ROLE OF PRIMING AND MULTILINGUALISM

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Abstract - The current study examined the Priming efficacy of emotional and neutral words with two languages of Odisha (Santali and Odia). Hence, the aim of the present study is to examine the hemispheric advantage as a function of Priming (With-Priming, Without-Priming) with two different bilingual groups (Group A: (SO) Santali first language (L_1), Odia second language (L_2) and Group B: (OS) Odia first language (L_1), Santali second language (L_2). Split visual field technique is used to measure visual-field superiority (VFS) of bilinguals groups. The multivariate ANOVA technique was used to analyze the data generated from experiment for two dependent variables namely, recognition accuracy (RA) and response latency (RL).The independent variables considered in the ANOVA are visual field (VF) (LVF : Left visual-field, RVF : Right-visual field), stimulus content (SC) : emotional word (EW), neutral word (NW), word type (WT) : Santali word (SW), Odia word (OW), and presentation mode (PM) : (unilateral, bilateral). The result sowed Group B (OS) performed better than the Group A (SO) both in 'With Priming' test and 'Without Priming' test.

Keywords - Multilingualism, Priming, Visual-Field superiority

I. INTRODUCTION

Priming paradigm is mostly used to explore the structure of mental lexicon in monolinguals and bilinguals. This paradigm has been used, because when a word is presented, it not only activates the meaning of the word but also establishes a link of those words that are semantically associated to the presented word [1]-[2]. Other studies showed that primed words were processed faster than unprimed words in RH during presentation in Orthography [3]. A priming study on English words and Chinese hanzi words concluded that Chinese hanji primes were more powerful than English primes [4]. Contemporary studies have escalated their interest on the combined interactions between emotional and cognitive processing [5].

Bilingualism study in India

Numbers of studies have been conducted on tribal languages of India. Studies on bilingualism and culture in India have reported that Kond bilinguals performed better than Kond monolinguals in language tasks [6]. Kui-Oriya bilingual Konds performed better than the Oriya monolingual Konds in the field of intellectual, cognitive meta-linguistic, meta-cognitive and academic achievement [7]. A study on Rogmeis (Rogmeis are one of the primitive linguistic groups of North East India) revealed that they were not only well-versed in Bengali, which is a dominant language of Barak valley, but have also maintained their own language [8].

From the above mentioned studies it can be clearly noted that though a few studies have been conducted with Kond and Kui tribes on bilingualism but no studies have been conducted on hemispheric superiority of tribal languages using emotional and neutral words. Hence it is necessary to examine the functional laterality of tribal bilingual population. Hence, the aim of the present study has been to study the visual-field advantage of bilinguals in the understanding of functional laterality of brain. The present study has taken stimulus content (Emotional, Neutral), word type (Santali word, Odia word) and presentation mode (Unilateral, Bilateral) as within-subject factors. The study is carried out on the Santali (a tribal language) and Odia language users of Odisha. It uses Santali (Ol chiki) as well as Odia script to measure hemispheric superiority among bilingual groups.

II. OBJECTIVE

- To examine the effect of 'Priming: With-Priming and Without-Priming' efficacy on visual-field advantage on multilingual groups of Odisha. To determine whether stimulus content (emotional and neutral) has any significant effect on hemispheric superiority in case of With-Priming and Without-Priming test. To examine the interaction effect of word type (Santali and Odia) on visual-field advantage in case of With-Priming and Without-Priming test
- To examine whether presentation mode (unilateral and bilateral) is a function of hemispheric superiority in case of With-Priming and Without-Priming test

III. HYPOTHESES

- H_1 (a): The study of 'With Priming' would elicit visual-field advantage both in terms of RA and RL than 'Without Priming' test in SO (Group A).

- H_1 (b): The study of 'With Priming' would elicit visual-field advantage both in terms of RA and RL than 'Without Priming' test in OS (Group B).
- H_2: The emotional words would have more RA and less RL in LVF and neutral words would be processed more accurately and with less RL in RVF in 'With Priming' than 'Without priming test'.
- H_3: The recognition accuracy (RA) of Odia words would be significantly more in RVF than that of Santali words. Similarly, response latency (RL) would be significantly less in RVF than that of Santali words in 'With Priming' than 'Without priming test'.
- H_4: The RA would be more and RL would be significantly less in unilateral presentation than bilateral presentation mode in 'With Priming' test than 'Without Priming' test.

IV. METHOD

A. Tools of the test

The experiment is conducted on a personal computer using Java programming.

B. Design of the test

Two experiments were conducted to test the priming efficacy among bilinguals. In first experimental design we analysed the role of 'Priming test' on both bilingual groups. In the second experimental design 'Priming' is between subject factor and within subject factors are, VF (Visual-Field), WT (Word Type), PM (Presentation Mode) and SC (Stimulus Content).

- Design I = 2 (Priming: With-priming, Without-Priming) x 2 (Group: Group A, Group B)
- Design II = 2 (Priming: With-Priming, Without-Priming) x 4 (VF): LVF, RVF, (PM): Unilateral,
- Bilateral, (WT): Santali, Odia, (SC): Emotional, Neutral.

C. Sample of the study

Total number of participants in this study was 150. The participants were categorised into two groups: Group A and Group B, each with sample size equal to 75. The mean age of Group A was mean age of Group A was 23.04 years, standard deviation was 3.85 years, and the mean age of Group B was 23.78 years, standard deviation was 4.04. All of them were right-handed as measured by 20 items of Handedness questionnaire [9].

D. Procedure of the study

The test is administered, by using the computer based software. The materials of this study are constructed by using emotional words and neutral words in Santali and Odia language. Total numbers of words are 132. The words of the test were projected in a randomized order in each visual field to each participant, both unilaterally and bilaterally.

RESULTS

The result examined hemispheric superiority on Stimulus Content (emotional and neutral), Word Type (Santali and Odia), and Presentation Mode (unilateral and bilateral), with respect to Priming and Group. The summary of the 'Priming test' mean tables is presented in (Table 1and 2).

Visual Field			LVF (Left Visual Field)			
Word Type			Santali word		Odia Word	
WOP	PM	SC	Mean (RA)	Mean (RL) msec	Mean (RA)	Mean (RL) msec
	UNI	EMO	13.29	864.73	14.28	760.28
		NEU	7.00	911.42	8.56	1054.68
	BI	EMO	12.26	956.83	10.93	1048.98
		NEU	3.60	1142.05	7.06	989.29
Visual Field			LVF (Left Visual Field)			
Word Type			Santali word		Odia Word	
WP	PM	SC	Mean (RA)	Mean (RL) msec	Mean (RA)	Mean (RL) msec
	UNI	EMO	15.27	667.14	13.14	636.93
		NEU	10.28	789.05	9.39	803.95
	BI	EMO	11.49	714.20	10.13	729.24
		NEU	4.29	838.66	10.97	818.69

Table 1. Mean Table of Priming Test (Without-Priming and With-Priming) with respect to LVF (Left Visual-Field)

* WOP – Without-Priming, WP – With-Priming, PM- Presentation Mode, UNI - Unilateral, BI - Bilateral, SC-Stimulus Content, EMO- Emotional, NUE-Neutral

Visual Field			LVF (Left Visual Field)			
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	PM	SC	Mean (RA)	Mean (RL)	Mean (RA)	Mean (RL) msec

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Table 2. Mean Table of Priming Test (Without-Priming and With-Priming) with respect to RVF (Right Visual-Field)

* WOP – Without-Priming, WP – With-Priming, PM- Presentation Mode, UNI - Unilateral, BI - Bilateral, SC- Stimulus Content, EMO- Emotional, NUE-Neutral

A. The effect of Recognition Accuracy

The ANOVA result revealed that, Recognition Accuracy (RA) of 'Priming' (With-Priming and Without-Priming test) was significant, F (1, 9568) = 305.46, $p < 0.001$. RA of 'With-Priming' test (M =10.36) was greater than 'Without-Priming' test (M = 8.51). The result also showed a significant effect on Visual-field, Stimulus Content, Presentation Mode and Word Type. The result also showed a significant effect on Visual-field, Stimulus Content, Presentation Mode and Word Type. Words were recognized significantly in LVF (M = 10.11) than RVF (M = 8.75), F (1, 9568) = 166.16, $p < 0.001$. Emotional words were recognized more accurately (M = 11.38), in comparison to neutral words (M = 7. 48), F (1, 9568) = 1351.57, $p <0.001$. Furthermore, unilaterally presented words were recognized significantly more accurately (M =10.49) than bilaterally presented words (M = 8.37), F (1, 9568) = 400.46, $p <.001$. In addition, Odia words were perceived with greater RA (M =9.56) than Santali words (M = 9.30), F (1, 9568) = 6.09, $p < 0.01$. The three way interaction of Priming x Visual -field x Stimulus Content were significant, F (1, 9568) = 23.7, $p < 0.001$ (Figure 1). The result signified that in LVF, emotional word had (M = 12.51) more recognition accuracy than the emotional words of RVF (M = 11.45) in case of 'With-Priming test'. Similarly, in 'Without-Priming test' emotional words (M = 12.69) were more accurately perceived in LVF than that of emotional words RVF (M = 8.79). The two way interaction of Priming x Visual-Field was significant, F (1, 9568) = 66.67, $p < 0.001$.The two way interaction of Priming x Stimulus Content was significant, F (1, 9568) = 37.83, $p < 0.001$.

The three way interaction of Priming x Word Type x Presentation Mode was significant, F (1, 9568) = 61.69, $p < 0.001$ (Figure 2). Unilaterally presented Santali words (M = 12.4) were better recognized in case of 'With Priming' test than that of 'Without Priming' test (M = 8.89). Additionally, unilaterally presented Santali words (M = 8.89) had more recognition accuracy than bilaterally presented Santali words (M = 7.36) in case of 'Without Priming' test. The result also indicated that unilaterally presented Odia words (M = 10.76) were better recognized in case of 'With Priming' test than that of 'Without Priming' test (M = 9.91). Additionally, unilaterally presented Odia words (M = 9.91) had more recognition accuracy than bilaterally presented Odia words (M = 7.86) in case of 'Without Priming' test. The two way interaction of Priming x Presentation Mode was significant, F (1, 9568) = 9.38, $p =0.002$ ($P < 0.01$. The two way interaction of Word Type x Presentation Mode was not significant, F (1, 9568) = 0.79, $p = 0.37$. The two way interaction of Group x Priming was not significant, F (1, 9592) = 2.59, $p = 0.10$.

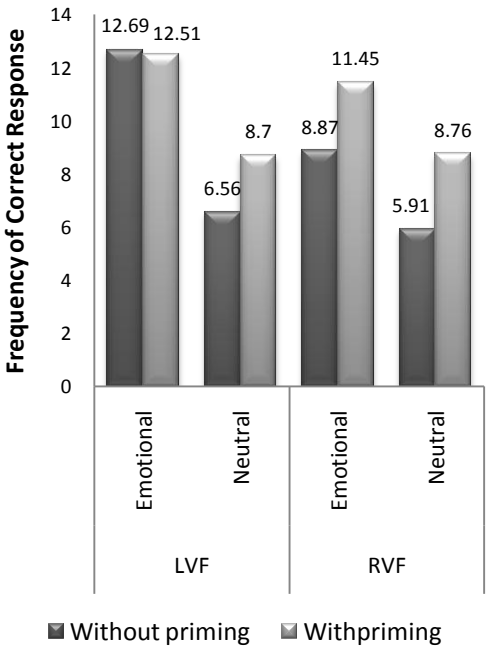


Fig. 1: Mean of Priming, Visual-field and Stimulus Content with relation to frequency of correct responses.

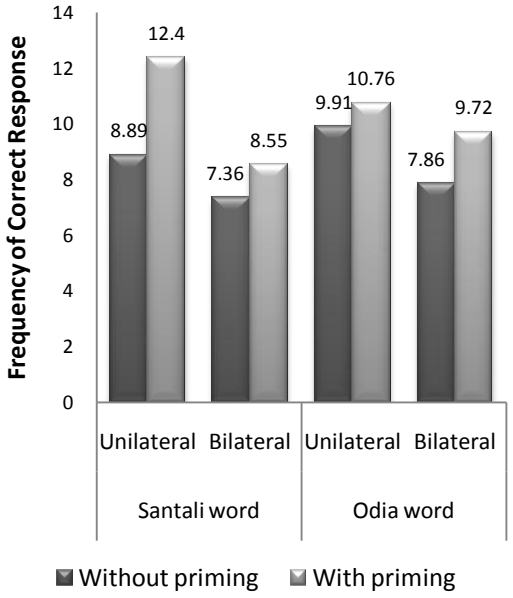


Fig. 2. Mean of Priming, Word Type and Presentation Mode with relation to frequency of correct responses.

B. The effect of Response Latency

The result revealed that, Response Latency (RL) of 'Priming' (With-Priming and Without-Priming) test was significant, F (1, 9568) = 216.46, p < 0.001. In 'With Priming' test (M = 828.01 msec) words took less time to respond than 'Without Priming' test (M = 1007.20 msec). The result also showed a significant effect on Visual-field, Stimulus Content, Presentation Mode and Word Type. Words took less time to recognize in LVF (M = 857.88 msec) than RVF (M = 977.32 msec), F (1, 9568) = 96.19, p < 0.001. Emotional words took less time (M = 824.62 msec) to respond, in comparison to neutral words (M = 1010.59 msec), F (1, 9568) = 233.15, p <0.001. Moreover, unilaterally presented words (M =812.13 msec) took less time to respond than bilaterally presented words (M = 1023.07 msec), F (1, 9568) = 299.98, p <.001. In addition, Odia words had taken less time (M =896.07 msec) to respond than Santali words (M = 939.11 msec), F (1, 9568) = 12.47, p < 0.001.The three way interaction of Priming x Visual-Field x Stimulus Content was significant, F (1, 9568) = 9.96, p < 0.001 (Figure 3). The result indicated that, emotional word had (M = 686.88 msec) taken less time to respond in LVF than emotional words in RVF (M = 817.09 msec) in case of 'With Priming' test. Similarly, in 'Without Priming' test emotional words took less time to respond in RVF (M = 886.79 msec) than in LVF (M = 907.70 msec). The three way interaction of Priming x Stimulus Content x Presentation Mode were significant, F (1, 9568) = 22.57, p < 0.001 (Figure 4). The result concluded that unilaterally presented emotional words (M = 684.35 msec) took less time to respond than bilaterally presented emotional words (M = 819.62 msec) in case of 'With Priming' test. Similarly, unilaterally presented emotional words (M = 857.12 msec) took less time to respond than bilaterally presented emotional words (M = 937.37 msec) in case of 'Without Priming' test. Moreover, unilaterally presented neutral words (M = 791.08) took less time to respond than bilaterally presented neutral words (M = 1016.98 msec) in 'With -Priming' test. Same result is found in case of 'Without Priming' test that, unilaterally presented emotional words (M = 791.08msec) took less time to respond than bilaterally presented emotional words (M = 1318.32 msec). The RL of Group x Priming was significant, F (1, 9592) = 4.27, p < 0.039 (Figure 5). Group B took less time to respond in 'With Priming' test (M = 772.40 msec) than 'Without priming' test (M = 978.02 msec). Similarly, 'With Priming' test had taken less time to respond (M = 883.61 msec) than that of 'Without Priming' test (M = 1036.37 msec) in case of group A. The result also revealed that, Group B took less time to respond than the Group A in both priming tests.

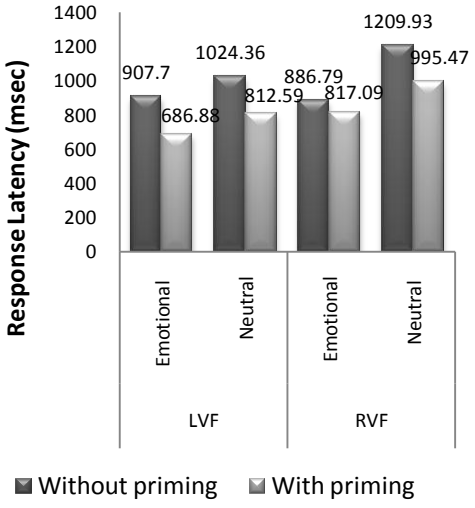


Fig. 3: Mean of Priming, Visual-Field and Stimulus Content with relation to response latency.

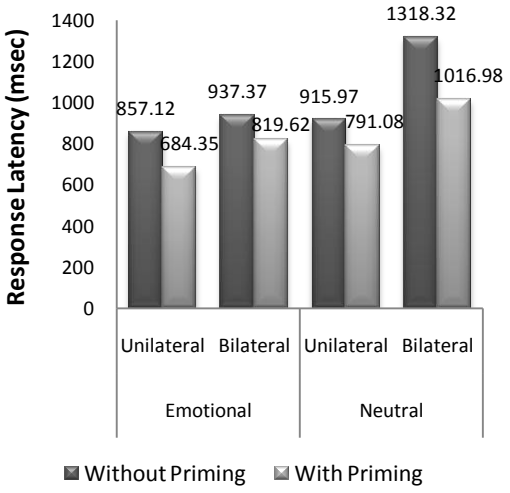


Fig. 4: Mean of Priming, Stimulus Content and Presentation Mode with relation to response latency.

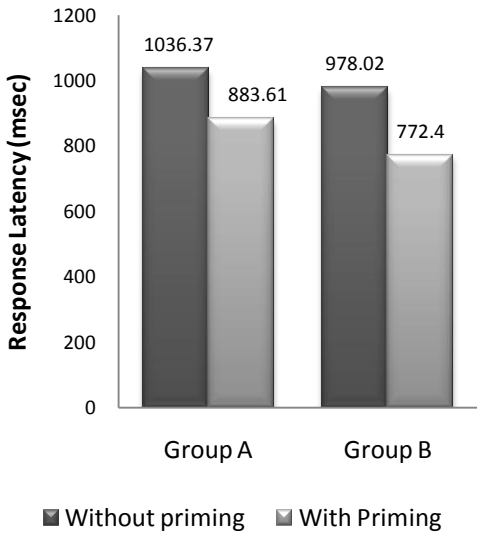


Fig. 5: Mean of Group and Priming with relation to response latency

DISCUSSION

The result reports that emotional words are recognised better in left visual-field than right visual-field in both languages of bilingual groups. This finding is consistent with the finding that, emotional words are better recognized in left visual-field than right visual-field. It is well known that, right visual-field is associated with cognitive processes and left visual-field is involved with the emotion [10]-[11]. The result may be associated with the structure of limbic system, that amygdale played important role when emotional words were presented [12]. The result is also consistent with the previous studies on emotional and neutral words by [13]-[14]. Result also signified that in unilateral presentation mode the stimuli had faster accuracy than the bilateral presentation mode. Perhaps the specialised hemisphere gets chance on the presented stimuli without having any competition in unilateral presentation mode, but it happens in bilateral presentation mode [15]-[16]. Therefore, unilaterally presented words are better recognized than bilaterally presented words. The result indicates that, emotional words had taken less time to respond in LVF than emotional words of RVF in case of 'With Priming' test. On the contrary, in 'Without Priming' test emotional words have taken less time to respond in RVF than LVF [17]. It may be due to the fact that priming helps to recognise emotional words quickly, thus taking less time to recognise through LVF, whereas stimulus in without-priming test might take more time to analyze and processes through RVF. However, the interaction of Priming and Group are not significant in case of RA but in RL there is a significant interaction observed in case of Group and Priming. Therefore 'Priming' does not fully support both bilingual groups. Hence, this hypothesis is partially validated.

CONCLUSION

The result examined the language processing of both multilingualism groups. Moreover, recognition accuracy of 'With Priming' test was greater than 'Without Priming' test. In addition, emotional words had more recognition accuracy in LVF than the emotional words of RVF in case of 'With-Priming test'. Similarly, in 'Without-Priming test' accuracy of emotional words were more accurate in LVF than that of emotional words in RVF. In addition, unilaterally presented Santali and Odia words were recognized more accurately than bilaterally presented words. Hence, we conclude that hemispheric asymmetries of 'Priming' test are affected by the visual-field, stimulus content, word type and presentation mode.
Further research is necessary to investigate the role of LVF and RVF on other languages to explore the language processing of multilingual groups. The paradigm used in this study can be used in other attributes of stimuli such as, lexical task, sentences, priming test and other linguistic tasks. Besides, as the world becomes more globalised, the understanding of how bilinguals manage and control multiple languages give rise a path for study on multilingualism.

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