



Toronto Cognitive Assessment (TorCA)

Administration, Recording & Scoring Guide

Version 1.0

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INTRODUCTION

The Toronto Cognitive Assessment (TorCA) is a domain based cognitive assessment tool that with permission includes measures such as the Consortium to Establish a Registry for Alzheimer’s Disease (CERAD) Word List, Benson Figure, and Multi-Lingual Naming Test (MINT). The TorCA is intermediate between brief screening tests and lengthy neuropsychological testing. In addition, the TorCA is intended to determine the pattern and the severity of different cognitive deficits profiles, thus assisting the in diagnosis of a broad spectrum of cognitive disorders including mild cognitive impairment. The TorCA provides a reliable assessment of seven cognitive domains, including: Orientation, Immediate Verbal Recall, Delayed Verbal and Visual Recall, Delayed Verbal and Visual Recognition, Visuospatial Function, Working Memory/Attention/Executive Control, and Language.

The TorCA takes approximately 35 minutes to administer—depending on the individual’s degree of impairment—and can be administered by any trained healthcare professional or assistant. There is both a paper-based and an iPad version of the TorCA. This training guide is designed to highlight the techniques required to administer and score the TorCA for both the paper and iPad as many of the instructions and scoring for both are similar, unless otherwise indicated. This guide includes the following:

1. TorCA administration instructions
2. Scoring rules
2. Prompts that may be given during administration
3. Benson Figure Scoring Criteria (see page 42)
4. Clock Scoring Criteria (see page 54)
5. TorCA Normative Values (see page 56)

Please note: Deficits in any of the domains on the TorCA may reflect varying degrees of cognitive impairment. Interpreting results and providing diagnosis should be made by qualified healthcare professionals only.

TORONTO COGNITIVE ASSESSMENT (TorCA)

Required Materials

To administer the paper-based version TorCA, you will require the following materials:

1. The TorCA Record Form
2. The TorCA Response Booklet
3. The CERAD Word List and Language Test Booklet
4. A Clipboard
5. A Stopwatch
5. Several pens and pencils

General Considerations for Testing

- Keep the record form out of direct sight of the examinee.
- Do not provide specific feedback during testing. If the examinee asks about his or her performance, provide non-specific reassurances (i.e. “I’m happy that you are trying your best.”)
- Ensure that testing is completed in a quiet, well-lit room with the door closed. Do not administer the TorCA in the waiting room or other public spaces.
- During testing, only the administrator and examinee should be present in the room.
- The examinee should be seated in a comfortable, stationary chair. If in a wheelchair, the patient should have their chair brakes on.
- Sit at a table. Ensure the table surface is clean except for needed materials.
- Read all instructions verbatim. Instructions may be repeated except where explicitly disallowed.
- Record all responses verbatim. Do not use a check mark or “X” to indicate a correct or incorrect response. Rather, a 1 or 0 should be used to indicate correct and incorrect responses, respectively.
- Do not rush the assessment.

General Introduction to the Procedures

Depending on the individual’s level of impairment, the TorCA can take upwards of 35 minutes to administer. It is suggested that the examinee be made aware of this prior to testing in order to have sufficient time to use the washroom or tend to other business. If required, the examinee should bring their reading glasses and hearing aids for the test session.

Say to the examinee: **“Today we are going to do a variety of tasks. Some tasks will require you to use a pen and paper. You may find some of the tasks that we do today easy while others you may find difficult. You may also find that some tasks start off easy and get more difficult as we go along. They**

are designed this way. They are meant to be challenging but not impossible. All that I ask is that you try your best.

I will also mention that I am not able to provide you with any feedback on the accuracy of your answers. Some people may find this frustrating. Again, I just ask that you try your best.

Our session today will take approximately 35 minutes. Do you have any questions?”[†]

Answer the examinee’s questions and provide any clarification where required.

[†]Source. Instructions were adapted from the Ontario Neurodegenerative Disease Research Initiative (ONDRI) Neuropsychology Platform: Test Administration Manual with the authors' permission.

Shorthand Notations

Acceptable shorthand notations used on the TorCA are:

- Ⓡ **Repetition.** The administrator was required to repeat the instructions for any reason and/or the examinee repeated the same word on verbal measure (CERAD, Verbal Fluency, etc.)
- Ⓢ **Intrusion.** The examinee said a word that was not on the on the CERAD Word List or violates a rule given on the Verbal Fluency measures.
- ⓓⓀ **“Don’t Know”.** The examinee has stated that they do not know the answer.
- ⓃⓇ **No Response.** The examinee does not verbalize a response.
- Ⓢⓐ **Self-Correction.** The examinee has made a self-correct to an answer or response.
- Ⓠ **Query.** An explanation and/or elaboration of the examinee’s response was requested by the administrator. This is done by saying “*Tell me more about that.*”
- ⓐⓔ **Administrator Error.** The administrator has made an error during test administration.

Recording Personal Information

Occupation

Record the examinee’s current occupation. If the examinee is retired, ask for their most recent position prior to retiring.

Education (Paper-Based version)

Grades 1-12

- For grades 1-12, record the grade completed.

Community college

- Grade 12 *plus* the number of years to complete the diploma (e.g. a 2-year diploma = 14 years of education).

University

- Bachelor's Degree = 16 years
- Master's Degree = 18 years
- Doctorate (PhD, MD, DD, LLB) = 20 years
- If no degree is obtained, record the number of years of post-secondary schooling completed.

Multiple Advanced Degrees

- For multiple advanced degrees, credit the highest degree only. Do not give cumulative credit (e.g. if the examinee completed two Bachelor of Science degrees, only credit 16 years).

TorCA MEASURES

The following sections provide detailed information on test administration, scoring and general guidelines and/or rules to follow as an administrator.

Introduction

This section provides a brief overview of the test, its rationale, and any other relevant information.

Instructions

This section provides the administrator with what to say to the examinee. Instructions to be read to the examinee are commonly **bolded**.

All instructions should be read verbatim. The administrator may paraphrase the instructions only when the bolded instructions have first been read.

Scoring

This section provides general scoring criterion and guidelines.

General Rules

This section provides special considerations during testing, further prompting instructions, and more that to help ensure that test administration and scoring remains consistent and reliable.

Orientation

Overview:	Test's examinee's orientation to time, place and knowledge.
Domain:	Orientation
Required Materials:	Page 1 of the TorCA Record Form, Pen or Pencil

Introduction

The first measure on the TorCA is Orientation. For this domain, the examinee is asked questions related to the current time, date, their current location, as well as the name of the Premier and Prime Minister.

Instructions

Say to the examinee: **"Tell me, what is the ...?"** or **"Who is the ...?"** Record the answers verbatim.

Scoring

1 point is awarded for each correct response. 0 points are awarded for incorrect responses.

General Rules

1. If the TorCA is administered in a country where the designations *Premiere* and *Prime Minister* are not used, substitute for the appropriate terms. For example, in the USA, these items would be replaced by *Governor of the state* and *President of the United States*, respectively.
2. If the examinee's estimate for the season is based on current weather, say **"According to the calendar, what season is it?"**
3. If the examinee answers *"Hospital"* for the place, say, **"Yes, but what is the name of the hospital?"** If the assessment is being carried out in a physician's office and the examinee answers *"Doctor's office"* say, **"Yes, but whose office is this?"** or **"What is the name of the building?"** If the assessment is being carried out in the examinee's home, accept *"My home"* as the correct answer.

Serial Subtractions – 7s

Overview: Examinees subtract by 7s starting from 100
Domain: Working Memory/Attention/Executive Control
Required Materials: Page 2 of the TorCA Record Form, Pen or Pencil

Introduction

Serial subtractions are a measure of attention and concentration. This first test, serial 7s, requires the examinee to count backwards by 7s starting at 100.

Instructions

Say to the examinee: **“Begin at 100 and take away/subtract 7 and keep taking away 7 from the next number until I say stop.”**

Scoring

1. Record responses verbatim. This should be done regardless of whether the response is correct or incorrect.
2. Give 1 point for each correct subtraction as long as the difference between two successive subtractions is correct.
3. If an error is made and the next subtraction is correct then this next subtraction is scored as correct. Add the total number of correct points to get the total score.

General Rules

1. Do not correct the examinee if they miscalculate. If the examinee loses set (i.e. starts subtracting by a number other than 7), or states that they do not know what to do or does not know where they are in the sequence, then prompt by saying: **“Remember, count backwards by 7. The last number you said was [supply the examinee with the last response]”**.
2. In order to ensure that the examinee has lost set and not simply miscalculated, wait until there have been **two** successive responses using the incorrect number to be subtracted (e.g. 5 instead of 7) before prompting.

Serial Subtractions – 3s

Overview: Examinees subtract by 3s starting from 90
Domain: Working Memory/Attention/Executive Control
Required Materials: Page 2 of the TorCA Record Form, Pen or Pencil

Introduction

The second measure, Serial 3s, requires the examinee to count backwards by 3s starting at 90. Serials 3s is an easier task than Serial 7s. In individuals with more marked difficulties in attention and concentration who cannot perform Serial 7s without any errors—i.e. who perform at floor level—Serial 3s subtraction may not be at floor level and may thus provide a subtest that can be used to monitor cognitive deterioration.

Serial 3s should be administered even if the examinee completes Serial 7s without error.

Instructions

Say to the examinee: **“Begin at 90 and take away/subtract 3 and keep taking away 3 from the next number until I say stop.”**

Scoring

1. Record responses verbatim. This should be done regardless of whether the response is correct or incorrect.
2. Give 1 point for each correct subtraction, as long as the difference between two successive subtractions is correct.
3. If an error is made and the next subtraction is correct then this next subtraction is scored as correct. Add the total number of correct points to get the total score.

General Rules

1. Do not correct the examinee if he or she miscalculates. If the examinee loses set (i.e. starts subtracting by a number other than 3), or states that he or she does not know what to do or does not know where he or she was in the sequence, then prompt by saying: **“Remember, count backwards by 3. The last number you said was [supply the examinee with the last response]”**.
2. In order to ensure that the examinee has lost set and not simply miscalculated, wait until there have been **two** successive responses using the incorrect number to be subtracted (e.g. 5 instead of 3) before prompting.

Verbal Learning - CERAD

Overview:	Verbal learning and memory task
Domain:	Memory - Immediate Recall
Required Materials:	Page 3 of the TorCA Record Form, CERAD Word List Memory Task Booklet, Pen or Pencil

Introduction

The CERAD (Consortium to Establish a Registry for Alzheimer’s Disease) Word List assesses verbal learning and verbal memory. The specific aspects include immediate memory, learning, susceptibility to interference, delayed recall, and recognition memory. The examinee is presented with words one at a time from the CERAD stimulus book and is required to read each word aloud as quickly as possible. There are 3 trials administered during this measure, with each trial containing the same list of 10 word but presented in a different order.

Instructions

Trial 1

Place the CERAD Word List Memory Task Booklet in front of the examinee, open to the page titled Trial 1, and read the instructions.

Say to the examinee: **“I am going to show you a list of words. I would like you to read each word out loud. Afterwards, I would like you to repeat back as many words as you can remember. It does not matter in what order you repeat them. Just try to remember as many as you can.”**

Turn the page to the next word as soon as the examinee has read each word, encouraging him or her to read the words as quickly as possible.

Record all of the examinee’s responses verbatim and in the order recalled in the table in the Record Form.

Prompt **“Anything else?”** at the end of each recall trial.

Trials 2 & 3

Say to the examinee: **“Now I am going to show you the same words to read, but in a different order. Again, when you finish reading the words, you will be asked to recall as many words as you can, including words you said the first time. It does not matter in what order you repeat them. Just try to remember as many as you can.”**

Record all responses verbatim.

Prompt **“Anything else?”** at the end of each recall trial.

Scoring

Each word correctly recalled gets one point. Add up the total score for each trial out of 10, and overall for all 3 trials out of 30. There is no penalty for intrusions or repetitions, but these should be recorded.

General Rules

1. Record responses verbatim and in the order given.
 - a. Do *not* use numbers to indicate the order given.
 - b. Do *not* use check marks to indicate a correct response.
2. Words provided by the examinee that are not on the list are called Intrusions. Words that are repeated are called Repetitions. Record the number of Intrusions and Repetitions in the table.
3. Score the plural variant as correct.
 - a. For example, “letters” for “letter” would be awarded a point as being *correct*.
 - b. Any other variant, such as “motor” for “engine” is *incorrect*.
4. No feedback should be given regarding the number of correct responses, repetitions or errors. For example, if the examinee asks “*Did I already say engine?*”, respond by saying “**Do you think you said engine?**”

Benson Figure Copy

Overview:	Examinees draw a geometric figure
Domain:	Visuospatial
Required Materials:	Page 4 of the TorCA Record Form, Page 1 of the TorCA Response Booklet, Pen or Pencil

Introduction

The Benson Figure Copy is a measure of visuospatial ability. The examinee will be asked to recall the figure 10-minutes later (as part of a delayed recall) that comprises a test of visual memory. The examinee is asked to copy the figure as accurately as possible.

Instructions

Say to the examinee: **“Please copy this design [point to design] as best you can down here [point to the bottom half of the page].”**

Have the examinee copy the figure in the lower half of the page.

When completed, the examiner leaves the figure in front of the examinee for 5 seconds while saying: **“Be sure to remember this design, because I’ll ask you to draw it again later from memory.”**

Scoring

Each detail of the drawing is evaluated for accuracy and location. One point is given if the reproduction is correct with regard to accuracy but incorrectly placed or is incorrect but is recognizable as the target and correctly placed.

If a feature of the drawing is incorrect (either not present or present but not recognizable), 0 points are given. The maximum score for this measure is 17.

Provide a bonus point if the copy is unusually well-proportioned and accurate.

Please refer to Benson Scoring Criteria on page 45 for detailed scoring instructions.

General Rules

1. In general, score leniently for borderline responses. If a response is borderline for accuracy and borderline for placement, give 1 point. Self-corrected responses are acceptable. For detailed scoring criteria for the Benson Figure, please refer to Appendix A.
2. The examiner should not allow the paper to be rotated and should not allow erasures.
3. The examiner should note the time the copy was completed to ensure a 10-minute interval for recall
4. When the examinee stops drawing, the examiner should ask **“Are you finished?”**

Digit Span - Forward

Overview: Examinees repeat a sequence of numbers
Domain: Working Memory/Attention/Executive Control
Required Materials: Page 5 of the TorCA Record Form, Pen or Pencil

Introduction

Digit Span Forward is a measure of working memory. Examinees will be presented with a set of numbers and will be asked to repeat them out loud and in the same order as they were presented.

Instructions

Say to the examinee: **“I am going to say some numbers. Listen carefully, and when I am through, I want you to say them right after me and in the same order that I said them.”**

Scoring

Although correct responses on each trial get a score of 1 and incorrect responses get a score of 0, the total score is equal to the longest forward span length recalled correctly before discontinuation.

The total score recorded for the TorCA is not total trial score. Rather, the total score is the maximum number of digits that the examinee repeats without errors and represents one point more than the trial number (e.g. Trial 1 is comprised of a digit span of 2).

General Rules

1. Read the numbers at a rate of between 1 - 1½ seconds per digit.
2. Be careful to not ‘clump’ or group the numbers together when reading. Keep your voice prosody flat and do not vary your rhythm. Inflect your voice downwards after reading the last digit to indicate the end but do not prompt for recall. Record all responses verbatim.
3. Articulate each number carefully and loudly. If the examinee does not hear a number, it cannot be repeated.
4. Record responses verbatim and in the order given.
5. If the examinee responds correctly on the first trial of any span length, move immediately to the next higher span length. Administer the second trial of span length only if response to first trial is incorrect. Discontinue when both trials of a span length are failed.
6. Do not say anything to indicate when to begin recall.

Digit Span - Backward

Overview:	Examinees repeat a sequence of numbers in the reverse order
Domain:	Working Memory/Attention/Executive Control
Required Materials:	Page 6 of the TorCA Record Form, Pen or Pencil

Introduction

Digit Span Backward is a measure of working memory. Examinees will be presented with a set of numbers and will be asked to repeat them out loud in the reverse order as they were presented.

Instructions

Say to the examinee: **“I am going to say some more numbers, but this time, when I stop, I want you to say the numbers backward – in the reverse order. For example, if I say 1-5, then you would say 5-1. Let’s try another one. If I say 2-5, then you would say...”**.

- If the response is incorrect, then say: **“Let’s try that one again”** and repeat the digits.
- If the examinee cannot establish the set for the example, discontinue the test.
- If the examinee can establish set, then say: **“Let’s start”** and proceed to present the digits.

Scoring

Although correct responses on each trial get a score of 1 and incorrect responses get a score of 0, the total score is equal to the longest forward span length recalled correctly before discontinuation.

The total score recorded for the TorCA is not total trial score which will be one point less than the digit span score because trial 1 is comprised of a backwards digit span of 2.

General Rules

1. Read the digits at a rate of approximately 1 - 1½ seconds per digit.
2. Be careful to not ‘clump’ or group the numbers together when reading. Keep your voice prosody flat and do not vary your rhythm. Inflect your voice downwards after reading the last digit to indicate the end but do not prompt for recall. Record all responses verbatim.
3. Articulate each number carefully. If the examinee does not hear a number, it cannot be repeated.
4. Record responses verbatim and in the order given.
5. If the examinee responds correctly on the first trial of any span length, move immediately to the next higher span length. Administer the second trial of span length only if response to first trial is incorrect. Discontinue when both trials of a span length are failed.
6. Do not say anything to indicate when to begin recall.
7. Do not provide feedback for errors during the test (e.g. if the examinee starts to repeat digits in the forward order).

Clock Drawing

Overview:	Examinee draws a clock at a specified time
Domain:	Visuospatial
Required Materials:	Page 4 of the TorCA Record Form, Page 2 of the TorCA Response Booklet, Pen or Pencil

Introduction

The clock drawing test is a measure of multiple functions which include visuospatial ability, planning, monitoring, and language comprehension. This test requires the examinee to draw the face of a clock and set the hands at 10 after 11.

Although clock drawing is classified under the visuospatial domain on the TorCA, errors on clock drawing may reflect deficits in other domains. Thus, in addition to simply scoring the clock you should assess the drawing to determine the types of errors that may have been made and whether the errors reflect difficulties in visuospatial function or difficulties in other domains.

For example, if the examinee sets the minute hand at the ten rather than at the two this suggests a deficit in abstraction (i.e., examinee cannot recode the 10 to a 2) and is suggestive of frontal system dysfunction rather than visuospatial function.

As another example, if the examinee draws all of the numbers from 1-12 in a closely crowded fashion without spacing them properly around the contour of the clock, this suggests poor planning and is also suggestive of frontal system dysfunction.

Instructions

Place page 2 of the TorCA response booklet in front of the examinee and read the instructions aloud.

Say to the examinee: **“Draw the face of a clock, put in the numbers and set the hands at 10 after 11.”**

Scoring

Scoring is based on the clock’s contour, numbers, hands and center, separately, and with a total score based on the sum of the separate scores.

Please refer to Appendix B on page 58 for detailed scoring instructions.

Contour

One point is given for a closed contour or within 1/8 of an inch (3mm), not too small to contain all the numbers. One point is given for a circular contour with the ratio of shortest to longest diameter being no greater than 1 to 1.5.

Numbers

One point is given for each of the following being present:

- Numbers 1-12 are all present without any additional numbers
- Numbers are either all Arabic or all Roman and not a combination
- Numbers are in the correct order
- The paper is not rotated
- The numbers are in the approximate correct position
- All numbers are within the contour

Hands

One point is given for each of the following being present:

- Two and only two hands are present
 - Note: Three hands can be present if the examinee indicates that it is a second hand)
- The hour target number (i.e. 11) is indicated in some manner
- The minute target number (i.e. 2) is indicated in some manner
- The hands are in the correct proportion
- There are no superfluous markings on the face
- The hands overlap within 1/16 of an inch

NOTE: For a point to be given for the hour or minute target number to be indicated it is not adequate for there to simply be an hour or minute number indicated on the clock. Instead the numbers indicated must be the correct target numbers (i.e. 11 and 2).

Centre

One point is given for the centre being drawn or inferred.

General Rules

1. The paper should be placed in portrait orientation.
2. Do not allow erasures but mistakes can be crossed out.
3. If the examinee wishes to re-draw the clock (e.g. too many errors were made and the clock is not legible), write "First Attempt" next to the examinee's first attempt at drawing the clock and "Second Attempt" next to the examinee's second attempt once the drawing is complete.

Trail Making Test (TMT) – Part A

Overview:	Examinee connects encircled numbers in a sequenced order
Domain:	Working Memory/Attention/Executive Control
Required Materials:	Pages 8 & 9 of the TorCA Record Form, Pages 3 & 4 of the TorCA Response Booklet, Pen or Pencil, Stopwatch

Introduction

The Trail Making Test is a measure of attention, cognitive flexibility and speed. The first test, known as Trail Making Test Part A, requires the examinee to connect the 25 encircled numbers in ascending order.

Instructions

Sample A (page 3 of the TorCA Response Book)

Place the Sample A page in front of the examinee. The sample sheet allows the examinee to become familiar with the test that they are about to complete.

Say to the examinee: **“See this page. Notice that there are numbers inside each circle. I'd like you start with the number 1 and draw a line to 2, from 2 to 3, [as you give the instruction, trace the path with your pen but do not mark the trail] and so on in order until you reach the end [point to the number 8] . Remember, the rule here is to go from number, to number in order. Try to go as quickly as you can without making a mistake and try not to lift your pencil [pen] from the paper. When I say GO you may begin. Place your pencil [pen] on number 1, ready GO.”**

If the examinee is able to complete the sample, even with corrections, continue to the Trails task.

If the examinee makes an error on Sample A:

- Immediately point out the error and mark an “X” across the incorrect line, and have them go back to the last previous correct response and resume.
- Remind the examinee of the instructions if they appear to have forgotten them or do not grasp the instructions.

Test Page (page 4 of the TorCA Response Book)

Once the examinee successfully completes the practice sample, they will move on to the actual test. Place the test in front of the examinee.

Say to the examinee: **“Good! On this page, there are more numbers to be joined. Again, start with 1, and draw your line 2, from 2 to 3, and so on, in order, until you reach the end [point to the number 25]. Remember to go from number to number in order. Go as quickly as you can without making a mistake and try not to lift your pencil [pen] from the paper. Place your pencil [pen] on number 1, ready GO.”**

Scoring

Each number that is connected correctly is scored. Add the total number of correct points and subtract any errors. Record the time even though this is not scored.

General Rules

1. Feedback is given to the examinee during the sample portion of the test only. Once the test begins, no feedback about performance should be given. Common examples of comments made by the examinee include *“That number is not on the page.”* Again, no feedback is to be provided during the test.
2. If an error is made during the test, mark an “X” over in incorrect line and say **“That one is not correct. Please start here and continue** [point to the last correct circle].” The examiner should point to the last previous correct response but should not explain the error.
3. Discontinue after 90 seconds (1½ minutes).

Trail Making Test (TMT) – Part B

Overview:	Examinee connects encircled numbers and letters in a sequenced order
Domain:	Working Memory/Attention/Executive Control
Required Materials:	Pages 10 & 11 of the TorCA Record Form, Pages 5 & 6 of the TorCA Response Booklet, Pen or Pencil, Stopwatch

Introduction

The second test, known as Trail Making Test Part B, requires the examinee to connect the 25 encircled numbers and letters in ascending order while alternating from number to letter to number.

Instructions

Sample B (page 5 of the TorCA Response Book)

Place the Sample B page in front of the examinee. The sample sheet allows the examinee to become familiar with the test that they are about to complete.

Say to the examinee: **“See this page. Notice that there are numbers and letters inside each circle. I'd like you start with the number 1 and draw a line from 1 to A, from A to 2, from 2 to B, from B to 3, [as you give the instruction, trace the path with your pen but do not mark the trail] and so on in order until you reach the end [point to the letter D] . Remember, the rule here is to go number, letter, number, letter, each one in order and alternating between the two. Try to go as quickly as you can without making a mistake and try not to lift your pencil [pen] from the paper. When I say GO you may begin. Place your pencil [pen] on number 1, ready, GO.”**

After the examinee successfully completes the sample, they will move on to the test. Provide the examinee with the test sheet found on page 6 of the response booklet.

If the examinee is able to complete the sample, even with corrections, continue to the Trails task.

If the examinee makes an error on Sample B:

- Immediately point out the error and mark an “X” across the incorrect line, and have them go back to the last previous correct response and resume.
- Remind the examinee of the instructions if they appear to have forgotten them or do not grasp the instructions.
- If the examinee cannot acquire the alternating response after 4 attempts at explanation, discontinue.

Test Page (page 6 of the TorCA Response Book)

After the examinee successfully completes the sample, they will move on to the test. Provide the examinee with the test sheet found on page 6 of the response booklet.

Say to examinee: **“Good! On this page, there are more numbers and letters to be joined. Again, start with 1, and draw your line from 1 to A, from A to 2, from 2 to B, B to 3, and so on, in order, until you reach the end [point to the number 13]. Remember to go number, letter, number, letter, number, letter. Try to go as quickly as you can without making a mistake and try not to lift your pencil [pen] from the paper. Place your pencil [pen] on number 1, ready GO.”**

Scoring

Each number and letter that is connected correctly is scored. Add the total number of correct points and subtract any errors. Record the time even though this is not scored.

General Rules

1. Feedback is given to the examinee during the sample portion of the test only. Once the test begins, no feedback about performance should be given. Common examples of comments made by the examinee include *“That [number or letter] is not on the page”* or *“I don’t understand, the order is correct.”* Again, no feedback is to be provided during the test.
2. If an error is made during the test, mark an “X” over in incorrect line and say **“That one is not correct. Please start here and continue** [point to the last correct circle].” The examiner should point to the last previous correct response but should not explain the error.
3. Discontinue after 240 seconds (4 minutes).

Delayed Verbal Recall – CERAD

Overview:	Delayed verbal recall
Domain:	Memory - Delayed Recall
Required Materials:	Page 10 of the TorCA Record Form, CERAD Stimulus Book, Pen or Pencil

Introduction

The CERAD test measures delayed memory and recognition memory. For the delayed memory, examinee will be asked to recall the list of words that they read several times.

Instructions

Say to the examinee: **“A while ago, I showed a list of words to you several times, and you had to repeat back the words. Please tell me the words from that list you remember.”**

Record all of the examinee’s responses verbatim and in the order recalled in the table. Words said that are not on the list are called Intrusions. Words that are repeated are called Repetitions. Record the number of Intrusions and Repetitions in the table.

Scoring

Each word correctly recalled gets one point. Add up the total score for each trial out of 10. There is no penalty for intrusions or repetitions, but these should be recorded.

General Rules

1. Record responses verbatim and in the order given.
 - a. Do not use numbers to indicate the order given.
 - b. Do not use check marks to indicate a correct response
2. Words provided by the examinee that are not on the list are called Intrusions. Words that are repeated are called Repetitions. Record the number of Intrusions and Repetitions in the table.
3. Score the plural variant as correct.
 - a. An example is that “letters” for “letter” would be awarded a point as being correct.
 - b. Any other variant, such as “motor” for “engine” is incorrect.
4. No feedback should be given regarding the number of correct responses, repetitions or errors. For example, if the examinee ask *“Did I already say engine?”*, respond by saying **“Do you think you said engine?”**

Delayed Verbal Recognition – CERAD

Overview:	Delayed verbal recognition
Domain:	Memory - Delayed Recognition
Required Materials:	Page 10 of the TorCA Record Form, CERAD Stimulus Book, Pen or Pencil

Introduction

For the recognition memory—performed after delayed memory—the examinee will also be shown a longer list of words containing words that were and were not on the list they read earlier and they will have to indicate which words they think were on the list.

Instructions

Open the CERAD Word List Memory Task booklet to the page titled Delayed Recognition Task and place it in front of the examinee.

Say to the examinee: **“I will now show you some words that were on the word lists and some words that were not on those lists. If the word was on the list say YES, if it was not on the list say NO.”**

Show each word in the Recognition set of the stimulus booklet and circle the examinee’s answer. The bolded and italicized answers are the correct answers.

Scoring

Correct responses on each trial get a score of 1 and incorrect responses get a score of 0 for a maximum score of 20.

General Rules

1. There is no time limit to respond but if there is no response within 5 seconds ask: **“Was the word on the list or not?”**
2. If the response is *“Maybe it was [on the list]”*, ask: **“Was it on the list, yes or no?”**
3. Circle all responses on the recognition test.
4. Total score for recognition is the sum of true positives and true negatives.
 - a. True Positive: The examinee responds ‘Yes’ when the correct answer is ‘Yes’.
 - b. False Positive: The examinee responds ‘Yes’ when the correct answer is ‘No’.

Benson Figure – Delayed Recall

Overview:	Delayed visual recall and recognition
Domain:	Memory – Delayed Recall
Required Materials:	Page 11 of the TorCA Record Form, Page 7 of the TorCA Response Booklet, Pen or Pencil

Introduction

This test is a measure of delayed visual memory. The examinee is asked to draw the Benson Figure that they had copied previously as best they can.

Instructions

Present the examinee with page 7 from the TorCA Response Book and a pencil or pen and read the instructions aloud.

Say to the examinee: **“Please draw again that figure I had you copy before.”**

Scoring

The scoring guidelines are the same as for the Benson Figure Copy.

Please refer to Benson Scoring Criteria on page 45 for detailed scoring instructions.

General Rules

1. If the examinee begins to draw a clock, say: **“No, there was that other figure I asked you to draw before that one.”**
2. If the examinee states that they are unsure about which figure you are referring to, say: **“There was a figure that I had you copy before.”** Do not provide any clues or feedback as to what the figure looks like.
3. If the examinee appears discouraged, provide non-specific reassurances, such as: **“I know it sounds difficult, but try to draw as much as you can remember.”**
4. If the examinee stops drawing, the examiner should ask **“Are you finished?”**
5. If the examinee wishes to re-draw the figure (e.g. the examinee has started drawing the clock), write **“First Attempt”** next to the examinee’s first attempt at drawing the figure and **“Second Attempt”** next to the examinee’s second attempt once the drawing is complete.

Benson Figure – Delayed Recognition

Overview:	Delayed recognition
Domain:	Memory – Delayed Recognition
Required Materials:	Page 12 of the TorCA Record Form, Page 8 of the TorCA Response Booklet, Pen or Pencil

Introduction

This test is a measure of delayed visual recognition memory. The examinee is presented with four figures and is asked to select the figure which they believe was the one they copied earlier.

Instructions

Place page 8 of the response book in front of the examinee and say: **“Which of these figures was the one you copied earlier? Please circle the one you remember.”**

Scoring

Give 1 point for correct identification, otherwise 0 points.

General Rules

1. If the examinee states they cannot remember or is not sure say: **“It’s okay to guess, just circle the one you think you saw before.”**

Alternating Sequences

- Overview: Patient continues copying a design to the end of the page
- Domain: Working Memory/Attention/Executive Control
- Required Materials: Page 13 of the TorCA Record Form, Page 9 of the TorCA Response Booklet, Pen or Pencil

Introduction

This test is a measure of executive function. The examinee is asked to continue drawing the design until they reach the end of the page.

Instructions

Place page 9 of the response book in front of the examinee and say: **“Starting here, continue with the same design until you reach the end of the page.”**

Scoring

Give the 2 points for a complete correct sequence, 1 point for 1 error, and 0 points for 2 or more errors.

General Rules

1. Place the page in landscape orientation.
2. Encourage the examinee to keep going to the end of the page.
3. If the examinee stops before reaching the end of the page, say: **“Keep going until you reach the end of the page.”**
4. There is no minimum number of alterations that must be completed.
5. If the examinee has marked difficulty drawing the design (i.e. due to physical impairment, tremor, etc.), have them complete only as many alternations as possible.

Similarities

Overview:	Patient describes how two items are alike
Domain:	Working Memory/Attention/Executive Control
Required Materials:	Page 14 of the TorCA Record Form, Pen or Pencil

Introduction

This test is a measure of executive function. The examinee is asked to explain how two items are alike.

Instructions

The examiner states: **“I am going to read two words to you and I want you to tell me how they are alike. In what way are an orange and apple alike?”**

NOTE: If the patient does not provide a 2-point answer on the first item about an orange and apple, give the patient the corresponding score and then say: **“Well an orange and an apple are alike because they are both fruits.”**

Only give the correct answer for the first item. Record all responses verbatim.

Scoring

To score each item, give the examinee 2 points for an abstract or categorical response, 1 point for a concrete response, and 0 points for an irrelevant or non-specific response.

The TorCA Record Form provides examples of correct, concrete and irrelevant or non-specific responses.

General Rules

1. Record responses verbatim.
2. If a response seems reasonable but is not listed, query.
3. Certain responses warrant a query to determine whether a better response can be obtained. These are noted with (Q) in the Record Form.
4. To query a response say **“Tell me more about that.”** Only give one query per item. Score the queried response even if the second response results in a lower score than the initial response.
5. If the examinee gives two scoreable responses, repeat each response verbatim and say: **“Which answer do you think is best?”** Score the chosen response.

Verbal Fluency – F-Words

Overview:	Spontaneous production of words within a specified class
Domain:	Working Memory/Attention/Executive Control
Required Materials:	Page 15 of the TorCA Record Form, Pen or Pencil

Introduction

This test evaluates the spontaneous production of words within a specified class. The examinee is asked to say as many English words as possible in 1 minute that begins with the letter F that are not proper nouns, such as names of people or places.

Instructions

Say to the examinee: **“I’m going to say a letter of the alphabet. When I tell you to start, I would like you to tell me as many words as you can think of that begin with that letter. But do not tell me names of people or places or any words that would usually be capitalized. For example if the letter was N then don’t say Nancy or November. The other rule is that you should not give me the same word you have told me in different ways. For example, if you say nap do not say naps, napped, or napping.”**

Having given the instructions say to the examinee: **“The letter is ‘F,’ start now.”**

Record the responses verbatim, in 15 second intervals. After exactly 60 seconds, say **“Stop.”**

Scoring

One point is given for each word starting with the letter “F.” There is no maximum score. Correct responses are words that:

1. Start with the letter “F”
2. Are not names of people, places, or proper nouns
3. Are not grammatical variants of the same word (e.g. naps, napped, napping)
4. Are not repetitions

Include the number of intrusions and repetitions. There is no penalty for intrusions and repetitions, but they must be recorded.

General Rules

1. If the examinee pauses for more than 15 seconds without a response, prompt by saying **“What other words beginning with ‘F’ can you think of?”**
2. If the examinee gives numbers, give one point for the first number and tell him/her not give numbers. If the examinee gives a proper name, say: **“No proper names.”**
3. Do not count repeated words as warranting a point.

Specific Scoring Rules and Criteria

Repetitions

1. A repetition is considered as such if the identical word is repeated. The administrator will score the first occurrence of the word as correct, and the second identical word as a repetition.
2. If a repeated word is both an intrusion and repetition, the repeated word is counted as an intrusion and repetition.
3. If a repeated word has two meanings (e.g. base, bass) or two words are pronounced the same (e.g. sail and sale), the second response is scored as a repetition error unless
 - a. The examinee clarifies the spelling the words (e.g. says “*s-a-i-l and s-a-l-e*”), or
 - b. Clarifies the meaning (e.g. “*base as in a substance and bass as in the instrument*”), or
 - c. The context clearly reflects a different word (e.g. *sale, save, spend, summer, sea, sail*).In these cases, the examinee is awarded 2 points.

Intrusions

1. An intrusion word is any word that violates the predefined criteria as stated in the instructions (i.e. names of people, places).
2. Grammatical variants of the same word are intrusions if the meaning of the word is not changed substantially (i.e. nap and naps, where naps is an intrusion).
3. Are grammatical variants of the same word where the meaning of the word has not changed (e.g. sing and singing). Grammatical variants of words where the meaning has changed are both scored as correct (e.g. fire and fiery).

Verbal Fluency – Animals

Overview: Spontaneous production of words within a specified class
Domain: Working Memory/Attention/Executive Control
Required Materials: Page 16 of the TorCA Record Form, Pen or Pencil

Introduction

The examinee is asked to say as many animal names as possible in one minute.

Instructions

Say to the examinee: **“Now I want you to tell me as many animals as you can think of. It does not matter what letter they start with. Just tell me all the animals that you can think of, as quickly as you can. An animal is anything that walks, crawls, flies or swims.”**

Record the responses verbatim, in 15 second intervals. After exactly 60 seconds, say **“Stop.”**

Scoring

One point is given for each animal given. There is no maximum score. Correct responses are words that are:

1. Animals
2. Not repetitions or intrusions

Include the number of intrusions and repetitions. There is no penalty for intrusions and repetitions, but they have to be recorded.

General Rules

1. If the examinee pauses for more than 15 seconds without a response, prompt them by saying **“What other animal names can you think of?”**
2. If the examinee is clearly attempting to give names beginning with the letter “F”, then say: **“The names can begin with any letter.”**
3. Adult and infant, or male and female variations of the same type are allowed as individual names. For example, *caterpillar/butterfly* or *sheep/lamb* would be scored as unique names.
4. Mythological creatures are not allowed but extinct animals are scored as correct.
5. If the examinee gets stuck on categories of animals, such as birds and insects, say: **“Give me specific ones.”**
6. If patient says *“birds”* and also gives types of birds, count birds and the types as one point each.

Specific Scoring Rules and Criteria

Repetitions

1. A repetition is considered as such if the identical word is repeated. The administrator will score the first occurrence of the word as correct, and the second identical word as a repetition.

Intrusions

1. An intrusion word is any word that violates the predefined criteria as stated in the instructions (i.e. words that are not names of animals).
2. Grammatical variants of the same word are intrusions if the meaning of the word is not changes substantially (i.e. *bird* and *birds*, where *birds* is an intrusion).

Multilingual Naming Test (MINT)

Overview:	Examinee names black and white line drawings
Domain:	Language
Required Materials:	Page 17 of the TorCA Record Form, TorCA Language Test Booklet, Pen or Pencil

Introduction

This measure is used to assess visual naming ability using black and white line drawings of common objects. Examinees are shown pictures from the Multilingual Naming Test (MINT) in the TorCA language test booklet and asked to provide the name of each item.

Instructions

Turn to the first picture in the MINT book to the examinee and say: **“What is this called?”**

Examinees are allowed 10 seconds to name the item. If no response is given within 10 seconds, give the semantic cue listed in the Record Form.

- **Semantic Cues** are given when the examinee clearly misperceives the object they are looking at (e.g. *“Brick”* for Book) or does not know what the drawing is.
- **Phonemic Cues** are typically given when following a semantic cue if the examinee is still unable to name the object. The exception to this is when the examinee is aware of what the object is but does not know its name (e.g. *“I know what it is, I just can’t think of what it’s called.”*)

NOTE: To determine the appropriate cue to give if the examinee says *“I don’t know”* the administrator may ask **“You don’t know what it is or what is called?”**

If the examinee says:

- *“I don’t know what it is”*, provide the semantic cue.
- *“I don’t know what it is called”*, say **“You still have some time”**, wait for the 10 seconds to elapse and then provide the phonemic cue.

Scoring

Give one point for each correct item. Correct responses following a semantic cue are scored as correct. No points are awarded for correct responses following a phonemic cue.

General Rules

1. Record responses verbatim
2. Allow 10 seconds for the initial response. If no response is given within 10 seconds give the semantic cue.

3. If the examinee clearly misidentifies the item say: **“No, it is a** [give the semantic cue given in parentheses].” An example is *“Found in a circus”* for Clown.
4. After giving the semantic cue allow another 10 seconds to respond.
5. Phonemic cues may be given after failing an item (cues indicated by underlined letters) but responses are not scored.
6. If the examinee describes the object or provides a response that is too general (e.g. *“Instrument”* for Drum, say: **“Please be more specific.”**
7. If the examinee provides additional words (e.g. *“A nest with eggs in a tree”* for Nest), the response is considered correct.

Sentence Repetition

Overview: Patients are required to repeat a sentence back verbatim
Domain: Language
Required Materials: Page 18 of the TorCA Record Form, Pen or Pencil

Introduction

This measure requires the examinee to repeat back a sentence aloud after it is read by the examiner.

Instructions

Say to the examinee: **“I’m going to read some sentences to you. Please repeat the sentence back to me, exactly the way I said it.”**

Read each sentence out loud, clearly, and slowly to the examinee. If the examinee does not repeat the sentence perfectly, transcribe their response verbatim in the space below the corresponding sentence and indicate the type of error made.

NOTE: In order to avoid the need for repetitions and ensure that the examinee gets as many points as possible on this measure, be sure to speak loudly enough that the examinee can hear without difficulty, and enunciate.

Scoring

Give the examinee 2 points for response without error or repetition; Give 1 point for correct response without errors but with repetition. Give a 0 score for response with any errors. List the number of omitted words, semantic errors, phonological/other errors.

General Rules

1. One repetition of the sentence is allowed in cases where the examinee did not hear the sentence, but only if the examinee explicitly requests it.
2. Self-corrections are allowed without penalty.

Single Word Comprehension

Overview:	Examinee selects the appropriate image
Domain:	Language
Required Materials:	Page 20 of the TorCA Record Form, TorCA Language Test Booklet, Pen or Pencil

Introduction

This measure requires the examinee to select the appropriate image in the Language Assessment Test Section – Comprehension Subtests Plates 1 and 2. Plate 1 is used for items 1 and 2. Plate 2 is used for items 3 and 4 in the TorCA Language Test Booklet.

Instructions

Open the test book to the appropriate plate and place in front of examinee.

Say to the examinee: **“I’m going to say a word; I want you point to what I say. Point to the [item]”**.

Circle the response in the table below. If applicable, record the presence of delays, self-corrections or repetitions in the check boxes below each response.

Scoring

Items receive 2 points for correct answers, and 0 for incorrect answers or no response, but 1 point is given in following three situations:

1. **Code D** - Correct responses delayed more than 5 seconds after stimulus is presented;
2. **Code SC** - Correct responses occurring after a spontaneous self-correction: Note: false starts should only be counted as self-corrected if it was clear that the examinee was going to make an error. Otherwise they should be ignored.
3. **Code R** - Correct responses made after requests for the stimulus to be repeated coded as (r): Only one repetition should be provided in any case. Note that requests for repetitions that were clearly due to mishearing, investigator accent, etc., do not count as requests for repetitions and should not be noted.

Where applicable, the D, SC, and/or R boxes should be checked for either correct or incorrect responses.

General Rules

1. If the examinee requests a repetition, say the word again but only one repetition is allowed.
2. In order to avoid the need for repetitions and ensure that the examinee gets as many points as possible on this measure, be sure to speak loudly enough that the examinee can hear without difficulty and enunciate.

Single Word Reading Comprehension

- Overview: Examinee reads aloud and selects the appropriate image
- Domain: Language
- Required Materials: Page 20 of the TorCA Record Form, TorCA Language Test Booklet, Pen or Pencil

Introduction

This measure requires the examinee to read aloud the word “Goat” and select the appropriate image.

Required for this measure include the Language Assessment Test Booklet - Comprehension Subtests Plate 3 in the TorCA language test booklet.

Instructions

Say to the examinee: **“See this word [point to the word ‘Goat’], read it out loud and then point to the picture that goes with it.”**

Circle the response in the table below and if appropriate, indicate the presence of a delayed response or self-correction in the check boxes below.

Scoring

This item receives 2 points for the correct answer, and 0 for an incorrect answer or no response, but 1 point is given in following three situations:

1. **Code D** - Correct responses delayed more than 5 seconds after stimulus is presented;
2. **Code SC** - Correct responses occurring after a spontaneous self-correction: Note: false starts should only be counted as self-corrected if it was clear that the examinee was going to make an error. Otherwise they should be ignored.
3. **Code R** - Correct responses made after requests for the stimulus to be repeated coded as (r): Only one repetition should be provided in any case. Note that requests for repetitions that were clearly due to mishearing, investigator accent, etc., do not count as requests for repetitions and should not be noted.

Where applicable, the D, SC, and/or R boxes should be checked for either correct or incorrect responses.

General Rules

1. If the examinee states they cannot remember or is not sure say: **“It’s okay to guess.”**

Sentence Comprehension

Overview:	Examinee selects the appropriate image
Domain:	Language
Required Materials:	Page 21 of the TorCA Record Form, TorCA Language Test Booklet, Stopwatch, Pen or Pencil

Introduction

This measure requires the examinee to select the appropriate section in the TorCA Language Test Booklet. Required for this measure is the Language Assessment Test Book- Comprehension Subtests Plates 4, 5, 6, and 7.

Instructions

Place the appropriate plate in front of the examinee and say: **“Now I’m going to read a sentence, and show you some pictures. I’d like you to point to the picture that goes with the sentence.”**

Correct choices are indicated in bold italics. For each item, circle the response in the table. Record the time to make response in the space indicated to the nearest second. If applicable, record the presence of a delay, self-correction or repetition in the check boxes below.

Scoring

Items receive 2 points for correct answers, and 0 for incorrect answers or no response, but 1 point is given in following three situations:

1. **Code D** - Correct responses delayed more than 5 seconds after stimulus is presented;
2. **Code SC** - Correct responses occurring after a spontaneous self-correction: Note: false starts should only be counted as self-corrected if it was clear that the examinee was going to make an error. Otherwise they should be ignored.
3. **Code R** - Correct responses made after requests for the stimulus to be repeated coded as (r): Only one repetition should be provided in any case. Note that requests for repetitions that were clearly due to mishearing, investigator accent, etc., do not count as requests for repetitions and should not be noted.

Where applicable, the D, SC, and/or R boxes should be checked for either correct or incorrect responses.

General Rules

1. If the examinee states they cannot remember or is not sure say: **“It’s okay to guess.”**

Single Word Reading

Overview: Examinee reads a list of words aloud

Domain: Language

Required Materials: Page 22 of the TorCA Record Form, TorCA Language Test Booklet, Pen or Pencil

Introduction

This measure requires the examinee to read aloud each presented word. Required for this measure is the TorCA Language Assessment Test Booklet - Comprehension Subtests Plate 8.

Instructions

Place Plate 8 in front of examinee and say: **“Read each of these words aloud.”**

Record responses verbatim. If applicable, indicated presence of a delay or self-correction in the check boxes below.

Scoring

Items receive 2 points for correct answers, and 0 for incorrect answers or no response, but 1 point is given in following three situations:

1. **Code D** - Correct responses delayed more than 5 seconds after stimulus is presented;
2. **Code SC** - Correct responses occurring after a spontaneous self-correction: Note: false starts should only be counted as self-corrected if it was clear that the examinee was going to make an error. Otherwise they should be ignored.
3. **Code R** - Correct responses made after requests for the stimulus to be repeated coded as (r): Only one repetition should be provided in any case. Note that requests for repetitions that were clearly due to mishearing, investigator accent, etc., do not count as requests for repetitions and should not be noted.

Where applicable, the D, SC, and/or R boxes should be checked for either correct or incorrect responses.

General Rules

1. If the examinee states they are not sure of the word or its pronunciation, say: **“It’s okay to guess.”**

Semantic Knowledge

Overview:	Examinee selects the appropriate image
Domain:	Language
Required Materials:	Page 23 of the TorCA Record Form, TorCA Language Test Booklet, Pen or Pencil

Introduction

This measure requires the examinee to select the appropriate image in the booklet. Required for this measure is the Language Assessment Book Plates 9, 10, 11, 12, 13, and 14

Instructions

Open the Language Assessment book to Plate 9 for the practice item and say: **“I am going to show you some pictures. Which of these pictures [motion to the four pictures in the corners] goes with the one in the middle?”**

- If correct, say: **“That’s right.”**
- If incorrect, say: **“It goes with this one [point to the banana]; the apple goes with the banana.”**

Turn to Plate 10 and say: **“Now, which of these [motion to the corner pictures] goes with this one [point to the lock].”**

Repeat the instructions for the remaining plates. Circle the response in the table. If applicable, indicate the presence of a delay or self-correction in the check boxes below. Correct answers are in ***BOLD ITALICS***.

Scoring

Items receive 2 points for correct answers, and 0 for incorrect answers or no response, but 1 point is given in following three situations:

1. **Code D** - Correct responses delayed more than 5 seconds after stimulus is presented;
2. **Code SC** - Correct responses occurring after a spontaneous self-correction: Note: false starts should only be counted as self-corrected if it was clear that the examinee was going to make an error. Otherwise they should be ignored.
3. **Code R** - Correct responses made after requests for the stimulus to be repeated coded as (r): Only one repetition should be provided in any case. Note that requests for repetitions that were clearly due to mishearing, investigator accent, etc., do not count as requests for repetitions and should not be noted.

General Rules

1. Only give feedback for the practice item. Do not give feedback for responses to Plates 10 – 14.
2. For each trial, motion to the four pictures in the corners.
3. If the examinee states they cannot remember or is not sure say: **“It’s okay to guess.”**

FINAL SCORING

Final scores from all subtests are recorded and totaled. There is no maximum score for the TorCA as there are no upper limits on the verbal fluency measures. The score breakdown is as follows:

Domain	Subtest	Guide Page	Subtest Score	Domain Total
Orientation	Orientation	6	/12	/12
Memory – Immediate Recall	CERAD Word List Trial 1	9	/10	/30
	CERAD Word List Trial 2	9	/10	
	CERAD Word List Trial 3	9	/10	
Memory – Delayed Recall	CERAD Delayed Recall	20	/10	/27
	Benson Figure Delayed Recall	22	/17	
Memory – Delayed Recognition	CERAD Delayed Recognition	21	/20	/21
	Benson Figure Delayed Recognition	23	/1	
Visuospatial	Benson Figure Copy	11	/17	/32
	Clock Drawing	14	/15	
Working Memory/ Attention/ Executive Control	Serial 7s	7	/13	N/A
	Serial 3s	8	/13	
	Digit Span – Forward	12	/9	
	Digit Span – Backward	12	/8	
	Trail Making Test Part A	16	/24	
	Trail Making Test Part B	17	/24	
	Alternating Sequences	24	/2	
	Similarities	25	/10	
	Verbal Fluency – F-Words	26	N/A	
Language	Verbal Fluency – Animals	28	N/A	N/A
	MINT Naming	30	/15	
	Sentence Repetition	32	/10	
	Single Word Comprehension	33	/8	
	Single Word Reading Comprehension	34	/2	
	Sentence Comprehension	35	/8	
	Single Word Reading	36	/12	
	Semantic Knowledge	37	/10	

Final scores from all subtests are recorded on the Summary Score page and totaled. Percentile rating may also be calculated for each cognitive domain and for the overall total. Please see Appendix C for normative data for each cognitive domain and for overall scores.

BENSON FIGURE SCORING CRITERIA


General scoring rules:

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 element is scored for accuracy and placement (1pt each). In general, 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.

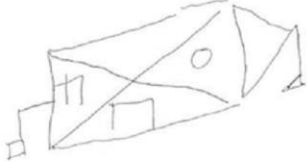
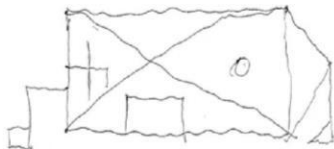
For **Accuracy (A)**, element drawn must be recognizable as the target element and meet the additional criteria listed below. Leniency is given for wavy lines (e.g., due to tremor). A protractor and ruler should be used for making angle and distance judgments. Extraneous lines do not impact scoring.

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.

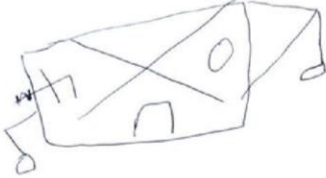



Element 1

	<p>Accuracy: 4 reasonably straight sides must be present with 90° angles ($\pm 10^\circ$); width > height; corners do not have to touch and lines can be broken, but gaps or overlaps cannot exceed 8mm.</p> <p>Placement: Any square-like or rectangular figure is present with at least 3 sides but no more than 4 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.</p>
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2 points:

 <p>Figure is not rotated more than 30° and gaps at corners and at broken lines do not exceed 8mm.</p>	 <p>Leniency is given for wavy lines.</p>
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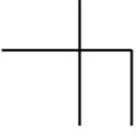
1 point:

 <p>A: 0 P: 1 Bottom left angle is not precise.</p>	 <p>A: 0 P: 1</p>
 <p>A: 0 P: 1 3 sides of the rectangle are present and element bears enough resemblance to the target element to receive placement credit.</p>	 <p>A: 1 P: 0 Placement credit is lost due to rotation.</p>

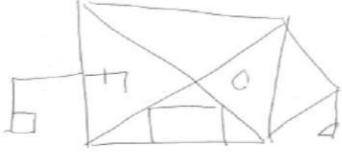
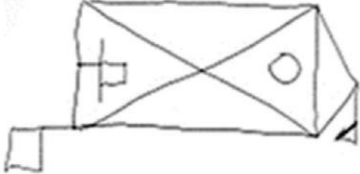
0 points:

Pentagon, circle, triangle


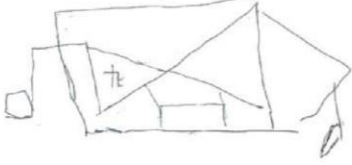
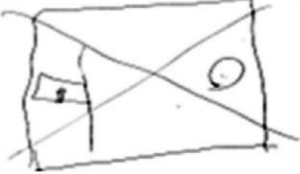

Element 2

	<p>Accuracy: Figure is correctly shaped.</p> <p>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.</p>
---	--


2 points:

 <p>Placement credit is given because it connects at the middle third.</p>	 <p>Do not deduct accuracy because of the extraneous line.</p>
---	--

1 point:

 <p>A: 1 P: 0</p> <p>Connects at upper third.</p>	 <p>A: 1 P: 0</p> <p>Element is correctly shaped (A) but the gap between the element and large rectangle exceeds 8mm (P).</p>
 <p>A: 0 P: 1</p> <p>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.</p>	 <p>A: 1 P: 0</p> <p>Placement credit is lost due to overlap with diagonals. This element barely receives accuracy credit.</p>

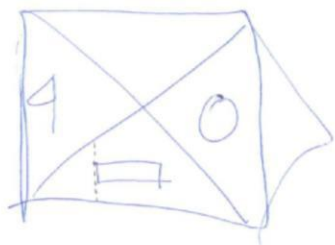

Element 3

	<p>Accuracy: The width must be $>$ the height, and the angles are $90^\circ (\pm 10^\circ)$. The vertical sides of the rectangle are $> \frac{1}{2}$ 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 1st 2-point example). Extraneous lines are acceptable.</p> <p>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.</p>
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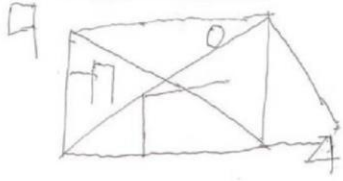
2 points:

	 <p>Extraneous lines are acceptable.</p>
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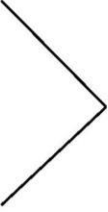
1 point:

 <p>A: 0 P: 1</p> <p>Vertical sides are $< \frac{1}{2}$ vertical measurement. Dotted lines were added to illustrate vertical measurement.</p>	 <p>A: 0 P: 1</p> <p>Top left angle is not precise.</p>
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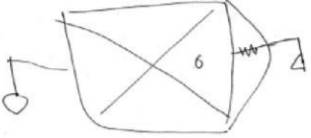
0 points:

 <p>This response would have received placement credit if the overlap with the diagonal lines did not exceed 8mm.</p>
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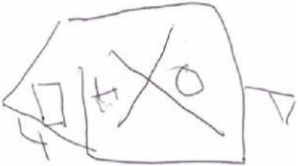
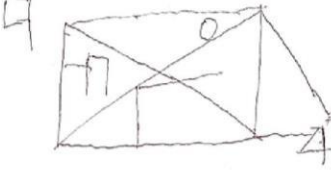
Element 4

	<p>Accuracy: Element is comprised of 2 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.</p> <p>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.</p>
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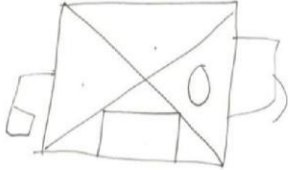
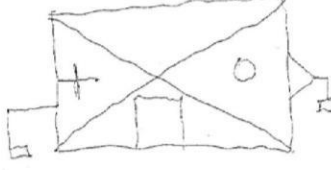
2 points:

 <p>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.</p>
--

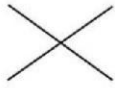
1 point:

 <p>A: 1 P: 0</p> <p>The vertex of the angle corresponds to the middle third of the large rectangle (A) but is on the wrong side (P).</p>	 <p>A: 0 P: 1</p> <p>The vertex corresponds to the bottom third of the large rectangle (A).</p>
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0 points:

 <p>A: 0 P: 1</p> <p>This element is considered to bear enough slight resemblance to target element to receive placement credit, although it is a borderline response.</p>	 <p>A: 0 P: 1</p> <p>Element is too small to receive accuracy credit</p>
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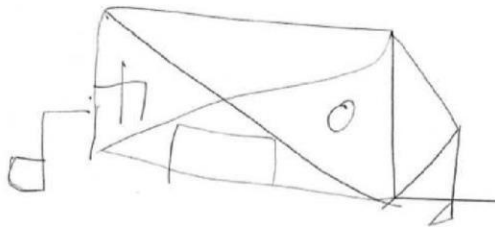
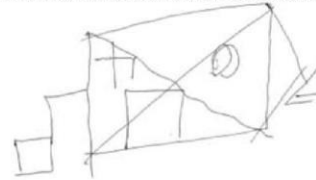
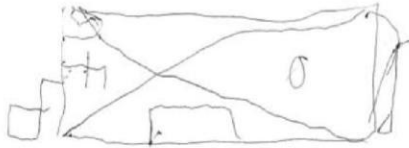
Element 5



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

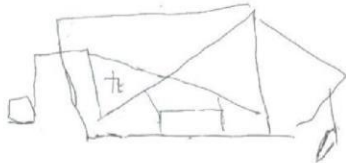
Placement: Gap or overlap at the corners of the large rectangle must not exceed 8mm from where the corner is or is supposed to be. If only 1 line is present but placement is

2 points:



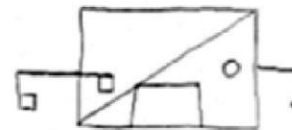
Line overlapped the outside rectangle by 8mm but did not exceed 8mm from where the corner is supposed to be.

1 point:



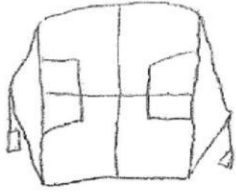
A: 1 P: 0

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



A: 0 P: 1

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



A: 1 P: 0

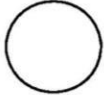
Lines are recognizable (A) but rotated (P).



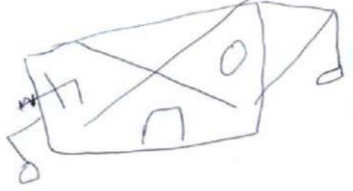
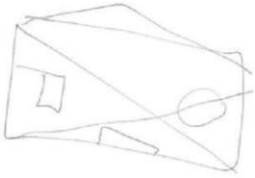
A: 1 P: 0

Lines are recognizable but not correctly placed.


Element 6

	<p>Accuracy: Reasonably round (longest diameter to shortest ratio < 2:1).</p> <p>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.</p>
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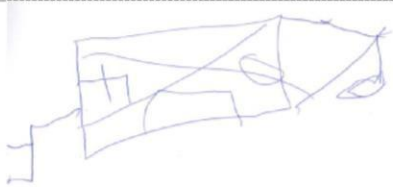
2 points:

 <p>The ratio for this circle is 1.8:1, and so it barely receives accuracy credit.</p>	 <p>Placement is scored based on where the diagonal lines should have been placed.</p>
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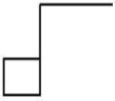
1 point:

 <p>A: 1 P: 0</p>

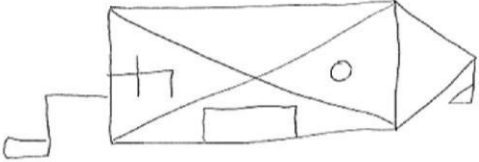
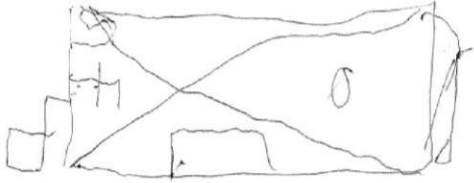
0 points:

 <p>Exceeds ratio requirement (A). Circle touches the rectangle (P).</p>

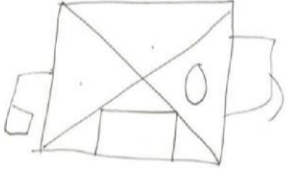
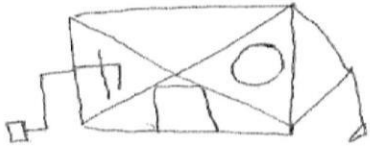

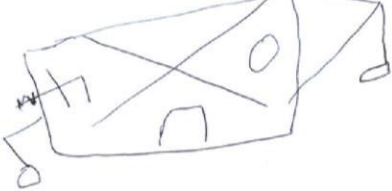
Element 7

	<p>Accuracy: Flag points in the correct direction and shares a side with its staff. Flag may resemble a rectangle or a square.</p> <p>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 corner of the large rectangle closest to the element .</p>
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2 points:

	
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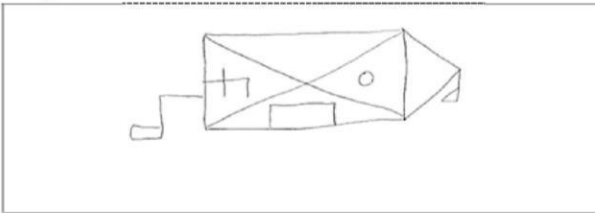
1 point:

 <p>A: 0 P: 1</p> <p>Flag does not point in the correct direction (A). Placement is scored based on where element 3 should have been placed.</p>	 <p>A: 0 P: 1</p> <p>Element is just below element 3 (P), but flag does not share a side with the staff (A).</p>
 <p>A: 0 P: 1</p> <p>In this example, the element bears some slight resemblance to the target element and is placed correctly.</p>	 <p>A: 1 P: 0</p> <p>Top of the flag is below the bottom of the large rectangle (P).</p>



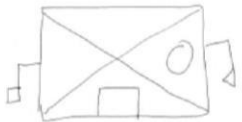

Element 8

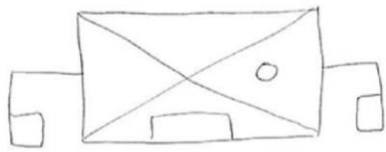
	<p>Accuracy: There must be a triangle and a stem. The angle of the triangle at the furthest end of the stem must approximate $90^\circ (\pm 15^\circ)$. The flag and stem are in correct relationship to each other.</p> <p>Placement: Either a stem or flag must be present and placed to the right of the rectangle. The flag need not be a triangle. The element must connect directly to element 7 or be within 8mm of either element 7 or element 1. No credit is lost for an additional stem. The top of the flag must be above the corner of the large rectangle closest to the element. Rotation $> 45^\circ$ is not allowed.</p>
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2 points:



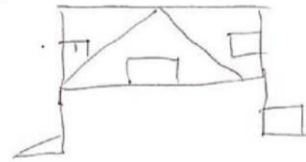
1 point:

 <p>A: 0 P: 1</p> <p>Stem is present and placed correctly (P). This is an example of the minimal amount of resemblance required to be eligible for placement credit.</p>	 <p>A: 1 P: 0</p> <p>The entire element is rotated $> 45^\circ$ (P), but the relationship between the triangle and stem is preserved (A).</p>
 <p>A: 0 P: 1</p> <p>The angle does not approximate 90° (A).</p>	 <p>A: 0 P: 1</p> <p>Element bears resemblance and is placed correctly.</p>



A: 0 P: 1

Element bears resemblance and is placed correctly.



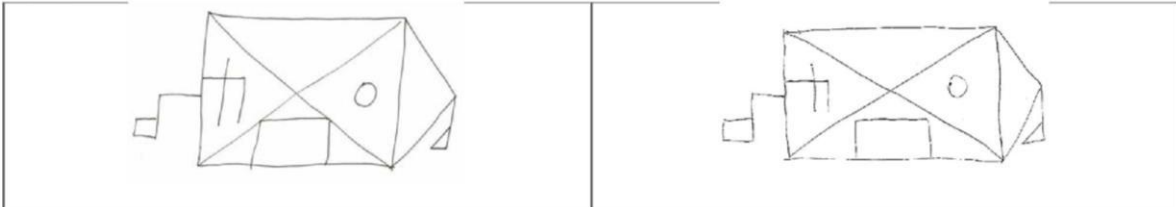
A: 1 P: 0

Accurate but not placed correctly.

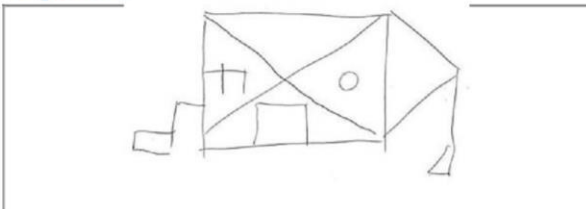
Bonus Point

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:



0 points:



TorCA CLOCK SCORING CRITERIA¹

Scoring is based on the clock's contour, numbers, hands and center, separately, and with a total score based on the sum of the separate scores.

Contour

1. One point is given for a closed contour or within 1/8 of an inch (3mm), not too small to contain all the numbers.
 - *A square or square-like shape would be awarded 0 points*
2. One point is given for a circular contour with the ratio of shortest to longest diameter being no greater than 1:1.5.

Numbers

One point is given for each of the following being present:

3. Numbers 1-12 are all present without any additional numbers
4. Numbers are either all Arabic or all Roman and not a combination
5. Numbers are in the correct order (sequence)
 - *To be awarded a point at least 2 numbers (1-12) must be present and in correct order.*
6. The paper is not rotated
7. The numbers are in the approximate correct position
 - *At least one number must be present to score 1. Numbers may be outside contour*
8. All numbers are within the contour
 - *If contour is absent score 0*
 - *A visible space must be present between a number and the contour to score 1*
 - *If a number touches contour score 0*
 - *A number written as a word does not count as a number*

Hands

One point is given for each of the following being present:

9. Two and only two hands are present
 - *Three hands can be present if the examinee indicates that it is a second hand*
10. The hour target number (i.e. 11) is indicated in some manner
11. The minute target number (i.e. 2) is indicated in some manner
12. The hands are in the correct proportion
 - *Hour hand must be perceptually or measurably shorter than minute hand.*
 - *Score 0 if only one hand present*

¹ The BNA clock scoring system was modified from Clock Drawing: A Neuropsychological Analysis by Freedman M, Leach L, Kaplan E, Winocur G, Shulman KI, Delis D. Copyright 1994 by Oxford University Press, Inc.

13. There are no superfluous markings on the face
- *Marks representing minute ticks are allowed*
 - *Any mark or word not allowed under any other category is considered superfluous except extra numbers. These are scored as 0 under item 3*
 - *Second hand superfluous if not explicitly identified as second hand by subject*
 - *Arrowheads on hands are not superfluous*
14. The hands overlap within 2mm (1/16 of an inch)
- *For a point to be given for the hour or minute target number to be indicated it is not adequate for there to simply be an hour or minute number indicated on the clock. Instead the numbers indicated must be the correct target numbers (i.e. 11 and 2).*

Centre

15. One point is given for the centre being drawn or inferred

TorCA DOMAIN AND SUBTEST NORMATIVE SCORES

The following sections include the domain and subtest normative scores for the TorCA^{2,3}

Table 2 presents participant profiles and normative data. Groups did not differ in years of education. There were significantly more females for the 50–59 year group, 60–69 year group, and 70–79 year group, but not for the 80–89 year group.

Normative TorCA test scores are categorized into ≤ 5 th percentile (impaired), 6th–24th percentile (borderline), or ≥ 25 th percentile (normal). Tables 3, 4, 5, and 6 present normative data for individual subtests.

² Freedman, M., Leach, L., Carmela Tartaglia, M. *et al.* The Toronto Cognitive Assessment (TorCA): normative data and validation to detect amnesic mild cognitive impairment. *Alz Res Therapy* **10**, 65 (2018) doi:10.1186/s13195-018-0382-y

³ Freedman, M., Leach, L., Carmela Tartaglia, M. *et al.* Correction to: The Toronto cognitive assessment (TorCA): normative data and validation to detect amnesic mild cognitive impairment. *Alz Res Therapy* **10**, 120 (2018) doi:10.1186/s13195-018-0446-z

Toronto Cognitive Assessment (TorCA) group profiles and normative data

Group profile		Age group						
		50–89 years	50–59 years	60–69 years	70–79 years	80–89 years		
<i>N</i>		302	75	77	75	75		
Male/female		103/199	28/47	22/55	20/55	33/42		
Years of education, median (range)		16 (8–20)	16 (12–20)	16 (11–20)	16 (9–20)	14 (8–20)		
TorCA Sum Index, mean (standard deviation)		292.8 (18.4)	297.6 (18.6)	296.9 (16.7)	290.5 (16.6)	286.0 (19.4)		
TorCA Sum Index, median		295	301	298	291	289		
Normative Data		Percentile range	Rating	50–89 years	50–59 years	60–69 years	70–79 years	80–89 years
Sum Index	≤ 5	Impaired	< 261	< 266	< 272	< 262	< 257	
	6–24	Borderline	261–281	266–287	272–287	262–280	257–272	
	≥ 25	Normal limits	> 281	> 287	> 287	> 280	> 272	
Orientation	≤ 5	Impaired	< 10	< 10	< 10	< 10	< 10	
	6–24	Borderline	10	10	10	10	10	
	≥ 25	Normal limits	> 10	> 10	> 10	> 10	> 10	
Immediate Memory Recall	≤ 5	Impaired	< 15	< 17	< 16	< 15	< 14	
	6–24	Borderline	15–18	17–20	16–18	15–17	14–16	
	≥ 25	Normal limits	> 18	> 20	> 18	> 17	> 16	
Delayed Memory Recall	≤ 5	Impaired	< 10	< 14	< 12	< 8	< 6	
	6–24	Borderline	10–14	14–16	12–15	8–12	6–12	
	≥ 25	Normal limits	> 14	> 16	> 15	> 12	> 12	
Delayed Memory Recognition	≤ 5	Impaired	< 19	< 20	< 19	< 18	< 18	
	6–24	Borderline	19	20	19	18–19	18	
	≥ 25	Normal limits	> 19	21	> 19	> 19	> 18	
Visuospatial	≤ 5	Impaired	< 25	< 27	< 25	< 24	< 24	
	6–24	Borderline	25–27	27–28	25–27	24–27	24–27	
	≥ 25	Normal limits	> 27	> 28	> 27	> 27	> 27	
Working Memory/Attention/Executive Control	≤ 5	Impaired	< 99	< 98	< 102	< 99	< 98	
	6–24	Borderline	99–106	98–105	102–107	99–106	98–105	
	≥ 25	Normal limits	> 106	> 105	> 107	> 106	> 105	
Language	≤ 5	Impaired	< 71	< 63	< 74	< 74	< 66	
	6–24	Borderline	71–78	63–78	74–80	74–78	66–76	
	≥ 25	Normal limits	> 78	> 78	> 80	> 78	> 76	

Normative data for subtests within domains: Memory

Percentile	Rating	Toronto Cognitive Assessment Memory test ratings			
		Immediate recall	Verbal delayed recall	Verbal delayed recognition	Visual delayed recall
Ages 50–89 years					
≤ 5	Below normal	< 15	< 3	< 18	< 6
6–24	Borderline	15–18	3–4	18	6–8
≥ 25	Within normal limits	> 18	> 4	> 18	> 8
Ages 50–59 years					
≤ 5	Below normal	< 17	< 5	< 19	< 6
6–24	Borderline	17–20	5–6	19	6–9
≥ 25	Within normal limits	> 20	> 6	20	> 9
Ages 60–69 years					
≤ 5	Below normal	< 16	< 4	< 19	< 8
6–24	Borderline	16–18	4	19	8–9
≥ 25	Within normal limits	> 18	> 4	20	> 9
Ages 70–79 years					
≤ 5	Below normal	< 15	< 3	< 18	< 6
6–24	Borderline	15–17	3	18	6–7
≥ 25	Within normal limits	> 17	> 3	> 18	> 7
Ages 80–89 years					
≤ 5	Below normal	< 14	< 3	< 18	< 5
6–24	Borderline	14–16	3	18	5–7
≥ 25	Within normal limits	> 16	> 3	> 18	> 7

Normative data for subtests within domains: Visuospatial

Percentile	Rating	Toronto Cognitive Assessment Visuospatial test ratings	
		Benson Figure Copy	Clock Drawing
Ages 50–89 years			
≤ 5	Below normal	< 14	< 10
6–24	Borderline	14	10–12
≥ 25	Within normal limits	> 14	> 12
Ages 50–59 years			
≤ 5	Below normal	< 15	< 11
6–24	Borderline	15	11–12
≥ 25	Within normal limits	> 15	> 12
Ages 60–69 years			
≤ 5	Below normal	< 14	< 10
6–24	Borderline	14	10–12
≥ 25	Within normal limits	> 14	> 12
Ages 70–79 years			
≤ 5	Below normal	< 14	< 10
6–24	Borderline	14	10–12
≥ 25	Within normal limits	> 14	> 12
Ages 80–89 years			
≤ 5	Below normal	< 13	< 9
6–24	Borderline	13–14	9–12
≥ 25	Within normal limits	> 14	> 12

Normative data for subtests within domains: Working Memory/ Attention/ Executive Control

Table 5 Normative data for subtests within domains: Working Memory/Attention/Executive Control

Toronto Cognitive Assessment Working Memory/Attention/Executive Control Test Ratings													
Percentile Rating	Serial Subtractions 7 s	Serial Subtractions 3 s	Serial Subtractions Total	Digit Span Forwards	Digit Span Backwards	Digit Span Total	Trails A Time	Trails A Score	Trails B Time	Trails B Score	Trails Time Difference	Alternating Sequences	Similarities
Ages 50–89 years													
≤ 5	Below normal	< 9	< 11	< 5	< 4	< 10	> 67	< 24	> 163	< 22	> 107	< 2	< 7
6–24	Borderline	9–10	11–12	5	4	10	67–47	–	163–107	22	107–63	–	7–8
≥ 25	Within normal limits	> 10	> 12	> 5	> 4	> 10	< 47	24	< 107	> 22	< 63	2	> 8
Ages 50–59 years													
≤ 5	Below normal	< 9	< 11	< 5	< 4	< 10	> 67	< 24	> 163	< 22	> 107	< 2	< 7
6–24	Borderline	9–10	11–12	5	4	10	67–47	–	163–107	22	107–63	–	7–8
≥ 25	Within normal limits	> 10	> 12	> 5	> 4	> 10	< 47	24	< 107	> 22	< 63	2	> 8
Ages 60–69 years													
≤ 5	Below normal	< 10	< 11	< 5	< 4	< 9	> 59	< 24	> 146	< 24	> 100	< 2	< 9
6–24	Borderline	10	11–12	5	4	9–10	59–43	–	146–91	–	100–53	–	9
≥ 25	Within normal limits	> 10	> 12	> 5	> 4	> 10	< 43	24	< 91	24	< 53	2	> 9
Ages 70–79 years													
≤ 5	Below normal	< 9	< 11	< 5	< 4	< 10	> 86	< 24	> 196	< 23	> 137	0	< 8
6–24	Borderline	9–11	11	5	4	10	86–49	–	196–111	23	137–65	1	8
≥ 25	Within normal limits	> 11	> 11	> 5	> 4	> 10	< 49	24	< 111	24	< 65	2	> 8
Ages 80–89 years													
≤ 5	Below normal	< 9	< 11	< 5	< 4	< 9	> 73	< 24	> 198	< 21	> 159	0	< 7
6–24	Borderline	9–10	11–12	5	4	9	73–53	–	198–120	21–22	159–85	1	7–8
≥ 25	Within normal limits	> 10	> 12	> 5	> 4	> 9	< 53	24	< 120	> 22	< 85	2	> 8

Normative data for subtests within domains: Language

Percentile	Rating	Toronto Cognitive Assessment Language Test Ratings:								
		F-words	Animal names	Naming	Repetition	Single word comprehension	Reading single word comprehension	Sentence comprehension	Single word reading	Semantic knowledge
Ages 50–89 years										
≤ 5	Below normal limits	< 10	< 14	< 13	< 8	< 8	< 2	< 5	< 11	< 9
6–24	Borderline	10–12	14–16	13	8	–	–	5–6	11	9
≥ 25	Normal limits	> 12	> 16	> 13	> 8	8	2	> 6	12	> 9
Ages 50–59 years										
≤ 5	Below normal limits	< 8	< 13	< 9	< 5	< 8	< 2	< 5	< 9	< 9
6–24	Borderline	8–11	13–18	9–13	5–7	–	–	5–6	9–11	9
≥ 25	Normal limits	> 11	> 18	> 13	> 7	8	2	> 6	12	10
Ages 60–69 years										
≤ 5	Below normal limits	< 10	< 14	< 13	< 8	< 8	< 2	< 6	< 12	< 9
6–24	Borderline	10–12	14–17	13	8	–	–	6–7	–	9
≥ 25	Normal limits	> 12	> 17	> 13	> 8	8	2	8	12	10
Ages 70–79 years										
≤ 5	Below normal limits	< 10	< 14	< 13	< 8	< 8	< 2	< 5	< 12	< 9
6–24	Borderline	10–12	14–16	13	8	–	–	5–6	–	9
≥ 25	Normal limits	> 12	> 16	> 13	> 8	8	2	> 6	12	10
Ages 80–89 years										
≤ 5	Below normal limits	< 11	< 11	< 12	< 8	< 8	< 2	< 4	< 11	< 9
6–24	Borderline	11–12	11–15	12	8	–	–	4–5	11	9
≥ 25	Normal limits	> 12	> 15	> 12	> 8	8	2	> 5	12	10