

PD CogniCare

Verbal Learning Tests

VLT

1

**California Verbal
Learning Test**

2

**Hopkins Verbal
Learning Test**

3

**Rey Auditory Verbal
Learning Test**

Description

Verbal Learning Tests (VLTs) provide a measure of immediate and delayed verbal memory and verbal learning. There are three common VLTs used in PD: 1) the California VLT (CVLT), 2) the Hopkins VLT (HVLT), and 3) the Rey Auditory VLT (RAVLT). All three VLTs are recommended by the MDS for use in PD-MCI,⁴ although only the RAVLT is recommended for PDD.³

Training and Administration

Only one VLT should be run in a cognitive assessment. Instruction protocols are included in each test manual. These tests present a series of words to the client, read aloud in a set order at one-second intervals. This is repeated over several learning trials, with the client recalling as many words as they can remember from the list after each trial. In all VLTs, the clients complete an immediate recall of the original items presented in the learning trials, followed by a delayed recall trial 20 minutes after the final learning trial.



PD Considerations

Motor deficits may impact scores on VLTs. To mitigate the effect of compromised speech output, test administrators should ask examinees to repeat responses if necessary.⁴⁵ To account for bradyphrenia, or slowness of thought, test administrators should avoid assuming that the examinee has finished recalling words and instead confirm with them that they are finished.⁴⁵

Semantic clustering is effective for categorical learning and memory – individual words are chunked for more efficient encoding and retrieval.⁶³ In a dementia population, this may lead to high false positives as people list other words within those semantic clusters.



California Verbal Learning Test

CVLT

 Copyright Status	Pearson Clinical
 Administration Time	10 minutes to complete + 20-minute recall

Training and Administration

There are five learning trials where clients are asked to recall 16 words (Figure 7). These words are semantically related. After the five learning trials, there is a distractor list of words. Afterwards, clients are then asked to recall the words from the first list (Short Delay Free Recall) and complete category cueing. After a 20-minute delay, clients complete another recall (Long Delay Free Recall) and category cueing. There is no forewarning for the delayed recall trial, and nonverbal tasks should be administered within this delay period. Afterwards, a recognition trial presents 48 words: 16 words are targets from the original list and 32 are distractor non-target words.

Scoring

There are a number of score summaries that can be taken from the CVLT. The most important scores to assess impairment is the immediate recall and the delayed recall. The immediate recall score requires a sum of all correctly recalled words across the five learning trials (/80). The delayed recall is scored by summing correctly recalled words (/16) after the 20 minute delay period.

Alternative Versions

Alternative word lists are available to reduce practice effects.

Telehealth

There is currently no evidence for the validity of tele-health administration of the CVLT.



Not validated in PD



Not validated in
telehealth



Alternative versions
available

Psychometric and Normative Data

The CVLT has not been validated in people with PD. Normative Australian data is shown in Table 14.⁶⁸

Table 14 Australian Normative Data for the CVLT.⁶⁸

Age Group	Trials 1 – 5 total		Long Delay	
	n	Mean (SD)	n	Mean (SD)
60 – 64	124	55.98 (9.04)	125	12.79 (2.64)
65 – 69	189	55.42 (9.76)	188	12.72 (2.75)
70 – 74	161	51.95 (9.33)	159	11.97 (2.66)
75 – 79	116	49.95 (10.10)	114	11.69 (2.86)
80 – 84	63	47.11 (8.99)	62	10.87 (2.71)

Figure 7 A faux example of the CVLT.¹

	<u>Trial 1</u> <u>Recall</u>	<u>Trial 2</u> <u>Recall</u>	<u>Trial 3</u> <u>Recall</u>	<u>Trial 4</u> <u>Recall</u>	<u>Trial 5</u> <u>Recall</u>
football					
notebook					
island					
billiards					
paper					
river					
tennis					
cake					
folder					
boxing					
mountain					
pie					
candy					
envelope					
valley					
ice cream					
	___/16	___/16	___/16	___/16	___/16
Total Learning	___/80]				



Hopkins Verbal Learning Test

 Copyright Status	<u>PAR Inc.</u>
 Administration Time	10 minutes to complete + 20 minute recall

Training and Administration

The HVLT has three learning trials, a delayed recall trial, and a recognition trial (see). The word list includes 12 words in total, made up of four words from three different semantic categories. There is no forewarning of the delayed recall trial. The recognition trial presents 24 words: 12 words are on the learned list, six (6) words are non-target words from the same semantic categories, and six (6) words are unique unrelated words.

Scoring

There are a number of score summaries that can be taken from the HVLT. The most important scores to assess impairment is the immediate recall and the delayed recall. The immediate recall score requires a sum of all correctly recalled words across the three learning trials (/36). The delayed recall is scored by summing correctly recalled words (/12) after the 20-minute delay period.

Telehealth

HVLT immediate and delayed recall both demonstrated moderate reliability for direct-to-home videoconference administration in a cohort of people living with PD.³³

Alternative Versions

There are six alternative forms for the HVLT:

- Form 1: four-legged animals, precious stones, human dwellings
- Form 2: kitchen utensils, alcoholic beverages, weapons
- Form 3: musical instruments, fuels, food flavourings
- Form 4: birds, articles of clothing, carpenter's tools
- Form 5: occupations/professions, sports, vegetables
- Form 6: fish, parts of a building, phenomena



Not validated in PD



Moderate reliability for
telehealth



Alternative versions
available

Psychometric and Normative Data

There are no psychometric studies available for the HVLT in PD populations. Australian normative data is shown in Table 15.⁶⁹

Table 15 Australian Normative Data for the HVLT⁶⁹

Age, years	Education <9 years		Education 9-11 years		Education 12 years		Education 13-15 years		Education ≥16 years	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
70-74	n = 667	n = 772	n=1,317	n=1,780	n = 442	n = 558	n = 669	n = 778	n=1,245	n=1,149
75-79	n = 355	n = 461	n = 603	n = 887	n = 198	n = 266	n = 252	n = 387	n = 449	n = 457
80+	n = 239	n = 336	n = 286	n = 525	n = 123	n = 175	n = 185	n = 209	n = 257	n = 224
Total recall										
70-74	19.9 (4.9)	22.7 (4.9)	21.6 (5.1)	23.9 (5.0)	21.7 (5.5)	24.5 (5.2)	22.4 (5.2)	25.2 (5.1)	23.8 (5.4)	26.0 (5.0)
75-79	19.1 (5.0)	21.2 (5.3)	20.1 (5.2)	22.7 (5.2)	20.7 (5.2)	23.2 (5.3)	20.8 (5.5)	23.4 (5.7)	22.4 (5.3)	24.5 (5.3)
80+	17.3 (4.8)	19.8 (5.4)	18.9 (5.4)	20.6 (5.3)	19.1 (5.2)	21.3 (5.3)	19.5 (5.1)	21.6 (5.5)	19.9 (5.2)	22.8 (5.5)
Learning										
70-74	3.4 (1.7)	3.6 (1.7)	3.4 (1.6)	3.6 (1.7)	3.5 (1.7)	3.5 (1.7)	3.6 (1.7)	3.6 (1.8)	3.5 (1.7)	3.5 (1.7)
75-79	3.3 (1.8)	3.6 (1.8)	3.4 (1.7)	3.6 (1.7)	3.5 (1.7)	3.5 (1.7)	3.3 (1.7)	3.6 (1.7)	3.6 (1.7)	3.6 (1.7)
80+	3.3 (1.8)	3.5 (1.8)	3.2 (1.7)	3.7 (1.8)	3.7 (1.8)	3.4 (1.8)	3.3 (1.7)	3.7 (1.9)	3.5 (1.7)	3.5 (1.6)
Delayed recall										
70-74	6.7 (2.6)	7.8 (2.5)	7.4 (2.7)	8.4 (2.6)	7.3 (2.9)	8.5 (2.5)	7.7 (2.8)	9.0 (2.6)	8.3 (2.7)	9.3 (2.4)
75-79	6.1 (2.7)	7.3 (2.8)	6.7 (2.8)	7.8 (2.7)	7.0 (2.6)	8.0 (2.7)	7.0 (2.8)	8.1 (2.7)	7.7 (2.8)	8.6 (2.6)
80+	5.4 (2.6)	6.5 (2.7)	6.0 (2.9)	6.9 (2.9)	6.0 (3.0)	6.9 (2.5)	6.3 (2.9)	7.3 (2.8)	6.6 (2.9)	8.0 (2.9)
% Retention										
70-74	79.9 (23.6)	83.7 (20.6)	82.5 (22.4)	86.0 (19.8)	80.7 (23.6)	87.4 (20.3)	83.3 (22.6)	88.7 (18.3)	85.8 (19.5)	89.7 (17.2)
75-79	75.4 (26.7)	81.9 (23.6)	79.0 (24.7)	83.5 (21.8)	80.4 (22.2)	83.9 (21.7)	80.7 (23.1)	84.4 (19.2)	82.9 (21.7)	87.4 (18.9)
80+	71.4 (27.4)	78.1 (28.0)	74.1 (27.0)	78.7 (26.1)	72.1 (27.7)	78.3 (24.2)	75.6 (26.0)	80.6 (23.7)	77.5 (24.9)	84.2 (21.5)



Rey Auditory Verbal Learning Test

 Copyright Status	<u>PAR Inc.</u>
 Administration Time	10 minutes to complete + 20 minute recall

Training and Administration

The RAVLT has five learning trials, a delayed recall trial, and a recognition trial. The first word list includes 15 unrelated nouns in a fixed order (List A). These words are read out at a speed of one word per second. Clients immediately recall the words remembered from the list. After the five learning trial presentations, clients are presented with a 15-word distractor list presented once (List B). Afterwards, there is an immediate recall of the first list (List A). After 20-minutes, there is a delayed recall trial (List A). There is no forewarning of the delayed recall trial. The recognition trial presents 50 words that contain words from the learned list (List A), the distractor list (List B) and 20 phonemically or semantically similar words. The RAVLT is shown in Figure 8.

Scoring

There are several derived scores from the RAVLT. The most important scores to assess impairment is the immediate recall and the delayed recall.

There are several other scoring methods proposed by the Mayo's Older Americans Normative Studies (MOANS) that are useful in an older adult population.⁷⁰ The most important scores commonly reported include the scores from Trial 5 (final learning trial) and Trial 7 (delayed recall trial). These two scores are predictive of cognitive decline in PD.

Alternative Versions

There is an alternative list (List C) that can be used to replace either List A or List B.⁶³

Telehealth

RAVLT immediate and delayed recall have demonstrated good and excellent reliability, respectively, for direct-to-home videoconference administration in older adults with varying cognitive statuses.⁵⁴

Psychometric and Normative Data

Psychometric (Table 16) and normative data (Table 16) is available for the RAVLT immediate recall and delayed recall in detecting MCI in PD.

Table 16 Psychometric data for the RAVLT in PD-MCI

RAVLT Score	Cut-offs	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	AUC (CI 95%)
Immediate Reproduction (Trials 1 - 5)	< 40.3	68	78	57	85	0.7 (0.62 - 0.82)
Delayed Recall (Trial 7)	< 8.9	74	64	46	85	0.7 (0.57 - 0.77)

Table 17 New Zealand normative data for the RAVLT⁶⁷

		Trial 1	Trial 5	Total 1 – 5	Immediate Recall (trial 6)	Delayed Recall (Trial 7)
Age Group	N	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
60 – 69	77	5.57 (1.67)	11.6 (2.14)	46.28 (8.60)	9.23 (3.13)	8.79 (3.31)
70 – 74	83	5.11 (1.61)	11.10 (2.59)	43.61 (9.99)	8.64 (3.34)	8.39 (3.50)
75 - 79	68	4.76 (1.69)	10.10 (2.67)	39.96 (9.27)	7.25 (3.23)	6.74 (3.62)
80 +	44	3.95 (1.60)	9.00 (2.68)	34.45 (9.12)	6.14 (3.12)	5.55 (3.59)

Figure 8 The RAVLT

(Note: Do not re-read List A for Recall Trial A6 or A7)

List A	A1	A2	A3	A4	A5	List B	B1	A6	A7	
Drum						Desk				Drum
Curtain						Ranger				Curtain
Bell						Bird				Bell
Coffee						Shoe				Coffee
School						Stove				School
Parent						Mountain				Parent
Moon						Glasses				Moon
Garden						Towel				Garden
Hat						Cloud				Hat
Farmer						Boat				Farmer
Nose						Lamb				Nose
Turkey						Gun				Turkey
Color						Pencil				Color
House						Church				House
River						Fist				River
# Correct										

Total A1 to A5 _____

Trial A6 – A5 _____

Word List for Testing RAVLT Recognition

Bell (A)	Home (SA)	Towel (B)	Boat (B)	Glasses (B)
Window (SA)	Fish (B)	Curtain (A)	Hot (PA)	Stocking (SB)
Hat (A)	Moon (A)	Flower (SA)	Parent (A)	Shoe (B)
Barn (SA)	Tree (PA)	Color (A)	Water (SA)	Teacher (SA)
Ranger (B)	Balloon (PA)	Desk (B)	Farmer (A)	Stove (B)
Nose (A)	Bird (B)	Gun (B)	Rose (SPA)	Nest (SPB)
Weather (SB)	Mountain (B)	Crayon (SA)	Cloud (B)	Children (SA)
School (A)	Coffee (A)	Church (B)	House (A)	Drum (A)
Hand (PA)	Mouse (PA)	Turkey (A)	Stranger (PB)	Toffee (PA)
Pencil (B)	River (A)	Fountain (PB)	Garden (A)	Lamb (B)

On the recognition list, A- words from list A; B- words from list B; S- words with a semantic association to a word on list A or B as indicated; P- words phonemically similar to a word on list A or B as indicated.