

Digital Cognitive Biomarkers

This table lists all digital cognitive biomarkers (**DCBs**) that can currently be derived from multi-trial wordlist memory (**WLM**) tests. It is important to note that the specific DCBs differ based on the wordlist presentation order used in a specific WLM test because maintaining the same presentation order (fixed order) versus changing the presentation order (shuffled order) of wordlist items across learning trials, impacts the serial position effects of primary and recency.

“✓” in the table indicates whether the specific DCB can be derived or not. Note that many more DCBs can be derived when using a WLM test with a fixed word order.

Data Collection Instrument	Shuffled Order	Fixed Order	Biomarker Label	Biomarker Name	Biomarker Description
Word List Memory Task	✓	✓	N_1	One-shot Learning	Probability of encoding into the DURABLY LEARNED State
Word List Memory Task	✓	✓	N_2	Transient Learning	Probability of encoding into the TRANSIENTLY LEARNED State
Word List Memory Task	✓	✓	N_3	Consolidated Learning	Probability of encoding into the DURABLY LEARNED State, following previous TRANSIENT LEARNING (N_2)
Word List Memory Task	✓	✓	N_4	Testing Effect Learning	Probability of encoding into the DURABLY LEARNED State, due to successful retrieval (R_1) from the TRANSIENTLY LEARNED State
Word List Memory Task	✓	✓	R_1	Transient Retrieval	Probability of retrieving from the TRANSIENTLY LEARNED State
Word List Memory Task	✓	✓	R_2	Immediate Durable Retrieval	Probability of retrieving from the DURABLY LEARNED State
Word List Memory Task	✓	✓	R_3	Delayed Durable Retrieval	Probability of retrieving from the DURABLY LEARNED State after a 5-minute delay with distraction
Word List Memory Task		✓	$N_{1\alpha}$	One-shot Learning—Primacy	Probability of encoding <i>with primacy effect</i> into the DURABLY LEARNED State
Word List Memory Task		✓	$N_{1\beta}$	One-shot Learning—Recency	Probability of encoding <i>with recency effect</i> into the DURABLY LEARNED State
Word List Memory Task		✓	$N_{2\alpha}$	Transient Learning—Primacy	Probability of encoding <i>with primacy effect</i> into the TRANSIENTLY LEARNED State

Word List Memory Task		✓	$N_{2\beta}$	Transient Learning—Recency	Probability of encoding <i>with recency effect</i> into the TRANSIENTLY LEARNED State
Word List Memory Task		✓	$N_{3\alpha}$	Consolidated Learning—Primacy	Probability of encoding <i>with primacy effect</i> into the DURABLY LEARNED State, following previous PARTIAL LEARNING (N_2)
Word List Memory Task		✓	$N_{3\beta}$	Consolidated Learning—Recency	Probability of encoding <i>with recency effect</i> into the DURABLY LEARNED State, following previous PARTIAL LEARNING (N_2)
Word List Memory Task		✓	$R_{1\alpha}$	Transient Retrieval—Primacy	Probability of retrieving <i>with primacy effect</i> from the TRANSIENTLY LEARNED State
Word List Memory Task		✓	$R_{1\beta}$	Transient Retrieval—Recency	Probability of retrieving <i>with recency effect</i> from the TRANSIENTLY LEARNED State
Word List Memory Task		✓	$R_{2\alpha}$	Immediate Durable Retrieval—Primacy	Probability of retrieving <i>with primacy effect</i> from the DURABLY LEARNED State
Word List Memory Task		✓	$R_{2\beta}$	Immediate Durable Retrieval—Recency	Probability of retrieving <i>with recency effect</i> from the DURABLY LEARNED State
Word List Memory Task		✓	$R_{3\alpha}$	Delayed Durable Retrieval—Primacy	Probability for retrieving <i>with primacy effect</i> from the DURABLY LEARNED State after a 5-minute delay with distraction
Word List Memory Task		✓	$R_{3\beta}$	Delayed Durable Retrieval—Slope	Rate of probability decline across list for retrieving from the DURABLY LEARNED State after a 5-minute delay with distraction
Word List Memory Task		✓	$R_{3\gamma}$	Delayed Durable Retrieval—Switch	Inflection point of probability decline across list for retrieving from the DURABLY LEARNED State after a 5-minute delay with distraction
Word List Memory Task + Delayed Recognition Task with Same Items		✓	k	Criterion	Z-score for executive judgment threshold of storage strength for identifying list items from foil items
Word List Memory Task + Delayed Recognition Task with Same Items		✓	d'_1	Pre-task Storage Strength	Z-score for storage strength of the PRE-TASK State
Word List Memory Task + Delayed Recognition Task with Same Items		✓	d'_2	Transiently Learned Storage Strength	Z-score for storage strength of the TRANSIENTLY LEARNED State
Word List Memory Task + Delayed Recognition Task with Same Items		✓	d'_3	Durably Learned Storage Strength	Z-score for storage strength of the DURABLY LEARNED State