CEREBRAL DOMINANCE IN MULTILINGUALS

P. J. KUMAR*, N. P. NATARAJA* AND M. G. SUBRAMANYATAH*

The present study was an attempt to find out the relationship between the familiarity of language and the hemisphere involved in processing it, A dichotic listening task was administered to 10 adult males. All of them had Kannada as mother tongue and were familiar with English and as well as Hindi. The results indicate that the most familiar language seems to be processed in the left hemisphere.

Cerebral Dominance for language has been catching the views of many researchers. Most of the researchers have attributed the language to the domain of the left hemisphere. Though there have been many studies to determine the dominance for language using one language, no studies have been available with us at present as to know the dominance for different languages in a single speaker. The idea of the present researchers was facilitated owing to the controversies present in the area of aphasia, as to the loss of language in multilingual aphasics.

Present study was designed using dichotic listening tasks in Kannada, Hindi and English to get possible answers for following quertions using normal subjects :

1. Is it the language, that the speaker is most familiar with, that has a stronger tendency to be processed by the left hemisphere ?

<div align="center">OR</div>

2. Is it the mother-tongue of the speaker that has a stronger tendency to be processed by the left hemisphere ?

<div align="center">OR</div>

3. Is it the left hemisphere that processes all the languages those are used by a speaker irrespective of their familiarity ?

Methodology

Subjects :

10 subjects in an age range of 18 to 21 years were selected for the study. Mother-tongue of all the subjects was Kannada. They were also familiar with

* AIISH, Mysore-6.

English and Hindi.   All were right-handed and had no family history of left-handedness.

Test and its Administration :

Three dichotic listening tasks, one in each language *(i.e.,* English, Kannada and Hindi) were developed using 14 Trisyllabic words in each language, in order to present seven Words each into each ear simultaneously.   Test words were presented into the subjects' ears using a cosmic tape deck through TDH-39 earphones.   A binaural equal loudness balance was maintained while presenting the words.   At the end of each test, subjects were asked to recall the word they heard through both the ears,   Depending upon the number of words each ear recalled, the dominance for that particular language was determined.   That is, if the right ear was more forthcoming in terms of number of words recalled when compared to the left,   then the left hemisphere was considered to be dominant.   If the situation was reverse, that is, left ear coming forth more when compared to the right, then the subject was considered to have the right hemisphere dominant for that particular language.   If both the ears recalled equal number of words, then a bilateral representation, meaning equal participation of both the hemispheres was assumed.

Results and Discussions

TABLE I- Familiarity ratings for the three languages as assessed by the subjecis themselves.

Subject	Most familiar language	More familiar language	Familiar language-
1	Kannada	English	Hindi
2	Kannada	English	Hindi
3	Kannada	English	Hindi
4	Kannada	English	Hindi
5	Kannada	English	Hindi
6	Kannada	English	Hindi
7	English	Kannada	Hindi
8	Kannada	English	Hind i
9	English	Kannada	Hindi
10	English	Hindi	Kannada

TABLE II Dominance Pattern for different languages

Language	Left Hemisphere Dominance	Right Hemisphere Dominance	Bilateral Representation
Kanaada (Mother-tongue)	7		3
English	3	3	4
Hindi	4	1	5

7 of the 10 subjects in the present study' were observed to have left hemi-sphere dominance for their mother-tongue while the remaining three were observed to have the bilateral representation for the language.

3 subjects presented left hemisphere dominance, 3 subjects presented right hemisphere dominance and 4 subjects depicted bilateral representation with reference to English language.

4 subjects presented left hemisphere dominance, 1 subject presented right hemisphere dominance and 5 subjects presented bilateral representation with reference to Hindi.

The instance of left hemisphere dominance was found to be more with the mother-tongue when compared with that of other languages. Right hemisphere dominance was observed with other languages and it was not at all observed with the mother-tongue. The instance of bilateral representation for language was more with ether languages than with the mother-tongue.

When statistical analysis of the data was done using X^2 analysis to see whether these differences were significant or not it was observed that these differences were significant at 0-25 level with $X^2 = 5\text{-}664621$ at 4 degrees of freedom. The analysis shows that the instance for left hemisphere dominance for mother-tongue is greater when compared to ether languages.

Hence, the following question that " Is it the mother tongue of the speaker that has a stronger tendency to be processed by the left hemisphere ? " can be answered with the following statement that mother-tongue has a stronger tendency to be in the domain of the left hemisphere.

However, when the cerebral dominance for language was compared with the familiarity of the languages, the results were observed to be little different than whai it is above. The language that was most familiar to subject seemed to have

a stronger tendency to be processed by the left hemisphere than the mot her-tongue. Table HI depicts the csrebral dominance for language with reference w> familiarity of the language.

TABLE III   Femiliarity Language and dominance.

Familiarity	Left Hemisphere Dominance	Right Hemisphere Dominance	Bilateral Represent at ion
Most familiar language	8		2
More familiar language			5
Familiar language		1	
			5

8 of the ten subjects presented with left hemisphere dominance for most familiar language, when compared to 2 subjects and 4 subjects presenting left hemisphere dominance for language in more familiar and familiar language categories respectively.

Right hemisphere dominance was not observed in the category of most familiar language, whereas 3 subjects with more familiar language and 1 subject with familiar language category presented right hemisphere dominance.

The instance of bilateral representation of language was found to be higher in more familiar language and familiar language categories than with most familiar language category. 5 $_2$ subjects presented bilateral representation in more familiar language and familiar language categories, whereas bilateral representation for language was observed only with 2 subjects in the most familiar language category.

When these differences were statistically analysed using X- analysis, they were found to be significantly different between 0-05 and 0- 10 levels with X^2 = 8-9520291 at 4 degrees of freedom.

Hence, the question that "Is it the language, that the speaker is most familiar with, that has stronger tendency to be processed by the left hemisphere ?" can be answered with the following statement that, it is the most familiar language that has stronger tendency fo be in the domain of the left hemisphere than the other languages.

Left hemisphere dominance for language was found to be more stronger with the most familiar language than with the mother-tongue in the present pilot study. When cerebral dominance for mother-tongue was compared with that of the cerebral dominance for most familiar language, it was observed that

7 subjects presented left hemisphere dominance and 3 subjects presented bilateral representation. 8 subjects presented left hemisphere dominance and 2 subjects presented bilateral representation with reference to the most familiar language.

When these differences were treated statistically, it was found that they were stetistically significant between 0-50 and 0-70 levels with $X^2 = 0 \cdot 2666666$ at one degree of freedom. This indicated that there is a stronger tendency for the most familiar language to be in the domain of the left hemisphere than the mother-tongue.

When the data is examined it can be made out that left hemisphere does process all the languages to certain extent but its instance of appearance seems to be more with the most familiar language and the mother-tongue than the other categories.

The findings of the present study cannot be generalised in any manner, because it is only a pilot study done with ten subjects. No efforts were done in his study as to compare the skills like reading and writing of each language with that of dominance, because they may also contribute towards the establishment of cerebral dominance of language.

References

Kumar, P. J., "Dichotic listening *versus* Dichhaptic Braille Reading' Master's Dissertation University of Mysore, 1978.

Siegal, S., *Nonparametric Statistics for the Behavioural Sciences,* Tokya : McGraw-Hill, Kogakusha Lt*d.,* International Students Edition, 1956.