



# International Journal of Gerontology & Geriatric Research

## Research Article

# Aging and Cognitive Pragmatics: An Exploratory Study to Understand the Illustrious Components in Healthy Aging -

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**Submitted:** 12 May 2022; **Approved:** 08 August 2022; **Published:** 09 August 2022

**Cite this article:** Girija PC, Sisliya F, Narayanan N. Aging and Cognitive Pragmatics: An Exploratory Study to Understand the Illustrious Components in Healthy Aging. Int J Gerontol Geriatr Res. 2022 Aug 09;6(1): 005-008. doi: 10.37871/ijggr.id26

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## ABSTRACT

The field that deals with cognition or the mental processes involved in human communication is known as Cognitive pragmatics. As cognition and pragmatics is interrelated, age related cognitive decline can hamper the pragmatic functions. Apart from age, the cognitive pragmatic abilities are influenced by other variables like education, metabolic health, cognitive stimulation, substance abuse etc. Our study aims to determine the minimally and the maximally affected domains of cognitive pragmatic abilities of educated and uneducated typical ageing population. A total of 180 participants in the age range of 50 to 80 years were selected for the current study. The participants were divided into three sub groups with age ranges as 50-60 years, 61-70 years and 71-80 years respectively with 30 educated and 30 uneducated typical aging populations in each group. A tool was developed to assess cognitive pragmatic abilities which consisted of six domains namely Discourse, Description, Narratives and Figurative language 1 to assess pragmatic production and Humour, and Figurative language 2 for pragmatic comprehension. Scoring was done accordingly. The results revealed that educated groups of all age outperformed their uneducated counterparts in all the domains assessed. Performance varies significantly with age, with a noticeable drop in the age group of 71 to 80 years. Under the domains of pragmatic production, the minimally affected domain was discourse and the maximally affected domain was narratives. With respect to comprehension, domain humor was most affected as compared to the domain figurative language 2 in both the groups.

**Keywords:** Cognition; Pragmatics; Aging; Discourse; Humor; Figurative language

## INTRODUCTION

The field that deals with cognition or the mental processes involved in human communication is known as Cognitive pragmatics. The influence of cognition on verbal pragmatics is still unclear. Even though, age associated changes in pragmatic abilities were reported in several studies, the relationship between cognition, pragmatics, and communication competence is complex. Assessment of cognitive pragmatic abilities in adults was little known. There are many standardized and non-standardized tests and procedures available to assess pragmatics. Several observational and conversational profiles are also available for assessing pragmatic abilities of adults with neurologic impairments. An assessment tool focusing on cognitive pragmatics would be beneficial in assessing communication skills in social context. Hence, we attempted to develop a non standardized tool to exclusively assess the cognitive pragmatics.

Through this tool, it is possible to explore various cognitive pragmatic abilities that are altered as age advances. The assessment of these areas would help to understand the nature of variations in cognitive pragmatics thereby paving the way to provide effective intervention strategies to geriatric population, thus helping to uplift the subtle nuances of communication and adding onto improving the quality of life.

## AIM

To analyse the maximally affected as well as minimally affected domains of cognitive pragmatic abilities in healthy ageing individuals.

## METHOD

A total of 180 participants in the age range of 50 to 80 years were selected for the current study. The participants were divided into three sub groups with age ranges as 50-60 years, 61-70 years and 71-80 years respectively. Each subgroup comprised of 30 educated and 30 uneducated typical aging populations in which both males and females were included.

### Inclusion criteria

1. All participants should be native speakers of Malayalam.
2. Participants should have normal/corrected vision and hearing.
3. Educated participants must have minimum 12<sup>th</sup> grade of education.

4. Uneducated participants must have below 10<sup>th</sup> grade of education

### Exclusion criteria

1. Individuals with neurological disorder (stroke and neurodegenerative diseases), cancer and other psychiatric illness.
2. Individual with cognitive dysfunction, Mini-Addenbrook's Cognitive Examination (ACE) < 21.
3. Individual with history of CNS (Central Nervous System) condition and head injuries.

## PROCEDURE

The study was done in two phases

Phase 1- Development of test material

Phase 11- Administration of test material

### Phase 1- Development of test material

The test material was developed on the basis of Assessment of Pragmatic Abilities and Cognitive Substrates (APACS) test. The current test evaluates two key parts of pragmatics, pragmatic production and pragmatic comprehension across six domains. Discourse, Description, Narratives and Figurative language 1 were evaluated for assessing pragmatic production and Humour, and Figurative language 2 for pragmatic comprehension.

**Pilot study:** A pilot study was conducted to ensure that all the selected stimuli were appropriate. Ten healthy adults between the ages of 20 and 40 were chosen and the created test material was administered on them. The test material was found to be capable of eliciting cognitive pragmatic abilities.

### Phase 11- Administration of test material

The test procedure was begun by obtaining the formal consent from the participants. Prior to testing, the participants were told about the objective and nature of the evaluation. A clinical interview was conducted to acquire demographic data, medical history, and other pertinent information, after which the Mini-ACE was administered to screen for cognitive dysfunction. The participants were seated in a relaxed manner. Before initiating the test, the clinician made a rapport with the individual. Each participant was administered using

the developed tool “Assessment of Cognitive Pragmatic Abilities in Adults” in a single session of approximately 45 - 50 min. Participants were encouraged to evoke the responses. The pragmatic production and pragmatic comprehension were assessed under the domains of above mentioned assessment tool. Each response was assigned a score, which was listed under each domain. The total cognitive pragmatic abilities were calculated by combining the scores from each domain.

The raw scores of the participant’s performances obtained using “Assessment of cognitive pragmatic abilities in adults” were analysed statistically in an IBM SPSS Statistics 26 software. A descriptive analysis was carried out to obtain the mean and standard deviations for each domain. Mann Whitney U test was used for comparison and to determine if there were statistically significant differences between groups. The significance level used throughout the study was 0.05.

**RESULTS**

To compare the performance of educated and uneducated typical ageing population on the domains of cognitive pragmatic abilities, Mann Whitney U test was carried out.

From the table 1, it is evident that there is a significant difference in the scores between educated and uneducated healthy aging participants in all the domains across all the age groups.

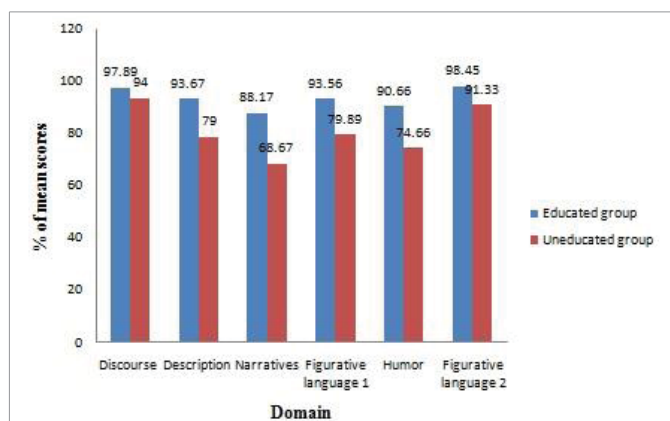
Figure 1 depicts the graphical representation of mean scores between the domains in the age group of 51-60 years. Figures 2,3 portray the same for 61-70 years and 71-80 years respectively.

When we compared the domain scores between educated and uneducated healthy aging participants, we could interpret that with

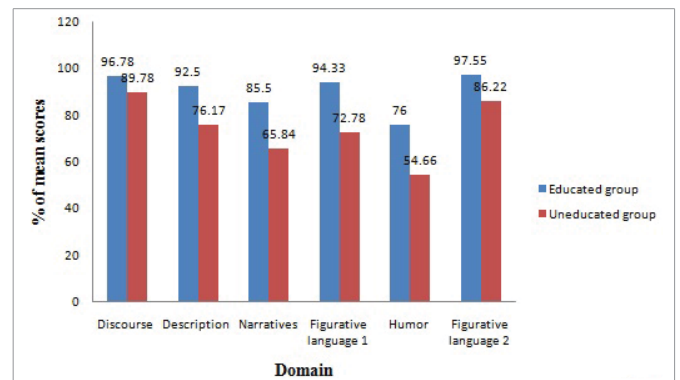
**Table 1:** Results of comparison of domain scores between educated and uneducated typical ageing population in the age range of across the age group.

Domain	51-60 years		61-70 years		71-80 years	
	MWU	p value	MWU	p value	MWU	p value
Discourse	148.000	< 0.001	50.00	< 0.001	11.500	< 0.001
Description	82.500	< 0.001	85.500	< 0.001	6.00	< 0.001
Narratives	95.500	< 0.001	66.500	< 0.001	10.500	< 0.001
Fig Lang 1	89.00	< 0.001	69.00	< 0.001	0.00	< 0.001
Humour	268.500	0.004	268.500	0.006	67.500	< 0.001
Fig Lang 2	280.000	0.003	168.00	< 0.001	5.00	< 0.001

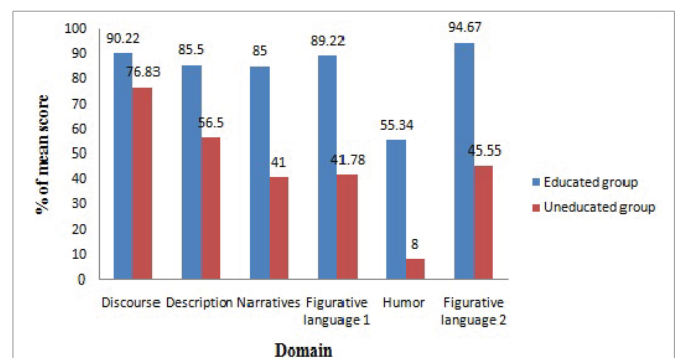
Note: MWU; Mann- Whitney U; Fig Lang 1: Figurative Language 1; Fig Lang 2: Figurative Language 2; p < 0.001.



**Figure 1:** Comparison of specified domains between educated and uneducated typical ageing population in the age range of 51-60 years.



**Figure 2:** Comparison of specified domains between educated and uneducated typical ageing population in the age range of 61-70 years.



**Figure 3:** Comparison of specified domains between educated and uneducated typical ageing population in the age range of 71-80 years.

respect to pragmatic expression minimally affected domain was discourse whereas maximally affected domain was narratives. On the other hand for pragmatic comprehension, humour was most significantly affected than the other domain figurative language 2. The result was similar across all age groups.

**DISCUSSION**

The domains assessed were discourse, description, narratives and figurative language 1 for evaluating pragmatic production and, humor and figurative language 2 for pragmatic comprehension. From the above results, it could be inferred that the educated groups were better than their uneducated counterparts in performing tasks under the domains of both pragmatic production and comprehension. Better performance of educated group could be attributed to person’s innate cognitive ability or the impact of early life exposures and educational experiences. Educated group receives continuous cognitive stimulation which will enrich the neural networks responsible for higher level cognitive skills such as attention, memory, inferential and analytical ability, logical reasoning, and finer access to lexical storage which are crucial for performing the tasks included in the current study, whereas uneducated group does not receive any advantageous stimulation due to lack of education. The findings were supported by the cognitive reserve hypothesis [1], which states that increased education offers the brain increased resistance to cognitive decline and brain pathology or alterations associated with ageing. Reading and writing may cause brain networks to be enriched directly, allowing people with higher degrees of education to have larger cognitive reserves and process information more quickly [2].

Further, under the domains of pragmatic production the minimally affected domain was discourse and the maximally affected

domain was narratives in both the groups. The reasoning for this result can be found within the nature of discourse production, as it involves faculties of crystallized intelligence more than working memory and pragmatic abilities. On the other hand, narratives requires more finer cognitive grains like adequate processing speed, sustained auditory attention, topic cohesion in a micro and macro linguistic level, inhibitory mechanism, inferential and analytical ability. As per Frontal aging hypothesis abilities mediated by the frontal lobe, which includes cognitive flexibility, abstract reasoning, and working memory, is more susceptible to aging process [3]. Hence, we can effectively say that our results are in par with this hypothesis.

When pragmatic comprehension abilities of educated and uneducated groups were analysed, it was found that both groups performed better on the domain Figurative language 2 but poorest in the domain Humour. Figurative Language 2 involved comprehension of idioms, metaphors etc which once again utilizes crystallized intelligence and long term memory. Also, Advancing age provides equips one with better grasp of figurative language of the language due to its repeated usage. Hence, the better performance of figurative language in pragmatic comprehension can directly be attributed to better language proficiency that comes with the additional years.

Among all the domains, Humour requires highest level of cognitive activation [4]. Humour comprehension is a highly complicated process involving the participant's cognitive ability hold the joke context meanwhile sifting through all the possible meanings and eventually settling for the funniest correct options from the list provided by comparison, evaluation, and cross connection to the joke context. Executive function and mentalizing abilities also play a crucial role in humor comprehension. As age advances, the ability to actively involve such complex cognitive processes naturally becomes a challenge.

## Summary and Conclusion

Age and education influenced almost all tasks used in the assessment of cognitive pragmatic abilities in typical aging population. Age had a detrimental effect on both group whereas; education had a beneficial effect on the performance of educated individuals.

In both the groups, the minimally affected domain was discourse and the maximally affected domain was narratives under the domains of pragmatic production and the domain humour was maximally affected when compared to the domain figurative language 2 in pragmatic comprehension. As the task complexity increases cognitive pragmatic demands also increases and age related neurobiological changes along with less education compromised the cognitive pragmatic abilities of typical ageing population.

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