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PICTORIAL EVALUATION OF METAPHOR COMPREHENSION IN TAMIL

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Abstract

Metaphors are a key component in the area figurative language. People with neurogenic speech disorders are often seen to have impairment in metaphor comprehension. While there are assessment tools accessible for diagnosing figurative language impairment in English, such a tool lacks in the Dravidian language Tamil. Therefore this study aims in developing and validating a pictorial metaphor comprehension test tool in Tamil. Twenty frequently used metaphors were visually represented through a combination of two part images and were administered to forty neurologically typical adults aged 20-25 years. The participants had to correctly identify the metaphors based on the pictorial stimuli given. The statistical analysis demonstrated that the data was normally distributed and had an acceptable internal consistency for the tool with a Cronbach's alpha of 0.756. Furthermore, there were no significant differences observed between male and female participants. The findings support the reliability and feasibility of the pictorial based assessment of metaphor comprehension. The tool needs to be studied furthermore with a diverse age range of population before the usage in clinical settings.

Keywords – Metaphors, Figurative language, Neurogenic speech disorders

Introduction

Language is a very complex cognitive function that necessitates the interaction of various brain areas. Any deviancies in these interactions caused by a stroke, traumatic brain injury, neurodegenerative diseases or cognitive impairment in adults can cause discrepancies in the comprehension and production of language. These are broadly categorised under the term Adult Language disorders. Language not only comprises of literal and direct meaning sentences, whereas there is figurative part of language like the metaphors, idioms, similes, proverbs etc. These figurative language comprehension makes the person think beyond the literal context and uses situational context of both the speaker and the listener as well as the pragmatic inferences to fully understand the meaning of spoken utterance. Thus, comprehension of figurative language needs more cognitive demand (Sundaray et al., 2018). The deficits in figurative language is commonly seen in brain damaged clinical populations and these deficits are attributed to the impairments like poor semantic knowledge, lack of

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theory of mind and problems with executive functions (Siqueira et al., 2016). Thus, assessing figurative language is necessary in knowing the underlying deficit that may persist in linguistic, pragmatic and cognitive aspect (Siqueira et al., 2016) such that it can help develop individualized intervention plans for the patients. This study aims to assess comprehension of metaphors in Tamil language through pictorial representations which are a major part of figurative language. Metaphors were specifically chosen for the study because they are commonly used in daily language conversations in Tamil.

Literature Review

1. Importance of figurative language

Figurative language is a method of expressing concepts in a more imaginative and vibrant manner, which adds meaning to the ideas that we are attempted to express. Figurative language also makes the conversation more engaging, interesting and memorable as well. The ability to understand and produce figurative language tends to be affected in almost all of the clinical population with cognitive and language disorders (Benítez-Burraco, 2017). It is critical to analyse figurative language because flaws in figurative language link to problems in fundamental elements of language such as syntax, phonology, and semantics, hence negatively influence literal meaning comprehension as well. (Benítez-Burraco, 2017). This is owing to the fact that the dichotomy between figurative and literal language is a delicate balance and basic components such as vocabulary, phonology, and syntax aid in the formation of more complex figurative language expressions (Boeckx, 2014). It is also evident that be it cognitive disorders or language disorders people face difficulties with figurative language, pragmatic abilities and social interaction (Benítez-Burraco, 2017) ranging from mild to profound severity. The figurative language also enhances the ability of cross modal thinking, understanding other people's intentions and social dimension (Sandrine Zufferey, n.d.) and this becomes the exact reason why people with deficits in figurative language also face problems in social interaction. With all of the significance of figurative language discussed in the literature, it is clear that assessing figurative language in a population with language impairment can help us identify the strengths and weaknesses of their language skills, allowing us to provide appropriate intervention and support. It can also be used to assess the prognosis and implications of language intervention, as well as the effectiveness of various approaches and strategies. It can assist us in recognizing their cognitive and social abilities in order that we may foster their involvement and inclusion in various social contexts and activities.

2. Metaphor processing in brain

Metaphors are major part of figurative language that expresses abstract ideas by comparing two words that are unrelated but share common characteristics. Metaphor processing involves areas of the brain depending on the type, complexity and context of the metaphors. The left inferior frontal gyrus that is involved in language expression, syntax and semantics is also activated when processing abstract metaphors (Jiang et al., 2019). The right inferior frontal

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gyrus (the homologous area of left inferior frontal gyrus) is activated when processing concrete metaphors (Krishnan-Barman et al., 2017). The bilateral middle temporal gyrus the part of area responsible for language comprehension, word recognition and semantic memory is activated when processing both conventional and novel metaphors (Caruana et al., 2017). The bilateral angular gyrus in the parietal lobe is involved in the processing of metaphors that involves spatial relations (Robert E. Owens Jr., n.d.). The bilateral medial prefrontal cortex of the frontal lobe involves in the processing of metaphors that involves concepts like personal and social relevance (Chen et al., 2020).

3. Processing of visual metaphors

Metaphor comprehension is a particularly dynamic process that necessitates the activation and interaction of several brain areas, those in the right hemisphere and the left hemisphere (Duque et al., 2023) According to fMRI research, white matter pathways such as the Inferior Fronto Occipital Fasciculus (IFOF) and Superior Longitudinal Fasciculus (SLF) are areas of connectivity during metaphor comprehension (Duque et al., 2023). The white these matter tracts are also critical because they are severely invaded by the tumour but remain physiologically intact (Zoli et al., 2021). Thus assessing metaphors in the form of pictures can assess regions of brain along with subcortical white matter tract connections.

METHODOLOGY

Considering Tamil is the oldest language still spoken, it is necessary to design test materials for patients, as the Tamil speaking people accounts for 20% of India's population. There are roughly around 80 million people who speak Tamil as their native language worldwide. Tamil has rich grammar and literary culture. The literatures have applied the usage of figurative language in a very extended manner and has a separate section of grammar dedicated for figurative language called the “Ani Ilakkanam (அணி இலக்கணம்-aṇi ilakːaṇam”) among the five sections of grammar in Tamil. In everyday communication, figurative language is utilized frequently. As a result, assessing figurative language for people with language disorders in Tamil is necessary. However, there are not many tests that focus on this aspect. Most of the rehabilitation centres and hospitals in Tamil Nadu employ only the Tamil translation of Western Aphasia Battery to assess people with language and communication difficulties. The purpose of this research is to create a test in Tamil that evaluates one aspect of figurative language - metaphors. The variation here is that we provide metaphors as images for individuals to name them. Thus, the study seeks to investigate the feasibility of grasping and naming familiar metaphors in the form of images. The test tool was developed with 20 commonly used metaphors in Tamil. Metaphors in Tamil are mostly two-word phrases, example: Muthu Pal (முத்துப்பல் – Teeth are pearls), Kayal Vizhi (கயல்விழி-Eyes are like fish). Thus, the test showed two pictures and asked the participants to name the metaphor. Pictures for the test tool were taken from free web source. These pictures were then distributed to forty participants using non-probability sampling method through online mode after signing

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the consent form. The participants contained twenty female and twenty males in the age range of 20 to 25. Similar educational background and age group were used as inclusion criteria for participation. All of the participants had finished their undergraduate studies. The participants had to say the name of the metaphors based on the pictures shown. The graphic representation of metaphor can be used either by cards or PPTs. Here it was used in PPT as the data was collected remotely.

ANALYSIS AND RESULTS

The data collected from the participants were analysed through SPSS. Descriptive statistics, reliability & validity analysis, One-Sample Kolmogorov-Smirnov Test and t-Test were done. Reliability and validity analysis were carried out as they are considered important in tool construction to ensure that measurements are exact and accurate, and that the tool is measuring what it is supposed to measure (Winter, 2010).

- **Descriptive Statistics**

The descriptive statistics was used to find out the distribution of the data set and relationship between the variables. The mean for the data of 40 participants were found out to be 15.0250. The median and mode are 15. The standard deviation for the data is 3.59121. The variance is 12.897. The skewness is -0.270 and kurtosis is -0.927. This indicates that the data is slightly left-skewed and the curve is platykurtic. In order to check whether the data was normally distributed or not the One Sample Kolmogorov-Smirnov test was done in SPSS. Since the test's asymptomatic significance value or the p-value was found to be 0.200 which is greater than the significance level of 0.05 it is evident that the data set is normally distributed.

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Statistics

VAR00021

N	Valid	40
	Missing	0
Mean		15.0250
Median		15.0000
Mode		15.00
Std. Deviation		3.59121
Variance		12.897
Skewness		-.270
Std. Error of Skewness		.374
Kurtosis		-.927
Std. Error of Kurtosis		.733
Range		13.00
Minimum		7.00
Maximum		20.00

Table 1: Results of Measures of Central Tendency from SPSS

One-Sample Kolmogorov-Smirnov Test

		VAR00021
N		40
Normal Parameters[a,b]	Mean	15.0250
	Std. Deviation	3.59121
Most Extreme Differences	Absolute	.109
	Positive	.100
	Negative	-.109
Test Statistic		.109
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.

Table 2: Result of One-Sample Kolmogorov-Smirnov Test from SPSS

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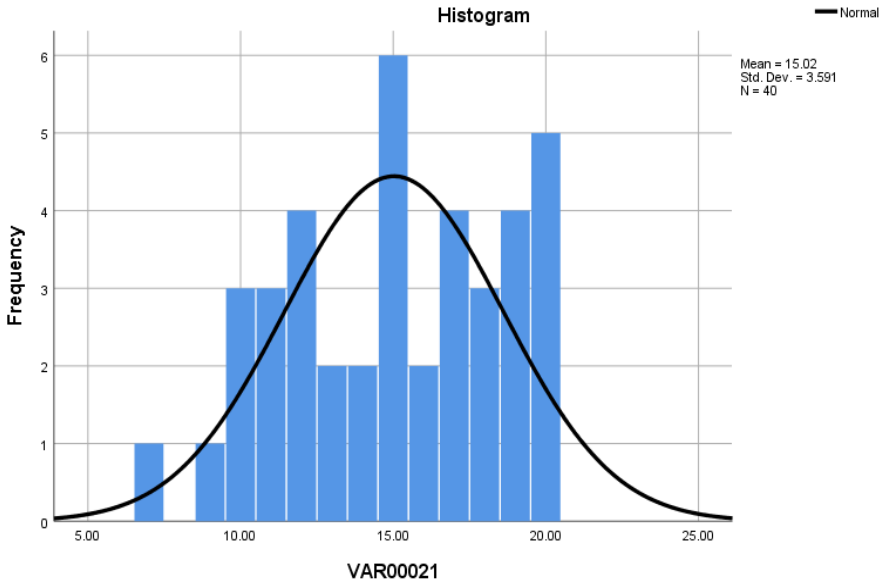

Picture1: The histogram and distribution curve of the data set

- **Reliability & Maximum Validity Analysis**

The reliability of the test tool was assessed using Cronbach's alpha, which measures the internal consistency of the set of items. A higher value of Cronbach's alpha indicates that the items are more reliable and measure the same construct. The value of Cronbach's alpha for the test tool was α = .756, which is considered acceptable according to the guidelines by George & Mallery, 2003 (Shahirah & Moi, 2019). The maximum validity that the test or measure can achieve, given its reliability coefficient, is $\sqrt{0.756} = 0.8694$. Further, the tool possess content and face validity which is established based on the expert's opinion from the faculty of Alagappa University, Karaikudi and National Institute for Empowerment of Persons with Multiple Disabilities (NIEPMD).

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.756	.747	20

Table 3: Reliability statistics result table from SPSS

- **t- Test Analysis between Male and Female**

In order to find out if there is a difference in the data set between male and female an independent t-Test was conducted to compare the means of two groups on a continuous

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variable. Female participants were assigned to Group-1 and Male participants were assigned to Group-2. The t-value found was 0.833 which is found to be less than the designated table value of 2.021 of the 95% confidence intervals. Also, the significance value or the p-value was 0.855 and the two-tailed p-value was 0.410, where both are much greater than 0.05. These results suggest that the two groups are not significantly different on the variable of gender.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
score	Equal variances assumed	.034	.855	-.833	38	.410	-.95000	1.14012	-3.25805	1.35805
	Equal variances not assumed			-.833	37.702	.410	-.95000	1.14012	-3.25865	1.35865

Table 4: Result of Independent t-Test analysis from SPSS

CONCLUSION

The aim of this study was to evaluate the comprehension of metaphors using pictorial representations in Tamil Language. The test tool contained 20 items in total. The study involved 40 participants consisting of 20 male and female each from Tamil Nadu. They were asked to name the metaphors when the pictures were shown to them. The study analysed the reliability and validity of the test tool, as well as the effect of gender in metaphor comprehension. The major findings of the study were:

- The data set was normally distributed as indicated by the descriptive statistics and confirmed by one-sample Kolmogorov- Smirnov test.
- The test tool has an acceptable level of reliability as indicated by the Cronbach's alpha coefficient. The value of the Cronbach's alpha coefficient was 0.756. The maximum validity the test tool could achieve was 0.8694. As the reliability and maximum validity values are high the constructed tool is highly reliable and valid.
- There was no statistically significant difference between the genders on metaphor comprehension as indicated by the independent t-test. The t-value found was 0.833 which is found to be less than the designated table value of 2.021 of the 95% confidence intervals. The p-value or the significance level was 0.855 which was greater than 0.05.

DISCUSSION

From the conclusion we can say that testing metaphors in the form of pictures can be a good idea and could be used in the test battery when assessing people with language disorder. Conventional metaphors when compared to novel metaphors activates both the hemispheres inferior frontal gyrus whereas the latter had an inclination towards the right hemisphere (Sundaray et al., 2018). As this test employs the use of conventional metaphors the usage of this test tool would be extensive as it can cover more brain areas. Since metaphor evaluation

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also dipped into semantic memory (Siqueira et al., 2016) of the patients it indirectly gives the evaluator an informal overview about whether or not the semantic system is affected. By choosing metaphors in the form of images has also led us to assess the white matter tracts as well, because the combination of images and metaphors tends to stimulate particular white matter tracts IFOF - metaphor understanding, SLF - visual cortex activation (Duque et al., 2023). Thus, as a first step to incorporate figurative language assessment in Tamil Context, this study has helped in developing a tool to assess a part of it.

SIGNIFICANCE

Testing metaphors with pictorial representation was chosen because metaphors are considered as words of thought and visuals tend to elicit a stronger emotional response than words (Bolognesi, 2019). This test can look into the activation of semantic links that are required to combine metaphor meaning into a unified linguistic representation (Kenett et al., 2018). Because metaphors are shown as images, the dynamic engagement of the visual, frontal, and temporal cortex via white matter tracts can be studied through this test. Also, figurative language is not only assessed in patients with aphasia but also in patients with traumatic brain injury, cognitive impairment etc and thus this test can be used in various settings. Assessing figurative language helps with the assessing of social interaction, pragmatic abilities. The main purpose of this test can be served in the rehabilitation of patients with aphasia (Mancopes & Schultz, 2008) and also could be used in checking the prognosis of the client.

LIMITATIONS

Due to the time constraint the data were collected only from 40 participants and thus standardization of the test would be difficult as it needs larger sample size to standardize a test tool (Kukull & Ganguli, 2012). The major limitation of the study is that the data has been collected from a younger population in the age range of 20 to 25 as they were easily accessible while test is actually meant for persons with language disorder in adult and geriatric population.

IMPLICATIONS

Since this test tool has given satisfactory results in terms of reliability and validity this tool can be used to create a more extensive and standardized test in the future. Further research can focus on collecting data from older age population and assess whether there are changes and comparisons between the results. Also, the tool can be used to collect data from the population with language disorder for whom it is meant to be used. A more intensive development of test materials for figurative language can be attempted in near future.

"Hope, figurative language will be featured in the assessment of language disorder in the future in Tamil Nadu".

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