) and exceeds that of approximately 63 percent of individuals in her age group. On the Delayed Memory Index (DMI), a measure of the ability to recall verbal and visual information after a 20 to 30 minute delay, Sofia performed in the Low Average range (DMI = 88, 95% Confidence Interval = 82-95). Sofia's delayed memory capacity exceeds that of approximately 21 percent of individuals in her age group.

The interpretation of Sofia's IMI score should account for the significant inconsistency in performance on a measure within this domain. A closer look at this subtest is warranted. Within immediate memory, Sofia displayed a relative weakness on the Verbal Paired Associates I subtest. Verbal Paired Associates I required Sofia to recall novel and semantically related word pairs. This subtest measures immediate learning of verbal associations over multiple exposures (Verbal Paired Associates I scaled score = 8).

The interpretation of Sofia's DMI score should account for the significant inconsistency in performance on a measure within this domain. A closer look at this subtest is warranted. Within delayed memory, Sofia exhibited a relative strength on the Logical Memory II subtest. On Logical Memory II, Sofia was asked to recall specific details of information presented orally in a story format in a single exposure. This subtest measures the ability to recall verbal information that is conceptually organized and semantically related after a delay (Logical Memory II scaled score = 11).

## Retention of Information

Some individuals lose information between immediate and delayed recall, while others actually improve their memory performance over time. The overall amount of forgetting and consolidation that occurred between the immediate and delayed tasks is indicated by the level of Sofia's delayed memory performance given her immediate memory performance. Compared to individuals with a similar level

of immediate memory capacity, Sofia's delayed memory performance is in the Extremely Low range (1st percentile), indicating that her delayed memory is much lower than expected, given her level of initial encoding.

## Specific Auditory Memory Abilities

### Auditory Process Scores

On a measure of her ability to answer specific questions about details from a previously heard story, Sofia performed in the average range (LM II Recognition cumulative percentage = 26-50%). Sofia performed in the borderline range on a measure of her ability to identify previously presented word associations (VPA II Recognition cumulative percentage = 3-9%). When asked to recall as many words as she could remember from a previously presented list of word pairs, without being required to correctly associate the words, Sofia performed in the average range (VPA II Word Recall scaled score = 10).

### Auditory Forgetting and Retrieval Scores

The degree to which Sofia may benefit from story details being presented in a recognition format instead of a free recall format can be determined by comparing her delayed cued recall performance to that of individuals with a similar level of recognition memory (LM II Recognition vs. Delayed Recall contrast scaled score = 12). This comparison suggests that Sofia is able to retrieve auditory information from memory as well as expected, given her level of recognition memory. The degree to which Sofia forgot the story details she learned during the immediate condition of Logical Memory I can be determined by comparing her delayed recall performance to that of others with a similar level of immediate recall (LM II Immediate Recall vs. Delayed Recall contrast scaled score = 7). This comparison indicates that Sofia displayed a higher than expected rate of forgetting, given her immediate memory performance.

The degree to which Sofia may benefit from word associations being presented in recognition format versus cued recall can be determined by comparing her delayed cued recall performance to that of individuals with a similar level of recognition memory (VPA II Recognition vs. Delayed Recall contrast scaled score = 11). Based on this comparison, Sofia is able to retrieve auditory information from memory as well as expected, given her level of recognition memory. The degree to which Sofia forgot the word associations she learned during immediate recall of Verbal Paired Associates I can be determined by comparing her delayed recall performance to that of others with a similar level of immediate recall (VPA II Immediate Recall vs. Delayed Recall contrast scaled score = 8). This comparison indicates that Sofia is able to recall cued word associations after a delay as well as expected, given her level of immediate recall.

## Specific Visual Memory Abilities

### Visual Process Scores

Sofia's immediate memory for visual details is in the average range, while her delayed memory for visual details is below average (DE I Content scaled score = 8, DE II Content scaled score = 7). Although she is not likely to have difficulty recalling specific visual information soon after it is presented when compared to individuals her age, her ability to recall the information decreases over

time more than is typical. When required to recall designs and their locations in a grid, Sofia's immediate and delayed memory for the locations of cards placed in the grid, regardless of her ability to recall the visual details of the cards, are both in the average range, indicating that she is not likely to have difficulty recalling spatial locations when compared to individuals her age (DE I Spatial scaled score = 10, DE II Spatial scaled score = 8). On a measure of her ability to recognize designs previously presented and the correct locations for the designs, Sofia performed in the borderline range when compared to others her age (DE II Recognition cumulative percentage = 3-9%).

On a measure of Sofia's ability to discriminate designs she saw previously from similar designs that were not shown, she performed in the low average range when compared to others her age (VR II Recognition cumulative percentage = 10-16%). When required to simply copy designs as she looked at them, Sofia was able to perform the task as well as or better than 26-50% percent of individuals her age.

### Visual Forgetting and Retrieval Scores

Sofia's immediate recall of visual details is average when compared to others with similar levels of immediate spatial memory ability. Her delayed recall of visual details is average when compared to others with similar levels of delayed spatial memory ability. Sofia's level of free recall for visual details and spatial locations relative to her recognition memory for this visual information can be determined by comparing her delayed recall performance to that of individuals with a similar level of recognition memory (DE II Recognition vs. Delayed Recall contrast scaled score = 11). This comparison indicates that she is able to freely recall visual information as well as expected, given her level of recognition memory. The degree to which Sofia forgot the visual details and spatial locations she learned during the immediate condition of the Designs subtest can be determined by comparing her delayed recall performance to that of individuals with a similar level of immediate memory (DE Immediate Recall vs. Delayed Recall contrast scaled score = 6). Based on this comparison, Sofia displayed a higher than expected rate of forgetting, given her immediate memory performance.

It is possible to determine the degree to which Sofia's ability to recall the details and relative spatial relationships among elements of a design benefits from the designs being presented in a recognition format instead of a free recall format by comparing her ability to draw the designs after a delay to her ability to discriminate the previously drawn designs from similar designs (VR II Recognition vs. Delayed Recall contrast scaled score = 10). This comparison indicates that she is able to freely recall details and relative spatial relationships among elements in a design as well as expected, given her level of recognition memory. When compared to others with a similar level of simple copying ability, Sofia's ability to immediately recall and draw the details and relative spatial relationships among elements of a design is what would be expected given her level of copying ability (VR II Copy vs. Immediate Recall contrast scaled score = 12). The degree to which Sofia forgot the details and relative spatial relationship among elements of the designs presented during the immediate recall of the Visual Reproduction subtest can be determined by comparing her ability to recall and draw the designs after a delay to that of individuals with a similar level of immediate ability (VR Immediate Recall vs. Delayed Recall contrast scaled score = 6). Based on this comparison, Sofia displayed a higher than expected rate of forgetting, given her immediate memory performance.

## Test Results Summary

Sofia is a 40-year-old female who completed the WMS-IV.

Sofia was administered 10 subtests of the Adult battery of the WMS-IV. Sofia's ability to listen to oral information and repeat it immediately, and then recall the information after a 20 to 30 minute delay is in the Average range. Her memory for visual details and spatial location is in the Average range. Her ability to temporarily hold and manipulate spatial locations and visual details is in the Average range. Sofia's ability to recall verbal and visual information immediately after the stimuli is presented is in the Average range. Her ability to recall verbal and visual information after a 20 to 30 minute delay is in the Low Average range. Sofia displayed a notable amount of forgetting between the immediate and delayed tasks of the WMS-IV. Compared to individuals with a similar level of immediate memory capacity, Sofia's delayed memory performance is in the Extremely Low range, indicating that her delayed memory is much lower than expected given her level of initial encoding.

## Recommendations

Sofia may benefit from using associative linkages when encoding information. By linking new information to what has been previously learned, she may be able to gain a more global understanding of the information and improve recall.

When Sofia first encounters new information, she should link it in as many ways as possible to already known information. This strategy creates several avenues for remembering the information later.

Sofia should be encouraged to use external memory sources such as lists, date books, calendars, and pocket-size recorders for information that must be remembered.

Teaching Sofia "self-cueing" strategies may help facilitate her retrieval of information.

Tests for Sofia should be structured so that they require recognition rather than recall of information. They should be structured in multiple choice or other selected-response formats, rather than in extended short-answer and essay. Test formats such as these will assist her in retrieving previously learned information.

Sofia should be encouraged to use a "memory book" that would include information such as her daily schedule; important names, addresses, and phone numbers; personal information; medication schedule; and due dates of monthly bills.

This report is valid only if signed by a qualified professional:

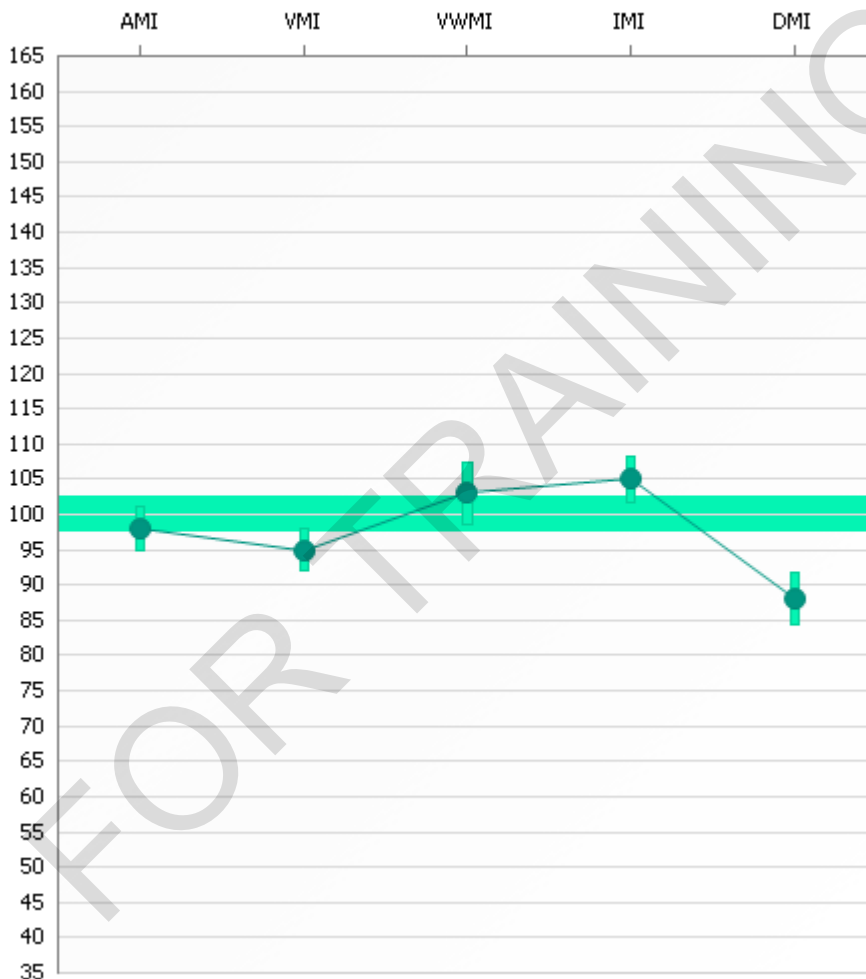
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# Score Report

## Index Score Summary

Index	Sum of Scaled Scores	Index Score	Percentile Rank	95% Confidence Interval	Qualitative Description
Auditory Memory	39	AMI 98	45	92-104	Average
Visual Memory	37	VMI 95	37	90-101	Average
Visual Working Memory	21	VWMI 103	58	96-110	Average
Immediate Memory	43	IMI 105	63	99-111	Average
Delayed Memory	33	DMI 88	21	82-95	Low Average

## Index Score Profile



## Index Scores and Standard Error of Measurement

Index	Score	SEM
AMI	98	3
VMI	95	3
VWMI	103	4.5
IMI	105	3.35
DMI	88	3.67

The vertical bars represent the standard error of measurement (*SEM*).

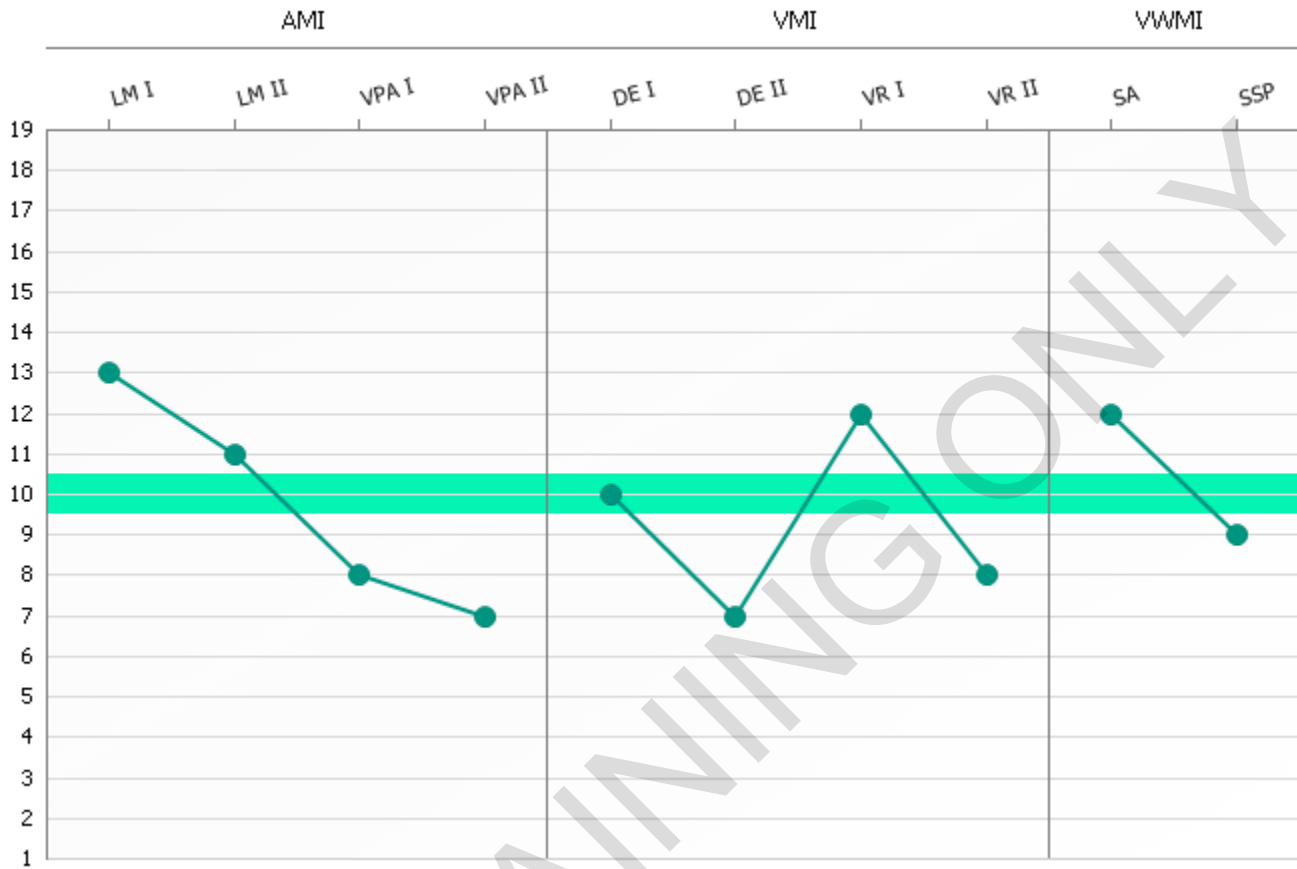
### Primary Subtest Scaled Score Summary

Subtest	Domain	Raw Score	Scaled Score	Percentile Rank
Logical Memory I	AM	32	13	84
Logical Memory II	AM	25	11	63
Verbal Paired Associates I	AM	25	8	25
Verbal Paired Associates II	AM	7	7	16
Designs I	VM	71	10	50
Designs II	VM	45	7	16
Visual Reproduction I	VM	40	12	75
Visual Reproduction II	VM	21	8	25
Spatial Addition	VWM	17	12	75
Symbol Span	VWM	22	9	37

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## Primary Subtest Scaled Score Profile



## Process Score Conversions

### Auditory Memory Process Score Summary

Process Score	Raw Score	Scaled Score	Percentile Rank	Cumulative Percentage (Base Rate)
LM II Recognition	24	-	-	26-50%
VPA II Recognition	33	-	-	3-9%
VPA II Word Recall	18	10	50	-

## Visual Memory Process Score Summary

Process Score	Raw Score	Scaled Score	Percentile Rank	Cumulative Percentage (Base Rate)
DE I Content	32	8	25	-
DE I Spatial	17	10	50	-
DE II Content	27	7	16	-
DE II Spatial	10	8	25	-
DE II Recognition	10	-	-	3-9%
VR II Recognition	4	-	-	10-16%
VR II Copy	42	-	-	26-50%

## Subtest-Level Differences Within Indexes

### Auditory Memory Index

Subtest	Scaled Score	AMI Mean		Critical Value	Base Rate
		Score	Difference from Mean		
Logical Memory I	13	9.75	3.25	2.64	5%
Logical Memory II	11	9.75	1.25	2.48	>25%
Verbal Paired Associates I	8	9.75	-1.75	1.90	>25%
Verbal Paired Associates II	7	9.75	-2.75	2.48	15%

Statistical significance (critical value) at the .05 level.

### Visual Memory Index

Subtest	Scaled Score	VMI Mean		Critical Value	Base Rate
		Score	Difference from Mean		
Designs I	10	9.25	0.75	2.38	>25%
Designs II	7	9.25	-2.25	2.38	15-25%
Visual Reproduction I	12	9.25	2.75	1.86	15%
Visual Reproduction II	8	9.25	-1.25	1.48	>25%

Statistical significance (critical value) at the .05 level.

### Immediate Memory Index

Subtest	Scaled Score	IMI Mean		Critical Value	Base Rate
		Score	Difference from Mean		
Logical Memory I	13	10.75	2.25	2.59	>25%
Verbal Paired Associates I	8	10.75	-2.75	1.82	15-25%
Designs I	10	10.75	-0.75	2.42	>25%
Visual Reproduction I	12	10.75	1.25	1.91	>25%

Statistical significance (critical value) at the .05 level.

## Delayed Memory Index

Subtest	Scaled Score	DMI Mean		Critical Value	Base Rate
		Score	Difference from Mean		
Logical Memory II	11	8.25	2.75	2.44	15-25%
Verbal Paired Associates II	7	8.25	-1.25	2.44	>25%
Designs II	7	8.25	-1.25	2.44	>25%
Visual Reproduction II	8	8.25	-0.25	1.57	>25%

Statistical significance (critical value) at the .05 level.

## Subtest Discrepancy Comparison

Comparison	Score 1	Score 2	Difference	Critical Value	Base Rate
Spatial Addition – Symbol Span	12	9	3	2.74	41.8

Statistical significance (critical value) at the .05 level.

## Subtest-Level Contrast Scaled Scores

### Logical Memory

Score	Score 1	Score 2	Contrast Scaled Score
LM II Recognition vs. Delayed Recall	26-50%	11	12
LM Immediate Recall vs. Delayed Recall	13	11	7

### Verbal Paired Associates

Score	Score 1	Score 2	Contrast Scaled Score
VPA II Recognition vs. Delayed Recall	3-9%	7	11
VPA Immediate Recall vs. Delayed Recall	8	7	8

### Designs

Score	Score 1	Score 2	Contrast Scaled Score
DE I Spatial vs. Content	10	8	8
DE II Spatial vs. Content	8	7	8
DE II Recognition vs. Delayed Recall	3-9%	7	11
DE Immediate Recall vs. Delayed Recall	10	7	6

### Visual Reproduction

Score	Score 1	Score 2	Contrast Scaled Score
VR II Recognition vs. Delayed Recall	10-16%	8	10
VR Copy vs. Immediate Recall	26-50%	12	12
VR Immediate Recall vs. Delayed Recall	12	8	6

## Index-Level Contrast Scaled Scores

### WMS-IV Indexes

Score	Score 1	Score 2	Contrast Scaled Score
Auditory Memory Index vs. Visual Memory Index	98	95	9
Visual Working Memory Index vs. Visual Memory Index	103	95	8
Immediate Memory Index vs. Delayed Memory Index	105	88	3

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