Summary and Conclusion
The study of brain-behaviour relationships has long been an area of interest for Psychologists, Neurologists, Psychiatrists, Speech language pathologists and Cognitive scientists. Its development as a specific area of study is relatively recent, although its scientific basis results from several decades of knowledge and investigation. From the perspective of speech language pathologists, verbal fluency tasks are one means of understanding how concepts or words are organized in the brain. In general, these tasks are operationalized as the retrieval of words on a restricted category within a given time limit (e.g., 60 seconds).

While verbal fluency measures have been fairly well researched in the adult population, research on these measures in children is scanty. Despite the potential of this analysis as a measure of word retrieval in children, it is not generally used in clinical or experimental studies with typically developing children or children with brain injury. Moreover, with literature support of verbal fluency measures being sensitive to neurodevelopment, there is a lack of clarity on performance on these instruments in children or how they are dependent on various factors. The lack of Indian norms for these tests, as well as the paucity of information concerning the relationship between the different measures in children, has hindered the full use of this important diagnostic instrument, limiting their function to that of merely describing children’s linguistic abilities. With these caveats in mind, the current study was designed to understand the developmental trend of verbal fluency in Malayalam speaking typically developing children between five and fifteen years of age. To achieve this aim, the researcher investigated how demographic variables such as age and gender and procedural variables such as task variations influenced the verbal fluency performance in children. The study also probed in depth, the error pattern observed during the verbal fluency task.

Using a cross sectional study design, verbal fluency performance was investigated in 1015 Malayalam speaking typically developing children between the ages of five to fifteen years (in both gender groups). The participants were classified into five groups stratified based on the grades they belonged to. The verbal fluency paradigm involved word generation on three tasks of Initial Letter Fluency (/p/ fluency, /n/ fluency, /k/ fluency) and three tasks of Semantic Category Fluency (animal fluency, food fluency, vehicle fluency). For each task
employed, the outcome measures of total number of correct words, clustering parameters (number of clusters, mean cluster size), number of switches and error response analysis (type and frequency of error) were examined across the five groups and gender.

The results of the present study suggested that with respect to **age**, both Initial Letter Fluency and Semantic Category Fluency, exhibited a gradual increase in scores with increase in age on all the verbal fluency parameters excepting mean cluster size. With respect to **gender**, the findings added on to the increasing evidence on lack of significant gender effects on verbal fluency in children with presence of similar search strategies in both gender groups. The study results further indicated the influence of **task** with difference in performance across the tasks and with differential demands on phonemic and semantic search strategies. Children were prone to producing **errors** with intrusion, perseveration, miscue and non-words error types noticed. Among these, intrusion was seen more on Initial Letter Fluency as compared to Semantic Category Fluency whereas perseveration was seen more in Semantic Category Fluency as compared to Initial Letter Fluency. The miscue type of error was noticed only in Initial Letter Fluency and the frequency of non-words was similar for both tasks. All the error types, except perseveration, showed a decreasing trend with increase in age. With respect to psychometric properties, good reliability was observed for both inter-rater and intra-rater reliability with a significant positive correlation between measures except for the mean cluster size measure.

The present study on verbal fluency using both qualitative and quantitative analyses indicated that verbal fluency as a task has a great potential in clinical and research application in children. The study findings provide strong support for the usefulness of verbal fluency task as a semantic and executive functioning measure in children. In the wake of limited knowledge of verbal fluency performance in typically developing children which is highly language and culture based, the present research findings would be of significance in understanding the developmental changes in the mechanism of word retrieval using different search strategies during verbal fluency task. The outcome of the study from the sufficiently large sample of Malayalam speaking typically developing children therefore provides a reliable estimate of performance on verbal fluency. It’s presumed that the percentile distributions stratified for age, gender and task from the Malayalam speaking population...
would help in enhanced understanding of the response pattern and word retrieval abilities on verbal fluency. Malayalam version of verbal fluency scoring protocol developed here can be utilized in future researches for deeper understanding of developmental course in the pattern of maturation of verbal fluency. This can be further utilized as a baseline while testing children with disorders who speak Malayalam as a native language. A comprehensive and complete utilization of verbal fluency performance data in childhood disordered population continues to remain unexplored. The comparison of magnitude of deficits across component processes of verbal fluency in childhood disorders in future studies, will further enhance the sensitivity and specificity of the test. In order to increase the usefulness of a verbal fluency index in clinical practice, further forays are warranted for each language, culture, and population across various verbal fluency measures.

To summarize, the implications of this research study findings are fourfold: (a) better understanding of the influence of demographic and procedural variables on verbal fluency performance in Malayalam-speaking children; (b) documentation of both quantitative (total number of correct word production) and less researched domain of qualitative (clustering-switching & error response) performance of typically developing children; (c) expanding the clinical and research usefulness of verbal fluency task performance in children; (d) empowerment of clinician on typical development of verbal fluency in children during the clinical decision-making process in the disordered population and specific to the Malayalam language by virtue of its grade-based data.