Do Cues Facilitate Retrieval of Verbs in Persons with Bilingual Aphasia?

K.S. Girish [a,*], B.P. Abhishek [b], P. Deepak [c]

[a] Assistant Professor, Department of Speech-Language Pathology, JSS Institute of Speech and Hearing, Dharwad-580007, India.
[b] Associate Professor & Research Coordinator, Department of Speech-Language Pathology, Nitte Institute of Speech and Hearing, Mangaluru-575018, India
[c] Assistant Professor, Department of Speech-Language Pathology, Father Muller College of Speech and Hearing, Mangaluru-575002, India
*Corresponding author Ph: +91, 9448647484 ; Email: girish06ks@gmail.com

Abstract: Word retrieval difficulty is commonly seen in persons with aphasia. The cues would repair word retrieval difficulty. The effect of cues during verb retrieval was gauged via Action Naming Test (ANT) in Kannada and English languages in persons with aphasia (PWAs). A total of eight persons with bilingual Aphasia (Broca's, conduction, and isolation type) were recruited for the study. The participants were expected to have a minimum quantum of verbal output were considered for the study. Specifically, the study used phonemic, semantic, and verbal contextual cues to assess verb retrieval abilities. The result of the study manifested that all participants of the study were able to perform better with phonemic cues followed by semantic and verbal contextual cues in both Kannada and English languages.

Keywords: Cues, Retrieval, Verbs, Action Naming Test, Aphasia.

About the Authors

Mr. Girish.K S currently works as an Assistant Professor at JSS Institute of Speech and Hearing, Dharwad. He was formerly working at All India Institute of Speech and Hearing Mysore. He has several research publications under his credit. His area of interest includes Speech disorders in Maxillofacial anomalies and Voice.

Dr. Abhishek B.P currently works as an Associate Professor & Research Coordinator at the Nitte Institute of Speech and Hearing, which is an institute under Nitte Deemed to be University. He was formerly working at All India Institute of Speech and Hearing Mysore. He has several research publications under his credit. His area of interest includes Language processing and language disorders.

Mr. Deepak P currently works as an Assistant Professor at father Muller Institute of Speech and Hearing, Manguluru. He was formerly working at All India Institute of Speech and Hearing Mysore. He has several research publications under his credit. His area of interest includes Adult Language Disorder, cognition and Bilingualism/Multilingualism.

1. Introduction

Word retrieval deficit is virtually exhibited in the majority of PWAs. This deficit is may often be attributed to defective storage and accessing deficits (McCarthy & Warrington, 1990; Rohrer *et al*, 2008). Storage deficits are posited when there is degradation in the semantic information resulting in partial or no information (Rogers & Friedman, 2008). The semantic system, in particular is deemed as the central component of language processing. Individuals with such deficits were found to have impairment in both comprehension and production modalities. Wherein, in the access deficits, PWAs have intact storage and will have difficulties in retrieving words from the stored lexicon (Mirman & Britt, 2014). Individuals with access deficit may further manifest difficulties in either lemma or lexeme level.

Lemma level activation is the first level in the lexical retrieval process. This level aids in the activation of a group of concepts pertaining to the lexicon and the concept, which reaches thresholds are, selected (Roelofs, 1992). Lexeme level is the next level in the chain of retrieval, where appropriate phoneme segments related to the activated lemma nodes are retrieved (Roelofs, 1992; Levelt, 1999). As the retrieval process is an intricate phenomenon and these levels are commonly affected in PWAs, cueing strategies may aids in the retrieval of words with less effort.

The effectiveness of cues is related to the nature of lexical-semantic breakdown. The lexical-semantic breakdown can arise due to deficits at the level of lemma or lexeme. If the deficits lie at the lemma level, then contextual and semantic cues may be helpful. The lemma node activation is dependent on the context (Daroff & Aminoff, 2014). Where the contextual cues aids in the activation of the concept. Owing to this a plethora of lemma nodes are activated simultaneously, and the node reaching the higher threshold is activated. Semantic cues provide supplementary semantic information, facilitating the activation of the target lemma nodes. A phonemic cue or syllabic cue is provided when there is a deficit at the level of the lexeme. The phonemic cue facilitates the activation of the phonological nodes relevant to the target lemma node, releasing the phonemic retrieval block. In addition, few researchers had found a positive impact on word retrieval when the cues were presented holistically. That is combinations of phonological, semantic, and contextual cues. Training word retrieval in this manner yields in manifesting both immediate and long-term effects (Nickels, 2002; Wisenburn & Mahoney, 2009).

Lemma node activation deficit and lexeme level retrieval deficits can be noted in both noun and verb retrieval deficits in PWAs. Thus, cueing strategies are deemed beneficial as they remediate the lexical-semantic breakdown in PWAs (Grechuta *et al*, 2020). They are prodigious literature that unraveled the efficacy of the cues in noun retrieval in PWAs. The results of these studies revealed that phonemic cues were more effective than semantic cues in PWA (Best, 2013; Meyer, Tippett, Turner, & Friedman, 2019). particularly in Broca's aphasia (Goodglass & Kaplan, 1979; Li & Williams, 1990; Lee & Janise, 2001; Meteyard & Bose, 2018; Rao & Deepak, 2019). Semantic cues and phonemic cues were helpful for persons with anomic aphasia. Wernicke's aphasia did not benefit from either semantic or phonemic cues (Goodglass & Kaplan, 1979). Rhyming cue (were words, which rhymes with target word is presented as cues) was also aids persons who manifested deficit at the phonemic level.

On the other hand, retrieval of verbs is more difficult compared to noun retrieval (Black & Chiat, 2003; Mätzig, Druks, Masterson, & Vigliocco, 2009; Links, Hurkmans & Bastiaanse, 2010; Faroqi-Shah, 2012; Webster & Whitworth, 2012). Since verbs are atypical and morphologically more complex than nouns, nouns have no argument structures, whereas verbs may have one or more argument structures leading to difficulty in retrieval. Researchers have investigated the efficacy of the cues in the retrieval of the verb in PWAs. The results revealed that semantic cues were more beneficial than phonemic cues in naming verbs. In addition, within the type of aphasics, there were no significant differences in the efficacy of cues (Li & Williams, 1990). On the contrary, the studies also revealed that phonemic cues were more helpful than semantic cues (Rao & Deepak, 2019).

1.1. Verb retrieval abilities in Bilingual Aphasia

In recent decades, aphasia in the bilingual population has received greater interest, but the incidence of these populations getting affecting has proliferated. Researchers have investigated verb retrieval abilities in bilingual speakers with aphasia and the findings have revealed no differences in processing of verbs across the languages, tasks, and modalities (Kambanaros, 2016). Bilingual research lacks robustness by their methodological constraints and is due to several unanswered questions about cognitive processes involved in bilingual language processing (Kambanaros, 2016).

In specific to word retrieval research, prodigious studies have examined the efficacy of cues (phonemic vs. semantic) in verb retrieval across different types of aphasia in various languages. However, only a handful of studies have been carried out determining the efficacy of cues in bilingual PWAs. For instance, Modayil *et al*. (2008) assessed the naming performance using phonemic, semantic, and graphemic cues in bilingual PWAs. The experimental group comprised three persons with Broca's aphasia and one person with conduction aphasia, and the control group consisted of thirty normal subjects. Participants were required to name 35-line drawings of different lexical categories in both Kannada and Tulu languages. Participants were presented with cues such as phonemic, semantic, or grapheme in a hierarchical fashion cue. This order is maintained if participants failed to retrieve the name of the picture. The authors concluded that graphemic cues were better for persons with conduction aphasia, and for persons with Broca's aphasia, phonemic cues were more useful, followed by grapheme and semantic cues.

Recently, an Indian study examined the verb naming skills using semantic and phonemic cues on 15 bilingual PWA. The study consisted of 10 verbs, out of these, five verbs received phonemic cueing and other 5 verbs received semantic cuing. The results revealed phonemic cueing were more robust than semantic cues which was attributed towards increased redundancy of phonemic cues than semantic cues. Also, these participants could have deficits at the post lexical level, thus, yielding better performance at phonemic cues than semantic cues (Rao & Deepak, 2019).

1.2. Aim of the Study

To assess the effectiveness of cues during verb retrieval in Kannada and English languages in PWAs using Action Naming Test (ANT).

1.3. Need for the study

The present study investigates the effectiveness of cues in verb retrieval. Because verbs are deemed crucial as it is the core element in the sentence constructions, it aids in specifying the relationship in the sentences. Verb processing and retrieval is a more complex process than noun naming in general. Thus, it serves to be an important element to understand the verb retrieval process. In addition, understanding the retrieval process concerning cues aids in understanding the superiority of the cues specific to verb retrieval. In specific, understanding the verb retrieval in the bilingual population seems to be interesting due to the following reasons (1) whether the same grammatical class of words differs in different languages (2) does the superiority of cues varies across languages, that is, phonemic is stronger in L1 and vice-versa. The study findings might serve as pivotal evidence in positing the strength of the cues pertaining to verb retrieval in the bilingual population.

The objectives of the study were:

1) To assess the performance of persons with aphasia (PWAs) on verb retrieval via different cueing strategies (phonemic vs semantic vs verbal contextual cues).

2) To assess the performance of persons with different types of aphasia on verb retrieval via different cueing strategies (phonemic vs semantic vs verbal contextual cues).

2. Methods

2.1. Participants

Eight persons with bilingual aphasia with at least a minimum quantum of verbal output were considered for the study. The verbal output of PWAs were assessed via Western Aphasia Battery in Kannada (WAB-K) (Shyamala & Ravikumar, 2008). Results computed on WAB-K revealed that out of Eight PWAs, six persons were of Broca's aphasia, and one participant was of conduction and isolation aphasia each. The details of PWAs are mentioned in Table 1.

Table 1 Demographic details of participants

PWA	Age in years	Gender	Type of Aphasia
1	44	M	Broca
2	54	M	Broca
3	23	M	Broca
4	33	M	Broca
5	55	M	Isolation

6	32	M	Broca
7	42	M	Broca
8	60	F	Conduction

Note. PWA = Persons with Aphasia

All the participants recruited in the study had Kannada as their first language (L1) and English as their second language (L2). The participants were selected based on the ratings obtained on the International Second Language Proficiency rating scale (ISLPR) speaking domain. The participants had a pre-morbid proficiency rating of 5 (native-like) in L1 (Kannada), and the pre-morbid proficiency level varied from 3 to 5 in L2 (English) on ISLPR speaking domain (Ingram & Wylie, 1997).

2.2. Materials

The Action Naming Test (ANT) was originally given by Obler and Albert (1979). The test material had five practices and 57 test items. These test items were modified for the current study, as some pictures were not appropriate to the Indian scenario. Thus, these pictures were modified and validated by experienced Speech-Language Pathologists (SLPs). The line drawings were changed or modified based on the ratings given by three SLPs. The items rated as three and two by the SLPs were considered the test stimuli, and the remaining pictures were excluded. Following the validation, the final stimuli of the test had three practice items and 57 test items, which were arranged in hierarchal order based on their complexity.

2.3. Procedure

The confrontation naming ability of the participants was gauged by presenting the line drawings of action verbs, one at a time. It was made sure that the pictures were legible to the participants. If the person was unable to name the verbs, then the researcher was provided with the following cues semantic cue (the characteristics of the picture were explained), phonological cue (cues about first sound or syllable were given), and contextual cue (the clinician may give cues like "what are you doing now?") were given for effortless verb retrieval abilities. For instance, for the verb "eeju/swimming," if the participant was unable to answer correctly after the presentation of the stimuli, then semantic cue ("edanu nadiyali maduthivi/ this action is done in the river"), phonemic cue (like, "the verb starts with the syllable /ee/") and verbal contextual cue ("just think about the river or swimming pool") were given. The ANT test was conducted in both Kannada and English languages, and these languages were counterbalanced across the participants. The order of presentation of semantic, phonemic, and verbal contextual cues was counterbalanced across all the participants.

2.4. Scoring

A maximum score of 114 can be computed from the ANT test. A score of 'two' was given if the response was elicited in the absence of cues. A score of 'one' (s) was given when the response is elicited with the help of semantic cue, a score of 'one' (p) was given when the response is elicited with the help of phonemic cue, and a score of 'one' (c) was given if the contextual cue is used. A score of 'zero' was given for incomplete, incorrect, or no responses. If the given response was a noun or an incomplete verb, it was marked under incomplete responses.

2.5. Statistical Analysis

Statistical computation was done by Statistical Package for Social Sciences (SPSS) version 20.0. The data obtained were subjected to a test of normality by using the Shapiro-Wilk test, and the normality test revealed a non-normal distribution of the data ($p > 0.05$). Owing to these, non-parametric tests were used for data analysis. Comparison of groups (between groups) was carried out by using the Mann-Whitney U test. Multiple group comparison was carried out by employing the Kruskal-Wallis Test, and within-group comparison was done using the Wilcoxon Signed-Rank test.

3. Results & Discussion

The obtained results and findings are explained under the following subsections.

3.1. Performance of PWAs on ANT and efficacy of cues

The total scores of the Action Naming Test (ANT) in PWAs were calculated for both Kannada and English languages, where the descriptive analysis revealed PWAs scored slightly better in Kannada (L1) (Mean = 47.87, SD = 14.08) than in English (L2) (Mean = 38.25, SD = 21.93). However, Wilcoxon Signed Rank test results revealed no statistically significant difference between the languages (Z = -1.823, p > 0.05). This might be a result of premorbid language proficiency was almost same in both L1 and L2. Owing to this, the post-morbid recovery would have happened more or less equally in both the languages. The current study findings are in consonance with the previous study results who also revealed no differences in processing of verbs across the languages (Kambanaros, 2016). Also, these findings could be plausible attributed to accessing the word at the conceptual level in both L1 and L2. Thus, manifesting no difference in retrieval abilities in both L1 and L2. In contrast, studies also reported significant verb retrieval differences across languages, where weaker language demonstrated more deficits than the stronger language (Bogka *et al*, 2003; Paradis, 2004; Hernández *et al*, 2008). In other words, less proficient language poses significant retrieval difficulty compare to more proficient language.

Furthermore, the verb retrieval abilities were assessed separately under two conditions, 'with cues' and 'without cues', in both L1 and L2 languages. Wherein, in both with and without cues, scores were slightly better in L1 (Kannada) than in L2 (English) as shown in Figure 1. Many previous literatures have supported this finding which also posits that the cues were found to improve both immediate and long-term retrieval abilities (Nickels, 2002; Wisenburn & Mahoney, 2009)
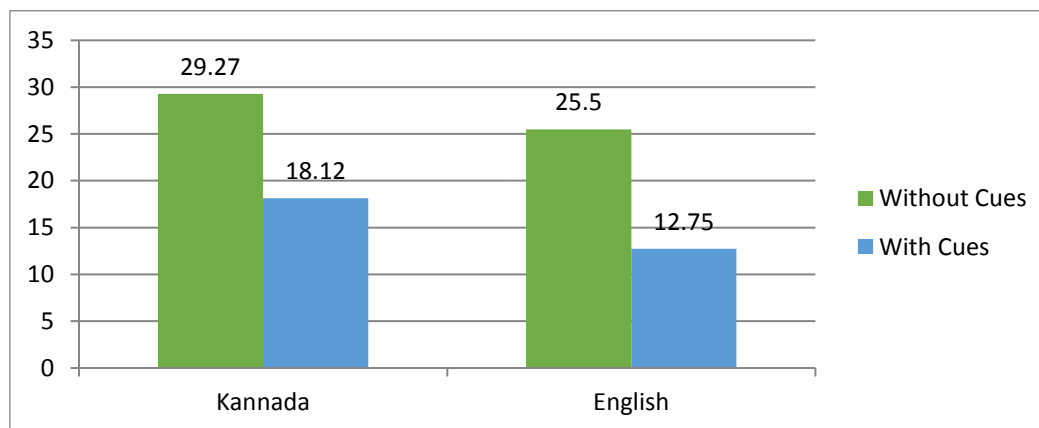
Figure 1 Mean ANT scores of PWAs in Kannada and English across two conditions

Mean, and standard deviation scores of the ANT test for different types of cues by PWAs in both Kannada and English languages were delineated in Table 2. PWAs had a mean score of 5.87 for SC, 9.5 for PC, and 2.75 for VCC in L1. Whereas, in L2, participants manifested a mean score of 3 for SC, 9.25 for PC, and 0.5 for VCC. In both the languages, PWA scored highest for phonemic cues and lowest for verbal context cues.

Table 2 Mean and Standard Deviation of Kannada and English scores of ANT in PWAs

Values	Kannada			English		
	SC	**PC**	**VCC**	**SC**	**PC**	**VCC**
Mean	5.87	9.50	2.75	3.00	9.25	0.50
SD	2.69	2.32	2.31	2.87	4.23	0.75

Notes. SC = Semantic Cues, PC = Phonemic Cues, VCC = Verbal Context Cues

Friedman's test was administered for mean ANT scores of PWAs in Kannada and English languages across different cues. Significant difference was found within PWAs across different cues in both the languages, where for Kannada language (χ 2 (2) = 11.80, p < 0.05) and for English (χ 2 (2) = 13.86, p < 0.05). Owing to these significant differences, the pair-wise comparisons among the cues were performed using Wilcoxon signed ranks test, and the result showed a statistically significant difference between the cues across both languages. The details are given in Table 3.

**Table 3** Comparison among different types of cues in Kannada and English language

|	Kannada			English		
	SC vs PC	**SC vs VCC**	**PC vs VCC**	**SC vs PC**	**SC vs VCC**	**PC vs VCC**
Z	-2.39	-2.13	-2.52	-2.53	-2.00	-2.52
p	0.01*	0.03*	0.01*	0.01*	0.04*	0.01*

*p<0.05 – a significant difference

In summary, across both the languages, phonemic cues were more useful for retrieving verbs, followed by semantic cues and verbal contextual cues. This finding is in corroboration with Mackay's (2002) study, where participants benefited more from phonemic cues than semantic cues. The study are also in consensus with many previous literature (Goodglass & Kaplan, 1979; Li & Williams, 1990; Lee & Janise, 2001; Meteyard & Bose, 2018; Rao & Deepak, 2019) who reported better verb retrieval abilities for phonemic cues in Broca's aphasia and there was a high proportion of participants with Broca's aphasia in the present study. This would suggest that these participants would have had difficulties retrieving phonemic segments from the phonological output lexicon and would have benefited from phonemic cues.

3.2. Performance of persons with different types of aphasia on ANT and efficacy of cues

On comparing ANT scores of different types of aphasia, persons with isolation aphasia scored better than Broca's aphasia and conduction aphasia without the help of cues in both Kannada and English languages. On the other hand, with the help of cues, persons with conduction aphasia scored better than the other two types of aphasia (Broca's and conduction) in Kannada, whereas, in the English language, persons with isolation aphasia scored better than the other two types of aphasia as shown in Figure 2 and 3.
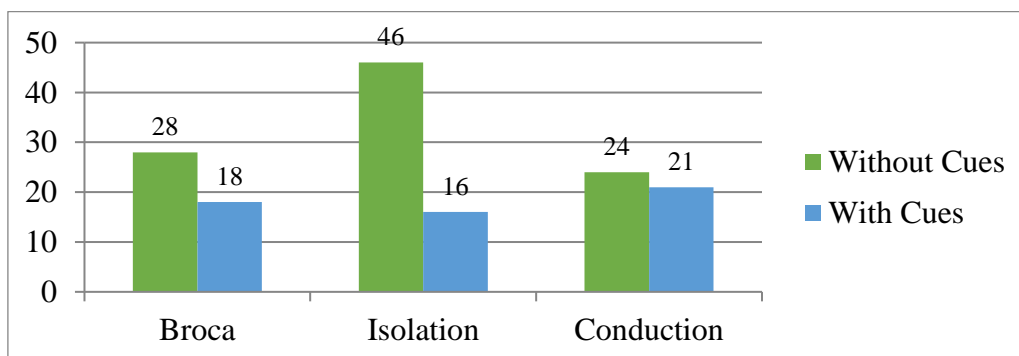
Figure 2 Mean of ANT scores in different types of aphasia in the Kannada language
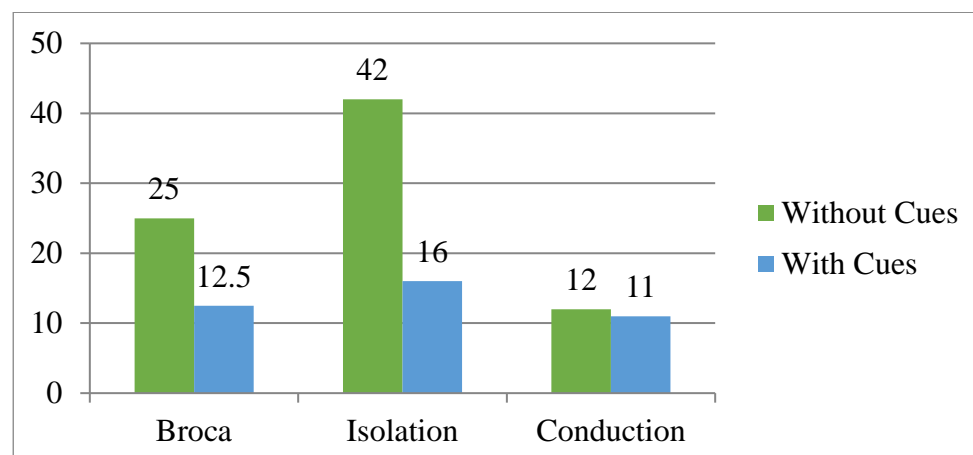
Figure 3 Mean of ANT scores in different types of aphasia in the English language

In all three types of aphasia, the mean score of ANT was more for phonemic cues than semantic and verbal contextual cues, where verbal contextual cues had the least score. Phonemic cues were more helpful, and verbal contextual cues were least helpful in the retrieval of verbs in both languages. The details are mentioned in Table 4.

Table 4 Mean and Standard Deviation of Kannada and English language scores of ANT across different types of aphasia

		Kannada			English		
		SC	PC	VCC	SC	PC	VCC
Broca	Mean	5.50	9.33	3.16	2.50	9.33	0.66
	SD	3.01	2.73	2.40	2.81	5.00	0.81
Isolation	Mean	6.00	10.00	0.00	7.00	9.00	0.00
	SD	-	-	-	-	-	-
Conduction	Mean	8.00	10.00	3.00	2.00	9.00	0.00
	SD	-	-	-	-	-	-

These differences in cueing response are plausible due to the cognitive-linguistic load that these cues are manifesting. In other words, the cognitive-linguistic load exhibited by phonemic cues is relatively less than semantic and verbal contextual cues. Thus, the scores of phonemic cues were noted to be higher compared to other cues. In the current study, participants had good auditory comprehension skills; this was ensured while assessing WAB-K. These spared comprehension abilities may posit that these participants have relatively intact lexical-semantic representation. However, these participants may exhibit deficits at the phonological level. Thus, phonemic cues would have yielded better retrieval abilities, and the results are in corroboration with the previous studies (Nickels, 2002; Kelly, Brady & Enderby, 2010; Rao & Deepak, 2019).

4. Conclusion

The present study sheds light on the superiority of cues in the retrieval of verbs in both Kannada (L1) and English (L2) languages. The study findings serve to be clinically relevant information as it posits the superiority of cues in both languages, particularly regarding verb retrieval. Notably, the current study findings should be explored by inculcating more cues and more aphasics with varied linguistic profiles. In addition, the paradigm used in the study should be meticulously used with PWAs who manifest homogenous linguistic profiles.

References

Best, W., Greenwood, A., Grassly, J., Herbert, R., Hickin, J., & Howard, D. (2013). Aphasia rehabilitation: Does generalisation from anomia therapy occur and is it predictable? A case series study, Cortex, 49, 2345–2357. https://doi.org/10.1016/j.cortex.2013.01.005

Black, M., & Chiat, S. (2003). Noun–verb dissociations: A multi-faceted phenomenon, *Journal of Neurolinguistics*, *16*(2-3), 231-250. https://doi.org/10.1016/S0911-6044(02)00017-9

Bogka, N., Masterson, J., Druks, J., Fragkioudaki, M., Chatziprokopiou, E. S., & Economou, K. (2003). Object and action picture naming in English and Greek, *European Journal of Cognitive Psychology*, *15*(3), 371-403. https://doi.org/10.1080/09541440303607

Daroff, R. B., & Aminoff, M. J. (2014). *Encyclopedia of the neurological sciences*. Academic press.

Faroqi-Shah, Y. (2012). Linguistic and sociocultural diversity among south Asians. *Perspectives on Communication Disorders and Sciences in Culturally and Linguistically Diverse (CLD) Populations*, *19*(1), 6-11. https://doi.org/10.1044/cds19.1.6

Goodglass, H., & Kaplan, E. (1979). Assessment of cognitive deficit in the brain-injured patient. In *neuropsychology* (pp. 3-22). Springer, Boston, MA.

Klaudia Grechuta, Belén Rubio Ballester, Rosa Espín Munné, Teresa Usabiaga Bernal, Begoña Molina Hervás, Bettina Mohr, Friedemann Pulvermüller, Rosa Maria San Segundo & Paul F. M. J. Verschure, (2020). Multisensory cueing facilitates naming in aphasia, *Journal of NeuroEngineering and Rehabilitation*, 17(1), 1-11. https://doi.org/10.1186/s12984-020-00751-w

Hernández, M., Cano, A., Costa, A., Sebastián-Gallés, N., Juncadella, M., & Gascón-Bayarri, J. (2008). Grammatical category-specific deficits in bilingual aphasia, *Brain and Language*, 107(1), 68-80. https://doi.org/10.1016/j.bandl.2008.01.006

Ingram, D., & Wylie, E. (1997). International Second Language Proficiency Ratings scale.

Kambanaros, M. (2016). Verb and noun word retrieval in bilingual aphasia: a case study of language-and modality-specific levels of breakdown, *International Journal of Bilingual Education and Bilingualism*, *19*(2), 169-184. https://doi.org/10.1080/13670050.2015.1037717

Kelly, H., Brady, M. C., & Enderby, P. (2010). Speech and language therapy for aphasia following stroke, *Cochrane Database of Systematic Reviews*, (5). https://doi.org/10.1002/14651858.cd000425.pub4

Lee, W. L., & Janise. (2001). The effectiveness of semantic and syllabic cues for Cantonese aphasic patients with naming difficulties. *Doctoral dissertation, The University of Hong Kong* (Pokfulam, Hong Kong).

Levelt, W. J. (1999). Models of word production, *Trends in cognitive sciences*, 3(6), 223-232. https://doi.org/10.1016/s1364-6613(99)01319-4

Li, E. C., & Williams, S. E. (1990). The effects of grammatic class and cue type on cueing responsiveness in aphasia, *Brain and Language*, 38(1), 48-60. https://psycnet.apa.org/doi/10.1016/0093-934X(90)90101-L

Links, P., Hurkmans, J., & Bastiaanse, R. (2010). Training verb and sentence production in agrammatic Broca's aphasia, *Aphasiology*, *24*(11), 1303-1325. https://doi.org/10.1080/02687030903437666

McCarthy, R. A., & Warrington, E. K. (1990). Cognitive neuropsychology: A clinical introduction.

Mätzig, S., Druks, J., Masterson, J., & Vigliocco, G. (2009). Noun and verb differences in picture naming: Past studies and new evidence, *Cortex*, *45*(6), 738-758. https://doi.org/10.1016/j.cortex.2008.10.003

Meteyard, L., & Bose, A. (2018). What does a cue do? comparing phonological and semantic cues for picture naming in aphasia. *Journal of Speech, Language, and Hearing Research*, 61(3), 658-674. https://doi.org/10.1044/2017_jslhr-l-17-0214

Meyer, A. M., Tippett, D., Turner, R. S., & Friedman, R. B. (2019). Long-term maintenance of anomia treatment effects in primary progressive aphasia, Neuropsychological Rehabilitation, 29, 1439–1463. https://doi.org/10.1080/09602011.2018.1425146

Mirman, D., & Britt, A. E. (2014). What we talk about when we talk about access deficits, *Philosophical Transactions of the Royal Society B: Biological Sciences*, 369(1634), 20120388. https://dx.doi.org/10.1098/rstb.2012.0388

Modayil, M., George, R., Ali, M. A. & Bhat, S. (2008). Naming performance in bilinguals with aphasia: using various cueing strategies. *ASHA Convention.*

Nickels, L. (2002). Therapy for naming disorders: Revisiting, revising, and reviewing, *Aphasiology*, 16(10-11), 935-979. https://doi.org/10.1080/02687030244000563

Obler, L.K & Albert, M.L. (1979). *Action Naming Test* (Experimental ed.). Boston VA Medical Center.

Paradis, M. (2004). A Neurolinguistic Theory of Bilingualism. Amsterdam: John Benjamins

Rao, A., & Deepak, P. (2019) Cueing Strategies for Different Grammatical Class of Words in Broca's Aphasia, *International Journal of Health Sciences & Research*, 9(8), 89-96.

Roelofs, A. (1992). A spreading-activation theory of lemma retrieval in speaking, *Cognition*, 42(1-3), 107-142. https://doi.org/10.1016/0010-0277(92)90041-f

Rogers, S. L., & Friedman, R. B. (2008). The underlying mechanisms of semantic memory loss in Alzheimer's disease and semantic dementia, *Neuropsychologia*, 46(1), 12-21. https://dx.doi.org/10.1016/j.neuropsychologia.2007.08.010

Rohrer, J. D., Knight, W. D., Warren, J. E., Fox, N. C., Rossor, M. N., & Warren, J. D. (2008).Word-finding difficulty: a clinical analysis of the progressive aphasias, *Brain*, 131(1), 8-38. https://doi.org/10.1093/brain/awm251

Shyamala, K. C. Ravikumar (2008). Normative and Clinical Data on the Kannada Version of Western Aphasia Battery (WAB-K). *Language in India*, *8*(6).

Webster, J., & Whitworth, A. (2012). Treating verbs in aphasia: exploring the impact of therapy at the single word and sentence levels, *International Journal of Language & Communication Disorders*, *47*(6), 619-636. https://doi.org/10.1111/j.1460-6984.2012.00174.x

Wisenburn, B., & Mahoney, K. (2009). A meta-analysis of word-finding treatments for aphasia, *Aphasiology*, *23*(11), 1338-1352. https://psycnet.apa.org/doi/10.1080/02687030902732745

Acknowledgement

Author contribution statement

Girish, K. S P. -Data acquisition & analysis, Manuscript preparation, editing & review ; **Abhishek, B.P**-Concepts, work Design, Data analysis, Manuscript preparation, editing & review ; **Deepak, P**.-Manuscript preparation, editing & review

Informed consent

Written consent was obtained from the participants

Funding

Ethics Approval

Approval was obtained from the institutional ethics committee

Does this article screened for similarity?

Yes.

Conflict of interest

The authors have no conflicts of interest to declare that they are relevant to the content of this article.

About The License