COGNITIVE FUNCTION

1   **Background and Rationale**

1.1   Cognitive function may decline as a result of certain risk factors, (e.g., hypertension, elevated cholesterol, cardiac arrhythmias). This in turn could adversely impact the physical functioning and quality of life of older adults. After a certain level of decline, dementia can develop. Dementia is a major illness and cause of disability among the elderly. Cerebrovascular disease or multi-infarct dementia is the second leading cause of dementing illness among Caucasians, preceded only by Senile Dementia of the Alzheimer's Type (SDAT). The CHS offers a unique opportunity to study cognitive changes resulting from vascular lesions in a population considered to be at high risk. CHS can also prospectively investigate risk factors for vascular dementia.

1.2   The cognitive tests chosen are sensitive to changes that may result from cerebrovascular disease or risk factors such as carotid atherosclerosis and cardiac arrhythmias.

1.2.1   The Mini-Mental State is a widely used test of cognitive function among the elderly; it includes tests of orientation, registration, attention, calculation, recall, language and visualspatial skills. A score of 27 or over is considered normal.

1.2.2   The Digit Symbol Substitution Test (DSST) requires response speed, sustained attention, visualspatial skills and set shifting. It is part of the Wechsler Adult Intelligence Scale, one of the most widely used measures of intelligence. The DSST requires that the participant fill in a series of symbols correctly coded within 90 seconds. In this test the higher the score the better the person's performance.

1.3   Both the Mini-Mental State and the Digit Symbol Substitution tests have been used in the Systolic Hypertension in the Elderly Program (SHEP).

2   **Definitions**

2.1   <u>Alert level</u> Participant scoring 25 or less on the Mini-Mental State may have a cognitive impairment and, therefore, should be referred for further evaluation.

2.2   <u>Mini-Mental State Scoring</u>

The Mini-Mental State will be computer scored. The scoring algorithm is as follows.

2.2.1   Comparison of Question 3 and 4

Both serial 7's and spelling world backwards will be done. A comparison of the scores

for these questions is made and the highest one included in the final score.

Details for calculating scores for these questions are found in Section 3.4 and 3.5 below.

2.2.2   All tasks scored as "0" or "1"

Add the total score (sum of all items coded "1") and record as "Sum of scores in Items 1 through 12".

2.2.3   One or more tasks scored as "7" or "9"

1. Add the total score (sum of all items coded "1") and record as "Sum of scores in Items 1 through 12".

2. Calculate the maximum possible score (sum of all tasks not coded "7" or "9") and record as "Sum of maximum scores for scored tasks".

3. Divide "Sum of scores in Items 1 through 12" by the Sum of maximum scores for scored tasks" and multiply by 30.

■   For example:

Sum of scores in Items 1 through 12 = 14
Sum of maximum scores for scored tasks = 20

$$14/20 \times 30 = 21$$

4. Record corrected score in box provided on the form.

2.3   Digit-Symbol Substitution Task Scoring

■   The Digit-Symbol Substitution Task score is based on the number of symbols correctly coded in 90 seconds.

      ●   Code Question 17a "1 - Done" when the sample or any part of the task was attempted.

      ●   When Question 17a is coded "1 - Done", a score must be calculated for Questions 17b and 17c.

2.3.1   Scoring criteria

      ●   Single blank spaces between two completed items are not considered incorrectly coded symbols.

- Two or more blanks which occur consecutively signal the end of the task. Symbols coded after two or more blanks are not included in totals recorded in Questions 17a and 17b.

- When part of the sample is attempted, but the participant refuses to complete the actual task, code Questions 17a and 17b "0".

- Enter the number of symbols correctly coded in Item 17b.

    - For purposes of the CHS Cognitive Function Form, when it is known that a participant is dyslexic and will therefore draw some types of symbols backward, those symbols which are drawn <u>exactly</u> <u>backward</u> are scored as being correct.

- Enter the number of symbols incorrectly coded in Item 17c.

3   Methods

3.1   <u>Mini-Mental State Examination</u>

3.1.1   The Mini-Mental Examination asks the participant to provide information on their physical location, or to perform certain tasks. Based on their response or performance of the task the interviewer scores the activity as correct or in error.

3.1.2   When the interviewer cannot determine whether an answer is correct, record notes in the left-hand margin so that an editor can review the scoring later.

3.1.3   When a participant is incapacitated by blindness, has a functional disability, is illiterate or is otherwise unable to respond to all questions (e.g., Questions 3, 4, 9, 11) code Item 13 - Special problems "Yes", and specify the problem and question(s) affected.

3.1.4   When a task is not attempted due to a physical impairment (e.g. vision, hearing, severe arthritis) that task should be scored "9 - Not attempted/Refused".

3.1.5   When a task is scored "7 - Can't do" or "9 - Not attempted/Refused", the reason the task was not completed **MUST BE SPECIFIED** in Item 13 - Special problems.

3.1.6   When a task is not attempted because the examiner feels that the participant would be unable to complete the task, that task should be scored "0 - error". This includes instances where the examiner felt that:

■   The participant would "just not be able to do" the task, or

■ Attempting the task would cause too much stress for the participant.

3.2 Question 1

■ Introductory Script: I would like to ask you a few questions dealing with concentration and memory. Some are a little bit more difficult than others.

■ Read each question from the form.

- Record the response on the form.

- Code "1" when the response is correct.

- Code "0" when the response is incorrect.

- If the participant is unable to answer the question or perform the task due to a functional disability, record "9 - Not attempted/Refused". Document the reasons in Item 13 - Special Problems.

- If the participant refuses to answer the question, record "9 -Not attempted/Refused". Document the reasons in Item 13 - Special Problems.

■ Questions 1a to 1e

- Ask for the date. Then ask specifically for parts omitted, e.g., "Can you also tell me what season it is?"

- Since distinctions between seasons can be difficult during certain months, the following schedule has been created. For months with two seasons listed, either answer is correct.

Month	Correct Response
January	Winter
February	Winter
March	Winter or Spring
April	Spring
May	Spring
June	Spring or Summer
July	Summer
August	Summer
September	Summer or Fall
October	Fall
November	Fall
December	Fall or Winter

- If participant supplies part or all of the data (e.g., month and day, or month, day, and year), record as appropriate and do not ask those questions again.

■ Questions 1f to 1j

- Ask the participant where they are. Then ask specifically for parts omitted, e.g., "Can you also tell me what city it is?"

- For people who live in cities with the same name as the county (e.g., Sacramento) any of the following are correct:

  1) City name
  2) We are not in a/the county
  3) City name followed by "City"
  4) City name followed by "County"

3.3   Question 2

■ Introductory Script: I am going to name three objects. After I have said them, I want you to repeat them. Remember what they are because I am going to ask you to name them again in a few minutes.

- Make sure participant is attentive when beginning the question.

- Read the list of objects slowly. DO NOT REPEAT ITEMS UNTIL AFTER THE FIRST TRIAL.

- If participant asks you to repeat the 3 items,

  Respond: Can you tell me the items I just mentioned? or
          Just do the best you can.

- Participant may repeat the items in any order.

■ Read:

APPLE   TABLE   PENNY

■ Script: Could you repeat the three items for me?

- Record the score for the first trial.

  - Code "1" when the response was correct.

- Code "0" when the response was incorrect.

- If after scoring the first attempt, the participant has not learned the 3 objects, repeat the list of objects up to six times until the participant has learned them.

3.4   Question 3

■ Introductory Script: Can you subtract 7 from 100, and then subtract 7 from the answer you get and keep subtracting 7 until I tell you to stop? Please do the subtraction out loud.

■ General instructions

- If the participant does not understand the instructions, repeat them.

- Time allowed is three minutes.

- One re-start, on participant's initiative, is allowed.

- Do not supply the last answer when participant loses his/her place.

- Pencil and paper are not allowed.

■ If participant stops too soon:

- Script: Please subtract 7 from the last answer you gave me and keep subtracting 7's until I tell you to stop.

■ If participant says s/he cannot subtract:

- Script: Would you be willing to give it a try?

- Code "7 - Can't Do" for each answer not attempted when participant states s/he cannot do the subtraction. Document the reasons in Item 13 - Special Problems.

■ If participant refused to do subtraction.

- Code "9 - Not attempted/refused" for each answer not attempted when participant says s/he is too tired or doesn't want to do it. Document the reasons in Item 13 - Special Problems.

■ Record the responses given by the participant in the space provided on the form.

- The correct responses are on the form.

- Scoring

  - Code "1 - Correct" for each correct answer.

  - Code "0 - Error" for each incorrect answer.

    EXCEPTION: If one subtraction is wrong but the subsequent response is 7 less than the prior number, count as one error. For example, 95, 88, 81, 74, 67 counts only as 1 error.

3.5   Question 4

- Introductory script: I am going to spell a word forwards and I want you to spell it backwards. The word is WORLD. W-O-R-L-D. Spell WORLD backwards.

  - Read the question slowly. Where "world" has hyphens between the letters, spell out the word.

  - Repeat the spelling if necessary.

  - Record the participants response. The correct letter is next to the line where you record the response.

- Scoring

  - Score 1 point for each correct answer.
  - No errors - Each letter in the correct position.
  - Two errors - Transposition of two letters
  - One error - Each extra letter
  - One error - Each omitted letter

3.6   Question 5

- Introductory Script: Now what were the three objects I asked you to remember?

  - Items may be repeated in any order.

  - Code "1 - Correct" for each correct answer.

  - Code "0 - Error" for each incorrect answer.

3.7   Questions 6 and 7

■   Introductory script: What is this called?

●   Show the wrist watch/pencil to the participant.

Note: The pencil should be a standard sharpened wooden pencil with eraser.

●   Code "1 - Correct" for each correct answer.
For Question 6 correct responses include:
    Watch
    Wrist watch
    Timepiece

●   Code "0 - Error" for each incorrect answer.

●   When the participant is visually impaired Code "9 - Not attempted/Refused".

3.8   Question 8

■   Introductory script: I would like you to repeat a phrase after me: "No if's "and's," or "but's."

●   Enunciate clearly; include the 's' at the end of "if's "and's," and "but's."

●   Allow only one attempt.

●   Code "1 - Correct" when the participant correctly repeated the phrase.

●   Code "0- Error" when the participant did not repeat the phrase exactly.

3.9   Question 9

■   Introductory script: Read the words on this page and then do what it says.

●   Hand participant the Card 11.

●   The participant may read the sentence out loud. The task to be coded is the participants ability to follow instructions by closing his eyes.

●   Code "1 - Correct" when the participant closed his/her eyes.

●   Code "0- Error" when the participant did not close his/her eyes.

- When the participant is visually impaired Code "9 - Not attempted/Refused". Document the reasons in Item 13 - Special Problems.

3.10   Question 10

■   Introductory script: I am going to give you a piece of paper. When I do, take the paper in your right hand, fold the paper in half with both hands, and put the paper down on your lap.

- Read the full statement <u>before</u> handing the paper to participant.

- Do <u>not</u> direct the paper to participant's right side. Hold the paper in front and have the participant reach out to take it. Observe which hand is used.

- Do not repeat instructions or coach participant.

- Code "1 - Correct" when the participant completed the activity as directed.

- Code "0- Error" when the participant did not complete the activity as directed.

3.11   Question 11

■   Introductory script: Write any complete sentence on that piece of paper for me.

- Use the same paper used in Question 10.

- Repeat the instructions to participant if necessary.

■   Scoring

- Code "1 - Correct" when the participant wrote a complete sentence as directed.

    - Written commands, such as "sit down," where the subject is implied, are considered correct response.

    - Spelling and/or punctuation errors are not counted as errors.

- Code "0- Error" when the participant did not write a complete sentence as directed.

- When the participant is visually impaired Code "9 - Not attempted/Refused". Document the reasons in Item 13 - Special Problems.

3.12   Question 12

■   Introductory Script: Here is a drawing. Please copy the drawing on the same paper.

●   Hand Card 12 to the participant.

■   Scoring

●   Code "1 - Correct" when the participant drew a diagram which matched that on Card 12.

- To be correct: Each pentagon must have:
    Five sides, and
    Five corners that point outward.
- The overlap figure must have four sides.

●   Code "0- Error" when the participant's drawing did not match that on Card 12.

●   When the participant is visually impaired Code "9 - Not attempted/Refused". Document the reasons in Item 13 - Special Problems.

■   Retrieve the paper from the participant.

■   Place a Participant ID label on the paper and file it in the participant's record.

3.13   Question 13 Special Problems

Record information regarding disabilities or difficulties the participant may have had in completing any of the tasks.

3.14   Questions 14 to 16 Scoring
See Section 2.2 above.

3.15   Question 17 Digit-Symbol Substitution Task

■   Place the task sheet before the participant and point to the task.

■   Introductory Script: Look at these boxes across the top of the page. On the top of each box are numbers from one through nine. On the bottom part of each box there is a symbol. Each symbol is paired with a number.

(Point to the four rows of boxes.)

Down here are boxes with numbers on the top, but the bottom part is blank. What I want you to do is to put the correct symbol in each box like this.

(Fill in the first three sample boxes.)

Now I want you to fill in all boxes up to this line.

(Point to the line separating the samples from the test proper.)

- If the participant has difficulty completing the ten sample items or does not grasp the task, help him complete the sample items.

  - If the participant still has difficulty or does not grasp the task, discontinue the task.
  - Code "1- Done" for Question 17a.
  - Code "0" for Questions 17b and 17c.

- Give participants with visual limitations an opportunity to complete the sample.

  If a visually impaired participant cannot complete the sample:

  - Code Question 17a "0 - Not Done".
  - Do not record scores for Questions 17b and 17c.

■ After the demonstration and practice is complete, point to the first box following the sample items and say:

- Script: When I tell you to begin, start here and fill in the boxes in these four rows. Do them in order and don't skip any. Please try to work as quickly as possible. Let's begin."
- Stop the participant after 90 seconds. Say, "That's good. That completes this set of tasks."