

Online Neuropsychological Assessment Protocol

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I. Setting up an Online Meeting

Schedule the meeting via email:

- Send an invitation email:
 - Ask if the participant is able to work with the computer and press buttons.
 - Inform the participant that another caregiver/family member should be present during the testing.
 - Inform the participant that they will need to provide a pencil, paper, and stable chair.
 - Include the estimated duration of the session and the incentive.
- If participant expresses interest, schedule a meeting:
 - Include the examiner's time zone to avoid confusion.
 - Assure the participant that they may continue taking their medications as they normally do, regardless of the meeting time.
 - Include a link to the scheduled video call.
 - Include the examiner's contact information..

Before the start of the session:

- Use existing databases to identify whether the participant has participated in a previous study, or if it is their first time.
- Print necessary forms (medical history, MoCA, SARA/UPDRS).

Starting the session:

- Introduce yourself and your role in the lab at UC Berkeley.
- Ask the participant if they can hear and understand the examiner's voice clearly, and adjust microphone and volume as needed.
- If applicable, mention the participant's participation in any past experiments. Otherwise, thank them for joining us for the first time.
- Make sure the participant is sitting in a stable chair.
- Make sure the participant is able to see themselves on their device.
- If possible, a caregiver/helper should be present for the SARA or UPDRS. They will help with the finger tracking or finger to nose tests. They should not be present in the same room for the MoCA because this may affect results. Ask for caregiver/helper's name right away.

- Explain that online testing is a temporary measure due to the COVID-19 pandemic, and that participants are generally tested in person in the lab at UC Berkeley

II. **Medical History Form** (forms for PD vs cerebellar ataxia participants are different):

- Fill out the medical history form with the participant.
- If the participant is part of the PD group, ask them when they take their medications. If necessary, make a note to pause the session to allow them to take their medications at the usual time.
- If the participant is part of the PD group and has DBS, ask them whether they are currently ON or OFF DBS.

III. **Montreal Cognitive Assessment (MoCA)**¹

Initial Notes: Screenshare the powerpoint: [MoCA Powerpoint Presentation](#). If there is a lag time in response, then add 1-2 seconds (depending on extent of delay) to the timed portions of the assessments.

Introduce the task: “Now I will guide you through a series of cognitive exercises. Before we begin, you will need a writing utensil and a piece of paper.”

1. **Alternating Trail Making:**

Administration: Do not complete this task.

Scoring: Do not incorporate this task into the total score.

2. **Visuoconstructional Skills (Cube):**

Administration: Display the cube. “Copy this drawing as accurately as you can onto your paper.”

Scoring: One point is allocated if:

- Drawing is three-dimensional
- All lines are drawn
- No extra lines are added
- Lines are relatively parallel and of similar length (rectangular prisms are not accepted)

3. **Visuoconstructional Skills (Clock):**

Administration: “Draw a clock. Put in all the numbers and set the time to 10 after 11.”

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

- Contour (1 pt.): the clock face must be a circle with only minor distortion acceptable (e.g., slight imperfection on closing the circle)
- 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; *f*
- 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 centred within the clock face with their junction close to the clock centre. A point is not assigned for a given element if any of the above-criteria are not met.

4. **Naming:**

¹ Adapted for online use from the November 12, 2004 Montreal Cognitive Assessment Administration and Scoring Instructions, Ziad Nasreddine MD

Administration: “Tell me the name of the animal you see on the screen.”

Scoring: “One point each is given for the following responses: (1) camel or dromedary, (2) lion, (3) rhinoceros or rhino.”

Click STOP screen share

5. **Memory:**

Administration: The examiner reads a list of 5 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 and do not write anything down. 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 subject produces on this first trial. When the subject indicates that (s)he has finished (has 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 subject recalls after the second trial. At the end of the second trial, inform the subject that (s)he 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.*”

Scoring: No points are given for these first two trials.

6. **Attention:**

a. **Forward Digit Span:**

Administration: “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.

Scoring: Allocate one point for the correct response.

Backward Digit Span:

Administration: “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.

Scoring: Allocate one point for the correct response, 2-4-7.

b. **Vigilance:**

Administration: The examiner asks the participant to position the camera so that you can see their hands tapping or clapping. The examiner should read the letters off at 1.5-2 seconds per letter, after giving the following instruction: “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.” If the participant’s clapping or tapping is inaudible, the examiner should keep the letters level with the participant’s video as they read, to avoid glancing up everytime they say ‘A.’

Scoring: 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).

c. **Serial 7s:**

Administration: “Now, I will ask you to count by subtracting seven from 100 out loud, and then, keep subtracting seven from your answer until I tell you to stop.” Give this instruction twice if necessary.

Scoring: 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.

7. **Sentence repetition:**

Administration: Ask the participant if they can hear and understand the examiner’s voice clearly. Adjust microphone or volume as needed. Then give 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.”

Scoring: 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.).

8. **Verbal fluency:**

Administration: “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.”

Scoring: Allocate one point if the subject generates 11 words or more in 60 sec. Record the subject’s response in the bottom or side margins.

9. **Abstraction:**

Administration: The examiner asks the subject 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 subject answers in a concrete manner, then say only one additional time: “Tell me another way in which those items are alike.” If the subject 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 prompt.

Scoring: 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 travelling, 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.

10. Delayed recall:

Administration: “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 (3) for each of the words correctly recalled spontaneously without any cues, in the allocated space. If the participant is stuck, give them the category cue. If they are still stuck, give them the multiple choice cue.

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

11. Orientation:

Administration:

- a. Date: *Explicitly* ask participants beforehand to “look at a wall next to them facing away from the computer screen” so they cannot peek at the date. “Tell me the date today.” If the subject does not give a complete answer, then prompt accordingly by saying: “Tell me the [year, month, exact date, and day of the week].”
- b. Place: “Can you tell me where you are right now and what city it is in?”

Scoring: Give one point for each item correctly answered. The participant should correctly identify what building they are in/what sort of room they are in (i.e. “I am in the living room in my house”). The city given should match up with the information provided upon completion of the medical history form.

TOTAL SCORE: Sum all subscores listed on the right-hand side. Add one point for an individual who has 12 years or fewer of formal education, for a possible maximum of 29 points. A final total score of 25 and above is considered normal.

IV. Motor Assessments

Important Note About Scoring

Try to be as rigid as possible when scoring (do NOT be lenient or too generous) and make sure that patient symptoms are not underestimated. This will ensure our data is accurate and matches the intended metrics of the tests.

- Keep in mind that in the literature,
 - The mean UPDRS motor score for PD patients is around 27.2
 - The mean SARA score for SCA patients is around 15.9

A. Scale for Assessment and Rating of Ataxia (SARA)

Initial Notes: Use only whole numbers when scoring each hand individually.

Introduce the task: “Now I will guide you through a series of motor exercises, similar to what you may do at a neurologist’s office.”

1. Gait: Use the following workflow to interview the participant about their gait.

STRONG SUPPORT is defined as the use of two walking sticks, a stroller, or another person.

LIGHT SUPPORT is defined as the use of one walking stick, or light support by one arm.

STAGGERING is defined as unsteady walking, with the potential to fall.

- a) Are you able to walk with any type of support?
 - i) YES → part b
 - ii) NO → **score 8**
- b) Do you use any supports when you walk?
 - i) YES → part c
 - ii) NO → part g
- c) Are you able to walk more than 10 meters with a strong support? (two special sticks, stroller, or accompanying person)
 - i) YES → part d
 - ii) NO → **score 7**
- d) Are you able to walk without a strong support? (only one stick, or aid of one arm)
 - i) YES → part e
 - ii) NO → **score 6**
- e) Do you experience any staggering when walking with light support?
 - i) YES → **score 5**
 - ii) NO → part f
- f) Do you experience any staggering when walking with very light support? (intermittent support of the wall)
 - i) YES → **score 4**
 - ii) NO → part g
- g) Do you experience any staggering when walking without support and when you change direction?
 - i) YES → **score 3**
 - ii) NO → part h
- h) Are you able to walk in tandem (tandem = both feet on one line, no space between heel and toe) for more than 10 steps with ease / comfortably?
 - i) YES → part i
 - ii) NO → **score 2**
- i) Do you experience any difficulties when walking normally, in tandem, or turning, without any support?
 - i) YES → **score 1**
 - ii) NO → **score 0**

2. Stance: Use the following workflow to interview the participant about their stance.

SUPPORT is defined as holding onto a wall, another person, or walking aid

DURATION is defined as 10 or more seconds.

- a) Are you able to stand in a natural position, feet shoulder width apart, without constant support?
 - i) YES → part b
 - ii) NO → Are you able to stand with constant support?
 - (a) Yes → **score 5**

(b) No → **score 6**

- b) Do you require any supports to stand at all? (intermittent support)
 - i) YES → **score 4**
 - ii) NO → part c
- c) Are you able to stand without support with your feet together in parallel? (big toes touching)
 - i) YES → part d
 - ii) NO → **score 3**
- d) Do you experience any swaying when standing with your feet together?
 - i) YES → **score 2**
 - ii) No → part e
- e) Are you able to stand with your feet in tandem? (tandem = both feet on one line, no space between heel and toe)
 - i) YES → **score 0**
 - ii) NO → **score 1**

3. **Sitting:** Use the following workflow to interview the participant about their sitting.

SUPPORT is defined as holding on to or being guided by an aid for more than 10 seconds, without using the back or arms of the chair.

DURATION is defined as 10 or more seconds.

- a) Are you able to sit down without any type of support?
 - i) YES → part b
 - ii) NO → Are you able to sit down with intermittent support, or do you require constant support? (intermittent = cannot sit for the entire 10+ seconds)
 - (a) Yes → **score 3**
 - (b) No, needs constant support to sit → **score 4**
- b) Do you experience a sway constantly while you sit? (unable to sit still / centered for more than 10 seconds)
 - i) YES → **score 2**
 - ii) NO → part c
- c) Do you experience any difficulties in the process of sitting or remaining seated?
 - i) YES → **score 1**
 - ii) NO → **score 0**

4. **Speech disturbance:**

- Is the participant's speech impaired? Is it difficult or easy to understand?

5. **Finger chase:**

- The examiner should play the following [video](#) while screen-sharing to demonstrate how the caregiver should move.
- The caregiver's movements should be rapid, smooth, and random. At the end of each movement they should pause briefly until the participant reaches their finger, before moving rapidly in another direction. Ask the caregiver to keep their movements within the frame of the camera.
- Specify which finger the participant should start with.
- Ask both caregiver and participant to look at their fingers and not at the camera

IN THE ABSENCE OF A CAREGIVER: Instruct the participant to move back from the camera

and extend their arm towards the screen so that their entire arm and hand are visible. The administrator will also extend their arm towards the camera and act as the target. The participant will follow the administrator's finger through the screen of their device.

6. Nose-finger test:

- The examiner should play the appropriate [video](#) while screen-sharing to demonstrate how the caregiver should move.
- Ask the caregiver and participant to look at their fingers and not at the camera.
- Specify which finger the participant should start with.
- *COVID Precautionary Measure: For the nose-finger task, they do not have to touch their nose; they can just point close to it if they feel uncomfortable touching their face. They can also wear gloves if they want to.*

7. Fast alternating hand movements:

- The examiner should play the appropriate [video](#) while screen-sharing to demonstrate how the caregiver should move. Test each hand separately.
- Encourage the participant to move as quickly as they are able.
- Perform the task with the participant and prompt them to keep up with the demonstrated pace.
- The participant should complete at least 10 cycles.

8. Heel-shin slide:

- Play the appropriate [video](#) while screen-sharing to demonstrate the desired movement. Specify which leg the participant should start with (right or left). Each movement should be performed within 1s, so encourage the participant to move as quickly as they are able.
- For better observation, have the participant place the camera on the floor in selfie mode or have the participant position the camera far from themselves.
- If the movement is very slow, then the score is likely a 3, especially if the heel goes off the shin.

B. Unified Parkinson's Disease Rating Scale (UPDRS)

Initial Notes: If the examiner is unfamiliar with rating the relative severity of PD symptoms, it helps to watch a few of the videos on this site: [Health Talk PD Videos](#).

Introduce the task: "Now I will guide you through a series of motor exercises, similar to what you may do at a neurologist's office."

18. Speech:

- Ask the participant to count to 10 as they normally would.
- Notice slurring, monotony, or loss of expression, diction, or volume.

19. Facial Expression:

- Notice loss of facial expression or parting of lips.

20. Tremor at Rest:

- Have the participant position the camera so that their entire body is visible. Observe for resting tremor.
- Follow up by asking if the participant experiences tremor all the time, most of the time, or infrequently. If the participant experiences tremor, ask if it is slight, moderate, or severe.

21. Action or Postural Tremor of Hands:

- Perform nose-to-finger test: the participant should repeatedly point from their nose to a stationary target as quickly as possible. Observe the path of the participant's finger.
- *COVID Precautionary Measure: For the nose-finger task, the participant does not have to touch their nose, they can just point close to it. They can also wear gloves.*

22. Rigidity:

- Demonstrate each of the following ranges of motion: push up on each elbow, nod head up and down, flex and extend both arms, flex and extend each calf. After each demonstration, ask the participant to replicate the range of motion on each side of their body. Ask if the participant experiences any stiffness when doing so.

23. Finger Taps:

- The participant should tap their index finger to their thumb. Observe both hands together.
- Perform the task with the participant and prompt them to keep up with the demonstrated pace.
- Encourage the participant to move as quickly as possible, and to try to maintain the full range of motion.

24. Hand Movements:

- The participant should open and close their hand. Observe each hand separately.
- Perform the task with the participant and prompt them to keep up with the demonstrated pace.
- Encourage the participant to move as quickly as possible, and to try to maintain the full range of motion.

25. Rapid Alternating Movements of Hands:

- The participant should flip both hands from front to back, first with their arms extended straight out, and then again with their arms bent at the elbow.
- The participant should flip their hands about 15 times in each position.
- Perform the task with the participant and prompt them to keep up with the demonstrated pace.
- Encourage the participant to try to move as quickly as possible, and to try to maintain the full range of motion.

26. Leg Agility:

- From a seated position, the participant should rapidly tap their foot on the ground, attempting to lift it at least three inches off the ground each time. Observe each leg separately. 10 times per leg.

- Try doing the movement yourself as the participant does it so you can determine whether lag is accounting for the difference in speed. Ask the caregiver/assistant whether they notice any difference in the video speed and the participant's speed.

27. Arising from Chair:

- “Imagine yourself sitting in a straight backed chair. Are you able to stand up from your chair *without* support from the arms of the chair? Are you able to stand up from your chair *with* support?”
- “Are you able to stand right away, or does it take several attempts?”
- “Do you feel like you stand at the same pace as you are used to, or more slowly?”

28. Posture:

- “Imagine yourself standing up straight. Do you feel like you have stooped posture, and if so, how much (is it barely noticeable, or is it significant, or somewhere in between)?
- “Do you ever feel yourself leaning slightly to one side?”

29. Gait:

- “Can you walk without assistance? When you walk, do you tend to take shuffling steps or are you able to pick up your feet? Do you feel like your head and neck are pushed forward when you walk? Do you walk at the same pace that you are used to or has your pace slowed at all?”
- **Note:** *Propulsive gait* is when a person walks with his or her head and neck pushed forward. *Festination* is the tendency to speed up in parallel with a loss of normal amplitude of repetitive movement.

Skip 30

31. Body Bradykinesia and Hypokinesia:

- Generally assess the participant's slowness in movement, overall tremors etc.
- It may help to use their caregiver/assistant as a reference point if they are married/approximately the same age.

TOTAL SCORE: The participant will be scored out of the maximum points minus 4 points. Use only whole numbers for scoring.

V. Administer Additional Questionnaires:

1. Create a plan assigning an anonymous key to each participant and indicating the order in which they should complete the questionnaires.
 - a. Half of the participants should complete the PROMIS questionnaires first, and the other half the ISEL-12 first. In each of these groups, half should complete the PROMIS Anxiety first, and half should complete the PROMIS depression first.
2. Ask participants if they would be willing to spend 10-15 minutes completing some questionnaires. Explain that these are very beneficial to the research study.
3. If the participant assents, send them the links to the PROMIS and ISEL Google forms, listed in the assigned order, via email. The email should include a unique identification code to anonymize each participant. Instruct participants to enter this code to the top of each online form.

4. Instruct participants to complete questionnaires in the order they are listed in the email, and remind them to hit the “submit” button.
 - a. Note: Researcher should turn off camera and microphone and minimize interactions with the participant during completion. Inform the participant that they can still ask questions if needed, and should indicate when they are done.
5. Email the link to the Qualtrics IPIP-NEO survey. Instruct participants to fill out the initial demographic portion of the form.
 - a. Offer the participant the option to complete the final survey on the same day at their own leisure, or to complete it during the current online session. This enables participants who are low on energy to take a break, as needed.

Links to questionnaires:

- [ISEL](#)
 - [PROMIS](#)
 - [NEO-IPIP](#)
-

VI. Debrief:

“That concludes our testing today. Thank you so much for your participation. Do you have any questions? We are studying how your cognition is related to your movement using two sister studies: one that focuses on cerebellar ataxia, and one that focuses on Parkinson’s disease. You should be receiving or may have already received a follow up email about online tests. You can complete these whenever you are able. Feel free to reach out to us with any additional questions you may have.”