NACC UNIFORM DATA SET

Instructions

For the Neuropsychological Battery (Form C2)

UDSv4.0, January 2025

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This publication was funded by the National Institutes of Health through the National Institute on Aging (Cooperative Agreement U24 AG072122).

Revisions made to the Instructions for the Neuropsychological Battery since release (January 2025)

Date yyyy-mm-dd	Description	Test(s) affected
2025-02-03	Moved RAVLT test delay recording from after List B to after Trial 6.	Rey Auditory Verbal Learning Test (RAVLT)
2025-10-09	Changed "church" to "school" in CERAD J7 Word List Recognition to avoid interference with the MoCA	CERAD Verbal Learning - Delayed Recognition

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Instructions for administering and scoring the UDSv4 Neuropsychological Battery FORM C2

General principles of assessment and testing

This section is intended to help technicians and other non-clinicians adopt appropriate test etiquette.

1. **Establishing rapport** is essential to the interview in general and the assessment of cognitive function in particular. The participants are volunteers who will typically have little experience with cognitive assessment procedures. Cognitive testing has the potential to be an uncomfortable or even threatening experience. This may be particularly relevant to older adults who have less familiarity with technology and may have physical challenges.

   The following considerations will help to establish and maintain rapport:

   - Provide a brief orientation to the testing procedures at the beginning and answer any questions the participant may have. An introduction similar to this may be used: **"I am going to ask you to complete some memory and thinking tests. Some of the questions I ask you may be very easy and some of the questions are very hard. No one gets everything correct, I just want you to try the best you can on these tests. Do you have any questions?"**
   - It is important to convey appreciation for the time and effort being volunteered. Remember that the participants are people (not sources of data) who are donating their time. The interviewer should convey respect for the participant, interest in the interview process, and sensitivity to the needs and concerns of the participant.
   - The participant will respond to the interviewer's emotional state. If the interviewer seems anxious, unsure, or uninterested, the participant will often respond in kind. Therefore, it is critical that the examiner be thoroughly trained and confident about test administration. Participants will be most cooperative and at ease with an interviewer who is secure in their role and who has a firm command of test administration, delivering instructions in a fluent, clear, and practiced manner with proper inflections.
   - Avoid subtle coaching or cheerleading. Your job is to administer each item as specified and obtain a response that can be scored. Do not provide either explicit or implicit verbal or non-verbal responses that could influence the participant's responses beyond what is permitted. For example, do not convey surprise, pleasure or disapproval to any answer. The examiner's role is to obtain honest, uninfluenced responses to the questions.
   - You may offer generic phrases of encouragement during testing when needed (e.g., **"You're doing just fine. Some of these tests are very challenging and some are easier"**) but do not offer any information on the correctness of a particular response. If participants ask how they are doing, explain that you are not permitted to give feedback. However, you should thank them for their effort and convey appreciation for participating in the study

2. **Ensure uniformity in data collection and scoring.** This is essential for all portions of the interview. To this end:

   a. Administer all tests in the order in which they are presented. The sequence of tests is important.

   b. Provide all instructions to the participant verbatim, both sample and actual test instructions.

   c. If the participant did not hear you or asks for clarification, you may repeat the instructions verbatim.

   d. Be sure to gain and hold the participant's attention as items are administered.

   e. Do not assume that partial answers or misstatements are correct. When in doubt about the acceptability of a response, refer to the manual and/or your supervisor.

3. **Avoid missing data.** Every reasonable attempt should be made to administer all performance items and all tests. Note that if an item is administered and the correct response is not made, the response should be scored as an error.

   Failure to complete an item or test may be the result of a participant's physical problem (coded as 95 or 995), cognitive/behavioral problem (96 or 996), other problem (97 or 997), or refusal (98 or 998). Select the appropriate reason and enter the code in the space provided. If more than one reason applies, enter the lowest numbered reason.

   It is intended that the tests be administered in the order in which they appear on NACC UDS Form C2. This is necessary in order to standardize the delay intervals for testing memory among Centers, and also to eliminate any differences that may result from varying the order of test administration. It is therefore important that the current UDS test be administered in its entirety either before or after the administration of other tests commonly used by the Center.

Validity of participant's responses

At the end of testing, have the examiner record their impression of whether hearing or other factors significantly influenced test results. It can be difficult to judge sometimes, but knowing that such an influence may have been present is helpful in adjudication and data analysis. Here is an example:

How valid do you think the participant's responses are?	☐ 1 Very valid, probably accurate indication of participant's cognitive abilities **(END FORM HERE)** ☐ 2 Questionably valid, possibly inaccurate indication of participant's cognitive abilities **(CONTINUE)** ☐ 3 Invalid, probably inaccurate indication of participant's cognitive abilities **(CONTINUE)**
What makes this participant's responses less valid? (Select all that apply.)	☐ 1 Hearing impairment ☐ 2 Distractions ☐ 3 Interruptions ☐ 4 Lack of effort or disinterest ☐ 5 Fatigue ☐ 6 Emotional issues ☐ 7 Unapproved assistance ☐ 8 Other (SPECIFY): _____

General considerations for video-based cognitive assessment

CONDITIONS OFTEN ARISE WHEN ADRC participants cannot meet face-to-face with staff for interviews or assessments. Failure to collect key data from participants in a timely fashion could severely compromise our research. Video administration of cognitive tests and questionnaires is an approach that has been used successfully in other studies.

Advantages of video-based testing

There are several advantages to video-based cognitive testing:

- The participant can be tested in their own home or some other place convenient to them.
- Testing can be scheduled at the convenience of the participant, which may also improve data completeness.
- Video-based testing can be a cost-efficient method to reach a larger number of individuals, and a broader geographic representation.
- Measurement error can be reduced in multi-site studies if the video batteries are administered centrally by a core of well-trained examiners, compared to training individual assessors at each site.

Limitations of video-based testing

There are limitations to using telephone-based cognitive assessments.

- Participants' hearing difficulties may present a problem. Also, different devices (cell phones, computers) may introduce additional challenges, such as poor sound quality, desynchronized exchanges, and unreliable connections. Using the video technology may be awkward for some participants due to physical limitations or fatigue.
- The quality of the interpersonal interaction between examiner and participant could also be poorer when using video testing.
- Some participants may rely on aids like clocks, calendars, notepads, or other persons. They should be reminded that use of aids is discouraged. In order to lessen the likelihood that participants use these aids, it can be explained that the tests have built-in indicators of test and performance validity, and examiners are able to monitor adherence to instructions.

While there are no perfect solutions to these potential limitations, there are steps one can take to mitigate their impact on the quality of the test data.

Recommendations for UDS v4.0 video-based testing

Getting set up

- Use a telephone headset with built-in earphones and a microphone to remain hands-free for typing or writing. Voice clarity is better, too.
- Arrange a mutually agreeable time to conduct the testing with the participant, asking them to reserve 1 hour for the video call.
- When you video call the participant, please re-introduce yourself and remind them where you are calling from and the purpose of the call. Confirm their identity with name and date of birth.
- Make it clear to the participant at the very beginning of the video call what you will do if the call is interrupted (typically, an immediate call-back by the examiner).
- Work with the participant to determine the best way to use their video device during testing. Options might include holding it, using the speaker phone, or using earphones or ear buds with a built-in microphone. If the participant is hands-free, there is less risk of inadvertent disconnection by accidental pressing of cell phone buttons.
- Instruct the participant to position themselves close to the microphone at all times. If you cannot hear them clearly, instruct the participant to speak directly into the microphone. You may need to remind them throughout the call.

Examiner's physical environment

- Examiner's environment should be quiet and free of distracting voices or sounds. This can be challenging. Posting signs on office doors that testing is under way and discussing noise-reduction strategies with officemates may be necessary.
- The examiner's space should be acoustically favorable. Large open rooms do not convey sound as well as closed-in areas.
- Have materials ready before testing to reduce extraneous noise and save time.
- Participants with dementia may benefit from having a proxy or care partner assist them with setting up the video call. After the participant and tester have successfully initiated the call, the care partner should be asked to leave the room.
- We recommend having the examiner briefly assess video quality by asking the participant to name common objects presented by the examiner (e.g., watch, pencil, paperclip) or identify the number of fingers presented on the examiner's hand.

Participant's hearing

Assess participant's hearing with questions and then a hearing task. Below is a script:

"Before we begin, I have a few questions about your hearing to make sure you can hear me well enough over video."

"Do you usually have trouble hearing over video?" ☐ **No** ☐ **Yes**

"Can you hear me well enough?" ☐ **No** ☐ **Yes**

"Do you use a hearing device?" ☐ **No** ☐ **Yes**

If YES … *"***Is it in place?"** ☐ **No** ☐ **Yes**

If NO … *"***Would you please put it on?"** ☐ **No** ☐ **Yes**

"Would you please repeat the following statement: 'I have a cat, so all I need is a dog.'"

Did participant correctly repeat statement? ☐ **No** ☐ **Yes**

If NO, then repeat the sentence: **"I have a cat, so all I need is a dog."**

Did participant correctly repeat sentence? ☐ **No** ☐ **Yes**

If YES, proceed with testing.

If NO, but you think from your interaction up to this point his/her poor hearing can be compensated for, proceed with the testing; however, speak as loudly and distinctly as possible.

If NO, and you think hearing will severely bias the cognitive test results, DO NOT continue with testing. Inform the participant that you will not be performing the testing:

Thank you very much, Ms./Mr. _____, but you may not be able to hear me well enough to complete the memory tasks over video, so I will not continue at this time. On behalf of the _____ study team, thank you for taking time to speak with me today.

Participant's physical environment

- Testing should be done with the participant alone in a room, although a proxy may initially be present in order to assist the participant with any technical difficulties encountered.
- If someone else is there you should ask that person to leave the space or the participant to move to a new space.
- If other people enter the participant's space, you may have to temporarily interrupt testing to ensure that they give the tasks their full attention.
- Ask the participant to ensure that they are comfortable and if the testing environment is as free of distractions as possible, as in this script:

"Are you in a quiet place where you will not be disturbed for about an hour?" ☐ **No** ☐ **Yes**

"Do you have pets that need to be taken care of before we begin?" ☐ **No** ☐ **Yes**

If YES, allow the participant to take care of their pet(s) before beginning

"Other than the device you are using, do you have a cell phone, TV, radio, or computer turned on in front of you?" ☐ **No** ☐ **Yes**

If YES … **"Can you to turn them off so they won't distract you while we're working together?"**

"Do you have anyone nearby?" ☐ **No** ☐ **Yes**

If YES … **"Can you please ask them to move to another room, as we don't want you distracted during the interview."**

"Do you need to use the bathroom or get a drink of water?" ☐ **No** ☐ **Yes**

If YES, allow the participant time to use the restroom or get a drink of water

"Do you have any calendars or newspapers in sight or a watch with a date feature?" ☐ **No** ☐ **Yes**

If YES … **"I need you to put them out of sight for me."**

- Ask about permission to record:

As part of this research study, your interview will be recorded while performing some of the cognitive tests. This is to assure accuracy as we record your answers. You will not be able to inspect, review, or approve the content of the digital recordings. You may request the recording be stopped at any time, and you can withdraw your consent to use the digital recording before any information is transcribed. All recordings may be kept and stored indefinitely and may be analyzed for research purposes. May I record the interview?" ☐ **No** ☐ **Yes**

"Good, _____, I think we are ready to get started. Are you ready?"

Examiner voice clarity

- Speak a bit slower than you would face-to-face. The pace newscasters use is good. You need to give yourself time to say each word clearly and completely.
- Enunciate each word. Some sounds are not heard as clearly over video or are difficult to distinguish from different sounds. You may need to exaggerate certain letters or syllables. Over time you may develop a list of very commonly misheard words and decide to give credit for them. Of course, the first action should be to speak more clearly and crisply.
- If you speak with an accent, you may need to adjust your speech for some words. You can practice with a person who does not speak your native tongue until you are ready. Whenever possible, use native speakers for the language of administration.

Ensuring data fidelity

- If you record each video interview, the recording can be used to check administration errors and scoring accuracy as well as in discussions among team members about specific responses.
- If interviewers are encouraged to discuss challenging situations with each other, then you can better decide as a team on any administration or scoring rule adjustments. For example, if a particular word on a word list learning task is repeatedly misunderstood, the team may decide to accept it if it is consistently reported by the participant incorrectly in the same way.
- Recordings of video administrations can be used for periodic recertification of examiners.

- Inform the participant of your wish to record the interview and seek consent. Individual ADRCs may need to modify this statement to match the language in their own informed consent documents. Here is an example:

  "As part of this research study, your interview will be recorded while performing some of the cognitive tests. This is to assure accuracy as we record your answers. You will not be able to inspect, review, or approve the content of the digital recordings. You may request that the recording be stopped at any time, and you can withdraw your consent to use the digital recording before any information is transcribed. All recordings may be kept and stored indefinitely and may be analyzed for research purposes. May I record the interview?"

Record the participant's responses on the test forms as they are given. Recording each full test administration is strongly encouraged. This allows for cross scoring, which should be done routinely as part of quality assurance. Never depend on your memory to record the participant's responses after the test session is over.

Some sites may have concern about participants using aids such as newspapers, clocks, or pencils to help them answer questions via video. In this case, examiners can remind participants about the requirement that they not use these items, stating: **"These tests have built-in indicators that help us know whether you provide answers in accordance with testing rules and guidelines — that is, that you not write things down or use other aids. If we feel that we are not receiving accurate data, it is likely that we will not be able to use this information for research diagnostic purposes."**

Additional instruction may be needed to emphasize the benefit of genuine effort without the assistance of aids during the testing. This instruction can be given in the introduction or during the administration, especially for particularly difficult tasks. One example of optional instruction is:

"M_____, one of the most important parts of our work is protecting the quality of the information we collect. If the data we collect from these tests I am about to give you and questions I will ask you are in any way compromised, then the conclusions we draw from them will be wrong and could mislead us and other researchers trying to find effective treatments for memory problems and Alzheimer's. With video interviews we must trust that participants will not use aids to make their performance appear better. We have had people admit after our calls to cheating by writing things down they shouldn't. Can I count on you to perform these tasks to the best of your ability without using any aids or other things that would distort your data? Thank you for working hand-in-hand with us."

MoCA

DESCRIPTION

The Montreal Cognitive Assessment (MoCA) is a rapid screening instrument designed to help health professionals detect mild cognitive dysfunction. It assesses numerous cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation.

SOURCE

All information on this test, including publications and norms and cut-off scores, appears on http://www.mocatest.org.

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ADMINISTRATION

Time to administer the MoCA is approximately 10 minutes. The examiner is permitted to repeat each item once, if asked. Following are detailed instructions.

1. **Alternating trail making**

   The examiner instructs the participant: **"Please draw a line, going from a number to a letter in ascending order. Begin here** (point to 1) **and draw a line from 1 then to A then to 2 and so on. End here** (point to E)**."**

2. **Visuoconstructional skills (cube):**

   The examiner gives the following instructions, pointing to the cube: **"Copy this drawing as accurately as you can, in the space below."**

3. **Visuoconstructional skills (clock):**

   Indicate the right third of the space and give the following instructions: "**Draw a clock. Put in all the numbers and set the time to 10 past 11."**

4. **Naming**

   Beginning on the left, point to each figure and say, **"Tell me the name of this animal."**

5. **Memory**

   The examiner reads a list of five words at a rate of one per second, giving the following instructions: **"This is a memory test. I am going to read a list of words that you will have to remember now and later on. Listen carefully. When I am through, tell me as many words as you can remember. It doesn't matter in what order you say them."**

   Mark a check in the allocated space for each word the participant produces on this first trial. When the participant indicates that they have finished (have recalled all words), or can recall no more words, read the list a second time with the following instructions: **"I am going to read the same list for a second time. Try to remember and tell me as many words as you can, including words you said the first time."** Put a check in the allocated space for each word the participant recalls after the second trial.

   At the end of the second trial, inform the participant that they will be asked to recall these words again by saying, **"I will ask you to recall those words again at the end of the test."**

6. **Attention**

   FORWARD DIGIT SPAN: Give the following instructions: **"I am going to say some numbers and when I am through, repeat them to me exactly as I said them."** Read the five-number sequence at a rate of one digit per second.

   BACKWARD DIGIT SPAN: Give the following instructions: **"Now I am going to say some more numbers, but when I am through you must repeat them to me in the backwards order."** Read the three-number sequence at a rate of one digit per second.

   VIGILANCE: The examiner reads the list of letters at a rate of one per second, after giving the following instructions: **"I am going to read a sequence of letters. Every time I say the letter A, tap your hand once. If I say a different letter, do not tap your hand."**

   SERIAL 7S: The examiner gives the following instructions: **"Now I will ask you to count by subtracting seven from 100, and then, keep subtracting seven from your answer until I tell you to stop."** Give these instructions twice if necessary.

7. **Sentence repetition**

   The examiner gives the following instructions: **"I am going to read you a sentence. Repeat it after me, exactly as I say it** [pause]: **I only know that John is the one to help today."** Following the response, [SAY]: **"Now I am going to read you another sentence. Repeat it after me, exactly as I say it** [pause]**: The cat always hid under the couch when dogs were in the room."** Space is also provided (MoCA notes page) to record responses.

8. **Verbal fluency**

The examiner gives the following instructions: **"Tell me as many words as you can think of that begin with a certain letter of the alphabet that I will tell you in a moment. You can say any kind of word you want, except for proper nouns (like Bob or Boston), numbers, or words that begin with the same sound but have a different suffix, for example, love, lover, loving. I will tell you to stop after one minute. Are you ready?** [Pause] **Now, tell me as many words as you can think of that begin with the letter F.** [Time for 60 sec]. **Stop."** Space is also provided (MoCA notes page) to record responses.

9. Abstraction

The examiner asks the participant to explain what each pair of words has in common, starting with the example: **"Tell me how an orange and a banana are alike."** If the participant answers in a concrete manner, then say only one additional time: **"Tell me another way in which those items are alike."** If the participant does not give the appropriate response (fruit), say, **"Yes, and they are also both fruit."** Do not give any additional instructions or clarification. After the practice trial, [SAY]: **"Now, tell me how a train and a bicycle are alike."** Following the response, administer the second trial, saying: **"Now tell me how a ruler and a watch are alike."** Do not give any additional instructions or prompts.

10. Delayed recall

The examiner gives the following instruction: **"I read some words to you earlier, which I asked you to remember. Tell me as many of those words as you can remember."** Make a check mark (✓) for each of the words correctly recalled spontaneously without any cues, in the allocated space. If the participant fails to freely recall one or more, proceed to cueing, as indicated below.

Following the delayed free recall trial, prompt the participant with the semantic category cue provided below for any word not recalled. Make a check mark (✓) in the allocated space. If the participant does not recall the word after the category cue, give them a multiple choice trial. For example, if the word FACE was not freely recalled with the category cue, ask, **"Which of the following words do you think it was, NOSE, FACE, or HAND?"** Use the following category and/or multiple-choice cues for each word, when appropriate:

	Category cue	**Multiple choice**
FACE	part of the body	nose, face, hand
VELVET	type of fabric	denim, cotton, velvet
CHURCH	type of building	church, school, hospital
DAISY	type of flower	rose, daisy, tulip
RED	a color	red, blue, green

11. Orientation

The examiner gives the following instructions: **"Tell me the date today."** If the participant does not give a complete answer, then prompt accordingly by saying: **"Tell me the [year, month, exact date, and day of the week]."** Then [SAY]: **"Now, tell me the name of this place, and which city it is in."**

ADDITIONAL INSTRUCTIONS FOR ADMINISTERING THE MOCA

- The MoCA need not be administered by the clinician who is administering the rest of the UDS battery, and it need not be administered in the same session as the other tests (it can be administered one to seven days before the rest of the battery).
- In drawing the clock and cube, the participant may erase his/her work after one or two pencil strokes and try again if they realize they didn't leave enough room or stop for a similar reason. The participant may not erase and try again, however, after drawing most or all of the item.
- The clinician may not demonstrate the tapping for the vigilance item. If the participant does not understand, the clinician may repeat the entire instruction once.
- Even though verbal fluency for F and L appear later in the battery, it is still necessary to administer the fluency test for the letter F in the language section of the MoCA.

SCORING

If any of the individual items cannot be administered, enter the appropriate reason code (95/995 – 98/998) from the key.

1. Alternating trail making

Allocate one point if the participant successfully draws the following pattern: 1– A – 2 – B – 3 – C – 4 – D – 5 – E, without drawing any lines that cross. Any error that is not immediately self-corrected earns a score of 0. Enter the score for "Visuospatial/executive — Trails" on NACC UDS Form C2, Question 1g.

2. Visuoconstructional skills (cube)

One point is allocated for a correctly executed drawing.

- Drawing must be three-dimensional
- All lines are drawn

- No line is added
- Lines are relatively parallel and their length is similar (rectangular prisms are accepted)

A point is not assigned if any of the above criteria are not met. Enter the score for "Visuospatial/executive — Cube" on NACC UDS Form C2, Question 1h.

3. Visuoconstructional skills (clock)

One point is allocated for each of the following three criteria:

CONTOUR (1 PT.): the clock face must be a circle with only minor distortion acceptable (e.g., slight imperfection on closing the circle). If acceptable, enter 1; otherwise, enter 0 for "Visuospatial/executive — Clock contour" on UDS Form C2, Question 1i.

NUMBERS (1 PT.): all clock numbers must be present with no additional numbers; numbers must be in the correct order and placed in the approximate quadrants on the clock face; Roman numerals are acceptable; numbers can be placed outside the circle contour. If all criteria are met, enter 1; otherwise, enter 0 for "Visuospatial/executive — Clock numbers" on NACC UDS Form C2, Question 1j.

HANDS (1 PT.): there must be two hands jointly indicating the correct time; the hour hand must be clearly shorter than the minute hand; hands must be centered within the clock face with their junction close to the clock center. If all criteria are met, enter 1; otherwise, enter 0 for "Visuospatial/executive — Clock hands" on NACC UDS Form C2, Question 1k.

For the MoCA Total Score, a point is not assigned for a given element if any of the above criteria are not met.

4. Naming

One point each is given for the following responses: (1) lion (2) rhinoceros or rhino (3) camel or dromedary. Enter the score for "Language — Naming" on NACC UDS Form C2, Question 1l.

5. Memory

For the MoCA Total Score, no points are given for Trials One and Two. Count the number correct for both trials and enter the score for "Memory — Registration (two trials)" on NACC UDS Form C2, Question 1m.

6. Attention

FORWARD DIGIT SPAN, BACKWARD DIGIT SPAN: Allocate one point for each sequence correctly repeated. (N.B.: the correct response for the backwards trial is 2 – 4 – 7.) Enter the score for "Attention — Digits" on NACC UDS Form C2, Question 1n.

VIGILANCE: Give one point if there is zero to one errors (an error is a tap on a wrong letter or a failure to tap on letter A). Enter the score for "Attention — Letter A" on NACC UDS Form C2, Question 1o.

SERIAL 7S: This item is scored out of 3 points. Give no (0) points for no correct subtractions, 1 point for one correction subtraction, 2 points for two to three correct subtractions, and 3 points if the participant successfully makes four or five correct subtractions. Count each correct subtraction of 7 beginning at 100. Each subtraction is evaluated independently; that is, if the participant responds with an incorrect number but continues to correctly subtract 7 from it, give a point for each correct subtraction. For example, a participant may respond "92 – 85 – 78 – 71 – 64" where the "92" is incorrect, but all subsequent numbers are subtracted correctly. This is one error and the item would be given a score of 3. Enter the score for "Attention — Serial 7s" on NACC UDS Form C2, Question 1p.

7. Sentence repetition

Allocate 1 point for each sentence correctly repeated. Repetition must be exact. Be alert for errors that are omissions (e.g., omitting "only," "always") and substitutions/additions (e.g., "John is the one who helped today;" substituting "hides" for "hid," altering plurals, etc.). Enter the score for "Language — Repetition" on NACC UDS Form C2, Question 1q.

8. Verbal fluency

Allocate one point if the participant generates 11 words or more in 60 sec. Record the participant's responses in the bottom or side margins, or on the MoCA notes page. Enter the score for "Language — Fluency" on NACC UDS Form C2, Question 1r.

9. Abstraction

Only the last two item pairs are scored. Give 1 point to each item pair correctly answered.

The following responses are acceptable:

Train – bicycle	means of transportation, means of traveling, you take trips in both
Ruler – watch	measuring instruments, used to measure

The following responses are not acceptable:

Train – bicycle	they have wheels
Ruler – watch	they have numbers

Enter the number correctly answered for "Abstraction" on NACC UDS Form C2, Question 1s.

10. Delayed recall

Allocate 1 point for each word recalled freely without any cues.

Scoring this section for the MoCA Total Score: No points are allocated for words recalled with a cue. A cue is used for clinical information purposes only and can give the test interpreter additional information about the type of memory disorder. For memory deficits due to retrieval failures, performance can be improved with a cue. For memory deficits due to encoding failures, performance does not improve with a cue.

Enter the number of words recalled without a cue for "Delayed recall — No cue" on NACC UDS Form C2, Question 1t.

Scoring for cued recall

If a category cue was given, enter the number of words recalled; otherwise, enter "88=Not applicable" for "Delayed recall — Category cue" on NACC UDS Form C2, Question 1u. If a multiple choice cue was given, enter the number of words recalled; otherwise, enter "88=Not applicable" for NACC UDS Form C2, Question 1v.

The total possible words recalled and entered in Questions 1t, 1u, and 1v should be 5 or less. If a participant remembers all five words on the MoCA delayed recall without cueing (i.e., uncued), enter 5 total correct for Question 1t; in this case, the number correct with a category cue and recognition cue (1u and 1v) should be set to "88=Not applicable" because they were not administered.

If a participant does not remember all five words uncued, record the number correct uncued for Question 1t, then provide the category cue for the words that were not recalled without a cue, and enter the number correct with the category cue (if any) for Question 1u.

If the participant did not recall all the words presented with category cue, administer those not recalled using the recognition cue and enter the total correct with the recognition cue (if any) for Question 1v.

11. Orientation

For the MoCA Total Score, give one point for each item correctly answered. The participant must tell the exact date and the exact place (name of hospital, clinic, office). No points are allocated if participant makes an error of one day for the day and date. For each item, enter 1 if correct or 0 if incorrect for Orientation on NACC UDS Form C2, Questions 1w – 1bb.

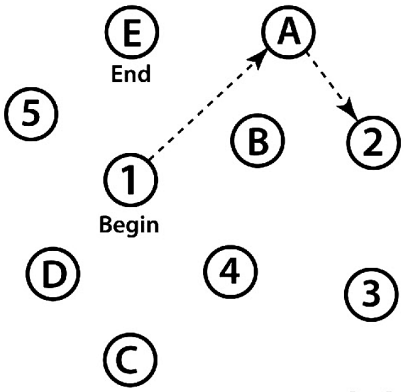
TOTAL SCORE

Sum all subscores listed on the right-hand side of the MoCA worksheet, the maximum score is 30 points. A final total score of 26 and above is considered normal.

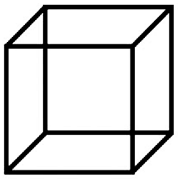
Enter the uncorrected score for NACC UDS Form C2, Question 1f. If any of the scored MoCA items (1g – 1l, 1n – 1t, and 1w – 1bb) were not administered, enter 88=Not applicable for the total score.

Montreal Cognitive Assessment (MoCA)

VISUOSPATIAL / EXECUTIVE



[ ] [ ]



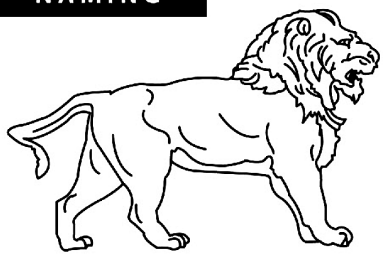
Copy cube

Draw CLOCK (Ten past eleven)
(3 points)

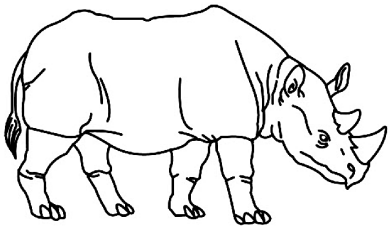
[ ] Contour [ ] Numbers [ ] Hands

POINTS ___/5

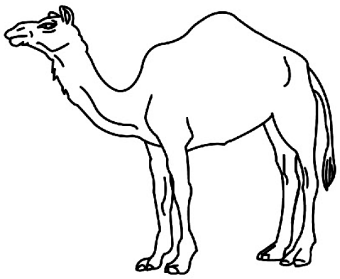
NAMING



[ ]



[ ]



[ ]

___/3

MEMORY

Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION

Read list of digits (1 digit/ sec.).

Subject has to repeat them in the forward order [ ] 2 1 8 5 4

Subject has to repeat them in the backward order [ ] 7 4 2

___/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B

___/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**

___/3

LANGUAGE

Repeat : I only know that John is the one to help today. [ ]

The cat always hid under the couch when dogs were in the room. [ ]

___/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] _____ (N ≥ 11 words)

___/1

ABSTRACTION

Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler

___/2

DELAYED RECALL

	Has to recall words **WITH NO CUE**	FACE	VELVET	CHURCH	DAISY	RED
		[ ]	[ ]	[ ]	[ ]	[ ]
Optional	Category cue					
	Multiple choice cue					

Points for UNCUED recall only

___/5

ORIENTATION

[ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City

___/6

© Z.Nasreddine MD **www.mocatest.org** Normal ≥ 26 / 30

TOTAL ___/30

Add 1 point if ≤ 12 yr edu

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Rules for single-item scoring and index score calculations for the MoCA*

			INDEX SCORES				
Items	Points towards total score	Memory***	Executive	Attention/ Concentration	Language	Visuospatial	Orientation
Trails	1	–	1	–	–	–	–
Cube	1	–	–	–	–	1	–
Clock Circle	1	–	1	–	–	1	–
Clock Hands	1	–	1	–	–	1	–
Clock Time	1	–	1	–	–	1	–
Language Naming	3	–	–	–	3	3	–
Memory: Registration (*2 learning trials, total possible = 10)*	0, not scored	–	–	Immediate recall, 2 trials total, max = 10	–	–	–
Attention: Digits	2	–	2	2	–	–	–
Attention: Letter A	1	–	1	1	–	–	–
Attention: Serial 7s	3	–	3	3	–	–	–
Language: Repetition	2	–	–	2	2	–	–
Language: Fluency	1	–	1	–	1	–	–
Abstraction	2	–	2	–	–	–	–
Delayed Recall with no cue	5	=3x number words recalled freely (max=15)	–	–	–	–	–
Delayed Recall with category cue	0**	=2x number of words retrieved with category cue (max = 10)	–	–	–	–	–
Delayed Recall, recognition	0**	=1x number of words recognized (max = 5)	–	–	–	–	–
Orientation: date	1	–	–	–	–	–	1
Orientation: month	1	–	–	–	–	–	1
Orientation: year	1	–	–	–	–	–	1
Orientation: day	1	–	–	–	–	–	1
Orientation: place (name)	1	–	–	–	–	–	1
Orientation: city	1	–	–	–	–	–	1
Totals	30	15	13	18	6	7	6

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**The standard administration of the MoCA does not score category and recognition responses, even if administered.

***If all five words are freely recalled, then cued and category recall are not administered and the total score would be 15 (3 points for each word recalled). After free recall, category cues are given only for items not recalled. Each word correct with category cue is awarded 2 points. After category cues, only words not correct are then tested with recognition. Award 1 point for each word correct on recognition (max=5). Here is an example: participant gets 2 free recall, 2 cued, and recognizes the fifth word; Memory Index Score: (2x3) + (2x2) + (1x1) = 11/15.

Craft Story 21 Recall (Immediate)

DESCRIPTION

This test assesses the ability to recall a short story. The examiner reads the story to the participant in a clear voice. Immediately after hearing the story, the participant is asked to retell the story from memory. The story should be read with adequate volume and clarity for the participant to understand during the presentation. No repetitions are permitted.

It is important for the examiner to get a sense of the participant's hearing acuity and modulate her/his voice accordingly. Please note that for the hard of hearing, it is not necessarily helpful merely to increase the volume. A change in pitch tends to be effective, with a lower-pitched voice more audible than a loud, high-pitched voice. As with all neuropsychological testing, it is best if the examiner projects their voice at the participant, rather than down toward a clipboard.

SOURCE

Craft S, Newcomer J, Kanne S, Dagogo-Jack S, Cryer P, Sheline Y, Luby J, Dagogo-Jack A, Alderson A. Memory improvement following induced hyperinsulinemia in Alzheimer's disease. Neurobiol Aging. 1996 Jan-Feb;17(1):123-30.

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ADMINISTRATION

Making sure you have the participant's attention, read the following instructions aloud. Then read the story slowly, articulating clearly and with normal inflection.

[SAY]: **"I am going to read you a story. Listen carefully, and when I am through, I want you to tell me everything you can remember. Try to use the same words I use but you may also use your own words. The story is …"**

As soon as the story is over, give the recall instruction:

[SAY]: **"Now tell me the story I just told you. Try to remember as much as you can."**

Record the participant's recall, writing between the lines of the story. For rapid and accurate transcribing of the story, use abbreviations as needed, omit filler words and irrelevant verbiage, and if absolutely necessary, say **"A little slower, please,"** rather than miss story elements. Make sure your transcription of the story is legible before proceeding.

Your transcriptions should be an exact replica of the participant's verbal responses. Write legibly, in ink, and leave room between each line for scoring. If it is difficult to write the participant's response, the examiner may prefer to tape-record the participant's response and then transcribe the results after the session; this is acceptable if appropriate consent has been obtained.

After the participant tells the story, you must give the delayed recall cue.

[SAY]: **"Later on, I will ask you to tell me this story again, so try not to forget it."** Note the time so that later you can calculate the time that has elapsed between Craft Story 21 Recall (Immediate) test and the Craft Story 21 Recall (Delayed) test.

SCORING

A. GENERAL INSTRUCTIONS

Scoring can be deferred until after the entire battery is administered but should be performed close to the completion time. Use the score sheets to score the transcription. One sheet is for verbatim scoring and the second is for paraphrase scoring.

The verbatim score is independent of the paraphrase score. Treat each scoring effort separately: they are not additive. Score the story first for verbatim recall and then score it for paraphrase recall.

For verbatim scoring, the story is divided into 44 "bits." All bits contain one "content" word, which is scored. Some bits also contain "non-content" words, which are not considered in scoring. Each bit is demarcated by a slash (/) at the beginning and at the end of the bit (e.g., /Barry/) on the score form.

For the paraphrase scoring, there are 25 bits of information to score.

Separately sum verbatim and paraphrase points earned for each story, for both the immediate and delayed recall conditions. Record all sums, in the appropriate boxes, on the summary scoring sheet.

Remember with verbatim and paraphrase scoring to consider each bit individually. The order that the bits were given does not matter in the scoring system.

B. DEFINITIONS

1. **CONTENT WORDS**: nouns, adjectives, adverbs, verbs, pronouns, prepositions with semantic load. These are considered during the scoring process.
2. **NON-CONTENT WORDS**: conjunctions, articles, helping verbs, prepositions without semantic load. These are not considered during the scoring process.

VERBATIM SCORING

PERFECT VERBATIM RESPONSE (1.0 POINT): Give the participant 1 point for every bit for which content words are recalled exactly and completely. Allowances can be made for variations of verbs (e.g., "likes" for "liked," "join" for "joining") and minor omissions (e.g., "neighbor" for "neighbor's") or changes in number (e.g., "games" for "game"). The content words do not need to be recalled by the participant in the same order they were read to receive credit. The words can appear anywhere in the recall.

Enter the verbatim score on NACC UDS Form C2, Question 3a. If the test was not completed, enter the appropriate reason code, 95 – 98, and leave the paraphrase score blank.

PARAPHRASE SCORING

PARAPHRASE RESPONSE (1.0 POINT): Give a point for a response that captures the elements of the story although not necessarily with the exact words (see table on page 13). If the participant provides a bit verbatim (e.g., the name), you should give a point for that bit.

Enter the paraphrase score on NACC UDS Form C2, Question 3b.

Craft Story 21 Recall (Immediate)

INSTRUCTIONS: Making sure you have the participant's attention, read the following instructions aloud. Then read the story slowly, articulating clearly and with normal inflection.

SAY: "**I am going to read you a story. Listen carefully, and when I am through, I want you to tell me everything you can remember. Try to use the same words I use but you may also use your own words. The story is...**"

Maria's / child / Ricky / played / soccer / every / Monday /

at 3:30. / He / liked / going / to the field / behind / their / house /

and joining / the game. / One / day, / he / kicked / the ball / so / hard /

that it / went / over / the neighbor's / fence / where three / large /

dogs / lived. / The dogs' / owner / heard / loud / barking, / came /

out, / and helped / them / retrieve / the ball.

Record time administration ended: ☐

Total story units recalled (VERBATIM SCORING): ___ ___ / 44

Total story units recalled (PARAPHRASE SCORING): ___ ___ / 25

As soon as the story is over, give the recall instruction:

SAY: "**Now tell me the story I just told you. Try to remember as much as you can.**"

Record the participant's recall, writing between the lines of the story above. For rapid and accurate transcribing of the story, use abbreviations as needed, omit filler words and irrelevant verbiage, and if absolutely necessary, say "A little slower, please," rather than miss story elements. Make sure your transcription of the story is legible before proceeding.

After transcribing the story, you must give the delayed recall cue.

SAY: "**Later on, I will ask you to tell me this story again, so try not to forget it.**" Note the time so that later you can calculate the time that has elapsed between Craft Story 21 Recall (Immediate) test and the Craft Story 21 Recall (delayed) test.

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Craft Story 21 Recall (Immediate): Verbatim Scoring

PERFECT VERBATIM RESPONSE (**1.0 POINT**): Give the participant 1 point for every bit for which content words are recalled exactly and completely. Allowances can be made for variations of verbs (e.g., "likes" for "liked," "join" for "joining") and minor omissions (e.g., "neighbor" for "neighbor's") or changes in number (e.g., "games" for "game"). The content words do not need to be recalled by the participant in the same order they were read to receive credit. The words can appear anywhere in the recall.

Maria's	
child	
Ricky	
played	
soccer	
every	
Monday	
three thirty	
he	
liked	
going	
field	
behind	
their	
house	
joining	
game	
one	
day	
he	
kicked	
ball	

so	
hard	
it	
went	
over	
neighbor's	
fence	
three	
large	
dogs	
lived	
dogs'	
owner	
heard	
loud	
barking	
came	
out	
helped	
them	
retrieve	
ball	
Total	

Scoring

Number of items recalled for verbatim scoring (IMMEDIATE RECALL SCORE): ___ ___ / 44

Guidelines for Paraphrase Scoring, Craft Story 21

Item	General Rule	Alternative 1-point responses	0-point responses	Points
Maria's	"Maria" or a variant of the name	Mary, Marie	Martha, Anna	
child	"child" or a phrase denoting it was a young person	son, kid, boy, teenager, young man	guy, children, daughter	
Ricky	"Ricky" or a variant of the name	Rick, Rich, Richie, Richard, Ricardo	Randy, Rusty, Robert	
played	"played" is required	to play, plays	did (soccer)	
soccer	"soccer" is required	futbol	baseball, volleyball, other sport	
every Monday	"Monday" or an indication that it occurred on a weekday	—	every day, another day of the week	
at 3:30	an indication that the activity took place in the afternoon	after school, every afternoon	after dinner, at night, in the morning	
He liked going to the field	an indication that he went to an outdoor area	went outside, went to the yard, going to the backyard	went to the school, gym	
behind their house	"house" or word denoting a house	home, residence, where they lived	any other building	
and joining	an indication that he participated in a game	played w/ other kids, became part of the team, playing w/the team	watching, played in the park	
the game.	"game" in any context	—	—	
One day	"One day" is required	—	—	
he kicked	indication that he performed the activity with his foot	booted, punted	threw, hit (with no mention of the foot)	
the ball	"Ball" is required	football, soccer ball	baseball, volleyball	
so hard	an indication that force was used	so much force, so strongly, (kicked it) so far	—	
that it went over	"Over" is required	—	—	
the neighbor's	an indication that the person lived in the same area	nearby resident	friend's	
fence	"fence" or a word denoting a fence of some kind	garden wall, wall	property line, street	
where three	"Three" is required	three (boys)	—	
large dogs lived.	an indication that there were dogs present	hounds, doggies	puppies, cats, kittens, other animals	
The dogs' owner	an indication that the person was responsible for the dogs	neighbor (if owner implied and "neighbor" mentioned twice)	a bystander, the police	
heard loud barking	an indication that the dogs were making noise	yelping, baying, yapping, heard the dogs	saw the dogs running around	
came out	a word or phrase indicating that the owner was present	(owner) saw the ball	his mother came out, the dogs came out	
and helped them	a word or phrase indicating that help was provided	assisted, aided, had to help	—	
retrieve the ball.	an indication that they got the ball back	gave him the ball, return the ball, (helped him) get the ball	—	

Number of items recalled for paraphrase scoring (IMMEDIATE RECALL SCORE): ___ ___ / 25 maximum

Benson Complex Figure Copy (Immediate)

DESCRIPTION

This test is a simplified form of the Rey-Osterrieth Complex Figure. The purpose of the test is to assess a participant's visuoconstructional and visual memory functions.

SOURCE

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Possin, KL, Laluz VR, Alcantar OZ, Miller BL, Kramer JH. Distinct neuroanatomical substrates and cognitive mechanisms of figure copy performance in Alzheimer's disease and behavioral variant frontotemporal dementia. Neuropsychologia. 2011 Jan; 49(1):43-8.

ADMINISTRATION

Give participant a pen, place sheet with figure in front of the participant, and say, **"Please copy this design as best you can."** Please do not use colored pencils for each element because this can be disruptive and will not be consistent with other ADRCs. Instead, please write notes to track progress. Have the participant make his or her copy in the lower half of the page below the figure. When design is completed, leave the figure in front of the participant for 5 seconds and say **"Be sure to remember this design, because I'll ask you to draw it again later from memory."** A maximum of 4 minutes should be allowed for completing the drawing. Do not administer other figure-copy tests during the delay, and do not administer the Rey-Osterrieth before the Benson on the same day.

The participant may start over once. Since a pen must be used, the participant cannot erase. They may, however, cross out or write over their first attempt. If the participant produces more than one figure, ask them which drawing is the final figure for scoring.

SCORING

Follow the scoring instructions as closely as possible and use your best judgment when scoring the Benson Complex Figure Copy. If there is more than one figure, circle the figure used for scoring.

The scoring system for the Benson Figure is modeled after Taylor's widely used scoring system for the Rey-Osterrieth Figure. Eight major figural elements have been identified. Each figural element is scored as 2 points if the element is drawn accurately and placed correctly in the figure (1 point for accuracy, 1 point for placement). Score 1 point if the element is poorly drawn but placed correctly or is correctly drawn but misplaced, and 0 points if the element is neither accurately drawn nor correctly placed. Detailed scoring rules are on the following page.

Enter the total score on NACC UDS Form C2, Question 4a. If the test could not be administered, enter the appropriate reason code, 95 – 98, from the key.

Always score leniently for borderline responses. If a response is borderline for accuracy and borderline for placement, give 1 point. Self-corrected responses are acceptable and should use the same scoring rubric based on accuracy and placement. Multiple attempts are acceptable at the participant's request either on an empty area of the page or, if more room is needed, on a fresh page. Ask the participant which drawing he or she would like you to score. Circle the drawing with a different ink color pen than was used by the participant to do the drawing. If the participant copies directly on top of the stimulus instead of drawing below, the participant should be directed one more time to draw below the figure. If a participant draws close to the edge of the paper, that participant can start again. Instances may occur where test administrators should consider the test invalid (e.g., if the participant did not bring his or her glasses and can't see well enough to take the test). In these instances, enter the appropriate code listed on NACC UDS Form C2. If a participant has motor problems and cannot complete the Benson Figure Complex Copy, a code of 95 (Physical problem) should be entered for the score on NACC UDS Form C2, Question 4a.

For accuracy (A), element drawn must be recognizable as the target element and meet the additional criteria listed below. Leniency is given for wavy lines or rounded angles (e.g., due to tremor). A protractor and ruler should be used for making angle and distance judgments. Extraneous lines do not impact scoring.

For placement (P), element need not be accurate, it must only bear some slight resemblance to the target element (with leniency), be placed correctly, and meet the additional placement criteria below. Major rotation of an element is not acceptable for placement credit.

ELEMENT 1

Accuracy: Four reasonably straight sides must be present with 90º angles (±10º); width > height; corners do not have to touch and lines can be broken, but gaps or overlaps cannot exceed 8mm.

Placement: Any square-like or rectangular figure is present with at least 3 sides but no more than four sides. Less precise angles are acceptable. Rotation of the entire figure should not exceed 30°. If height is greater than width, this is considered an accuracy failure rather than a rotation-related placement failure.

2-point examples:

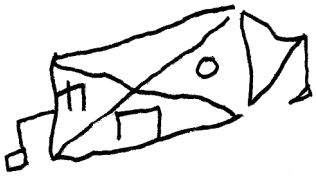
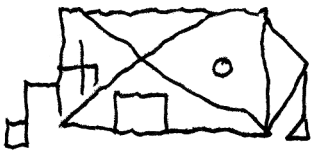
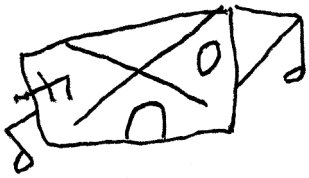


Figure is not rotated more than 30°, and gaps at corners and at broken lines do not exceed 8mm.

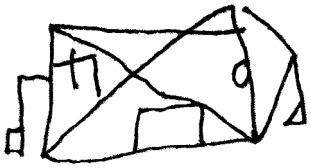


Leniency is given for wavy lines.

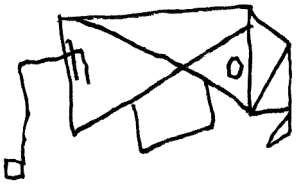
1-point examples:



Accuracy: 0 Placement: 1
Bottom left angle is not precise.



Accuracy: 0 Placement: 1

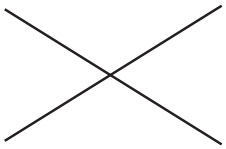


Accuracy: 0 Placement: 1
Three sides of the rectangle are present, and element bears enough of a resemblance to the target element to receive placement credit.

Accuracy: 1 Placement: 0
Placement credit is lost due to rotation.

0-point examples: pentagon, circle, triangle

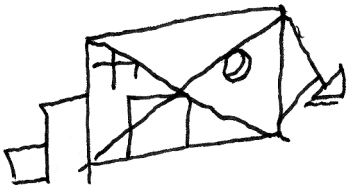
ELEMENT 2



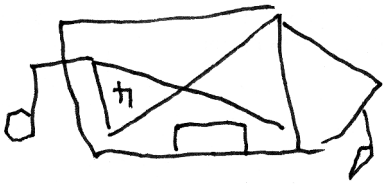
Accuracy: Two reasonably straight intersecting lines are recognizable as the target figure. Rotation is acceptable for accuracy, and lines need not be diagonal.

Placement: Gap or overlap at the corners of the large rectangle must not exceed 8mm. If only one line is present but placement is correct, credit is given.

2-point examples:

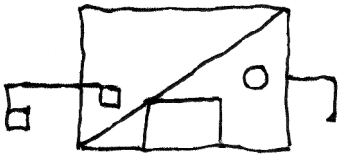


1-point examples:



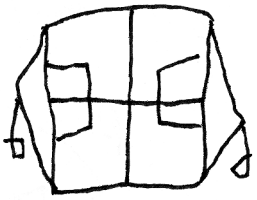
Accuracy: 1 Placement: 0

These lines are recognizable as the target figure (A), but the gaps at corners exceed 8mm (P).



Accuracy: 0 Placement: 1

Element loses accuracy point because one line is missing, but it is placed correctly.



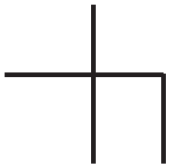
Accuracy: 1 Placement: 0

Lines are recognizable (A) but rotated (P).

Accuracy: 1 Placement: 0

Lines are recognizable but not correctly placed.

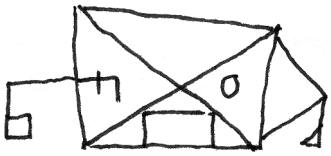
ELEMENT 3



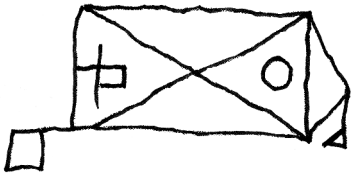
Accuracy: Figure is correctly shaped.

Placement: Figure is connected at the middle third of the large rectangle but does not need to be above element 6. Any gap with the large rectangle does not exceed 8mm. Lines may cross the large rectangle but not the diagonal lines.

2-point examples:

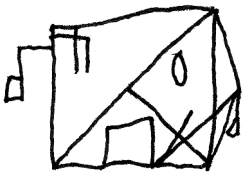


Placement credit is given because it connects at the middle third.



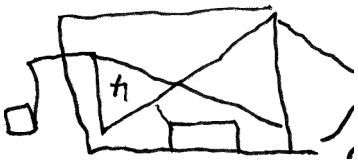
Do not deduct accuracy because of the extraneous line.

1-point examples:



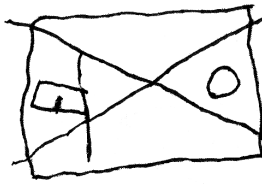
Accuracy: 1 Placement: 0

Connects at upper third.



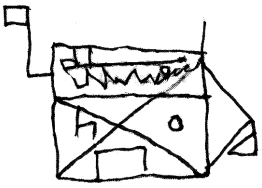
Accuracy: 1 Placement: 0

Element is correctly shaped (A), but the gap between the element and large rectangle exceeds 8mm (P).



Accuracy: 0 Placement: 1

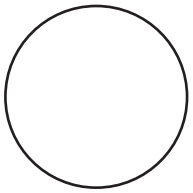
Element bears some slight resemblance to the target element (with leniency) and is placed correctly, at the middle third (P). This is an example of the least resemblance an element might have to receive credit for placement.



Accuracy: 1 Placement: 0

Placement credit is lost due to overlap with diagonals. This element barely receives accuracy credit.

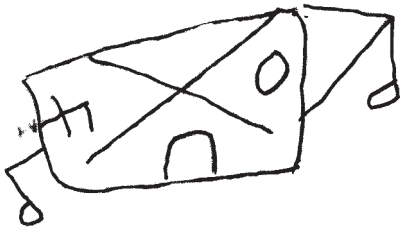
ELEMENT 4



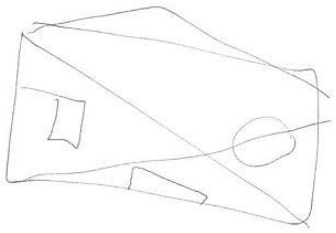
Accuracy: Reasonably round (longest diameter to shortest ratio < 2:1).

Placement: The circle is inside the right quadrant of the rectangle, which is defined by the diagonal lines. If the diagonal lines are not present or are misplaced, score based on their correct placement, with leniency. The circle cannot touch the large rectangle.

2-point examples:

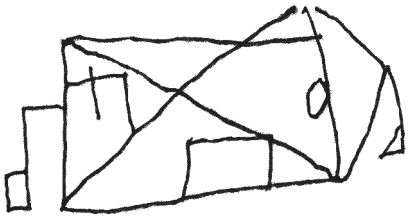


The ratio for this circle is 1.8:1, and so it barely receives accuracy credit.



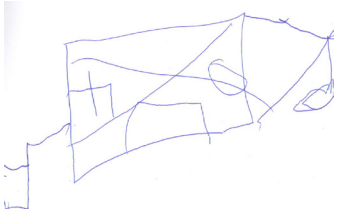
Placement is scored based on where the diagonal lines should have been placed.

1-point example:



Accuracy: 1 Placement: 0

0-point example:



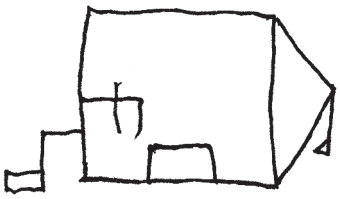
Exceeds ratio requirement (A). Circle touches the rectangle (P).

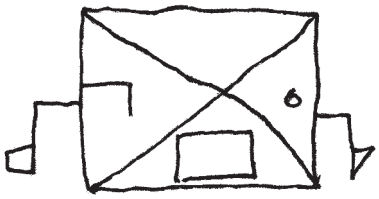
ELEMENT 5

Accuracy: The width must be > the height, and the angles are 90º (±10º). The vertical sides of the rectangle are > ½ of the vertical measurement between the bottom of the large rectangle and the closest part of diagonal lines. If the diagonal lines are not present, calculate based on where the lines should be placed (see first 2-point example). Extraneous lines are acceptable.

Placement: Figure is located in bottom quadrant of the large rectangle as defined by the diagonal lines. The gap or overlap with the bottom of the large rectangle does not exceed 8mm, and any overlap with the diagonal lines does not exceed 8mm.

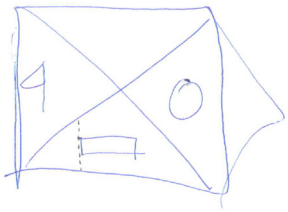
2-point examples:



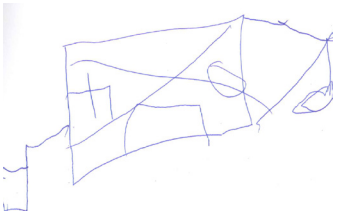


Extraneous lines are acceptable.

1-point examples:

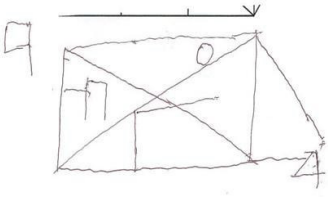


Accuracy: 0 Placement: 1
Vertical sides are < ½ vertical measurement. Dotted lines were added to illustrate vertical measurement.



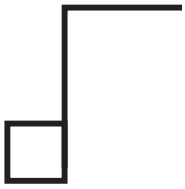
Accuracy: 0 Placement: 1
Top left angle is not precise.

0-point example:



This response would have received placement credit if the overlap with the diagonal lines did not exceed 8mm.

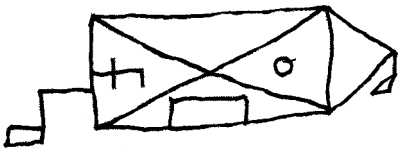
ELEMENT 6



Accuracy: Flag points in the correct direction and shares a side with its staff. Flag may resemble a rectangle or a square.

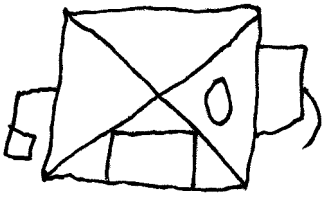
Placement: Element must be outside the large rectangle and below the left internal element (#3). If left internal element is not present, score placement leniently based on where left internal element should have been placed. The top of the flag must be above the bottom of the large rectangle.

2-point examples:



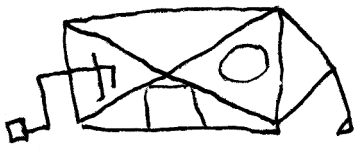
Extraneous lines are acceptable.

1-point examples:



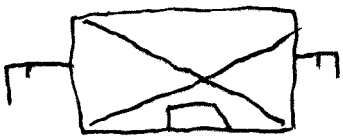
Accuracy: 0 Placement: 1

Flag does not point in the correct direction (A). Placement is scored based on where element 3 should have been placed.



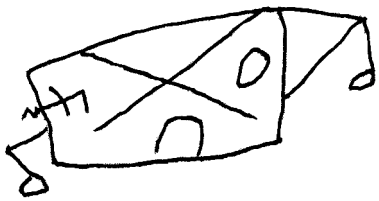
Accuracy: 0 Placement: 1

Element is just below element 3 (P), but flag does not share a side with the staff (A).



Accuracy: 0 Placement: 1

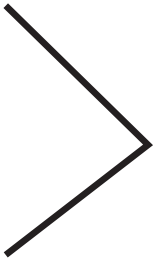
In this example, the element bears some slight resemblance to the target element and is placed correctly.



Accuracy: 1 Placement: 0

Top of the flag is below the bottom of the large rectangle (P).

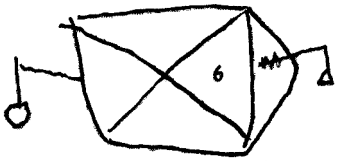
ELEMENT 7



Accuracy: Element is composed of two lines that form a triangle that is roughly the correct size, relative to element 1. The vertex of the angle must correspond to the middle third of the rectangle.

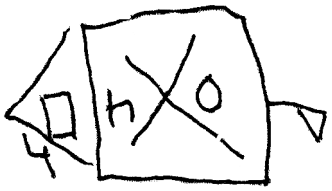
Placement: External lines must be outside the large rectangle on the right. Gap or overlap with the large rectangle should not exceed 8mm. Lines do not need to connect at corners for accuracy or placement credit.

2-point examples:



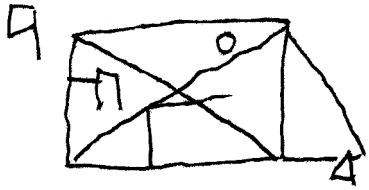
The lines to the right form a triangle-like shape, but if they were more rounded than this (i.e., if they formed a semi-circle), accuracy credit would be lost.

1-point examples:



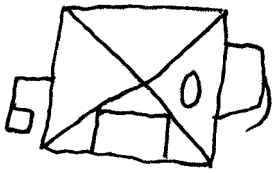
Accuracy: 1 Placement: 0

The vertex of the angle corresponds to the middle third of the large rectangle (A) but is on the wrong side (P).



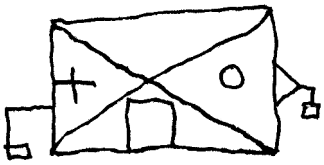
Accuracy: 0 Placement: 1

The vertex corresponds to the bottom third of the large rectangle (A).



Accuracy: 0 Placement: 1

This element is considered to bear enough slight resemblance to target element to receive placement credit, although it is a borderline response.



Accuracy: 0 Placement: 1

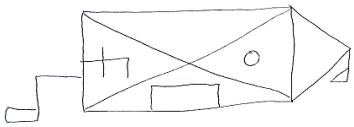
Element is too small to receive accuracy credit

ELEMENT 8

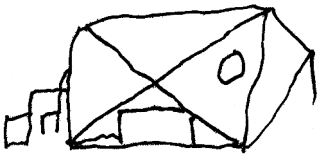
Accuracy: There must be a triangle and a stem. The angle of the triangle at the farthest end of the stem must approximate 90° (± 15°). The flag and stem are in correct relationship to each other.

Placement: Either a stem or flag must be present and placed to the right of the rectangle. The flag need not be a triangle. The element must connect directly to element 7 or be within 5mm of element 7. No credit is lost for an additional stem of any length, provided one of the stems meets the placement criteria (see examples). The top of the flag must be above the bottom of the large rectangle. Rotation > 45° is not allowed.

2-point examples:



1-point examples:

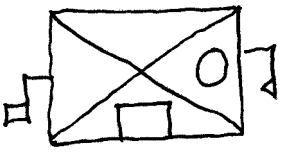


Accuracy: 0 Placement: 1

Stem is present and placed correctly (P). This is an example of the minimal amount of resemblance required to be eligible for placement credit.

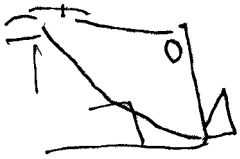
Accuracy: 1 Placement: 0

The entire element is rotated > 45º (P), but the relationship between the triangle and stem is preserved (A).



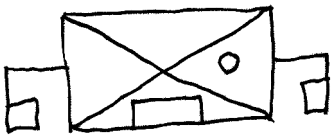
Accuracy: 0 Placement: 1

The angle does not approximate 90º (A).



Accuracy: 0 Placement: 1

No stem.



Accuracy: 0 Placement: 1

Element bears resemblance and is placed correctly.

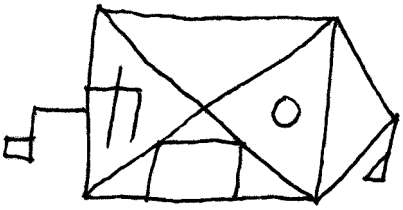
Accuracy: 1 Placement: 0

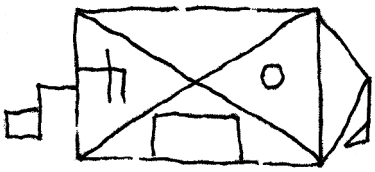
Accurate but not placed correctly.

BONUS POINT

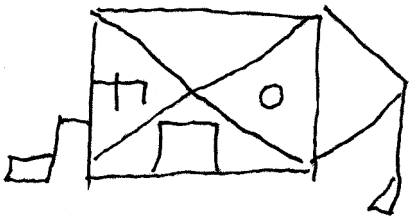
Each element must be accurately drawn, all elements must be properly placed, all elements must be drawn in proper proportions, all connections between elements must be clean, and no extraneous lines may be present.

1-point examples:





0-point example:



Benson Complex Figure Copy (Immediate)

Give participant a pen, place sheet with figure in front of participant.

SAY: **"Please copy this design as best you can."**

Please do not use colored pencils for each element because this can be disruptive and will not be consistent with other ADRCs. Instead, please write notes to track progress. Have participant make his or her copy in the lower half of the page below the figure. When design is completed, leave the figure in front of the participant for 5 seconds and say,

SAY: **"Be sure to remember this design, because I'll ask you to draw it again later from memory."**

A maximum of 4 minutes should be allowed for completing the drawing. Do not administer the other figure-copy tests during the delay, and do not administer the Rey-Osterrieth before the Benson on the same day.

Allow approximately 10–15 minutes before administering the delayed recall portion of the test.

	1. Four-sided, 90° angles, width > height, any gaps or overlaps < 8mm	☐ 0	☐ 1	☐ 2
	2. Reasonably straight lines; any gaps or overlaps < 8mm	☐ 0	☐ 1	☐ 2
	3. Connects at middle third, no overlap with diagonals	☐ 0	☐ 1	☐ 2
	4. Reasonably round, doesn't touch sides	☐ 0	☐ 1	☐ 2
	5. Vertical lines > 1/2 distance to diagonals, width > height, 90° angles	☐ 0	☐ 1	☐ 2
	6. Connects below #3, top of square above bottom	☐ 0	☐ 1	☐ 2
	7. Vertex corresponds to middle third; any gaps or overlaps <8mm	☐ 0	☐ 1	☐ 2
	8. Gap between #8 and #7 <5mm, angle at end of stem = 90°	☐ 0	☐ 1	☐ 2
	BONUS	☐ 0	☐ 1	

Time of day design completed: ____ ____ : ____ ____ ☐ AM ☐ PM

TOTAL SCORE (circle one): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

SCORING: For scoring guidelines, please see *NACC Uniform Data Set (UDS) Instructions for Neuropsychological Tests*. Each figural element is scored as 2 points if the element is drawn accurately and placed correctly in the figure (1 point for accuracy, 1 point for placement). Score 1 point if the element is poorly drawn but placed correctly or is correctly drawn but misplaced, and 0 points if the element is neither accurately drawn nor correctly placed.

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Number Span Test (Forward and Backward)

DESCRIPTION

This is a test of working memory, and it taps two different working memory constructs. The first, Forward Number Span, measures the capacity for holding information very briefly for the purpose of repeating it exactly. The second, Backward Number Span, measures the ability not only to hold the information but also to manipulate the numbers and reverse the sequence. This test is also referred to as Digit Span.

Numbers for both forward and backward span tests are presented, with sequences ranging from 2 to 9 numbers. Two trials are administered at each sequence length. There are two scores: total number of correct trials; longest sequence repeated correctly prior to failing two consecutive trials of the same length.

SOURCE

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ADMINISTRATION — FORWARD NUMBER SPAN

[SAY]: **"I am going to ask you to repeat some numbers for me. Wait until I finish saying the numbers and then repeat them in the same order. For example, if I say 1 – 8 – 7, you would say 1 – 8 – 7. If I say 2 – 9 – 8, what would you say?"** If the participant gives the wrong answer, say, **"Actually, you would say 2 – 9 – 8."**

[SAY]: **"Repeat only the numbers I say each time."** Then start with the test items. Before each item, say, **"Ready?"**

Administer the items in the order indicated on the test form. Write the participant's response on the answer sheet. Continue testing until two number strings at the same length are failed. Record total number of trials correct and longest number sequence repeated correctly prior to the two failed trials.

SCORING — FORWARD NUMBER SPAN

Enter the total forward trials correct on NACC UDS Form C2, Question 5a. If the test was not completed, enter the appropriate reason code, 95 – 98, from the key, and leave Question 5b blank. If the test was completed, enter the longest span forward that was correct for Question 5b.

ADMINISTRATION — BACKWARD NUMBER SPAN

[SAY]: **"I am now going to ask you to repeat some numbers for me but to reverse them from the way I say them. Wait until I finish saying the numbers and then repeat them in reverse order, or backward. For example, if I say 3 – 7 – 4, you would say 4 – 7 – 3. If I say 7 – 3 – 6, what would you say?"** If the participant gives the wrong answer, say, **"Actually, you would say 6 – 3 – 7."**

[SAY]: **"Repeat only the numbers I say each time, backward, in reverse order."** Then start with the test items. Before each item, say, **"Ready?"**

If the participant repeats the numbers in the forward order on either of the first two test items, you may remind them to say the numbers in reverse order by saying, **"Remember, after I say the number sequence, repeat the sequence backwards. Ready?"** Do not give them the number sequence again. Score correct if the participant is able to give the correct reverse order after the prompt. This unrequested reminder of the instructions can only be given once. For all future test items, if the participant repeats the numbers in forward order, score as errors.

Stop testing after two consecutive failures of the same span length. Administer the items in the order indicated on the test form. Write the participant's response on the answer sheet. Continue testing until two number strings at the same length are failed. Record total number of trials correct and longest number sequence repeated correctly prior to the two failed trials.

SCORING — BACKWARD NUMBER SPAN

Enter the total backward trials correct on NACC UDS Form C2, Question 6a. If the test was not completed, enter the appropriate reason code, 95 – 98, from the key, and leave Question 6b blank. If the test was completed, enter the longest span backward that was correct for Question 6b.

Number Span Test: Forward

SAY: **"I am going to ask you to repeat some numbers for me. Wait until I finish saying the numbers and then repeat them in the same order. For example, if I say 1–8–7, you would say 1–8–7. If I say 2–9–8, what would you say?"** If the participant gives the wrong answer, say, **"Actually, you would 2–9–8."**

SAY: **"Repeat only the numbers I say each time."** Then start with the test items. Before each item, say, **"Ready?"**

Stop testing after two consecutive failures of the same span length.

Span length		Response	Response code *incorrect = 0 correct = 1*
3	1-8-4		_____
	2-7-9		_____
4	4-1-6-2		_____
	8-1-9-5		_____
5	6-4-9-2-8		_____
	7-3-8-6-1		_____
6	3-9-2-4-7-5		_____
	6-2-8-3-1-9		_____
7	9-6-4-7-1-5-3		_____
	7-4-9-2-6-8-1		_____
8	4-7-2-5-8-1-3-9		_____
	2-9-5-7-3-6-1-8		_____
9	6-8-4-1-9-3-5-2-7		_____
	1-3-9-2-7-5-8-6-4		_____
		Total correct:	_____
		Length of longest correct series:	_____

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Number Span Test: Backward

SAY: **"I am going to ask you to repeat some numbers for me but to reverse them from the way I say them. Wait until I finish saying the numbers and then repeat them in reverse order, or backward. For example, if I say 3–7–4, you would say 4–7–3. If I say 7–3–6, what would you say?"** If the participant gives the wrong answer, say, **"Actually, you would 6–3–7."**

SAY: **"Repeat only the numbers I say each time, backward, in reverse order."** Then start with the test items. Before each item, say, **"Ready?"**

Stop testing after two consecutive failures of the same span length.

Span length		Response	Response code *incorrect = 0 correct = 1*
2	2 - 5		_____
	4 - 7		_____
3	2 - 9 - 6		_____
	3 - 7 - 4		_____
4	7 - 1 - 8 - 6		_____
	5 - 1 - 6 - 3		_____
5	5 - 2 - 4 - 9 - 1		_____
	9 - 1 - 7 - 3 - 6		_____
6	6 - 8 - 5 - 7 - 9 - 2		_____
	8 - 1 - 6 - 3 - 5 - 9		_____
7	1 - 5 - 2 - 9 - 7 - 3 - 8		_____
	7 - 3 - 1 - 6 - 8 - 5 - 2		_____
8	3 - 6 - 4 - 9 - 5 - 2 - 7 - 1		_____
	6 - 3 - 5 - 7 - 1 - 8 - 2 - 9		_____
		Total correct:	_____
		Length of longest correct series:	_____

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Category Fluency

DESCRIPTION:
This is a widely used measure of semantic memory (verbal fluency, language). The participant is asked to name different exemplars of a given semantic category, and the number of unique exemplars named is scored.

SOURCE:
The procedure is adapted from CERAD administration and scoring procedures for Verbal Fluency (Morris et al., 1989).

ADMINISTRATION

Read the initial instruction:

[SAY]: **"I am going to give you a category and I want you to name, as fast as you can, all of the things that belong in that category. For example, if I say 'articles of clothing', you could say 'shirt', 'tie', or 'hat'. Can you think of other articles of clothing?"**

Allow up to 20 seconds for the participant to produce two responses. Circle the number corresponding to the participant's responses and read the associated instruction.

Next, read the instructions for the Animals category:

[SAY]: **"Now I want you to name things that belong to another category: Animals. You will have one minute. I want you to tell me all the animals you can think of in one minute. Ready? Begin."**

Start timer as you say "Begin." Write actual responses as legibly as possible on the Worksheet for Category Fluency — Animals. Stop the procedure at 60 seconds. One prompt (**"Tell me all the animals you can think of"**) is permitted if the participant makes no response for 15 seconds or expresses incapacity (e.g., "I can't think of any more."). It is also permissible to repeat the instruction or category if the participant specifically requests it. Do not cue the participant about including more than mammals. However, if the participant inquires prior to initiating the response or asks during the test, the examiner is permitted to say "yes."

Next, read the instructions for the Vegetables category:

[SAY]: **"Now I want you to name things that belong to another category: Vegetables. You will have one minute. I want you to tell me all the vegetables you can think of in one minute. Ready? Begin."**

Start timer as you say "Begin". Write actual responses as legibly as possible on the Worksheet for Category Fluency — Vegetables. Stop the procedure at 60 seconds. One prompt (**"Tell me all the vegetables you can think of"**) is permitted if the participant makes no response for 15 seconds or expresses incapacity (e.g., "I can't think of any more."). It is also permissible to repeat the instruction or category if the participant specifically requests it.

SCORING

Defer scoring until after all test administration is finished.

The Animal Total score on the *Worksheet for Category Fluency — Animals* is the number of correct unique animal names produced within the one-minute time limit.

- CREDIT: Breeds (e.g., terriers); male, female, and infant names of a species (e.g., bull, cow, calf); both superordinate and subordinate examples of a species (e.g., both dog and terrier are credited); birds; fish; reptiles, insects.
- DO NOT CREDIT: Repetitions, mythical animals.

The Animal Total score (0–77) should be entered on NACC UDS Form C2, Question 7a. If the test was not completed, enter the appropriate reason code, 95 – 98, from the key.

The Vegetable Total score on the *Worksheet for Category Fluency — Vegetables* is the total number of correct unique names of vegetables produced within the 1-minute time limit.

- CREDIT: Both superordinate and subordinate responses (e.g., peppers and jalapeños are credited); less specific names (e.g., greens); nuts (e.g., peanuts, acorns); and grains such as corn or rice.
  - Names of vegetables found in other cultures but perhaps unfamiliar to you (e.g., jicama) are acceptable only if they can be verified in the dictionary. After completion of the task, ask the participant to spell the word if you are unsure of the correct spelling.
  - Grains (e.g., rice, wheat, oats, etc.), gourds, sugarcane, herbs, and seaweed are counted as acceptable vegetable responses.
  - Tomato, avocado, and pumpkin are acceptable responses.
  - Legumes are acceptable responses.
  - Nuts are acceptable responses.
- DO NOT CREDIT:
  - Repetitions.
  - Prepared vegetable products (e.g., pickles, tomato sauce, ketchup, etc.) are not acceptable responses.
  - Spices are not acceptable responses.

The Vegetable Total score (0–77) should be entered on NACC UDS Form C2, Question 7b. If the test was not completed, enter the appropriate reason code, 95 – 98, from the key.

Category Fluency

INSTRUCTIONS:

SAY: **"I am going to give you a category and I want you to name, as fast as you can, all of the things that belong in that category. For example, if I say 'articles of clothing,' you could say 'shirt,' 'tie,' or 'hat.' Can you think of other articles of clothing?"**

Allow up to 20 seconds for the participant to produce two responses. Circle the number corresponding to the participant's responses, and read the associated instruction.

Response code		Instruction
0	(No response)	"You could have said 'shoes' or 'coat' since they are articles of clothing."
1	(One or more incorrect responses, no correct response)	"No, _____is (are) not an article(s) of clothing. You could have said 'shoes' or 'coat' since they are articles of clothing."
2	(One or more correct response, no incorrect responses)	"That's right. You also could have said 'shoes' or 'coat'."
3	(One or more correct responses, one or more incorrect responses)	"_____is (are) correct, but _____ is (are) not an article of clothing. You also could have said 'shoes' or 'coat'."
4	(Two or more correct responses)	"That's right."

Next, read the instructions for the Animals category (worksheet follows this instruction page):

SAY: **"Now I want you to name things that belong to another category: Animals. You will have one minute. I want you to tell me all the animals you can think of in one minute. Ready? Begin."**

Start timer as you say **"Begin."** Write actual responses as legibly as possible on the Worksheet for Category Fluency — Animals. Stop the procedure at 60 seconds. One prompt (**"Tell me all the animals you can think of"**) is permitted if the participant makes no response for 15 seconds or expresses incapacity (e.g., "I can't think of any more"). It is also permissible to repeat the instruction or category if the participant specifically requests it.

Next, read the instructions for the Vegetables category (worksheet follows this instruction page):

SAY: **"Now I want you to name things that belong to another category: Vegetables. You will have one minute. I want you to tell me all the vegetables you can think of in one minute. Ready? Begin."**

Start timer as you say **"Begin."** Write actual responses as legibly as possible on the Worksheet for Category Fluency — Vegetables. Stop the procedure at 60 seconds. One prompt (**"Tell me all the vegetables you can think of"**) is permitted if the participant makes no response for 15 seconds or expresses incapacity (e.g., "I can't think of any more"). It is also permissible to repeat the instruction or category if the participant specifically requests it.

Worksheet for Category Fluency — Animals

1. _____	27. _____	53. _____
2. _____	28. _____	54. _____
3. _____	29. _____	55. _____
4. _____	30. _____	56. _____
5. _____	31. _____	57. _____
6. _____	32. _____	58. _____
7. _____	33. _____	59. _____
8. _____	34. _____	60. _____
9. _____	35. _____	61. _____
10. _____	36. _____	62. _____
11. _____	37. _____	63. _____
12. _____	38. _____	64. _____
13. _____	39. _____	65. _____
14. _____	40. _____	66. _____
15. _____	41. _____	67. _____
16. _____	42. _____	68. _____
17. _____	43. _____	69. _____
18. _____	44. _____	70. _____
19. _____	45. _____	71. _____
20. _____	46. _____	72. _____
21. _____	47. _____	73. _____
22. _____	48. _____	74. _____
23. _____	49. _____	75. _____
24. _____	50. _____	76. _____
25. _____	51. _____	77. _____
26. _____	52. _____	

Worksheet for Category Fluency — Vegetables

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____
37. _____
38. _____
39. _____
40. _____
41. _____
42. _____
43. _____
44. _____
45. _____
46. _____
47. _____
48. _____
49. _____
50. _____
51. _____
52. _____
53. _____
54. _____
55. _____
56. _____
57. _____
58. _____
59. _____
60. _____
61. _____
62. _____
63. _____
64. _____
65. _____
66. _____
67. _____
68. _____
69. _____
70. _____
71. _____
72. _____
73. _____
74. _____
75. _____
76. _____
77. _____

Trail Making Test

DESCRIPTION

This is a test of processing speed and executive function. Although both Parts A and B depend on visuomotor and perceptual-scanning skills, Part B also requires considerable cognitive flexibility in shifting from number to letter sets under time pressure.

Part A consists of 25 circles numbered 1 through 25 distributed over a white sheet of 8½² x 11² paper. The participant is instructed to connect the circles with a drawn line as quickly as possible in ascending numerical order.

Part B also consists of 25 circles, but these circles contain either numbers (1 through 13) or letters (A through L). The participant must connect the circles while alternating between numbers and letters in an ascending order (e.g., A to 1; 1 to B; B to 2; 2 to C).

The participant's performance is judged in terms of the time, in seconds, required to complete each Trail. The time to complete Part A (150-second maximum) and Part B (300-second maximum) will be the primary measure of interest (testing is stopped if the maximum time is reached).

SOURCE

This test, originally called Partington's Pathways[1], was a component of the Army Individual Test Battery[2]. It was popularized by Reitan and colleagues and subsequently became part of the Halstead-Reitan Neuropsychological Battery[3]. The instructions for administration are adapted from Spreen and Strauss[4].

ADMINISTRATION

PART A

Place the form for SAMPLE A in front of the participant. Read aloud the instructions:

> [SAY]: **"There are numbers in circles on this page. Please take the pencil and draw a line from one number to the next, in order. Start at 1** (point to the number)**, then go to 2** (point to the number)**, then go to 3** (point to the number) **and so on. Please try not to lift the pencil as you move from one number to the next. Work as quickly as you can. Begin here** (point to "Begin" number) **and end here** (point to "End" number)**."**
>
> If the participant makes an error, mark through the line and go back to the point at which the error was made and say, for example, **"You were at number 2. What is the next number?"** Wait for the participant's response. If the participant indicates 3, say **"Please start here** (pointing to 2) **and continue."** If the participant indicates any other number, say **"The next number would be 3."** Then point to 2 and say **"Please start here and continue."** If the participant cannot complete the sample and clearly does not comprehend the task, do not administer Test A. In that event, on the recording form enter the appropriate code (996=cognitive/ behavioral problem).

If the participant completes the sample, go to TEST A.

> [SAY]: **"On this page there are more numbers in circles. Please take the pencil and draw a line from one circle to the next, in order. Start at 1** (point to the "Begin" number) **and end here** (point to "End" number)**. Please try not to lift the pencil as you move from one circle to the next. Work as quickly as you can."** Start timing as soon as the instruction is given to begin.
>
> NOTE: In giving the instructions for the test form (as opposed to the sample), the examiner tells the participant to move from one circle to the next and does not used the word "number."
>
> If the participant makes an error, mark through the line and say **"That one was not correct."** Point to the last correct number and say **"Please start here and continue."** This is done for each error. The examiner should attempt to provide corrections as quickly as possible. Stop timing when the Trail is completed, or stop participant when the maximum time is reached. Allow a maximum of 150 seconds for the test.

PART B PRE-TEST

To ensure that the participant is familiar with the alphabet,

SAY: **"Please tell me the alphabet starting with the letter A."**

A B C D E F G H I J K L

- If the participant makes no errors in saying the alphabet from the letter "A" to "L," continue with the test.
- If the participant makes 3 or more errors in saying the alphabet from "A" to "L," discontinue the test and code as 997.
- If the participant makes 1 or 2 errors in saying the alphabet from "A" to "L," ask them to say the alphabet again. If they make at least one error, discontinue the test and code as 997.

PART B

Place the form for SAMPLE B in front of the participant. Present the sample for Part B even if the participant failed the sample for Part A. Read aloud the instructions:

[SAY]: **"There are numbers and letters in circles on this page. Please take the pencil and draw a line, alternating in order between the numbers and letters. Start at number 1** (point to the number)**, then go to the first letter, A** (point to the letter)**, then go to the next number, 2** (point to the number)**, and then the next letter, B** (point to the letter)**, and so on. Please try not to lift the pencil as you move from one number or letter to the next. Work as quickly as you can."**

If the participant makes an error, mark through the line and go back to the point at which the error was made and say, for example, **"You were at number 2. What is the next letter?"** Wait for the participant's response. If it is correct, say **"Please start here** (point to the 2) **and continue."** If the participant picks the wrong item, say, **"The next letter would be B** (point to the B)**."** Then point to the 2 and say **"Please start here and continue."** If the participant cannot complete the sample and clearly does not comprehend the task, do not administer the test. Enter the appropriate code (996=cognitive/behavioral problem.)

If the participant completes the sample correctly, go to TEST B.

[SAY]: **"On this page, there are more numbers and letters in circles. Please take the pencil and draw a line from one circle to the next, alternating in order between the numbers and letters. Start at 1** (point to the "Begin" number) **and end here** (point to the "End" number)**. Please try not to lift the pencil as you move from one circle to the next. Work as quickly as you can."** Start timing as soon as the instruction is given to begin.

NOTE: In giving the instructions for the test form (as opposed to the sample), the examiner tells the participant to move from one circle to the next and does not use the words "number" or "letter."

If the participant makes an error, mark through the line and say, **"That one was not correct."** Point to the last correct item and say, **"Please start here and continue."** This is done for each error. Do not indicate if the next item has to be a number or a letter. The examiner should attempt to provide corrections as quickly as possible. Stop timing when the Trail is completed, or stop participant when the maximum time is reached. Allow a maximum of 300 seconds for the test.

SCORING

Record the total number of seconds to complete Part A, up to a maximum of 150 seconds. If the participant is not finished by 150 seconds, the score is 150. Enter the score for Part A on NACC UDS Form C2, Question 8a. If the test was not completed, enter the appropriate reason code, 995 – 998, from the key, and leave Questions 8a1 and 8a2 blank.

Record the total number of seconds to complete Part B, up to a maximum of 300 seconds. If the participant is not finished by 300 seconds, the score is 300. Enter the score for Part B on NACC UDS Form C2, Question 8b. If the test was not completed, enter the appropriate reason code, 995 – 998, from the key, and leave Questions 8b1 and 8b2 blank.

For both Part A and Part B, record errors of commission and number of correct lines as described below:

"Errors of commission" are defined as errors occurring when the participant connects two circles in the incorrect sequence. Each time this occurs, one error of commission is scored. Essentially, any connecting line drawn by the participant that elicits a correction from the examiner is an error of commission. For example, on Part B, if the participant draws a line from C to D (instead of C to 3), the examiner would point out the error and have the participant go back to C. This would count as an error of commission.

"Number of correct lines" is defined as the total number of correct connections between circles. The maximum number of correct lines on each condition of Trail Making is 24, so whenever a participant completes the task within the time limit, the total number of correct lines will always equal 24. Scores less than 24 will occur when the participant is slow and does not complete the task in the time allotted. For example, a participant who gets as far as the number 6 on Part B when the allotted time elapses has only completed 10 correct connecting lines (1-A, A-2, 2-B, B-3, 3-C, C-4, 4-D, D-5, 5-E, E-6).

Number of correct lines and commission errors are theoretically orthogonal. Impulsive participants who make several failure-to-shift errors on Part B but who eventually finish will have several commission errors but have 24 correct lines. Conversely, participants who work slowly but accurately might have fewer than 24 correct lines because they did not finish in time but have zero commission errors.

If the participant draws a line through another circle while clearly on the way to the next circle in the sequence, caution the participant to avoid touching circles other than the ones intended, and make a note of what occurred on the raw data form, but do not count as an error of commission.

Recording number of correct lines and errors of commission significantly increases the amount of information gleaned from the Trail Making test. Under the current scoring system, a participant who gets as far as "C" within the time limit on Part B would receive the same score as a participant who gets as far as "K," yet clearly the second participant's performance is better. Recoding the number of correct lines allows researchers to measure these performance differences. Recording errors of commission provides an index of impaired rule monitoring, and preliminary data (Kramer, personal communication) suggest that this index may have a more specific relationship with frontal lobe neuroanatomical volumes.

Trail Making Test

PART A

Place the form for sample A in front of the participant. Read aloud the instructions.

SAY: **"There are numbers in circles on this page. Please take the pencil and draw a line from one number to the next, in order. Start at 1** [point to the number], **then go to 2** [point to the number], **then go to 3** [point to the number] **and so on. Please try not to lift the pencil as you move from one number to the next. Work as quickly as you can. Begin here** [point to "Begin" number] **and end here** [point to "End" number]."

If the participant makes an error, mark through the line and go back to the point at which the error was made and say, for example, **"You were at number 2. What is the next number?"** Wait for the participant's response. If the participant indicates 3, say **"Please start here** [point to the 2] **and continue."** If the participant indicates any other number, say **"The next number would be 3."** Then point to 2 and say **"Please start here and continue."** If the participant cannot complete the sample and clearly does not comprehend the task, do not administer Test A. In that event, on the recording form enter the appropriate code (996 = cognitive/behavioral problem).

If the participant completes the sample, go to TEST A.

SAY: **"On this page there are more numbers in circles. Please take the pencil and draw a line from one circle to the next, in order. Start at** 1 [point to "Begin" number] **and end here** [point to "End" number]. **Please try not to lift the pencil as you move from one circle to the next. Work as quickly as you can."** Start timing as soon as the instruction is given to begin.

Note: In giving the instructions for the test form (as opposed to the sample), the examiner tells the participant to move from one ***circle*** to the next and does not use the word "number."

If the participant makes an error, mark through the line and say **"That one was not correct."** Point to the last correct number and say **"Please start here and continue."** This is done for each error. The examiner should attempt to provide corrections as quickly as possible. Stop timing when the Trail is completed, or stop when the maximum time is reached. Allow a maximum of 150 seconds for the test.

PART B PRE-TEST

To ensure that the participant is familiar with the alphabet,

SAY: **"Please tell me the alphabet starting with the letter A."**

A B C D E F G H I J K L

- If the participant makes no errors in saying the alphabet from the letter "A" to "L," continue with the test.
- If the participant makes 3 or more errors in saying the alphabet from "A" to "L," discontinue the test and code as 997.
- If the participant makes 1 or 2 errors in saying the alphabet from "A" to "L," ask them to say the alphabet again. If they make at least one error, discontinue the test and code as 997.

PART B

Place the form for Sample B in front of the participant. Present the sample for Part B even if the participant failed the sample for Part A. Read aloud the instructions:

SAY: **"There are numbers and letters in circles on this page. Please take the pencil and draw a line, alternating in order between the numbers and letters. Start at number 1** [point to the number], **then go to the first letter, A** [point to the letter], **then go to the next number, 2** [point to the number], **and then the next letter, B** [point to the letter], **and so on. Please try not to lift the pencil as you move from one number or letter to the next. Work as quickly as you can."**

If the participant makes an error, mark through the line and go back to the point at which the error was made and say, for example, **"You were at number 2. What is the next letter?"** Wait for the participant's response. If it is correct, say **"Please start here** [point to the 2] **and continue."** If the participant picks the wrong item, say **"The next letter would be B** [point to the B]." Then point to the 2 and say **"Please start here and continue."** If the participant cannot complete the sample and clearly does not comprehend the task, do not administer the test. Enter the appropriate code (996 = cognitive/behavioral problem).

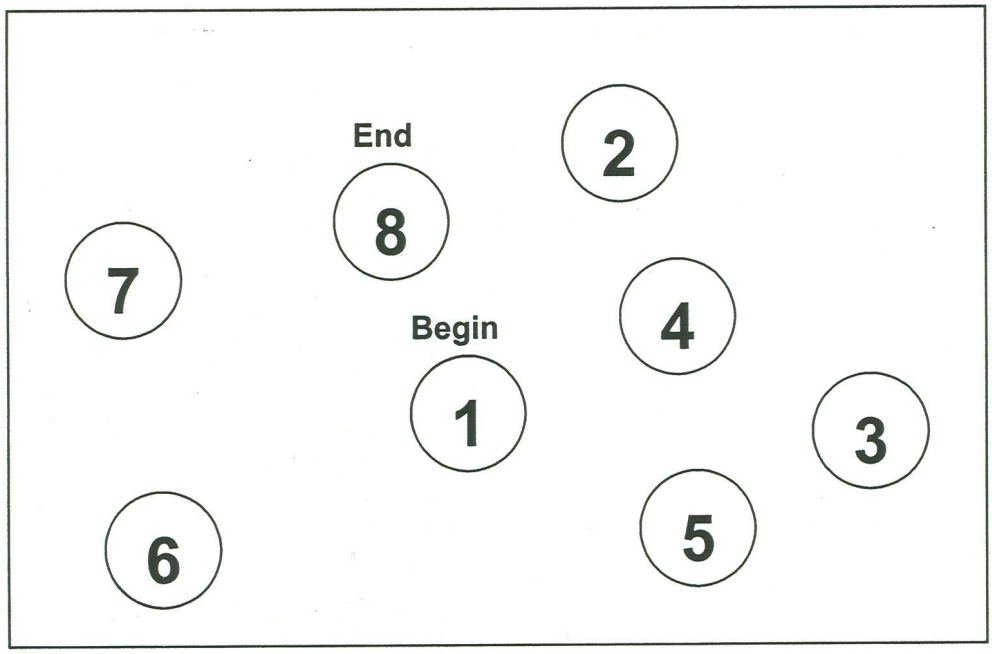
If the participant completes the sample correctly, go to TEST B.

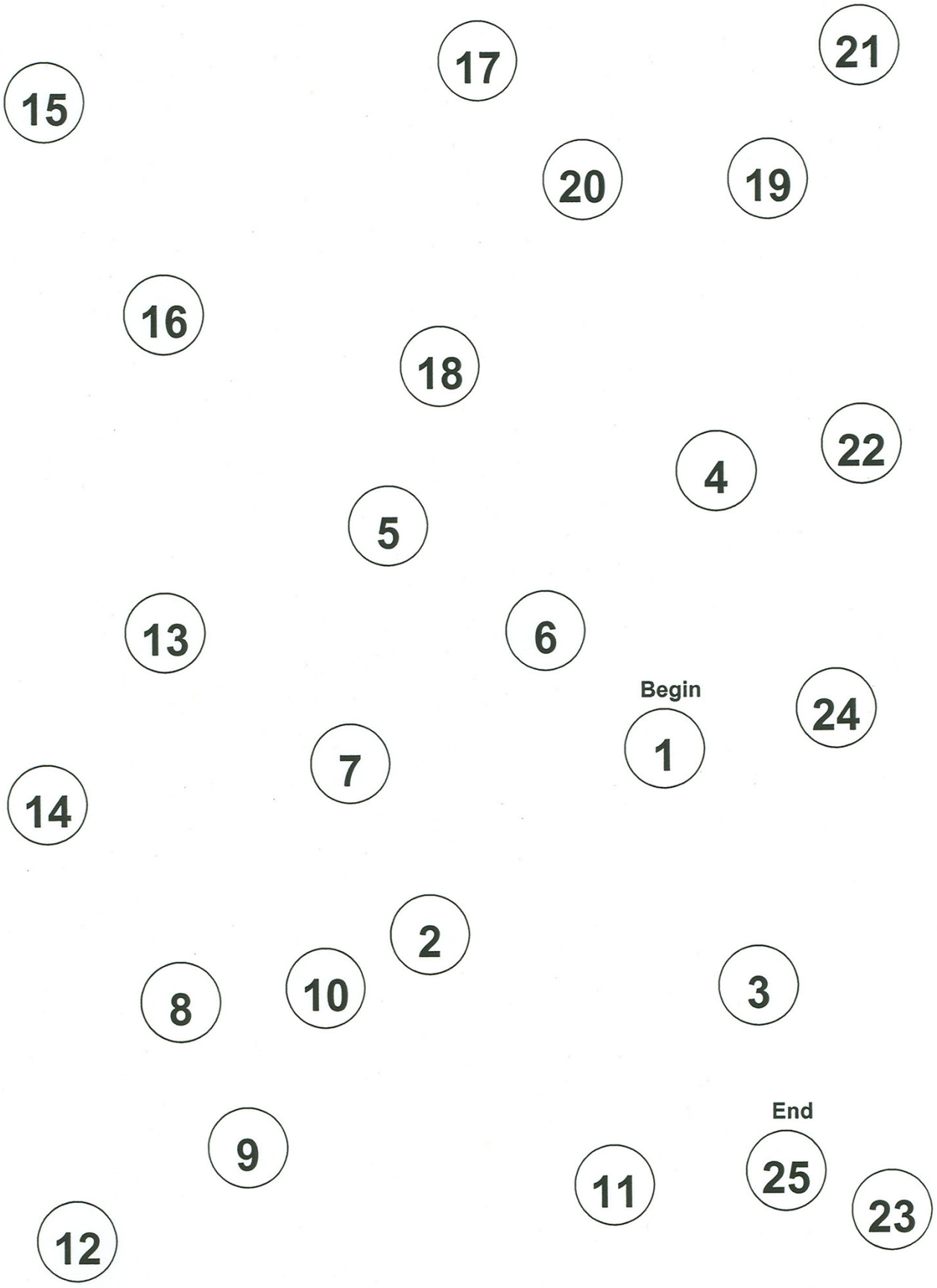
Say: **"On this page, there are more numbers and letters in circles. Please take the pencil and draw a line from one circle to the next, alternating in order between the numbers and letters. Start at 1** [point to the "Begin" number] **and end here** [point to the "End" number]. **Please try not to lift the pencil as you move from one circle to the next. Work as quickly as you can."** Start timing as soon as the instruction is given to begin.

Note: In giving the instructions for the test form (as opposed to the sample), the examiner tells the participant to move from one circle to the next and does not use the words "number" or "letter."

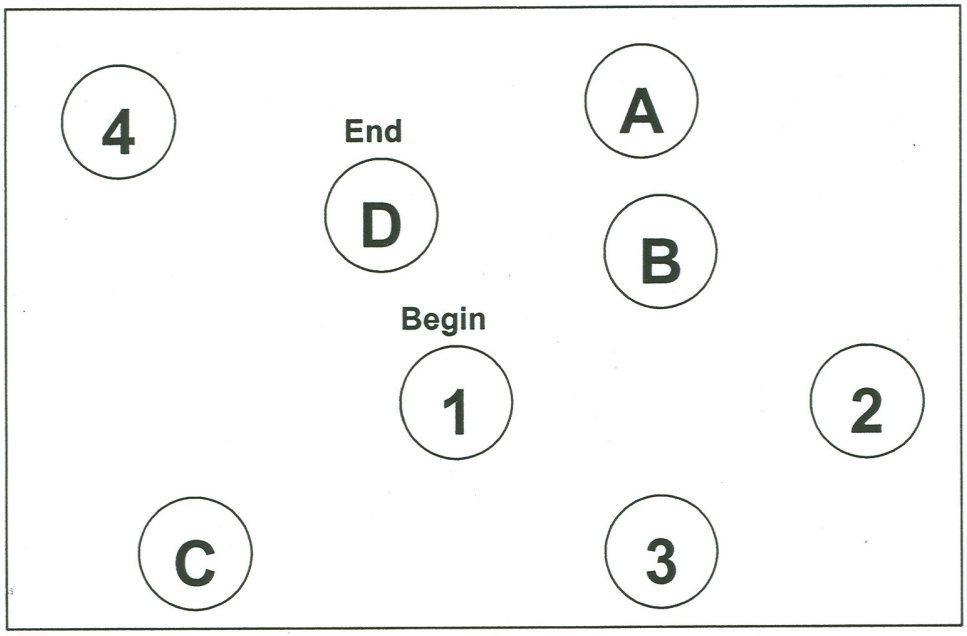
If the participant makes an error, mark through the line and say, **"That one was not correct."** Point to the last correct item and say, **"Please start here and continue."** This is done for each error. Do not indicate whether the next item should be a number or a letter. The examiner should attempt to provide corrections as quickly as possible. Stop timing when the Trail is completed, or stop participant when the maximum time is reached. Allow a maximum of 300 seconds for the test.

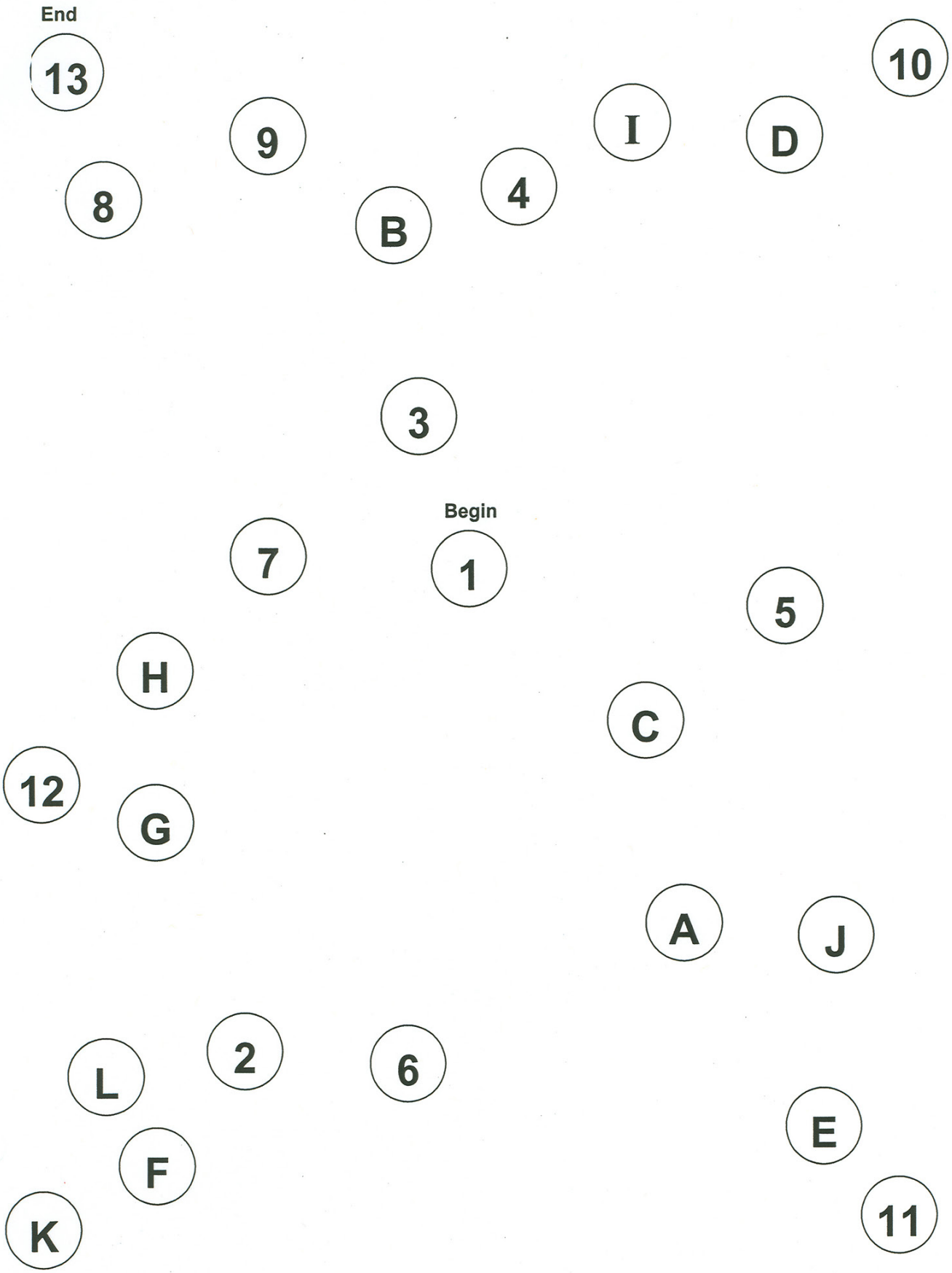
Sample A




21
17
15
20
19
16
18
22
4
5
13
6
Begin
24
1
7
14
2
10
3
8
End
9
25
11
23
12

Sample B




End
13
10
9
I
D
8
4
B
3
Begin
7
1
5
H
C
12
G
A
J
2
6
L
E
F
11
K

Benson Complex Figure Copy (Delayed)

DESCRIPTION

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SOURCE

Possin, KL, Laluz VR, Alcantar OZ, Miller BL, Kramer JH. Distinct neuroanatomical substrates and cognitive mechanisms of figure copy performance in Alzheimer's disease and behavioral variant frontotemporal dementia. Neuropsychologia. 2011 Jan; 49(1):43-8.

ADMINISTRATION

10 –15 minutes after completion of the copy trial, participants should be given a blank piece of paper and pen and asked:

[SAY]: **"Remember that figure that I asked you to copy a while ago? I want you to draw as much of it as you can remember."**

A maximum of 4 minutes should be allowed for completing the drawing. The same scoring guidelines as used for Benson Complex Figure Copy (Immediate) should be used to score recall performance.

RECOGNITION

After the completion of figure recall, place the recognition page in front of the participant and ask:

[SAY]: **"Which of these figures was the one you copied before?"**

SCORING

Enter the total score on NACC UDS Form C2, Question 10a. If the test could not be administered, enter the appropriate reason code, 95 – 98, from the key, and leave Question 10b blank. If the participant recognized the stimulus from among four options, select 1=Yes for Question 10b; otherwise, select 0=No.

Benson Complex Figure Copy (Delayed)

The interval between copy and recall of the Benson figure should be 10–15 minutes.

SAY: **"Remember that figure that I asked you to copy a while ago? I want you to draw as much of it as you can remember."**

Note order of completion.

	1. Four-sided, 90° angles, width > height, any gaps or overlaps < 8mm	☐ 0	☐ 1	☐ 2
	2. Reasonably straight lines; any gaps or overlaps < 8mm	☐ 0	☐ 1	☐ 2
	3. Connects at middle third, no overlap with diagonals	☐ 0	☐ 1	☐ 2
	4. Reasonably round, doesn't touch sides	☐ 0	☐ 1	☐ 2
	5. Vertical lines > 1/2 distance to diagonals, width > height, 90° angles	☐ 0	☐ 1	☐ 2
	6. Connects below #3, top of square above bottom	☐ 0	☐ 1	☐ 2
	7. Vertex corresponds to middle third; any gaps or overlaps <8mm	☐ 0	☐ 1	☐ 2
	8. Gap between #8 and #7 <5mm, angle at end of stem = 90°	☐ 0	☐ 1	☐ 2
	BONUS	☐ 0	☐ 1	

Time of day design completed: ____ ____ : ____ ____ ☐ AM ☐ PM

TOTAL SCORE (circle one): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

RECOGNITION

SAY: **Which of the figures was the one you copied before?**

Did participant recognize original stimulus from among four options? ☐ 0 No ☐ 1 Yes

SCORING: For scoring guidelines, please see *NACC Uniform Data Set (UDS) Instructions for Neuropsychological Tests*. Each figural element is scored as 2 points if the element is drawn accurately and placed correctly in the figure (1 point for accuracy, 1 point for placement). Score 1 point if the element is poorly drawn but placed correctly or is correctly drawn but misplaced, and 0 points if the element is neither accurately drawn nor correctly placed.

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Craft Story 21 Recall (Delayed)

DESCRIPTION

This is a test of delayed recall (episodic memory) of the story read to the participant at the beginning of the testing session, during Craft Story 21 Recall (Immediate).

SOURCE

Craft S, Newcomer J, Kanne S, Dagogo-Jack S, Cryer P, Sheline Y, Luby J, Dagogo-Jack A, Alderson A. Memory improvement following induced hyperinsulinemia in Alzheimer's disease. Neurobiol Aging. 1996 Jan-Feb;17(1):123-30.

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ADMINISTRATION

Administer this test approximately 20 minutes after Craft Story 21 Recall (Immediate).

NOTE: If 20 minutes have not elapsed, do not add other tests to fill the interval. Some of the time can be used to obtain blood pressure, weight, etc., if need be. Administer Craft Story 21 Recall (Delayed) and record the actual time elapsed.

[SAY]: **"I read you a story a few minutes ago. Can you tell me what you remember about that story now?"**

If the participant does not recall the story or having been told a story, make a note as indicated below and

[SAY]: **"It was a story about a boy. Can you tell it to me now?"**

Record the participant's response on the *Worksheet for Craft Story 21 Recall (Delayed)*. Make sure that your written record is legible before proceeding. If the participant asks a question about the story or for repetition of some or all of it, say, **"Please tell me as much as you remember about the story."**

SCORING

Score according to instructions for Craft Story 21 Recall (Immediate) in this instruction book. The examiner may prefer to tape-record the participant's response and then transcribe the results after the session; this is acceptable, if appropriate consent has been obtained.

VERBATIM SCORING

PERFECT VERBATIM RESPONSE (1.0 POINT): Give the participant 1 point for every bit for which content words are recalled exactly and completely. Allowances can be made for variations of verbs (e.g., "likes" for "liked," "join" for "joining") and minor omissions (e.g., "neighbor" for "neighbor's") or changes in number (e.g., "games" for "game"). The content words do not need to be recalled by the participant in the same order they were read to receive credit. The words can appear anywhere in the recall.

Enter the verbatim score on NACC UDS Form C2, Question 9a. If the test was not completed, enter the reason code, 95 – 98, from the key and leave the paraphrase score (Question 9b), delay time (Question 9c), and cue needed (Question 9d) blank.

PARAPHRASE SCORING

PARAPHRASE RESPONSE (1.0 POINT): Give a point for a response that captures the elements of the story although not necessarily with the exact words (see table on page 44).

Enter the paraphrase score on NACC UDS Form C2, Question 9b. Enter the delay time, in minutes, on NACC UDS Form C2, Question 9c. If the delay time is unknown or mis–recorded, enter 99=Unknown. If the cue ("boy") was needed, select 1=Yes for Question 9d; otherwise, select 0=No.

Craft Story 21 Recall (Delayed)

INSTRUCTIONS: Administer this test approximately 20 minutes after Craft Story 21 Recall (Immediate), making note of the time administration of Craft Story 21 Recall (Delayed) began. Note: If 20 minutes have not elapsed, do not add other tests to fill the interval. You may obtain other data, such as blood pressure, weight, etc. Administer Craft Story 21 Recall (Delayed) and record the actual time elapsed.

SAY: "**I read you a story a few minutes ago. Can you tell me what you remember about that story now?"**

If the participant does not recall the story or having been told a story, make a note as indicated below and SAY**: "It was a story about a boy. Can you tell it to me now?"**

Maria's / child / Ricky / played / soccer / every / Monday /

at 3:30. / He / liked / going / to the field / behind / their / house /

and joining / the game. / One / day, / he / kicked / the ball / so / hard /

that it / went / over / the neighbor's / fence / where three / large /

dogs / lived. / The dogs' / owner / heard / loud / barking, / came /

out, / and helped / them / retrieve / the ball.

Record time administration began: ☐

Total story units recalled (VERBATIM SCORING): ___ ___ / 44

Total story units recalled (PARAPHRASE SCORING): ___ ___ / 25

Time elapsed since Craft Story 21 Recall (IMMEDIATE): ___ ___ minutes

Cue ("boy") needed: ☐ No ☐ Yes

Craft Story 21 Recall (Delayed): Verbatim Scoring

PERFECT VERBATIM RESPONSE (**1.0 POINT**): Give the participant 1 point for every bit for which content words are recalled exactly and completely. Allowances can be made for variations of verbs (e.g., "likes" for "liked," "join" for "joining") and minor omissions (e.g., "neighbor" for "neighbor's") or changes in number (e.g., "games" for "game"). The content words do not need to be recalled by the participant in the same order they were read to receive credit. The words can appear anywhere in the recall.

Maria's	
child	
Ricky	
played	
soccer	
every	
Monday	
three thirty	
he	
liked	
going	
field	
behind	
their	
house	
joining	
game	
one	
day	
he	
kicked	
ball	

so	
hard	
it	
went	
over	
neighbor's	
fence	
three	
large	
dogs	
lived	
dogs'	
owner	
heard	
loud	
barking	
came	
out	
helped	
them	
retrieve	
ball	
Total	

Scoring

Number of items recalled for verbatim scoring (DELAYED RECALL SCORE): ___ ___ / 44

Guidelines for Paraphrase Scoring, Craft Story 21

Item	General Rule	Alternative 1-point responses	0-point responses	Points
Maria's	"Maria" or a variant of the name	Mary, Marie	Martha, Anna	
child	"child" or a phrase denoting it was a young person	son, kid, boy, teenager, young man	guy, children, daughter	
Ricky	"Ricky" or a variant of the name	Rick, Rich, Richie, Richard, Ricardo	Randy, Rusty, Robert	
played	"played" is required	to play, plays	did (soccer)	
soccer	"soccer" is required	futbol	baseball, volleyball, other sport	
every Monday	"Monday" or an indication that it occurred on a weekday	—	every day, another day of the week	
at 3:30	an indication that the activity took place in the afternoon	after school, every afternoon	after dinner, at night, in the morning	
He liked going to the field	an indication that he went to an outdoor area	went outside, went to the yard, going to the backyard	went to the school, gym	
behind their house	"house" or word denoting a house	home, residence, where they lived	any other building	
and joining	an indication that he participated in a game	played w/ other kids, became part of the team, playing w/the team	watching, played in the park	
the game.	"game" in any context	—	—	
One day	"One day" is required	—	—	
he kicked	indication that he performed the activity with his foot	booted, punted	threw, hit (with no mention of the foot)	
the ball	"Ball" is required	football, soccer ball	baseball, volleyball	
so hard	an indication that force was used	so much force, so strongly, (kicked it) so far	—	
that it went over	"Over" is required	—	—	
the neighbor's	an indication that the person lived in the same area	nearby resident	friend's	
fence	"fence" or a word denoting a fence of some kind	garden wall, wall	property line, street	
where three	"Three" is required	three (boys)	—	
large dogs lived.	an indication that there were dogs present	hounds, doggies	puppies, cats, kittens, other animals	
The dogs' owner	an indication that the person was responsible for the dogs	neighbor (if owner implied and "neighbor" mentioned twice)	a bystander, the police	
heard loud barking	an indication that the dogs were making noise	yelping, baying, yapping, heard the dogs	saw the dogs running around	
came out	a word or phrase indicating that the owner was present	(owner) saw the ball	his mother came out, the dogs came out	
and helped them	a word or phrase indicating that help was provided	assisted, aided, had to help	—	
retrieve the ball.	an indication that they got the ball back	gave him the ball, return the ball, (helped him) get the ball	—	

Number of items recalled for paraphrase scoring (DELAYED RECALL SCORE): ___ ___ / 25 maximum

Verbal Fluency: Phonemic Test

DESCRIPTION

This is a widely used measure of word generation that may be sensitive to dysfunction in the dominant frontal lobe. In this version, the participant is asked to say as many words as possible that begin with the letter "F" in 60 seconds, and then as many words that begin with the letter "L" in 60 seconds.

SOURCE

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ADMINISTRATION

LETTER F

MATERIALS: 1-minute timer

[SAY]: **"I'm going to say a letter of the alphabet. When I ask you to start, tell me as many words as you can that begin with that letter. You will have 1 minute before I tell you to stop. None of the words can be numbers or names of people, or places.**

"For example, if I gave you the letter B, you could say brown, bottle or bake, but you wouldn't say Barbara, Boston or billion. Also, please try not to give me the same word with different endings, so if you said bake, you wouldn't also say baked or bakes, and if you said big, you wouldn't also say bigger and biggest.

"Let's begin. Tell me all the words you can, as quickly as you can, that begin with the letter 'F'. Ready? Begin."

Start timer after completing instructions. Write actual responses as legibly as possible. Stop the procedure at 60 seconds.

PROMPTS:

If the participant pauses for 15 seconds:

- **"Keep going."**
- **"What other words beginning with "F" can you think of?"**

If the participant gives three consecutive words that do not start with the designated letter (provide this prompt only once during this condition):

- **"We are now using the letter F."**

LETTER L

MATERIALS: 1-minute timer

[SAY]: **"Now I want you to do the same for another letter. The next letter is L. Ready? Begin."**

Start timer after completing instructions. Write actual responses as legibly as possible. Stop the procedure at 60 seconds.

PROMPTS:

If the participant pauses for 15 seconds:

- **"Keep going."**
- **"What other words beginning with "L" can you think of?"**

If the participant gives three consecutive words that do not start with the designated letter (provide this prompt only once during this condition):

- **"We are now using the letter L."**

GUIDELINES

Record all responses, including repeated words and rule violations. When a rule violation (e.g., proper nouns, words beginning with the wrong letter) occurs on three consecutive responses, examiners should remind the participant of the correct rule. Each rule can be repeated only once per trial.

SCORING

Correct responses

Any word that begins with the specified letter, can be found in a dictionary, is not a proper noun or a number, and is not a repetition within that trial, should be scored as a correct response.

Although scoring of most responses is straightforward, many responses are ambiguous. For example, "frank" can refer to a man's name, a food item, or an adjective. The scoring principle with these sorts of responses is to give the benefit of the doubt and score the item as correct for the first instance of the response in a trial. In some instances, the context in which the response is given can provide clues as to the participant's meaning. For example, the sound "fôr" is ambiguous, and could be a preposition (for), golf term (fore), or number (four). If the word is given along with other numbers (e.g., "four, five"), the response can be interpreted as a number and be scored as a rule violation. If the response is at all ambiguous, however, apply the general principle of giving the benefit of the doubt. If a person self-corrects a rule violation or repetition during the trial, the response should not be counted as an error.

Other types of responses that should be scored as correct include:

- Contractions
- Compound words or conjoined words that convey a single meaning (e.g., ferris wheel)
- Slang words if they can be found in a dictionary
- Proper nouns that are not the names of people or places (e.g., days of the week, months of the year, brand names)

Repetitions

Any response that is repeated verbatim within the 60-second trial should be scored as a repetition.

If a repeated word has more than one meaning (e.g., "still" can be an adjective and a noun) or is a homophone (e.g., "flue" and "flew"), score the second response as a repetition error unless the participant explicitly or implicitly (e.g., with intonation or gesture) indicates that the second response has a different meaning or spelling, or if the context strongly suggests that it is a different word. For example, for the string of responses "felt, feeling, fresh, fabric, felt," the second occurrence of "felt" can be scored as correct since the context implies a different meaning than the first occurrence of "felt."

Grammatical variants should be scored as rule violations, not repetitions (see below).

Rule violations

Any response that reflects a deviation from the rules provided to the participant should be scored as a rule violation.

Several types of responses are potentially rule violations and include:

- Words beginning with letters other than the designated letter. This includes words that have the same initial sound but begin with a different letter (e.g., "phone" for F-words).
- Non–words
- Proper nouns that are names of people or places
- Numbers
- Grammatical variants of a previous response. These include words that are exactly the same as a previous response but with a different ending that represents a plural, altered tense, or other grammatical variant (e.g., present participle; comparatives). It is important to note that the examples in the instructions only explicitly prohibit plurals (e.g., bake, bakes), alteration in tense (bake, baking), and comparatives (big, bigger), and thus only these types of variants should be scored as rule violations.

Responses that are at all ambiguous should not be scored as rule violations. This particularly applies to responses that use the same root word as a previous response, but the addition is not a plural or change in tense. For example, give credit for "bakery," even if "bake" was a previous response.

Repeated rule violations count as repetitions, not rule violations.

On NACC UDS Form C2, Question 11a, enter the number of correct F-words generated in 1 minute. If the test was not completed, enter the appropriate reason code, 95 – 98, and leave Questions 11b and 11c blank. Enter scores for 11b and 11c, if applicable.

On NACC UDS Form C2, Question 11d, enter the number of correct L-words generated in 1 minute. If the test was not completed, enter the appropriate reason code, 95 – 98, and leave Questions 11e – 11i blank. Enter scores for 11e and 11f, if applicable. Enter corresponding total scores for 11g – 11i, if applicable.

Verbal Fluency: Phonemic Test

MATERIALS

1-Minute Timer

SAY: **"I'm going to say a letter of the alphabet. When I ask you to start, tell me as many words as you can that begin with that letter. You will have 1 minute before I tell you to sop. None of the words can be numbers, names of people, or places.**

"For example, if I gave you the letter B, you could say brown, bottle, or bake, but you wouldn't say Barbary, Boston, or billion. Also, please try not to give me the same word with different endings. So if you said bake, you wouldn't also say baked or bakes. And if you said big, you wouldn't also say bigger or biggest.

"Let's begin. Tell me all the words you can, as quickly as you can, that begin with the letter F. Ready? Begin."

ADMINISTRATION

Start timer after completing instructions. Write actual responses as legibly as possible. Stop the procedure at 60 seconds.

PROMPTS

1. If the participant pauses for 15 seconds:
   - **"Keep going."**
   - **"What other words beginning with F can you think of?"**
2. If the participant gives three consecutive words that do not start with the designated letter (*provide this prompt only once during this condition*):
   - **"We are now using the letter F."**

Record **F** responses:

1.	11.	21.	31.
2.	12.	22.	32.
3.	13.	23.	33.
4.	14.	24.	34.
5.	15.	25.	35.
6.	16.	26.	36.
7.	17.	27.	37.
8.	18.	28.	38.
9.	19.	29.	39.
10.	20.	30.	40.

SCORING Number of correct **F-words** generated in 1 minute (0–40) ____ ____

Number of **F-words** repeated in 1 minute (0–15) ____ ____

Number of **non-F-words** and rule violation errors in 1 minute (0–15) ____ ____

SAY: "**Now I want you to do the same for another letter. The next letter is L. Ready? Begin."**

Start timer after completing instructions. Write actual responses as legibly as possible. Stop the procedure at 60 seconds.

PROMPTS

1. If the participant pauses for 15 seconds:
   - **"Keep going."**
   - **"What other words beginning with L can you think of?"**
2. If the participant gives three consecutive words that do not start with the designated letter (*provide this prompt only once during this condition*):
   - **"We are now using the letter L."**

Record **L** responses:

1.	11.	21.	31.
2.	12.	22.	32.
3.	13.	23.	33.
4.	14.	24.	34.
5.	15.	25.	35.
6.	16.	26.	36.
7.	17.	27.	37.
8.	18.	28.	38.
9.	19.	29.	39.
10.	20.	30.	40.

SCORING

Number of correct **L-words** generated in 1 minute (0–40) ____ ____

Number of **L-words** repeated in 1 minute (0–15) ____ ____

Number of **non-L-words** and rule violation errors in 1 minute (0–15) ____ ____

TOTAL number of correct **F-words and L-words** (0–80) ____ ____

TOTAL number of **F-word and L-word** repetition errors (0–30) ____ ____

TOTAL number of **non-F/L words** and rule violation errors (0–30) ____ ____

Rey AVLT – Immediate

DESCRIPTION

The RAVLT assesses immediate memory span, new learning, susceptibility to interference, and recognition memory. A list of 15 words (List A) is read aloud for five consecutive trials and each trial is followed by a free-recall test. After the fifth trial, an interference list of 15 different words (List B) is presented, followed by a free-recall test of that list. The words of List A (Trials 1-5) and List B are presented at the rate of one word for per second. Immediately afterward, delayed free-recall of List A is tested (Trial 6). After a 20- to 30-minute delay, another free-recall and recognition trial is administered.

SOURCE

Schmidt, M. (1996). Rey Auditory Verbal Learning Test: A handbook. Los Angeles, CA: Western Psychological Services.

For normative data, please see:

Strauss, E., Sherman, E. M. S., & Spreen, O. (2006). A compendium of neuropsychological tests: Administration, norms, and commentary (3rd ed.). Oxford University Press.

Mayo Normative Studies: Regression-Based Normative Data for the Auditory Verbal Learning Test for Ages 30-91 Years and the Importance of Adjusting for Sex

Nikki H. Stricker et al., Journal of the International Neuropsychological Society (2021), 27, 211-226.

ADMINISTRATION

- For immediate recall, read the words at the rate of 1 word per second.
- If using an aural recognition word list, and if the participant asks for clarification of the word (e.g., "curtain" vs. "person"), a description of the word may help ("Curtain, like what hangs and covers a window"). If using the recommended single-page written recognition list to test word recognition, this won't be necessary.
- For the purposes of this task, "intrusion" refers to an extraneous word offered by the participant that does not appear on the list.

LIST A,TRIAL 1

SAY: **"I am going to read a list of words. Listen carefully, for when I stop, you are to say back as many as you can remember. It doesn't matter in what order you repeat them. Just try to remember as many as you can."** Read List A, at a rate of 1 word per second, then record responses. Note the order of recall for correct responses (i.e., 1, 2, 3, ...); do not record repetitions or intrusions in the order of recall. Use another mark to note repetitions (e.g., "R" or a symbol", and track intrusions in the box at the foot of the table.

LIST A,TRIAL 2–5

SAY: "**I am going to read the same list again, and once again when I stop, I want you to tell me as many of the words as you can remember, including words you have said before. It doesn't matter in what order you say them, just say as many words as you can remember, whether or not you said them before."** Repeat **"Now I am going to read the same list again…"** for Trials 2 through 5 with List A.

LIST B

SAY: **"Now I am going to read a second list of words. This time, again you are to say back as many words of this second list as you can remember. Again, the order in which you say the words does not matter. Just try to remember as many as you can."** Read List B at the rate of 1 word per second, record responses. Note the order of recall for correct responses; do not record order of recall for repetitions or intrusions.

TRIAL 6

SAY: **"Now tell me all the words you remember from the first list."** Record responses. Note the order of recall for correct responses; do not record order of recall for repetitions or intrusions.

SCORING

Give one point for each word correctly recalled. For each trial, the total number of words correctly recalled and total number of intrusions should be entered on NACC UDS Form C2, questions 12a-12n.

Rey Auditory Verbal Learning Test – Immediate

INSTRUCTIONS:	
List A, Trial 1	**"I am going to read a list of words. Listen carefully, for when I stop, you are to say back as many as you can remember. It doesn't matter in what order you repeat them. Just try to remember as many as you can."** *Read List A, at a rate of 1 word every second, then record responses. Note the order of recall for correct responses (i.e., 1, 2, 3, ...); do not record repetitions or intrusions in the order of recall. Use another mark to note repetitions (e.g., "R" or a symbol", and track intrusions in the box at the foot of the table.*
List A, Trials 2-5	**"I am going to read the same list again, and once again when I stop, I want you to tell me as many of the words as you can remember, including words you have said before. It doesn't matter in what order you say them, just say as many words as you can remember, whether or not you said them before."** *Repeat,* **"Now I am going to read the same list again..."** *for Trials 2 through 5 with List A.*
List B	**"Now I am going to read a second list of words. This time, again you are to say back as many words of this second list as you can remember. Again, the order in which you say the words does not matter. Just try to remember as many as you can."** *Read List B at the rate of 1 word every second, record responses. Note the order of recall for correct responses; do not record order of recall for repetitions or intrusions.*
Trial 6	**"Now tell me all the words you remember from the first list."** *Record responses. Note the order of recall for correct responses; do not record order of recall for repetitions or intrusions.*

List A	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	List B	List B Recall	Trial 6 (List A)	Do Not Repeat
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						NAIL			TURKEY
COLOR						PENCIL			COLOR
HOUSE						CHURCH			HOUSE
RIVER						FISH			RIVER
TOTAL RECALL						TOTAL RECALL			
INTRUSIONS						INTRUSIONS			

Record the time after recall of Trial 6 (delay begins): ___ ___ : ___ ___ ☐ AM ☐ PM

Administer Delayed Recall 20–30 minutes later.
Do not cue for the delayed recall.

Rey AVLT: Delayed Recall and Recognition

DESCRIPTION

The RAVLT Delayed Recall and Recognition trials assess delayed and recognition memory. List A is asked to be freely recalled again. After the delayed free-recall trial is complete, a recognition page is read, and participants are asked to say "Yes" when they recognize words from the first list (List A).

SOURCE

Schmidt, M. (1996). Rey Auditory Verbal Learning Test: A handbook. Los Angeles, CA: Western Psychological Services.

For normative data, please see:

Strauss, E., Sherman, E. M. S., & Spreen, O. (2006). A compendium of neuropsychological tests: Administration, norms, and commentary (3rd ed.). Oxford University Press.

Mayo Normative Studies: Regression-Based Normative Data for the Auditory Verbal Learning Test for Ages 30-91 Years and the Importance of Adjusting for Sex

Nikki H. Stricker et al., Journal of the International Neuropsychological Society (2021), 27, 211-226.

ADMINISTRATION

Administer this test 20 to 30 minutes after the Rey Auditory Verbal Learning Test – Immediate, making note of the time the delayed recall began. **Fill the delay with additional tests or tasks that do not involve verbal encoding.**

For delayed recall, read the words at the rate of 1 word per second.

After the 20 to 30 minute delay, SAY: "**A short while ago, I read a list of words to you several times, and you were trying to learn these words. Tell me the words from this list again."** Record responses.

Note the order of recall for correct responses (i.e., 1, 2, 3, ...); do not record repetitions or intrusions in the order of recall. Repetitions can be noted by another mark (e.g., "R" or a symbol) and intrusions in the box provided at the foot of the table.

For the recognition word list, you may either read the list on the first page to the participant and have them respond "yes" or "no" to each word, or show them the list on the second page and have them circle words from the list. Enter the method of recognition test administration on NACC UDS Form C2, question 13d.

If reading the list aloud, and the participant asks for clarification of the word (e.g., "curtain" vs "person"), a description of the word may help ("Curtain, like what hangs and covers a window").

SCORING

For delayed recall, give one point for each word correctly recalled. Enter the total number of words correctly recalled and total number of intrusions should be entered on Form C2, questions 13a-13b.

For recognition, sum the total correctly recognized as part of the list and the total incorrectly recognized as part of the list (false positives); enter these on Form C2, questions 13e-13f.

Rey Auditory Verbal Learning Test — Delayed Recall and Recognition

INSTRUCTIONS:

Administer this test 20 to 30 minutes after the Rey Auditory Verbal Learning Test – Immediate, making note of the time the delayed recall began. **Fill the delay with additional tests or tasks that do not involve verbal encoding.** After the 20 to 30 minute delay, say: "**A short while ago, I read a list of words to you several times, and you were trying to learn these words. Tell me the words from this list again."** *Record responses. Note the order of recall for correct responses (i.e. 1, 2, 3,...); do not record repetitions or intrusions in the order of recall. Use another mark to note repetitions (e.g., "R" or a symbol), and track intrusions in the box at the foot of the table.*

Record the time when delayed recall was initiated (delay ends): ___ ___ : ___ ___ ☐ AM ☐ PM

List A *(Do Not Repeat)*	Delayed Recall
DRUM	
CURTAIN	
BELL	
COFFEE	
SCHOOL	
PARENT	
MOON	
GARDEN	
HAT	
FARMER	
NOSE	
TURKEY	
COLOR	
HOUSE	
RIVER	
TOTAL RECALL	
INTRUSIONS	

RAVLT Recognition

Administration format:

☐ Shown list with 30 words (circle targets) **(PRESENT NEXT PAGE TO PARTICIPANT)**

☐ Read aloud word-by-word (forced choice) **(USE THIS PAGE)**

INSTRUCTIONS FOR READING ALOUD:

Do not show this page directly to the participant.

SAY: **"I'm going to read to you a list that contains the words from the first list, the one I read several times. If the word was on the first list, say 'yes,' and if it was not on the first list, then say 'no.'"**

INSTRUCTIONS FOR SHOWING LIST:

Do not show this page directly to the participant.

Place list ***on next page*** in front of participant.

SAY: **"Please circle the words that were from the first list, the one I read several times."**

TEACHER	☐ Yes	☐ No	COFFEE	☐ Yes	☐ No
RIVER	☐ Yes	☐ No	ROAD	☐ Yes	☐ No
BRIDGE	☐ Yes	☐ No	HAT	☐ Yes	☐ No
FARMER	☐ Yes	☐ No	TURKEY	☐ Yes	☐ No
PEN	☐ Yes	☐ No	MINUTE	☐ Yes	☐ No
FOREHEAD	☐ Yes	☐ No	NOSE	☐ Yes	☐ No
KERCHIEF	☐ Yes	☐ No	SCHOOL	☐ Yes	☐ No
HOUSE	☐ Yes	☐ No	BELL	☐ Yes	☐ No
MOON	☐ Yes	☐ No	FACE	☐ Yes	☐ No
COLOR	☐ Yes	☐ No	GARDEN	☐ Yes	☐ No
BEET	☐ Yes	☐ No	CLASSROOM	☐ Yes	☐ No
CURTAIN	☐ Yes	☐ No	PARENT	☐ Yes	☐ No
FLOOR	☐ Yes	☐ No	CHILDREN	☐ Yes	☐ No
SOLDIER	☐ Yes	☐ No	BROOMSTICK	☐ Yes	☐ No
DRUM	☐ Yes	☐ No	NAIL	☐ Yes	☐ No

TOTAL CORRECT: _____

TOTAL FALSE POSITIVES: _____

RAVLT Recognition

Teacher	Coffee
River	Road
Bridge	Hat
Farmer	Turkey
Pen	Minute
Forehead	Nose
Kerchief	School
House	Bell
Moon	Face
Color	Garden
Beet	Classroom
Curtain	Parent
Floor	Children
Soldier	Broomstick
Drum	Nail

Cues for Rey AVLT Recognition

INSTRUCTIONS:

The participant may ask you to clarify the word on the recognition list, due to hearing challenges over the phone or video. If so, you may use the descriptions below to explain each word. Do not use these descriptions on the learning trials, or immediate and delayed recall.

TEACHER	A person who teaches, especially in a school
RIVER	A large natural stream of water flowing to a sea or lake
BRIDGE	A structure over a river or road
FARMER	A person who owns or manages a farm, raising animals or growing crops
PEN	A writing instrument
FOREHEAD	The part of the face above the eyebrows
KERCHIEF	A piece of fabric used to cover the head
HOUSE	The building people live in
MOON	In the sky at night
COLOR	Like the color blue or red
BEET	The plant that grows in the ground
CURTAIN	A piece of material that covers windows
FLOOR	What you walk on in a room
SOLDIER	A person who serves in an army
DRUM	An instrument
COFFEE	A hot drink made in the morning
ROAD	What cars drive on
HAT	What someone wears on their head
TURKEY	The bird
MINUTE	As in, 60 seconds
NOSE	The part of the face between the eyes
SCHOOL	Where children go to learn
BELL	An instrument that rings
FACE	The part of your head where your eyes and nose are
GARDEN	Where to grow vegetables, herbs, and flowers
CLASSROOM	A room in a school
PARENT	A mother or father
CHILDREN	Kids or a child
BROOMSTICK	What is used to sweep the floor
NAIL	A small piece of metal for holding wood together

CERAD – Immediate

DESCRIPTION

The CERAD Word List Memory, Word List Recall, and Word List Recognition tests assess learning, delayed recall and recognition memory. Three trials of 10 words given in different orders are administered with immediate recall after each trial. After 5 minutes, the delayed free-recall trial is administered. Directly following the delayed recall trial, a recognition test is given where 20 words are shown one at a time (or read to the participant if unable to read), and participants are asked to say "Yes" when they recognize a word from the list and "No" to words that were not on the learned list.

SOURCE

CERAD, Center for the Study of Aging and Human Development, Box 3003, Duke University Medical Center, Durham, NC 27710, USA

Gerda G. Fillenbaum, PhD
Gerda.Fillenbaum@duke.edu

ADMINISTRATION

J4 WORD LIST MEMORY TASK

To assess participants' ability to remember newly learned information, we administer this free recall task, using 10 common nouns. To ensure that participants are familiar with and attend to each word, they are asked to read the words printed on separate cards in the CERAD "flip" book. The ten words on the flip cards are presented at a constant rate of 1 word every second, and then the participant is immediately asked to recall as many as possible. There are three trials, each of which presents the words in a different order.

The instructions for the first trial are:

SAY**: "I am going to show you 10 printed words. Read each word out loud as I show it to you. Later I will ask you to recall all 10 words."**

Show the words in the first set at the rate of one word every second. If the participant cannot read the word, say it for them and check the "can't read" column for that word. After the last word has been read, ask the participant to recall as many words as they can. Note the order of recall for correct responses (i.e., 1, 2, 3,...); do not record repetitions or intrusions in the order of recall. Allow a maximum of 90 seconds.

Continue with the second and third sets of words in the same way, changing your instructions slightly to encourage the participant.

(Exposure time: 1 word every second; Recall time: 90 seconds per trial maximum)

SCORING

J4 WORD LIST MEMORY TASK

The participant's score for each trial is the number of words correctly recalled. Be sure also to record on each trial the number of words that the participant "recalls" that are not on the list (intrusions).

CERAD Neuropsychological Assessment Battery — Word List Tasks

INSTRUCTIONS:

J4 Word List Memory Task

To assess participants' ability to remember newly learned information, we administer this free recall task, using 10 common nouns. To ensure that participants are familiar with and attend to each word, they are asked to read the words printed on separate cards in the CERAD "flip" book. The ten words on the flip cards are presented at a constant rate of 1 word every second, and then the participant is immediately asked to recall as many as possible. There are three trials, each of which presents the words in a different order.

The instructions for the first trial are:

SAY: "I am going to show you 10 printed words. Read each word out loud as I show it to you. Later I will ask you to recall all 10 words."

Show the words in the first set at the rate of one word every second. If the participant cannot read the word, say it for them and check the "can't read" column for that word. After the last word has been read, ask the participant to recall as many words as they can. Note the order of recall for correct responses (i.e., 1, 2, 3,...); do not record repetitions or intrusions in the order of recall. Allow a maximum of 90 seconds.

Continue with the second and third sets of words in the same way, changing your instructions slightly to encourage the participant. The participant's score for each trial is the number of words correctly recalled. Be sure also to record on each trial the number of words that the participant "recalls" that are not on the list (intrusions).

(Exposure time: 1 word every second; Recall time: 90 seconds per trial maximum)

CHECK EACH WORD AS IT IS RECALLED								
Can't read	Trial 1		Can't read	Trial 2		Can't read	Trial 3	
☐	Butter	___	☐	Ticket	___	☐	Queen	___
☐	Arm	___	☐	Cabin	___	☐	Grass	___
☐	Shore	___	☐	Butter	___	☐	Arm	___
☐	Letter	___	☐	Shore	___	☐	Cabin	___
☐	Queen	___	☐	Engine	___	☐	Pole	___
☐	Cabin	___	☐	Arm	___	☐	Shore	___
☐	Pole	___	☐	Queen	___	☐	Butter	___
☐	Ticket	___	☐	Letter	___	☐	Engine	___
☐	Grass	___	☐	Pole	___	☐	Ticket	___
☐	Engine	___	☐	Grass	___	☐	Letter	___
Intrusions:			**Intrusions:**			**Intrusions:**		
_____			_____			_____		
_____			_____			_____		
_____			_____			_____		
_____			_____			_____		

Can't read Trial 1: ___ ___
Can't read Trial 2: ___ ___
Can't read Trial 3: ___ ___

Trial 1 Total: ___ ___
Trial 1 Intrusions: ___ ___

Trial 2 Total: ___ ___
Trial 2 Intrusions: ___ ___

Trial 3 Total: ___ ___
Trial 3 Intrusions: ___ ___

Record the time after recall of J4 Word List (delay begins): ___ ___ : ___ ___ ☐ AM ☐ PM

CERAD – Delayed

DESCRIPTION

The CERAD Word List Memory, Word List Recall, and Word List Recognition tests assess learning, delayed recall and recognition memory. Three trials of 10 words given in different orders are administered with immediate recall after each trial. After 5 minutes, the delayed free-recall trial is administered. Directly following the delayed recall trial, a recognition test is given where 20 words are shown one at a time (or read to the participant if unable to read), and participants are asked to say "Yes" when they recognize a word from the list and "No" to words that were not on the learned list. NACC was given permission to change "church" on the J7 - Word List Recognition task to "school" to avoid interference with the MoCA.

SOURCE

CERAD, Center for the Study of Aging and Human Development, Box 3003, Duke University Medical Center, Durham, NC 27710, USA

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ADMINISTRATION

J6 WORD LIST RECALL

This task is to determine how well participants can remember the words presented in form J4 **after 5 minutes. Fill the delay with additional tests or tasks that do not involve verbal encoding.** The instructions for this recall task are:

SAY**: "A few minutes ago I asked you to learn a list of ten words which you read one at a time from cards. Now I want you to try to recall as many of those 10 words as you can. OK, now tell me as many of those ten words as you can remember."**

Allow the participant a maximum of 90 seconds. Number each word in its corresponding block on the response sheet in the order it is recalled.

(Maximum time: 90 seconds)

J7 WORD LIST RECOGNITION

The instructions for this recognition test are:

SAY: **"Now I am going to show you a set of words printed on cards. Some of the words are from the list you saw earlier and some are words I haven't shown you before. I want you to say YES if the word I show you is from the list you saw earlier (show the first word). Is this one of the words you saw earlier?"**

Repeat the question or say, **"How about this one?"** for each word. Record the participant's response.

(Only YES or NO responses are acceptable.)

SCORING

J6 WORD LIST RECALL

Score the number of words correctly recalled. Also record and score the number of words not on the list (intrusions) that the participant reports.

J7 WORD LIST RECOGNITION

The scores for this test include the number of correctly recognized words previously seen (correct "Yes" responses) and the number of correctly rejected new words (correct "No" responses). Urge participants to give "yes" or "no" responses, since "don't knows" are unscorable.

CERAD Neuropsychological Assessment Battery — Word List Recall

INSTRUCTIONS:

J6 Word List Recall

This task is to determine how well participants can remember the words presented in form J4 **after 5 minutes. Fill the delay with additional tests or tasks that do not involve verbal encoding.** The instructions for this recall task are:

SAY: "A few minutes ago I asked you to learn a list of ten words which you read one at a time from cards. Now I want you to try to recall as many of those 10 words as you can. OK, now tell me as many of those ten words as you can remember."

Allow the participant a maximum of 90 seconds. Number each word in its corresponding block on the response sheet in the order it is recalled. Score the number of words correctly recalled. Also record and score the number of words not on the list (intrusions) that the participant reports.

(Maximum time: 90 seconds)

Record the time when delayed recall was initiated (delay ends): ___ ___ : ___ ___ ☐ AM ☐ PM

CHECK EACH WORD AS IT IS RECALLED	
Butter	☐
Arm	☐
Shore	☐
Letter	☐
Queen	☐
Cabin	☐
Pole	☐
Ticket	☐
Grass	☐
Engine	☐
Intrusions:	
_____	
_____	
_____	
_____	
_____	
_____	
_____	

Total recalled: ___ ___

Intrusions: ___ ___

CERAD Neuropsychological Assessment Battery — Word List Recognition

INSTRUCTIONS:

J7 Word List Recognition

The instructions for this recognition test are:

SAY: "Now I am going to show you a set of words printed on cards. Some of the words are from the list you saw earlier and some are words I haven't shown you before. I want you to say YES if the word I show you is from the list you saw earlier (show the first word). Is this one of the words you saw earlier?"

Note: If participant is not able to read the words shown during the J4 Word List Memory Task, the administrator should read the J7 word list rather than showing it to the participant.

Repeat the question or say, **"How about this one?"** for each word. Record the participant's response. The scores for this test include the number correctly recognized words previously seen (correct **"Yes"** responses) and the number of correctly rejected new words (correct **"No"** responses).

Urge participants to give "yes" or "no" responses, since "don't knows" are unscorable.

(Only YES or NO responses are acceptable.)

	CORRECT YES RESPONSE	CORRECT NO RESPONSE
School		1
Coffee		1
Butter*	1	
Dollar		1
Arm*	1	
Shore*	1	
Five		1
Letter*	1	
Hotel		1
Mountain		1
Queen*	1	
Cabin*	1	
Slipper		1
Pole*	1	
Village		1
String		1
Ticket*	1	
Troops		1
Grass*	1	
Engine*	1	

Total YES correct: ___ ___

Total NO correct: ___ ___

*Original word from Word List Memory Task

MINT

DESCRIPTION

The Multilingual Naming Test (MINT) is a test of visual object naming designed to contain items that have similar levels of usage and familiarity across four different languages: English, Spanish, Hebrew and Mandarin. Other naming tests designed for English speakers have items that either do not exist in another language or that occur in different frequencies in other languages, making the MINT appropriate for use in diverse populations. Line drawings are presented to the participant with the instruction to say the name of the object.

SOURCE

Tamar H. Gollan, PhD, Department of Psychiatry, University of California, San Diego

Ivanova I, Salmon DP, Gollan TH. The Multilingual Naming Test in Alzheimer's Disease: Clues to the Origin of Naming Impairments. J Int Neuropsychol Soc. 2013; 19:272-283.

Gollan TH, Weissburger G, Runnqvist E, Montoya RI, Cera CM. Self-ratings of spoken language dominance: A Multilingual Naming Test (MINT) and preliminary norms for young and aging Spanish–English bilinguals. Bilingualism: Language and Cognition. 2011;13:215-8.

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ADMINISTRATION

[SAY]: **"I am going to show you some pictures of objects, one at a time. Please tell me the name of each object, that is, tell me what it is called. If you cannot think of the name try to make your best guess. If you don't know what the object is, I will try to help you. Do you have any questions?"**

Allow up to 20 seconds for a response, particularly if the participant is struggling.

If the answer is correct, put a check mark in the column "Uncued-correct."

For items 30 and 31 (mortar, pestle), there is only one picture.

[SAY]: **"On this page there are two things I would like you to name."** Point to the mortar and say **"What is this called?"** and record the response. Then point to the pestle and say **"What is this called?"** and record the response. Be sure to ask for both items.

Continue until the participant **fails to name six consecutive items, either spontaneously or after receiving semantic cues.**

ALTERNATIVE RESPONSES

Item no.	MINT item	Alternative correct response(s)
3	lightbulb	electric bulb, bulb
10	seesaw	teeter-totter
27	gauge	manometer, barometer

See more detailed alternative response instructions on the next page.

CUEING

If the initial response is incorrect, there are several procedures to follow. Responses to cues are not timed, and if they do not occur immediately, the examiner should move on. When the participant indicates knowledge of the object but cannot name it, it is appropriate to give a phonemic cue (the first few sounds of the word). Knowledge of the word can be assumed if the participant makes a phonemic paraphasia, such as "ankle" for "anvil" (substituting a sound within the word, retaining most of its original sounds) or correctly describes the use of the object (e.g., "You use it to mash things up," for "pestle").

Please take care to provide only the sound of the letter(s) underlined on the response form. Only three-syllable words have the first two letters underlined. The examiner can practice cuing by starting to say each word and suddenly stopping after the first sound.

Sometimes a participant will give a response that indicates lack of visual recognition of the object, that is, misperception (e.g., focusing only on the flame at the top of the candle and saying "fire" or misperceiving the twigs in the nest and saying "hair"). In that instance, a semantic cue should be given since it helps lead the participant to more accurate visual perception of the object. If the response is correct with the semantic cue, it is marked correct in the appropriate column under "Semantic cue."If it is incorrect it is marked as wrong and the examiner should then move to the phonemic cue. Note, the semantic cue is only given if the participant does not visually recognize the object (i.e., gives a response that clearly indicates misperception, e.g., for the gauge, the participant says "clock"; for the butterfly the participant says "kite".)

ALTERNATIVE RESPONSES & CUEING PROMPTS

Item no.	MINT item	Alternative response(s)	Query/Answer
1	Butterfly	Moth	Can you think of another name?
		An Insect	Can you think of a more specific name?
2	Glove	Hand	Give Semantic Cue
		Mitten	Can you tell me a different name?
3	Lightbulb	Bulb	Mark as correct
		Electric Bulb	Mark as correct
4	Watch	Wristwatch	Mark as correct
		Clock	Can you think of another name?
5	Candle	Light	Can you think of a more specific name?
		Flame	What is the whole thing called?
		Fire	What is the whole thing called?
6	Clown	<<names a specific clown>>	Can you think of a more general name?
7	Kite	Diamond	Give Semantic Cue
		Hang-glider	Give Semantic Cue
8	Rainbow	Sky	What is this part called?
		Arch	Give Semantic Cue
9	Witch	Lady on a broom	Give Semantic Cue
		Sorceress	Can you think of another name?
		<<names a specific witch>>	Can you think of a more general name?
10	Seesaw	Teeter-Totter	Mark as correct
		They have them at playgrounds	Can you tell me the name?
11	Flashlight	Light	Can you think of a more specific name?
		Torch	Give Semantic Cue; unless word given is regional variant - then mark correct
12	Peacock	Feathers	What is the whole thing called?
		Turkey	Can you think of a different name?
		Bird	Can you think of a more specific name?
13	Snail	Slug	Can you think of another name?
		Shell	What is the whole thing called?
14	Whale	Dolphin	Can you think of a different name?
		<<names a specific whale>>	Can you think of a more general name?
		Big Fish	Can you think of a more specific name?
		Blowhole	What is the whole thing called?
15	Cage	Birdcage	Mark as correct
		Perch	What is the whole thing called?
		Bird House	Can you tell me a different name?
		Locker	Give Semantic Cue

ALTERNATIVE RESPONSES & CUEING PROMPTS

Item no.	MINT item	Alternative response(s)	Query/Answer
16	Nest	Birds Nest	Mark as correct
		Eggs	What is the whole thing called?
		Sticks	Give Semantic Cue
		Hair	Give Semantic Cue
17	Plug	Cord	What is this part called?
		Outlet/Socket	Give Semantic Cue
18	Wig	Hair	Give Semantic Cue
		Toupee	Can you tell me a different name?
20	Scarf	Yarn	Give Semantic Cue
		Pashmina	Can you think of a different name?
21	Well	Wishing Well	Mark as correct
		Bucket	What is the whole thing called?
22	Dustpan	Pail	Give Semantic Cue
		You sweep things into it	Can you tell me the name?
23	Parachute	Skydiver	What is this part called?
		Kite	Give Semantic Cue
		Hanglider	Give Semantic Cue
24	Blind	Curtain	Can you think of another name?
		Shade	Can you think of another name?
		Window	Give Semantic Cue
		Mini blinds, Veneitan blinds, <<other specific type of blind>>	Mark as correct
25	Hinge	Latch	Give Semantic Cue
26	Funnel	Cup	Give Semantic Cue
27	Gauge	Barometer	Mark as correct
		Scale	Give Semantic Cue
28	Porthole	Window	Can you think of a more specific name?
29	Anvil	Wiley Coyote uses it	Can you tell me the name?
30	Mortar	Bowl	Give Semantic Cue
31	Pestle	Grinder	Can you tell me a different name?
32	Axle	Barbells	Give Semantic Cue
		Wheels	What is this part called?

Multilingual Naming Test (MiNT)

INSTRUCTIONS AND CUEING:

SAY: **"I am going to show you some pictures of objects, one at a time. Please tell me the name of the object, that is, tell me what it is called. If you cannot think of the name try to make your best guess. If you don't know what the object is, I will try to help you. Do you have any questions?**

Stop testing after six consecutive failures.

				Uncued	Semantic cue		Phonemic cue	
Item #	English	Semantic cue	Spontaneous Response(s)	correct	correct	incorrect	correct	incorrect
1	Butterfly	an insect						
2	Glove	an article of clothing						
3	Lightbulb	used to see better and is turned on electrically						
4	Watch	used to tell the time						
5	Candle	is used in the dark to make light						
6	Clown	found in a circus						
7	Kite	a toy that uses the wind to make it fly						
8	Rainbow	it's colorful and is found in the sky after it rains						
9	Witch	a woman with magical powers						
10	Seesaw	found on a playground						
11	Flashlight	used to see better and is battery-operated						
12	Peacock	a bird						
13	Snail	an animal						
14	Whale	an ocean animal						
15	Cage	an enclosure for animals						
16	Nest	it's where birds lay their eggs						
17	Plug	found on electronic devices						
18	Wig	it's worn on the head						
19	Screw	it's like a nail but it grooves into wood or a wall						
20	Scarf	clothing worn on the neck						
21	Well	used to obtain water						
22	Dustpan	used to remove dust and trash						

				Uncued	Semantic cue		Phonemic cue	
Item #	English	Semantic cue	Spontaneous Response(s)	correct	correct	incorrect	correct	incorrect
23	Parachute	used to jump from airplane						
24	Blind	used to block out light						
25	Hinge	part of a door						
26	Funnel	used for pouring liquid from one container to another						
27	Gauge	used to measure air pressure						
28	Porthole	found on a ship						
29	Anvil	used for shaping metal						
30	Mortar	used to grind different substances						
31	Pestle	used to grind different substances						
32	Axle	a supporting shaft on which wheels revolve						

SCORING:

(1.0 point for each correct answer under Uncued or Semantic columns, 0.0 points for correct answer under Phonemic column)

a. Total correct without a cue ("Uncued" column): ___ ___

b. Total correct with a semantic cue given ("Semantic" column): ___ ___

c. **Total correct (sum of a + b, maximum of 32):** ___ ___