Cognitive-Linguistic Assessment Protocol in Telugu - An Adaptation of CLAP in Kannada

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Abstract

The current study mainly aimed at adapting the Cognitive Linguistic Assessment Protocol for adults (CLAP) - Kannada (Kamath, 2001) into Telugu language (CLAP-T). Normal elderly persons in the age range of 65-80 years were considered for the study. The participants were classified based on the classification given by Nuegarten (1974); young-old, 75-85 as old-old, above 85 years as oldest-old. All male and female participants performed almost equal mean and SD values in all domains. Few subtests showed variations in performance of participants in three age groups. All the four domains showed a general trend where in, as the age increases there is degradation in cognitive performance. Reaction time for the visual task was considered and showed a delineating performance across three age groups. This assessment tool will help the professionals to find out cognitive-linguistic performance of Telugu speaking individuals across different age, gender and four domains i.e. attention, perception and discrimination, memory, problem solving and organization.

Key words: cognitive linguistic domain, assessment, elderly

Cognition means 'to know'. Knowledge can be thought of as memories formed from the manipulation and assimilation of raw input, perceived via our senses of sight, hearing, taste, touch and smell. Using knowledge to direct and adapt action towards goals is the foundation of the cognitive process. Past experiences and trends inform our sense of what the future might hold and help us to act accordingly (Kellett, 2008).

Importance of cognitive-linguistic tools

Cognitive tools are generalizable computer or screening tools that are intended to engage and facilitate cognitive processing. Cognitive tools help to screen the complex cognitive learning activities and critical thinking. These tools are person's controlled in the sense that they construct their knowledge themselves using the tools rather than memorizing knowledge. Cognitive tools are medium that helps transcend the limitations of the mind, such as memory, in activities of thinking, learning, and problem solving (Dimok, 1999).

Studies in Indian context are restricted and one such study by Kamath (2001) in Kannada, a classical language spoken in Karnataka, resulted in Cognitive-linguistic Assessment Protocol (CLAP) for adults. Nevertheless, assessment of persons from varied ethnic, cultural, and linguistic backgrounds are the current significant challenges for clinicians, because most of the tests have not comprised a representative number of people from diverse backgrounds in their consistency. Therefore, these all variables should be considered throughout assessment procedure.

The current study mainly aimed at adapting the Cognitive Linguistic Assessment Protocol for adults (CLAP)-Kannada (Kamath, 2001) into Telugu language (CLAP-T). The specific objectives were (1) to investigate age related changes in performances on various cognitive-linguistic skills on the CLAP-T, (2) study gender contingent variations in performances on different cognitive-linguistic skills on the test (3) to estimate reaction time measures of the participants (4) to determine the effect of age and gender on various domains of the test (viz. Attention, perception and discrimination; Memory; Problem solving; and Organization) and (5) to find out the interaction effect of age and gender on the domains.

Method

Participants: Normal elderly persons in the age range of 65-80 years were considered for the study. The participants were classified based on the classification given by Nuegarten (1974): 55-75 as young-old; 75-85 as old-old; above 85 years as oldest-old. The existing classification system given by Nuegarten (1974) was modified by adding two more groups as: 65-75 years: young-old adults, 75-80 as old-old adults.

Age groups: A total of 60 Telugu speaking participants (30 males and 30 females) were included in the study. The participants were divided in three age groups, which is shown in Table 1. Equal number of males and females were considered for the study.

Table 1. *Demographic data of subjects sampled*

Age	Number of Males	Number of Females
65-70	10	10
70-75	10	10
75-80	10	10

The participants were selected by adhering to the appropriate ethical procedures. Participants were explained the purpose and procedures of the study, and informed verbal and or written consent was taken.

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Inclusionary criteria considered for selection of participants were as follows: (1) the participant should not have any obvious or known history of neurological and/or psychological disorders as reported (2) he/she should be able to speak, read and write in Telugu, and (3) he/she should have a minimum of primary schooling. The exclusionary criteria were as follows: 1) No noticeable sensory deficits, (2) No history of drug/alcohol abuse as reported, (3) No difficulty in communication.

Mini Mental State Examination-MMSE (Folstein, Folstein & McHugh, 1975) was used for screening. All participants scoring greater than or equal to 25 points on the MMSE (Folstein, 1975) were considered for the study. Participants were selected from the residential areas and old age homes in the city of Hyderabad (Andra Pradesh state).

Procedure: The study was carried out in 3 phases

Phase 1: The existing CLAP in Kannada (Kamath, 2001) was translated into Telugu. The material was prepared by reviewing the literature in Telugu from books, journals and web-based sources.

Preparation of the material: Adaptation of CLAP-T test battery based on the original test item of CLAP in Kannada (Kamath, 2001) was carried out. The steps involved in the adaptation of the test were (a) syntactic structure and semanticity in Telugu language was studied and compared to Kannada (b) the commonalities and differences were studied to choose the appropriate test items (c) the test item in Telugu version was seen for semanticity, familiarity and ambiguity (d) then the Kannada version was translated to Telugu language after suitable modification (e) the translation was done with the help of a linguist and speech-language pathologist (f) materials for various test items were prepared in Telugu.

Phase 2: The translated materials were given to five experienced Speech-Language Pathologist (SLP) who served as judges. SLP's were asked to rate the material on a "Feedback questionnaire for Aphasia Treatment Manuals" (Field Testing of Manual for Adult Non-fluent Aphasia Therapy in Kannada-MANAT-K, Goswami, Shanbal, Samasthitha & Navitha, 2010), which included 17 parameters rating from very poor to excellent. The three parameters excluded for judgment were volume, size of the picture and color of the picture. Judges were also asked to give suggestions regarding the rating scale used and any other changes in the protocol.

Phase 3: The final test item was modified by incorporating the suggestions of SLP's and administered on 60 participants in the age range of 65-80 years. Instructions specific to the task were given in Telugu. The scoring was carried out simultaneously for each task as per the scoring procedure scheduled for each item.

Scoring: Various test items and their respective scoring under each domain was same as stated in the CLAP- Kannada version (Kamath, 2001).

Domain I: Attention, Perception and Discrimination

Two main modes were considered for this domain viz. visual and auditory. Two types of attention processes were evaluated, viz. selective attention and sustained attention. The cognitive processes of perception and discrimination were contingent on attention and three were parallel processes.

Table 2. *Cognitive-linguistic measures used in the protocol*

Domain	Test item	Max. score
I: Attention, Discrimination and Perception		
Visual	Letter Cancellation	10
	Contingent Letter Cancellation	10
	Word Cancellation	10
	Sound count	10
Auditory	Letter-Pair discrimination	5
	Word –Pair discrimination	5
	Months-backwards naming	10
II: Memory		
Episodic Memory	Orientation and recent memory questions	0
Working memory	Digit Forward	5
	Digit backward	5
Semantic memory	Co-ordinate naming	5
	Super ordinate naming	5
	Word-naming fluency	5
	Generative naming	5
	Sentence repetition	10
	Carry out commands	10
III: Problem solving		
	Sentence disambiguation	10
	Sentence formulation	5
	Predicting outcome	10
	Compare and contrast	10
	Predicting cause	10
	Why Questions	5
	Sequential Analysis	10
IV: Organization		
	Categorization	10
	Analogies	10
	Sequencing events	40

Source: Cognitive-linguistic Assessment Protocol for adults (Kamath, 2001)

Visual category included (a) *The cancellation at a letter level* (b) *The cancellation at word level* (c) *Contingent cancellation*

Auditory category

(a) Sustained auditory attention was evaluated using a task where the participants were required to count mentally how many times a particular letter was read out in a list.

(b) & (c) The second and third subtests involved the participant's ability to discriminate amongst a pair of letters and words read out by the tester (same/different task) respectively. This is a predominantly a discrimination task.

(d) The last sub test required the participants the names of the months in the backward direction (i.e. December to January). This task requires the attention and involves recall processes too.

Scoring: Performance on each task was scored for number of correct answers. Subtest (a) was given one point for every correct count. One point was deducted for every count above the correct number of total occurrence of stipulate letters.

Domain II: Memory

Three main types of memory processes tested were (1) Episodic memory (2) Working memory and (3) Semantic memory

Domain III: Problem solving

This domain includes various tests that assess reasoning abilities to aid in problem solving. The following tasks considered were Sentence disambiguation, Sentence formulation, Comparing and contrasting two objects, Predicting cause of a described situation, Answering why questions, Sequential task analysis.

Domain IV: Organization

Organization of available information to result in coherent communication is an important metalinguistic and metacognitive task. This included Categorization Analogies and Sequencing of events.

Statistical analysis was carried out using (SPSS 16). MANOVA was administered, to check for any significant difference across age in all male and female participants. Post hoc Duncan's test was administered.

Results and Discussion

The results obtained from the data were analyzed on various aspects. The findings of the present study have been broadly presented and discussed under the following headings.

I.(a) Performance of males and females in different age groups in attention

In this section visual and auditory, two modalities were assessed. The following were the various tasks in visual and auditory modes. The visual mode included Letter Cancellation (AVLC), Contingent Letter Cancellation (ACLC); Word Cancellation (AVWC). The auditory mode Sound count (AASC); Letter-Pair discrimination (AALPD); Word-Pair discrimination (AAWPD); Months-backwards naming (AAMBN).

The mean and standard deviation scores of three test items attention, visual letter cancellation (AVLC), Attention visual contingent letter cancellation (AVCLC), attention visual word cancellation (AVWC) in domain I.

Both male and female participants had equal mean scores on AVLC and AVWC which required sustained attention. On the other hand, correspondingly equal scores were obtained by both the male and female participants in AVCLC test item (rely on selective attention) across the three age groups. In general, although the age increased the performance of both the male and female participants were equal in all the above test-items.

To summarize apart from the AAMBN test item, the other test items (AASC, AALPD, and AAWPD) show equal mean scores on performance across age and gender.

I. (b) Performance of males and females in different age groups in memory across gender

The following test items were considered in this domain: Orientation and recent memory questions (EMOQ); Digit Forward (WMDF); Digit backward (WMDB); Co-ordinate naming (SMCN); Super ordinate naming (SMON); Word-naming fluency (SMWN); Generative naming(SMGN); Sentence repetition(SMSR); Carry out commands (SMCC).

Working Memory Digit Forward (WMDF)

A mean score ranging between 3.70 and 3.60 was secured by the participants in the age range of 65-70 years. An almost equal performance was contributed by all the participants in the age group of 70-75 with a mean value of 3.00 and 3.10 respectively, in the age group of 75-80years who scored mean values of 2.50 and 2.20. Finally, both the male and female participants achieved a mean score of 3.06 (SD=0.73) and 2.96 (SD=0.76) respectively across three age groups. The total mean values for all the participants was 3.01 (SD=0.74) for the test item WMDF in domain II.

Working Memory Digit Backward (WMDB)

In this test item, the male and female participants of age group 65-70years secured a mean value of 2.80 and 2.60 with comparatively better mean score value of 2.00 (SD=0.47) and 2.30 (SD=0.48) by the male and female participants in the age group of 70-75 years. A lowest mean score value of 1.90 (SD=0.56) and 1.70 (SD=0.48) was secured by the male and female participants in the age group

of 75-80 years. A total mean score was 2.23 (SD=0.62) and 2.20 (SD=0.61) in all male and female participants of the three age groups and a total mean score of 2.21 with (SD=0.61) for the domain II in WMDB.

Semantic memory Co-ordinate naming (SMCN), Semantic Memory Super Ordinate Naming (SMSN), Semantic memory Word Naming Fluency (SMWNF), Semantic memory Generative Naming (SMGN)

In exception to the above test items in the domain II, all the participants irrespective of age and gender got a maximum score of 5.00 for the test item in, SMCN, SMSN, SMWNF, and SMGN.

Semantic memory Sentence Repetition (SMSR) and Semantic memory carry out Commands (SMCC)

The same trend was repeated in the next two test items, SMSR and SMCC where the participants showed a complete score of 10.00 across the three age groups and gender.

I. (c) Performance of males and females in different age groups in Problem solving across gender

The following test items were considered in this domain of problem solving. They were Sentence disambiguation (PSSD); Sentence formulation (PSSF); Predicting outcome (PSPO); Compare and contrast (PSCAC); Predicting cause (PSPC); Why Questions (PSWQ) and Sequential Analysis (PSSA).

Problem Solving Compare and Contrast (PSCAC)

A mean value of 9.90 (SD=0.31) and 9.50 (SD=0.70) was scored by the male and female participants of age group 65-70years. However, the participants in the age group 70-75 years had a mean of 9.20 (SD=0.78) and 9.20 (SD=0.63) in males and females respectively. The performance of male and female participants was shown in the age group of 75 -80 years with a mean score of 9.30 (SD=0.82) and 8.70 (SD=0.94). A score of 9.46 (SD=0.73) and 9.13 (SD=0.81) was obtained by all male and female participants of the three age groups and a total mean score of 9.30 (SD=0.78) for the domain III, PSCAC was observed in all the participants.

Table 3. *Mean and SD values for male and female participants (normals) in Domain III*

		Males		Females		Total	
Domain III*	Group	Mean	SD	Mean	SD	Mean	SD
PSCAC	65-70	9.90	0.31	9.50	0.70	9.70	0.57
	70-75	9.20	0.78	9.20	0.63	9.20	0.69
	75-80	9.30	0.82	8.70	0.94	9.00	0.91
	TOTAL	9.46	0.73	9.13	0.81	9.30	0.78

*PSCAC=problem solving compare and contrast

Table 4. *Mean (M) and standard deviation (SD) values of male and female participants (normals)*

Domain I*	Groups	Males		Females		Total	
		Mean	SD	Mean	SD	Mean	SD
AVLCRT	65-70	19.00	1.15	18.20	0.42	18.60	0.94
	70-75	23.50	0.84	23.50	0.70	23.50	0.76
	75-80	24.20	0.78	25.30	1.25	24.75	1.16
	TOTAL	22.23	2.51	22.33	3.17	22.28	2.84
AVCLCRT	65-70	21.00	2.94	19.50	0.97	20.25	2.26
	70-75	29.70	0.67	30.30	0.67	30.00	0.72
	75-80	34.50	1.17	33.80	0.91	34.15	1.08
	TOTAL	28.40	5.96	27.86	6.24	28.13	6.06
AVWCRT	65-70	23.60	1.64	22.50	1.43	23.05	1.605
	70-75	35.30	0.94	34.50	0.70	34.90	0.911
	75-80	39.10	0.99	39.50	0.70	39.30	0.86
	TOTAL	32.66	6.81	32.16	7.32	32.41	7.016

*AVLCRT=attention visual letter cancellation reaction time; AVCLCRT=Attention visual contingent reaction time letter cancellation; AVWCRT=attention visual word cancellation reaction time.

I. (d) Performance of males and females in different age groups in organization across gender

The following test items were considered in this domain: Organization, Categorization (OC), Analogies (OA) and Sequencing events (OSE)

Organization Sequential Events (OSE)

In OSE, the primary age group explicitly 65-70 years attained a mean value of 35.80 (SD=1.47) and 35.20 (SD=1.03) in males and females correspondingly. On the other side, the subsequent participants in the group 70-75 years confirmed a mean 32.60 (SD=1.89) and 32.8 (SD=1.03) in males and females. At the same instance, the supplementary participants of age group 75-80 years attained a mean of 26.20 and 23.40 in males and females. A score of 31.53 (SD=4.53) and 30.46 (SD=5.45) was acquired by all male and female participants of the three age groups and an entire mean score of 31.00 with (SD=5.00) intended for the domain IV, OSE was experiential in all the participants.

II. Reaction time of males and females across the only first three test items in the domain of Attention, Perception and Discrimination, in different age groups

a) Attention visual letter cancellation reaction time (AVLCRT)

Mean scores (19.00 and 18.20) for reaction time of male and female participants in the age range of 65-70years. Both the male and female participants in the age group of 70- 75 years attained an equal mean scores (23.50 and 23.50) for reaction time. The following age group i.e.75-80years of males and females participants achieved a means score of 24.20 and 25.30 for reaction time respectively. The total mean score for reaction time 22.23 and 22.33 was attained by all males and females correspondingly.

All participants acquired a total mean score for reaction time was 22.28 (SD=2.84).

b) Attention visual contingent letter cancellation reaction time (AVCLCRT)

The male and female participants in the age group of 65-70years attained almost equal mean score (21.00 and 19.50) for reaction time correspondingly. The other side, following age group 70-75 years, male and female participants acquired a mean score (29.70 and 30.00) for reaction time respectively. The third age group that is 75-80years of male and female participants showed a mean score (34.50 and 33.80) for reaction time. The total mean score of 28.40 and 27.86 for reaction time was achieved by all female and male participants respectively. Overall mean scores of participants was 28.13 (SD=6.06) for reaction time.

c) Attention visual word cancellation reaction time (AVWCRT)

The male and female participants of age group 65-70years achieved an equal mean score (23.60 and 22.50) for reaction time. In the age group of 70-75years male and female participants showed a mean score (35.30 and 34.50) for reaction time. A mean score of 39.10 showing a better performance (SD=0.99) for reaction time was obtained by male participants compare to females with a mean score of 39.5 (SD=0.70). The total mean score of males and female participants was 32.66 (SD=6.81) and 32.10 (SD=7.32) respectively. Finally resulting a total mean score of 32.41 (SD=7.01) for the above mentioned test item.

To summarize it is evident from the above results that the overall performances of male and female participants w.r.t reaction time across all the three age groups showed a lower mean score values for the test item attention visual contingent letter cancellation reaction time (AVWCRT) compared to other two test items attention visual letter cancellation reaction time and attention visual word cancellation reaction time (AVLCRT) & (AVCLCRT).

III. Effect of age and gender performance on various domains

Domain I-Visual mode

Attention visual letter cancellation (AVLC), Attention visual contingent letter cancellation (AVCLC), Attention visual word cancellation (AVWC)

All the participants in these test items scored a full mean score valves. Hence, further statistical analysis (post hoc and Duncan's) was not administered. This finding was supported by the Madden (1997) in a study, where he reported young and older adults showed a equivalent performance in attention visual items, i.e. their ability to distinguish relevant from irrelevant information, but an increase in the number of relevant display items either in the target set or in the display impairs search performance more for older adults than for young adults.

The AVCLC is a task which is based on selective attention. Result of the present study fails to find an age related decline in this particular task, this is in concurrence with the findings of Groth and Allen (2000).

Attention visual letter cancellation reaction time (AVLCRT)

The male and female participants showed a significant difference for reaction time with $F(2, 54) = 257.58$, $p<0.05$ across age.

The Duncan's test was carried out to see the significant difference across age, the test results showed that there was a decline in the reaction time of task performance as the age increases. In age group of 65-70 years performed with a mean valve of 18.60, 70-75years performed with mean score of 23.50 and 75-80 years with a mean of 24.70 according to mean score there was not much decline in the age group of 70-75 and 75-80years.

Attention visual contingent letter cancellation reaction time (AVCLCRT)

From Table 4, it can be inferred that there is a significant difference with $F(2, 54) = 478.99$, $p<0.05$ in male and female participants respectively.

Duncan's test was done to show the effect of AVCLCRT on each age group individually, it revealed there is a decline in the performance of participants as the age increased i.e. 65-70years showed low reaction time to perform a task with a mean of 20.25 than other age groups with a mean of 30.00 and 34.10, as the age increased they required more reaction time to finish the task.

Attention visual word cancellation reaction time (AVWCRT)

A significant difference with $F(2, 54) = 110.70$, $p<0.05$ by each male and female participant across age. Following the MANOVA to see the significant difference across each age group separately, post hoc analysis and Duncan's test was carried out. Duncan's test results showed 65 -70years performed better with a mean of 23.05 compared to 70-75 and 75-80years with a mean of 34.90 and 39.30, this showed that the 75-80 years age group was away from the 65-70 and 70-75years.

Gender effect

No significant gender effect was found in all participants in above mentioned test items for reaction time i.e. attention visual letter cancellation

reaction time (AVLCRT), attention visual contingent letter cancellation reaction time (AVCLCRT), attention visual word cancellation reaction time (AVWCRT).

Age and gender interaction

No obvious age and gender interaction was observed among the participant on two tasks of domain I, which includes attention visual contingent letter cancellation reaction time (AVCLCRT), and attention visual word cancellation reaction time (AVWCRT). The test item Attention visual letter cancellation reaction time (AVLCRT) showed an age with gender interaction across the three age groups of all participants.

As with the advancement of age there could be a gradual degradation in fine motor skill as well as eye-hand co-ordination which are important for performing the subtle tasks like the one mentioned in the above test items. This will in turn result in longer reaction time in elderly populations. In addition the elderly participants experience difficulty in inhibiting the irrelevant (distractor) and facilitating the relevant ones (target). This is in congruence with finding of Redfern, Muller, Jennings and Furman (2002) where they reported that in the presence of distracters, older people tend to devote their exclusive attention to one stimulus, and ignore another stimulus than younger people. Literature also reports that older adults were as skilled as younger people at assimilating information, but they did take longer time to react Myerson, Robertson and Hale (2007).

Attention auditory sound count (AASC), Attention auditory letter pair discrimination (AALPD), Attention auditory word pair discrimination (AAWPD)

Apart from the attention auditory month background naming (AAMBN) test item, all the test items were performed equally and achieved a full mean score by all male and female participants of three age groups, as a result further statistical analysis were not carried out for the same.

Attention auditory month background naming (AAMBN)

The male and female participants showed significant difference across age with [$F(2,54)= 47.63$, $p<0.05$]. Duncan's test was carried out to show the performance of each age group separately which revealed that 70-75 and 75-80years showed a almost equal mean of 7.35 and 6.85 i.e. 70-75 and 75-80years showed a significant difference which was totally away from 65-70 years with a mean of 9.40, this showed that 70-75 and 75-80years performed poorer compared to 65-70 years.

Gender effect

There was no significant difference among male and female participants in below mentioned tasks [attention auditory sound count (AASC), attention auditory letter pair discrimination (AALPD), attention auditory word pair discrimination (AAWPD), attention auditory month background naming (AAMBN)].

Age and gender interaction

No interaction effect was found between age and gender in all participants of above mentioned age groups in each tasks [attention auditory sound count (AASC), attention auditory letter pair discrimination (AALPD), attention auditory word pair discrimination (AAWPD), attention auditory month background naming (AAMBN)].

Episodic memory orientation and recent memory questions (EMORMQ), Semantic memory coordinates naming (SMCN), Semantic memory subordinate naming (SMSN), Semantic memory word naming fluency (SMWNF), Semantic memory Generative naming (SMGN), Semantic memory Sentence repetition (SMSR), Semantic memory Carry out commands (SMCC)

All the above mentioned test items confirmed complete mean scores of all the male and female participants across three age groups, therefore further statistical analysis i.e. post hoc analysis and Duncan's test was administered only for the two test items, not intended for remaining test items.

Working memory digit forward (WMDF)

The male and female participants showed a significant difference with [$F (2, 54) =29.49$, $p<0.05$] respectively using MANOVA. The Duncan's test was carried out to show the significant effect of above test item in each age group and the results showed a significant difference between the age range of 75-80 years with a mean of 2.35 which significantly away from 70-75 and 65-70 years with a mean score of 3.05 and 3.65 .It revealed a significant difference of 75-80 from other age groups.

Working memory digit backward (WMDB)

There was no significant difference found with [$F (2, 54) = 16.96$, $p<0.05$] across age in males and females correspondingly. The results of the post hoc analysis revealed that 75-80years showed a significant difference from 65-70years with a mean value of 1.80. There was no significant difference between 65-70 and 70-75 years with a mean valve of 2.7 0and 2.15. 65-70 and 70-75 years age group performed better compared to 75-80years.

Gender effect

There was no significant difference across gender in above mentioned test items in all male and female participants.

Age and gender interaction

Interaction effect was not found across age and gender in any participant above mentioned test items. Literature attributes one more reason for the declined performance in digit span task to greater storage load than the executive function deficit. Though, digit span involved relatively little complex processing, the maximal verbal memory span depended on both the phonological loop and central executive. As the digit load increase, demands made on central executive also increases (Baddeley, 2001).

In some cases, older adults seem to be using different strategies than younger adults. For example, brain imaging studies have revealed that older adults are more likely to use both hemispheres when completing memory tasks than younger adults (Cabeza, 2001).

That there was a significant decline in the two test items across age group in male and female participants respectively, although domain II includes 9 test items. As all the participants in the seven test items i.e. SMSR, SMSN, SMCC, SMCN, SMWNF, EMORMQ and SMGN showed complete responses.

Domain III

All participants showed a significant difference in performance across the age group on MANOVA for the test items, problem solving sentence disambiguation (PSSD), problem solving compare and contrast (PSCAC), and problem solving predicting cause (PSPC) in domain III.

Gender effect

The males and female participants of all age groups showed no significant difference across gender in all test items.

Age and gender

No interaction was found between age and gender in any test item of all participants of three age groups.

Most studies of problem-solving are cross-sectional. Thus, age is confounded with cohort factors such as education. The two longitudinal studies by Arenberg (1974, 1982) showed that age declined only appear to be significant in the 60s and 70s. It appears that two factors can account for much of the decline in problem solving performance, changes in speed of execution of elementary information processes and changes in the capacity of working memory. It is also possible that speed alone can account for all the changes, to the extent that working memory relies on the speed of processes such as rehearsal.

Denney (1990) study reports the most general conclusion of this study was that, older subjects universally perform less well on problem solving tasks than do younger subjects, and the decline in performance is a linear function with respect to age.

Domain IV

a) With age as independent variable and various test items organization categorization (OC), organization sequencing events (OSE) as dependent variable, on the above domain showed a significant difference of [$F(2,54)=33.95$ for $p<0.05$]; [$F(2,54)=163.64$] for respectively.
b) Subsequent to this, post hoc Duncan's test revealed all three age group were significantly different from each other for all three test items.
   i. In organization categorization (OC): The age group 65-70 and 70-75 years was significantly different from 75-80 years with a mean value of 10.00 and 9.90. The performance of participants in 75-80 years age group showed a significant difference with the other two age group with a mean value of 8.00.
   ii. Organization analogies (OA): All the participants acquired full mean scores across three age groups, therefore further statistical analysis was not done.
   iii. Organization sequencing events (OSE): The older age group 75-80 years was significantly different from 65-70 and 70-75 years with a mean value of 24.80,that is to say 65-70 and 70-75 years scored almost equal mean score valves of 32.70 and 35.50 which was away from 75-80years.
c) No significant difference was seen on statistical analysis in gender and various test items
d) Similarly no interaction effect is seen between age and gender among various test items.

Conclusions

This assessment tool will help the professionals to find out cognitive-linguistic performance of Telugu speaking individuals across different age, gender, and four domains i.e. attention, perception and discrimination, memory, problem solving and organization. The present study further corroborates the evidence to research in cognitive-linguistic performance and the factors contributing to it and opines to carry out extensive research in this area. Assessment of cognitive skills across age will give an insight into the senile versus senescence in older group. Profiling of various cognitive skills in elderly population which in turn useful in therapeutic intervention.

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