

DE-WESTERNIZATION OF A DEMENTIA SCREENING SCALE: THE PHILIPPINE EXPERIENCE

L.K. Ledesma, B.V. Diputado,
G.O. Orteza and C.E. Santillan
University of the Philippines

ABSTRACT

In a developing country like the Philippines, it is often difficult to determine if sub-average performance on western-based neuropsychological tests of a patient belonging to the low socio-economic group is reflective of dementia or limitations in his/her educational as well as socio-cultural experiences. The authors share their experience in "de-westernizing" a Dementia Screening Scale for such a population. The instrument assesses the following 8 areas of higher cortical functioning: Behavior/Activities of Daily Living; Orientation/Information; Language; Abstract Thinking/Judgment; Memory; Mental Tracking; Calculation; and Praxis. In its final form, all the subtests except for Praxis were found to significantly discriminate between demented and non-demented subjects. The scale also achieved a Sensitivity of 94.12%, and a Specificity of 98.82%.

I. INTRODUCTION

The increase in the number of elderly individuals is highly noteworthy. In the United States, a society that has been characterized as ageing (Neugarten and Neugarten, 1991), 1 out of every 3 people in 1991 was over 65 years of age. This is up from a mere 1 in 25 at the turn of the century. In the Philippines in 1960, the number of elderly was 739,000 or 2.7% of the total population (Concepcion, 1983). By 1990, this rose to 1,820,550 or 3% of the nation's population (Philippine Population Data Sheet, 1990) but marks a dramatic 146% increase in actual numbers. In fact, the projected number of elderly by the year 2030 is a staggering 14,512,000 to 15,061,000 individuals (Domingo and Ferral, 1987).

Together with a growing elderly population is an awareness of their specific needs and health concerns. The incidence of dementia, a disease typically associated with the aged, is likewise on the rise. Ineichen (1987) reviewed 20 published studies in various countries and reported a prevalence rate of dementia ranging from 2.5% to 24.6% in those over 65 years.

Dementia is an acquired persistent impairment of intellectual function with deficits in at least three of the following: language, memory, visuospatial skills, emotion or personality, and cognition (e.g., abstraction, calculation, judgment, executive function) (Cummings and Benson, 1992). This definition is based on observations of disturbances that are readily testable at the bedside or using neuropsychological instruments. The DSM-III-R

*This study was partially funded by the Brain Foundation of the Philippines. It was presented in the Paper Session entitled "Neuropsychological Evaluation in Dementia" during the Centennial Convention of the American Psychological Association in Washington, DC from August 14-18, 1992.

*Address all correspondence to: Lourdes K. Ledesma, Ph.D., Section of Neurology, Dept. of Medicine, Ward 5, University of the Philippines/Philippine General Hospital (UP-PGH), Taft Avenue, Manila.

(1987) further specifies that the disturbance must be severe enough to interfere significantly with work, usual social activities or relationships with others.

The onset, course and severity of dementia varies from patient to patient depending on the etiology of the disease. In assessing dementing individuals, one must therefore be able to objectively evaluate their behavior through tests of cognitive performance or activities of daily living (Albert and Moss, 1984).

The Mental Status Exam (MSE), a customary component of a comprehensive neurologic evaluation, is an orderly assessment of the important cognitive and emotional functions that are commonly and characteristically disturbed in patients with organic brain disease (Strub and Black, 1981). Via this procedure, one is able to clinically observe and document the altering patterns of mental functions since differential involvement of structures of the central nervous systems produces identifiable patterns of neuropsychological deficits (Cummings and Benson, 1992). The MSE therefore assists in ensuring that subtle deficits are not overlooked in the routine neurologic exam, and in differentiating between psychiatric and organic diseases.

Through the years, numerous instruments to more systematically diagnose dementia and document its features have been developed and standardized. The Mini-Mental State Exam (MMSE) is a frequently used screening test which assesses orientation, immediate and delayed recall, attention and calculation, as well as dimensions of language functioning such as naming, repetition, reading and writing. It has a sensitivity of 87% and a specificity of 82% for detecting dementia (Folstein, Folstein, & McEugh, 1975). However, Haxby, et. al. (1992) found that the MMSE was not as useful as the Wechsler Adult Intelligence Scale (WAIS) and Dementia Rating Scale (DRS) in predicting the future rate and severity of decline in patients with dementia of the Alzheimer's type (DAT). Jorm, et. al. (1988) and Bleecker, et. al. (1989) also

caution that despite good psychometric properties, the potentially confounding effects of education and intellectual competence on MMSE performance remain unknown.

Another commonly used test is the Dementia Rating Scale (DRS) which assesses a wide variety of cognitive functions such as attention, initiation and perseveration, conceptualization, construction and memory at a level of difficulty appropriate to the patients (Albert and Moss, 1984). This test, however, fails to include an evaluation of language. Employing a short form of the Fuld-Object-Memory Evaluation (FOME), Fuld, et.al. (1990) were able to identify deteriorating normal individuals well over a year before there was any complaint of change in functioning or any significant alteration in mental status. The nature of this test proved more suitable for the evaluation of elderly who had visual or auditory difficulties, and for those who were resistant or depressed. In a similar study, Masur, et.al. (1990) utilized the Selective Reminding Test to predict the development of dementia through the detection of memory impairment in non-demented individuals.

Standard intelligence tests have likewise been used in the detection of dementia. Results of several studies have been provocative but are still equivocal. Satz, et.al. (1987) report evidence of a Wechsler Adult Intelligence Scale-Revised (WAIS-R) marker for DAT but warn that there is a need for further study on this.

The systematic use of valid and reliable psychometric instruments, therefore, provides a behavioral marker which might contribute to early and accurate diagnosis of decline (Katchaturian, 1985). Thus far, the instruments described have been Western in origin. Difficulties may arise, however, when the instrument proves unsuitable to the population.

At the University of the Philippines-Philippine General Hospital (UP-PGH), a state-owned, tertiary care teaching hospital that caters primarily to the lower socio-economic strata of Philippine society, patients from all over the archipelago suspected of having dementia are

referred. One of the major problems at the Neurology Section is to determine if sub-average performance on commonly used neuropsychological tests is indeed reflective of dementia or due to educational and/or socio-cultural factors. The authors, therefore, de-westernized an assessment approach to dementia for this population and would like to share their experience in the hopes that it will help others working with similar populations, particularly in developing nations like ours.

II. STATEMENT OF THE PROBLEM

In our local experience, subjects assessed to have normal higher cortical functions based on historical observation could perform either well or poorly on standard western tests because of the following variables: (1) level of education; (2) socio-economic status; and/or (3) urban exposure.

Educated, middle to upper income bracket groups residing in urban areas are familiar with the setting in which testing is conducted, as well as stimulus and response characteristics of western tests, and hence tend to do well on these. On the other hand, those who are minimally educated, belong to the low income bracket, and hail from rural areas are not as familiar as the well-educated, higher in income and urban respondents, and, therefore, usually perform poorly. Thus there is a high probability that this last group may be misdiagnosed as demented not because of deficient higher cortical functions but because of instrument bias. If such is the case, there is a need to resolve this incongruence between actual higher cortical function and test performance by de-westernizing our assessment tools.

To our minds, the assessment experience is made up of three major components: (1) setting; (2) stimulus characteristics; and (3) response characteristics. In what we shall term the "Western Paradigm", the setting is usually an office or clinic, with a one-to-one examiner-examinee relationship. The stimulus is in a

foreign tongue like English, and usually consists of objects and themes relevant to a western culture. Oftentimes reading skills are also demanded. Some expected responses require reading and writing, and acceptable answers are based on prevalent western constructs.

If we are then to conceptualize a "De-westernized Paradigm," the setting should take into account the social and cultural conventions that the subjects are comfortable functioning in. The stimulus should be in their native tongue and consist of objects and themes they are familiar with. Absence of literacy skills should not put them at a disadvantage. Finally, the acceptable responses should be based on prevalent indigenous constructs.

III. OBJECTIVES

To address these issues we set out to develop a dewesternized Dementia Screening Scale appropriate for low socio-economic groups with minimal educational exposure. With respect to setting, we conducted the test in a familiar environment and in the presence of a person known to the subject, like a relative or caretaker. This since we found that performance was enhanced by such modifications. In the area of stimulus characteristics, we developed the test in the native language and used parallel equivalents of western items, as well as familiar themes. We also limited this to auditory and visuo-graphic stimuli so that literacy skills would not be called into play. Finally, response characteristics were adapted by limiting tasks to those that did not require reading and writing. We also accepted responses that reflected indigenous constructs. For example, in the Philippines, we tend to give directions based on prominent landmarks like mango trees or on how many bridges to cross rather than on measured distance; we tend to acknowledge orientation in terms of where one is in relation to the sea as against the mountains instead of via north, south, east, and west.

We also set out to establish normal values of the different cognitive domains for this population, as well as determine the validity, sensitivity and specificity of the instrument.

IV. PROCEDURE

A. Subjects

All subjects were separately examined by two neurologists and one neuropsychologist. A consensus of three was required to classify them as normal or demented.

The criteria for inclusion were as follows:

(1) come from the low socio-economic group; (2) have formal education of 10 years or less; (3) be at least 20 years old; (4) have no hearing, visual or motor problems sufficient to impair performance on the test; and (5) have no significant neurologic, psychiatric, or debilitating illness to affect performance on the instrument.

Pretest involved 40 normal subjects with a mean age of 54.1 (range = 44 -70 years). 26 were female and 14 were male, with a mean formal education of 7.32 years.

For the establishment of normal values, we used a total of 82 subjects with a mean age of 52.43 (range = 20-80 years). 58 were female and 24 were male. The mean formal years of education was 6.19.

To test whether the Dementia Screening Scale could discriminate between demented and non-demented subjects, and to determine the sensitivity and specificity of the test, we matched 17 pairs of subjects based on age, sex and years of formal education.

B. Materials

On Pre-test, the instrument was constructed to assess the following 7 areas of higher cortical functioning: Behavior/Activities of Daily Living; Orientation/Information; Language; Abstract Thinking Judgment; Memory; Calculation; and Praxis. This pre-test material took an average of 1 1/2 hours to administer.

The final instrument, called the De-westernized Dementia Screening Scale or DDSS is based on DSM III-R's criteria. It consists of 136 items grouped into 9 subtests namely:

- (1) Behavior and Activities of Daily Living;
- (2) Memory;
- (3) Orientation;
- (4) Mental Tracking;
- (5) Praxis;
- (6) Calculation;
- (7) Language;
- (8) Abstract Thinking; and
- (9) Judgment.

The subtests are further grouped into three (3) categories. **Category A** pertains to a decline in intellectual functioning, as well as an impairment in social or occupational functioning. **Category B** pertains to impairment in short and long term memory. **Category C** is concerned with impairment in at least one of the following: orientation, mental tracking, praxis, calculation, language, abstract thinking, and judgment.

The test kit includes an Instruction Manual, test protocol, 2 blank sheets of paper and pencils; stimulus cards for Object Naming and Construction; 6 orange wood sticks; 1 pair of plastic spoon and fork; 1 pair of metal spoon and fork; Pesos in specified denominations; paper; comb; candle; envelope; fan; matchsticks; mirror; ring; tape measure; inexpensive ring and earrings. The DDSS takes an average of 20 - 30 minutes to administer.

C. Methodology

Pretest. Items were generated and pre-tested on 40 normal subjects who met the criteria. In the process of administering the instrument to this group, we noticed that they had difficulty appreciating certain items or subtests that we had adjudged as relatively simple. Specifically these included manual computation of math equations; copying of complex geometric designs; and interpretation of proverbs. Fatigue factors were likewise felt to have affected their performance since, as mentioned earlier, it took an average of

1 1/2 hours to complete the test. Yet these subjects were fully functioning and productive members of their families and communities. We therefore qualitatively analyzed their responses and concluded that the items were not accurately tapping at the higher cortical functions we were seeking to evaluate.

Test Modification. The following revisions were therefore made:

- (1) Instead of using equations to assess math computational abilities, the subjects were presented with word problems based on common experiences encountered when purchasing items in the public market. To help them establish the set, the first item involved their adding up actual peso bills and coins. The second item involved their handing over the correct change for a given problem. The succeeding items then called for mental computation.
- (2) The geometric designs to be drawn were simplified. In addition, we included items where the subjects replicated basic figures using orange wood sticks. This is to assess the constructional abilities of illiterates who were not used to handling writing instruments.
- (3) Instead of evaluating abstract thinking via proverbs, subjects were merely asked to note similarities and differences between familiar objects. Once again, to assist them in establishing the set, a metal spoon and plastic fork were used on the first item. The succeeding items no longer included such materials.
- (4) Finally, instead of predicting outcomes to stories while simultaneously committing these to memory, the task was simplified and limited to assessing judgment and reasoning abilities by having the subjects resolve problem situations commonly encountered by rural folk — like running out of rice.

The instrument was also expanded to include a subtest on verbal fluency involving the generation of animal and vegetable lists; and more items on the Mental Tracking and Praxis subtests.

Establishing Normal Values. We obtained the mean scores for each subtest and set the minimum passing scores at mean minus 2 standard deviations.

Determination of Test Validity, Sensitivity and Specificity. The study design is a prospective, crosssectional case control study using 17 matched pairs of demented and non-demented subjects to determine validity, sensitivity and specificity. A subject is assessed to be demented if he fails in both subtests 1 and 2, and at least one of the subtests 3 to 9. To determine the total score for each subtest on the DDSS, a score of 1 is assigned for passing a subtest and a score of 0 is assigned for failing this. The highest total score is 9 and the lowest is 0.

V. RESULTS

This table shows the normal values obtained for each subtest with the corresponding Standard Deviations and minimum passing score.

Table 1. Normal Values, Standard Deviations and Minimum Passing Scores Per Subtest.

SUBTEST	MEAN	SD	MPS
Behavior/ADL	25.67	0.52	24
Memory	21.68	1.97	16
Orientation	7.99	0.11	7
Mental Tracking	9.68	1.65	7
Praxis	9.93	0.26	9
Calculation	3.96	0.19	3
Language	57.74	5.89	46
Abstract Thinking	16.30	3.70	8
Judgment	7.00	0.00	7

This Table shows the summary of total scores of the 17 matched pairs of demented and non-demented subjects. Computed T for matched

groups is 32.1153. Comparing this with the T table value of 3.965, the difference in outcome for the 2 groups was significant at $P = .001$.

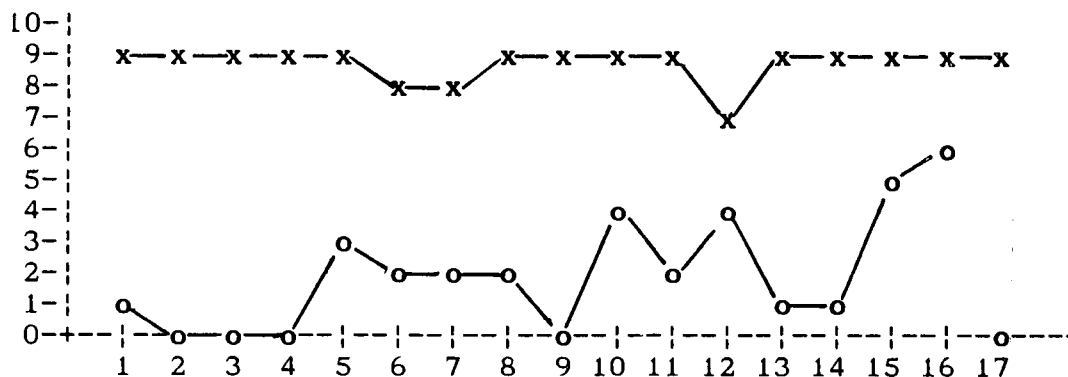


Figure 1. Summary of Total Scores of the 17 Matched Pairs of Demented and Non-Demented Subjects

Legend: x-x-x Nondemented o-o-o Demented

The instrument was found to have a Sensitivity of 94.12% and a Specificity of 100% based on the following formula:

Consensus

	+	-	
DDSS	16 (A)	0 (B)	
	(C)	17 (D)	

SENSITIVITY = $[A/A + C] \times 100 = 16/17 = 94.12\%$

SPECIFICITY = $[D/B + D] \times 100 = 17/17 = 100\%$

VI. DISCUSSION

In conclusion, to address the needs of a rapidly growing segment of the Philippine population, we set out to dewesternize an assessment approach to Dementia for Filipino in the low socio-economic class. This since we realized that some methods employed in western-developed instruments are unable to adequately assess certain aspects of their cognitive functioning due to the "alienness" of the tasks involved.

"De-Westernization" involved testing subjects in situations they were comfortable with (e.g., allowing a companion to be with them); using Filipino; including test items involving familiar objects and themes; taking illiteracy into consideration when designing the instrument; and accepting responses based on prevalent indigenous constructs. We found that adapting methods and materials to render these relevant or meaningful to a population can result in an

effective diagnostic tool for dementia, as evidenced by the validity, sensitivity and specificity values obtained. The study also generated normal values for 9 cognitive domains typically assessed by instruments for dementia, namely: Behavior and Activities of Daily Living; Memory; Orientation; Mental Tracking; Praxis; Calculation; Language; Abstract Thinking; and Judgment.

However, we admit that the De-Westernized Dementia Screening Scale (DDSS) in its current form has limitations. Hence, in future studies, we hope to be able to 1) generate more items for certain subtests in order to better discriminate between demented and non-demented; 2) obtain a larger sample to generate age- and education-related norms; 3) validate the instrument on a nationwide scale, including having it translated into other dialects; and 4) correlate it with other diagnostic parameters for dementia that are readily available in developing countries, like event-related potentials (P 300).

REFERENCES

- Albert, M. and Moss, M. (1984). The assessment of memory disorders in patients with Alzheimer disease. In Larry R. Squire and Nelson Butters (Eds.), *Neuropsychology of Memory*. New York, NY: The Guilford Press, 236-246.
- American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders*, Third Edition — Revised. Washington: American Psychiatric Association, 1987.
- Barth, J. T. and Macciocchi, S. N. (1986). Dementia: Implications for clinical practice and research. In S. B. Filskov and T. J. Boll (Eds.), *Handbook of Clinical Neuropsychology*, Vol 2. New York: John Wiley and Sons, 398-425.
- Blecker, M.L., Bolla-Wilson, K., Kawas, C., & Agnew, J. (1989), Age-specific norms for the Mini-Mental State Exam. *Neurology*, 38, 1565-1568.
- Concepcion, M. B. (Ed.). (1983). *Population of the Philippines: Current Perspectives and Future Prospects*. Philippines: National Economic and Development Authority, Population Development Planning and Research Project.
- Cummings, J. L. and Benson, D. F. (1992). *Dementia: A Clinical Approach*. Second Edition. Stoneham, MA: Butterworth-Heinemann, a division of Reed Publishing, Inc..
- Domingo, L. J. and Zosa-Feramil, I. (May 1987). *The Filipino Elderly: A Review of Literature and Existing Data*. Demographic Research and Development Foundation, Phase III: Asean Population Program.

- Folstein, M.F., Folstein, S.E., & McHugh, P.R. (1975). Mini-Mental State. *Journal of Psychiatric Research*, 12, 189-198.
- Fuld, P., Masur, D. M., Blau, A. D., Crystal, H., and Aronson, M. K. (1990). Object-memory evaluation for prospective detection of dementia in normal functioning elderly: predictive and normative data. *Journal of Clinical and Experimental Neuropsychology*, 12 (4), 520-528.
- Haxby, J. V., Raffaele, K., Gillette, J., Schapiro, M. B., and Rapoport, S. I. (1992) Individual trajectories of cognitive decline in patients with dementia of the Alzheimer Type. *Journal of Clinical and Experimental Neuropsychology*, 14 (4), 575-592.
- Ineichen, B. (1987). Measuring the rising tide. How many dementia cases will there be by 2001? In Jeffrey L. Cummings and D. Frank Benson's *Dementia: A Clinical Approach*. Second Edition. Stoneham, MA: Butterworth-Heinemann, a division of Reed Publishing Inc., 1992.
- Jorm, A. F., Scott, R., Henderson, A. S., & Kay, D.W.K. (1988). Educational level differences on the Mini-Mental State: The role of test bias. *Psychological Medicine*, 18, 727-731.
- Katchaturian, Z.S. (1985) Progress of research on Alzheimer's disease. In Masur, D. M., Fuld, P. A., Blau, A. D., Crystal, H., and Aronson, M.K. (1990). Predicting development of dementia in the elderly with the selective reminding test. *Journal of Clinical and Experimental Neuropsychology*, 12 (4), 529-538.
- Masur, D. M., Fuld, P. A., Blau, A. D., Crystal, H., and Aronson, M. K. (1990). Predicting development of dementia in the elderly with the selective reminding test. *Journal of Clinical and Experimental Neuropsychology*, 12 (4), 529-538.
- Neugarten, B. L. and Neugarten, D. A.. (1991). Policy issues in an ageing society. In Martha Storandt and Gary R. Vanden Boss (Eds.) *The Adult Years: Continuity and Change*. Washington, D.C.: American Psychological Association, The Master Lectures.
- Satz, P., Van Gorp, W. G., Soper, H.V. and Mitrushina, M. (1987). A WAIS-R marker for dementia of the Alzheimer type? An empirical and statistical induction test. In Robert S. Goldman, Bradley N. Axelrod, Bruno J. Giordani, Norma Foster, and Stanley Berent's *Longitudinal sensitivity to the Fuld cholinergic profile to Alzheimer's disease*. *Journal of Clinical and Experimental Neuropsychology*, 14 (4), 566-574.
- Strub, R.L. and Black, F.W. (1981). *The Mental Status Examination in Neurology*. Philadelphia: F.A. Davis Company.
- 1990 Philippine Population Data Sheet. *Philippine Population Projections: 1980-2030*. Philippines: National Economic and Development Authority.

APPENDIX

Sample items from the various subtests of the De-westernized Dementia Screening Scale:

- I. *Behavior and Activities of Daily Living*: The examiner completes the items on this subtest based on an interview with a reliable informant who has been with the subject for at least 6 months to 1 year. Questions asked include the subject's ability to travel alone in familiar places or streets; ability to bathe

and change clothes independently, and the like.

- II. *Memory*: The subject is asked to listen to, then immediately recall a story about Mang Nano, a farmer who planted his 3 hectares of land to rice. A typhoon destroyed what would have been a bountiful harvest. He was counting on this pay for his loan and send his son to school.

- III. *Orientation*: The examiner asks questions like what the current season is. Acceptable answers include: dry, wet, summer, rainy, planting, or harvesting seasons.
- IV. *Mental Tracking*: The examiner asks the subject to recite the days of the week backwards from Thursday.
- V. *Praxis*: The examiner asks the subject to copy a square using orange wood sticks.
- VI. *Calculation*: The examiner shows the subject one (1) 10 peso bill, two (2) 20 peso bills, one (1) 5 peso bill, one (1) 2 peso coin, and one (1) 1 peso coin, then asks how much they add up to.
- VII. *Language*: The examiner shows the subject specified objects like a pencil, candle, mirror, etc. and asks him/her to name each of these.
- VIII. *Abstract Thinking*: The examiner shows the subject a metal spoon and fork, and a plastic spoon and fork, then asks him/her to mention as many things about these that are the same and that are different.
- IX. *Judgment*: The examiner asks the subject what he/she would do if he/she ran out of rice.
-