The Modified Mini-Mental State (3MS) Examination

Evelyn Lee Teng, Ph.D., and Helena Chang Chui, M.D.

The Mini-Mental State (MMS) examination is a widely used screening test for dementia. The Modified Mini-Mental State (3MS) incorporates four added test items, more graded scoring, and some other minor changes. These modifications are designed to sample a broader variety of cognitive functions, cover a wider range of difficulty levels, and enhance the reliability and the validity of the scores. The 3MS retains the brevity, ease of administration, and objective scoring of the MMS but broadens the range of scores from 0–30 to 0–100. Greater sensitivities of the 3MS over the MMS are demonstrated with the pentagon item drawn by 249 patients. A summary form for administration and scoring that can generate both the MMS and the 3MS scores is provided so that the examiner can maintain continuity with existing data and can obtain a more informative assessment.


ADMINISTRATION AND SCORING

A summary form for the administration and scoring of the Modified Mini-Mental State (3MS) is presented in the Appendix and can be reproduced on one side of a standard (8½ in. × 11 in.) sheet of paper. Items from the MMS that are not part of the 3MS are included in parentheses so that both 3MS scores and MMS scores can be obtained by using the same form. On the back side of the same sheet, CLOSE YOUR EYES (all in capital letters, approximately ½ in. high) can be printed in the upper part, and two intersecting pentagons (each side 1 in. long) can be drawn in the lower part. Enough blank space will be left to record the subject’s drawing and writing.

Testing procedures and scoring criteria that either do not differ from the original MMS or are self-evident in the summary form are not repeated here. Clarifications, important aspects of administration, and comments on the differences between the MMS and the 3MS are presented in the next sections. Instructions enclosed in quotation marks and printed in capital letters should be followed verbatim.

Date and Place of Birth

Assign one point each to the year, month, date, city or town, and state of birth. This item is added to provide some measure of the subject’s recall of personal information that one can assume to have been overlearned.

Registration

"I SHALL SAY THREE WORDS FOR YOU TO RE-MEMBER. REPEAT THEM AFTER I HAVE SAID ALL THREE WORDS . . . SHIRT . . . BROWN . . . HON-ESTY."

If a person is tested repeatedly, the alternatives of "shoes, black, modesty" and "socks, blue, charity" may be used in successive test sessions. However, whether or not the three alternate forms are comparable has yet to be determined.

The MMS procedure permits the use of the names of any three objects, thus allowing wide variations in item difficulty. The 3MS procedure specifies the three words to
reduce the variation. The inclusion in the 3MS of a low-
frequency abstract word, honesty, is intended to broaden
the range of difficulty.

Mental Reversal
First establish the subject’s ability to recite in the for-
ward direction, coaching him or her once if needed. Then
ask the subject to recite in the reverse direction. Score for
the number of elements in correct relative position. Score
0 if, after being coached, the subject is still unable to re-
cite in the usual direction.

The relatively easy item of counting backward from 5
to 1 is added to introduce the task and to extend the lower
range of the test.

The corresponding MMS item of “Attention and Calcu-
luation” permits two choices of testing: either by spell-
ing “world” backward or by five serial subtractions of 7.
However, the equivalence between the two alternatives in
the composition of mental operations has not been demon-
strated. The serial subtractions are more difficult and are
more affected by the subject’s educational background; 3
therefore, this alternative is eliminated from the 3MS.

First Recall
First ask, “WHAT ARE THE THREE WORDS
THAT I ASKED YOU TO REMEMBER?”
For each word not recalled, provide a category cue (e.g.,
“something to wear”); if the subject still cannot
give the correct answer, provide three choices (e.g.,
“shoes, shirt, socks”). Use only the specified cues and
choices. If the subject does not give the correct answer
from the three choices, score 0 and provide the correct
answer.

The MMS gives credit only for unaided recall. To ex-
tend the lower range of the test, the 3MS also gives credit
for correct responses after the subject has received cate-
gory-cueing and after being given multiple choices.

Temporal Orientation
The MMS dichotomizes the response to each of the
five subitems as correct or incorrect. The 3MS assigns
scores according to the closeness of the response to the
correct answer. Graded scoring of temporal orientation
has been found to be highly sensitive for detecting abnor-
mal mental decline in old persons. 4

Temporal orientation is scored in a negative manner.
For example, most nondemented persons know the year;
assigning 8 points for the year means that not knowing the
year will be penalized for up to 8 points.

Spatial Orientation
For the last subitem, ask, “ARE WE IN A HOSPITAL
OR OFFICE BUILDING OR HOME?” If the correct an-
swer is not among those three choices, substitute the cor-
rect answer for the second choice, office building.

The MMS asks for the name of the hospital, but re-
porting the hospital’s name has a high memory component
and may not be applicable in some circumstances, such as
when a subject is tested in his or her home. The 3MS
procedure simply provides three alternatives for the sub-
ject to choose from. The MMS item for floor is eliminat-
because the correct identification of the floor is partly
fluenced by the total number of floors in a building.

Naming
Point to a part of your own body and ask the subject
to name it. Score 0 if the subject cannot name it readily.
Do not wait for the subject to mentally search for the name.

Body parts are used to ensure equal familiarity by
subjects. According to the Kućera-Francis word count,
the frequencies of occurrence in approximately 1 million
printed words for “shoulder,” “chin,” “forehead,” “bow,”
and “knuckle” are 61, 27, 16, 10, and 3, respec-
tively. The corresponding frequencies for the MMS words
of “watch” and “pencil” are 81 and 34, respectively.

Four-Legged Animals
Ask, “WHAT ANIMALS HAVE FOUR LEGS?” Allow
30 seconds for the response.

If the subject gives no response in 10 seconds, repeat
the question once.

The first time an incorrect answer is provided, say,
“DO NOT WANT FOUR-LEGGED ANIMALS.” Do not correct for
subsequent errors.

Score for the number of correct responses, up to 10.
This item is added because fluency of retrieval from
specified category has been demonstrated to be sensitive
in differentiating between normal and early-dementia
states. 4, 5, 6

Similarities
Ask, “IN WHAT WAY ARE AN ARM AND A LEG
ALIKE?” If the subject fails to give an answer that
worth 2 points, assign the appropriate score of 1 or 0. Do
do coach the subject by saying that an arm and a leg are
either both limbs or parts of the body. Do not coach for the
subsequent two subitems.

This item is added to sample abstraction or concept
thinking that is relatively unrelated to category retrieval
but that is impaired in dementia. 7

Repetition
First say, “REPEAT WHAT I SAY, ‘I WOULD LIKE
TO GO HOME/OUT.’” Pronounce the individual word
clearly but with the normal tempo of a spoken sentence
(i.e., without artificial slowing or pausing after each
word). Use “home” in the sentence if the subject is not
home; otherwise, use “out.”

Next say, “NOW REPEAT, ‘NO IFs, ANDs, OR
BUTS.’” Again, use the normal tempo of a spoken sen-
tence. Assign 1 point each for “no ifs,” “ands,” and
“buts.” Give no credit if the subject misses the “s.”

The first sentence is added to extend the lower range
of the test and to help establish the subject’s mental set
in repeating.

Read and Obey “Close Your Eyes”
Hold up the piece of paper on which the command
is printed and say, “PLEASE DO THIS.” If the subject does
not close his or her eyes within 5 seconds, prompt him or her by pointing to the sentence and saying, "READ AND DO WHAT THIS SAYS." If the subject has already read the sentence aloud spontaneously, simply say, "DO WHAT THIS SAYS." Allow 5 seconds for the response.

Assign a score of 1 if the subject reads the sentence aloud, either spontaneously or after the examiner's request, but does not close the eyes.

Writing

For this and the following item, provide the subject with a soft (No. 2) pencil with an eraser attached.

Ask the subject to write, "I would like to go home...". Repeat the sentence, word by word if necessary, but allow a maximum of 1 minute after the first reading of the sentence for the response.

Either printing or cursive writing is allowed. Assign 1 point for each correct word, but give no credit for "1." Each word needs to be completely correct to earn 1 point. Do not penalize self-corrected errors. If the writing is ambiguous, judge whether or not the word can be readily recognized in isolation.

The MMS calls for a written sentence generated by the subject and gives a score of 1 or 0 for the whole product. The subject may fail because he or she is unable to generate a sentence or unable to write or both. Recent reports indicate that the inability to write is the more limiting component for this item, and the loss of the ability to write is associated with a higher familial incidence of dementia. The 3MS item more specifically measures the ability to write a standard dictated sentence, and it permits a range of scores from 0 to 5.

Copying Two Intersecting Pentagons

Allow 1 minute for copying. In scoring, do not penalize for self-corrected errors, tremors, minor gaps, or overshoots.

For each five-sided enclosure, assign a score of 4 unless the longest side is more than twice the length of the shortest side, in which case assign a score of 3. A nonpentagon enclosed figure is given 2 points. Two or more line segments that do not form an enclosure are given 1 point.

A four-cornered intersection is given 2 points. An intersection with other than four corners receives 1 point.

The 0-10 graded scoring for this item in the 3MS replaces the 0-1 dichotomous scoring of the MMS. In the MMS only this one point is given to a nonverbal task.

Three-Stage Command

Hold up a piece of white paper in plain view of the subject but out of his or her reach and say, "TAKE THIS PAPER WITH YOUR LEFT [for a left-handed person, say RIGHT] HAND, FOLD IT IN HALF, AND HAND IT BACK TO ME."

After saying the whole command, hold the paper within reach of the subject. Do not repeat any part of the command. Do not give visual cues for the subject to return the paper, such as keeping a hand in a ready-to-receive posture.

The first part of the command asks the subject to use the nonpreferred hand in order to avoid crediting 1 point by default. The third part of the command is revised from the MMS for ease of administration.

Second Recall

Administer this item even if the subject has a score of 0 on the first recall. Test and score in the same way as with the first recall.

The second recall is added to test the subject's memory after a longer interval than the first recall, and it is expected to extend the ceiling of the test. The second recall may also help differentiate dementia of the Alzheimer type from other forms of dementia. Although the distinction between cortical dementia and subcortical dementia has been questioned, patients with dementia of the Alzheimer type show a clearly faster rate of forgetting between two recall tests than do patients with Huntington's disease.

COMPARISON BETWEEN 3MS SCORING AND MMS SCORING ON THE PENTAGON ITEM

One significant difference between the 3MS and the MMS is that the 3MS provides a range of scores on several items for which only a pass/fail dichotomy is given in the MMS. To assess the extent to which inter scorer agreement can be expected on the 3MS graded scoring system, we reviewed previous MMS records; and two scorers independently rescored, using the 3MS criteria, the drawings of two pentagons by 249 patients. The primary diagnoses of those 249 patients, each diagnosis followed by the number of cases in parentheses, were as follows: probable or possible dementia of the Alzheimer type (170), amnestic syndrome (24), Parkinson's disease (21), multi-infarct dementia (11), Pick's disease (6), progressive supranuclear palsy (4), normal-pressure hydrocephalus (3), and other (10).

Interscorer agreement was high: Scores assigned by one scorer had a mean ± SD of 5.49 ± 3.55; scores assigned by the other scorer had a mean ± SD of 5.44 ± 3.57. Of the 249 records, scores assigned by the two scorers were identical in 80% of the cases, differed by 1 point in 16% of the cases, and differed by 2 points in 4% of the cases. Pearson's correlation coefficient between the two sets of scores was .98 (df = 247, p < .0001).

According to the 3MS scoring, the patients were divided into 11 groups. The percentages of patients in the groups, ranking from best (score = 10) to poorest performance (score = 0), were 17%, 11%, 14%, 4%, 8%, 4%, 9%, 4%, 9%, 8%, and 12%. According to the MMS scoring, patients were simply dichotomized: 24.5% of them passed the item, and 75.5% failed.

The graded 3MS score on this drawing item had a Pearson's correlation coefficient of .69 (df = 247, p < .0001) with the sum of scores from the other items of the Mini-Mental State; the corresponding point-biserial correlation coefficient for the dichotomous MMS score was .39 (df = 247, p < .0001).

Ninety of the 249 patients received a second administration of the MMS after various intervals. For those 90
patients, the mean 3MS score on the drawing item was 5.78 on the first examination and 4.29 on the second examination; the corresponding MMS scores were 0.26 and 0.20. According to the 3MS scoring, 54 patients deteriorated and 9 patients improved in their drawing ability; the corresponding number of patients was 9 and 4, respectively, according to MMS scoring.

**COMMENTS**

We have just started using the 3MS at our clinics and do not yet have a large enough data set to conduct statistical analyses. However, the foregoing presentation on the drawing item does demonstrate that a finer differentiation of the subject’s responses can be achieved with graded scoring of their responses.

In addition to providing more quantitative scoring, the 3MS also includes a broader sampling of cognitive functions and a wider coverage of difficulty levels. The content of the added or modified items are drawn from common human experiences (e.g., date and place of birth, body parts, laughing/crying, eating/sleeping), so they will be equally applicable to subjects from different cultural and regional backgrounds.

The MMS has been used mainly as a screening test for dementia among hospital patients. The 3MS is a more comprehensive examination that has more refined scoring. It promises greater usefulness in epidemiological surveys and longitudinal studies.

Many studies that use the MMS are either in progress or being planned. Adoption of the 3MS should generate more informative data with little additional test time and effort. The summary form for administration and scoring shown in the Appendix can be used to obtain both the MMS and the 3MS scores, thus assuring continuity with existing data and an improved assessment.

**REFERENCES**

### Appendix: The Modified Mini-Mental State (3MS)

| Subject | | Age | | 3MS | | MMS | | DATE AND PLACE OF BIRTH | | Date: year _____, month _____, day _____ | | Place: town __________ , state _____ | | REGISTRATION (No. of presentations: _____) | | SHIRT, BROWN, HONESTY | (or: SHOES, BLACK, MODESTY) | (or: SOCKS, BLUE, CHARITY) | | MENTAL REVERSAL | 5 to 2 | Accurate | 2 | | | 1 or 2 errors/misses | 0 1 | | DLROW | | 0 1 2 3 4 5 | | FIRST RECALL | | Spontaneous recall: | | After "Something to wear" | 3 | | "SHOES, SHIRT, SOCKS" | 0 1 | | Spontaneous recall: | | After "A color" | 3 | | "BLUE, BLACK, BROWN" | 0 1 | | Spontaneous recall: | | After "A good personal quality" | 2 | | "HONESTY, CHARITY, MODESTY" | 0 1 | | TEMPORAL ORIENTATION | | Year | | Accurate | 8 | | Missed by 1 year | 4 | | Missed by 2-5 years | 0 2 | | Season | | Accurate or within 1 month | 0 1 | | Month | | Accurate or within 5 days | 2 | | Missed by 1 month | 0 1 | | Day of month | | Accurate | 3 | | Missed by 1 or 2 days | 2 | | Missed by 3-5 days | 0 1 | | Day of week | | Accurate | 0 1 | | SPATIAL ORIENTATION | | State | | 0 2 | | County | | 0 1 | | City (town) | | 0 1 | | HOSPITAL/OFFICE BUILDING/HOME? | | 0 1 | | NAMING (MMS: Pencil _____, Watch _____) | | Forehead _____, Chin _____, Shoulder _____ | | Elbow _____, Knuckle _____ |