# The Effects of Cueing in the Facilitation of Word Retrieval in Patients with Aphasia

**Original Article**

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## ABSTRACT

**Introduction:** Anomia is one of the hallmarks of aphasia. Word retrieval can be facilitated by using phonological and semantic cueing strategies. Phonological cueing may be phonemically based consisting of the first consonant or first consonant plus vowel in a target word, while semantic cueing provides description of target words.

**Purpose of the study:** To determine the effect of using phonological and semantic cueing on the facilitation of word retrieval in patients with aphasia and to compare the effect of phonological and semantic cues on picture naming accuracy.

**Patients and Methods:** The study includes 30 participants that had suffered a left hemisphere cerebrovascular accident (CVA) at least 3 months prior to the start of the study. Each patient has carried out language assessment using the Arabic version of the Comprehensive Aphasia test (CAT) prior to treatment and post treatment. Naming tests scores (using phonemic and semantic cues) obtained in pretreatment baseline phase were compared to post-treatment scores.

**Results:** Both phonological cueing and semantic cueing treatments improve word retrieval in participants. Naming tests scores has significantly improved for all participants. The results revealed beneficial effects of both phonological and semantic cues on word retrieval with the therapy sessions.

**Conclusion:** Responsiveness to cues in picture naming assessment might provide a positive prognostic indicator for treatment. There was an improvement in the pre & post rehabilitation scores regarding naming objects, naming actions and spontaneous picture description among the two groups using phonemic & semantic cueing therapy.

**Key Words:** Aphasia, phonemic cue, semantic cue, word retrieval.

## INTRODUCTION

Anomia is one of the hallmarks of aphasia. The development and testing of word-retrieval treatments for aphasia has focused on approaches that have targeted either the semantic or phonologic levels of processing[1]. Previous research has demonstrated that word retrieval can be facilitated by using phonological and semantic cueing strategies. Cueing is a technique used in both assessment and therapy to improve naming impairments[2]. A cue is a piece of relevant linguistic information presented once, before the individual attempts to name the target or after a failed production attempt[3]. Cueing involves the clinician providing minimal prompts designed to aid the person with aphasia in a testing or therapy task (as picture naming) and then offering more prompts if the task has not been achieved successfully. In confrontation naming, cues tend to be either phonemically based cues or semantic cues. Phonological cueing may be phonemically based consisting of the first consonant or first consonant plus vowel in a target word, (e.g., "c" for "car"). Meanwhile, semantic cueing targets the activation of lexical semantic association networks (e.g., semantic attributes, concept properties, word associates, category memberships)[4,5]. Semantic cueing consists of providing information that categorizes, describes, or defines target words as such as giving the superordinate word (e.g., cue "vegetable" to name the cucumber), an associative verb (e.g., cue "you ring it" to name the bell) or/and definitions or sentences to complete (e.g., cue "a farm animal that gives milk:" to name the cow).

Cueing Hierarchy (CH) is another therapy program for patients with anomic aphasia. CH is a treatment program that consists of cues. It helps the patient with anomic aphasia to deal with the naming problem. Some studies in the literature show that these cues work more effectively when they maintain a hierarchy[6]. CH consists of ten levels of hierarchy[7]. The cues available for patients with anomic aphasia, such as functional cues, description cues, categorical cues, phonemic cues, semantic cues, etc.

### Purpose of the study:

To determine the effect of using phonological and semantic cueing on the facilitation of word retrieval

in patients with aphasia and to compare the effect of phonological and semantic cues on picture naming accuracy.

## PATIENTS AND METHODS:

The study included 30 participants that had suffered a left hemisphere cerebrovascular accident (CVA) at least 3 months prior to the start of the study. The inclusion criteria included the following: Arabic-speaking, right-handed and all had expressive aphasia with word finding difficulties as a significant part of aphasia and were attending language therapy sessions due to aphasia following cerebrovascular stroke. The co-occurrence of neurodegenerative or psychiatric diseases or motor speech disorders were an exclusion criterion.

Participants were recruited in 2021–2022 attending at National Hearing and Speech Institute. Aphasia was diagnosed by an experienced Phoniatrician. Each patient carried out a language assessment using the Arabic version of the Comprehensive Aphasia test (CAT)[8] prior to the rehabilitation and post rehabilitation. A comprehensive evaluation of participants' single word production (naming objects) and other expressive tests as naming action and spontaneous picture description were performed using subtests from the CAT. Analysis of using cueing will be used in the assessment of the naming subtests.

Participants were divided in two subgroups according to their profile of errors: based on their performance on the Arabic version of the CAT Naming subtest. Group 1: lexical-phonological (producing a majority of phonemic errors that responded more to phonemic cues), and Group 2: lexical semantic (individuals producing a majority of semantic errors that responded more to semantic cues).

Intervention took place for 8 weeks (once weekly), sessions lasting about 1 hour. Target words were selected for therapy and the baseline naming ability was detected. The therapy method consists of repeated picture naming of therapy targets aided by a speech therapist. If unable to name the pictures after 5 sec, participants were aided with phonemic and semantic cues. All participants underwent two patterns of cueing: a phonological cueing pattern before a semantic cueing pattern. This order was done to avoid unwanted effects of the semantic pattern over the phonological pattern: as semantic effects could be temporally persistent[9]. The pattern with shorter-lasting effects (i.e., the phonological cueing) is administered first. Assessment of naming accuracy will be analyzed pretherapy and after therapy.

Cueing continued until the word target was accurately produced. If the whole word was accurately produced via cueing, then the participant was encouraged to repeat/read the target name.

The approval of the local ethics committee of the National Hearing and Speech Institute and General organization of the hospitals and Institutes (GOTHI) was obtained, and a fully written informed consent was signed by the patients before participating in the study.

## RESULTS:

The studied group consisted of 30 participants (15 males and 15 females) mean age 51.2 years. They were divided into two groups; Group 1: lexical-phonological (responding more to phonemic cues), and Group 2: lexical semantic (responding more to semantic cues). There were no statistically significant differences; between age & the two groups of participants given phonemic & semantic cues. Meanwhile, there were no statistically significant differences; between gender & literacy & the two types of groups of cues. They are two matched groups (Figure 1).

Comparison between the means of pre & post therapy regarding naming objects, naming actions and spontaneous picture description among phonemic group (group 1) using phonemic cues therapy and semantic group (group 2) showed highly significant differences. Those differences were statistically highly significant. (*p value < 0.001*) as shown in (Table 1, 2 & 3) and (Figure 2).

The mean change of using phonemic cues was higher than that for using semantic cues. That difference was statistically highly significant. {Changing in mean number of cues used from pre-rehabilitation till post-rehabilitation; was calculated using equation= (post rehabilitation number of cues –pre rehabilitation number of cues) where the Negative signs in (-4.5& -2) indicated decrease in number of cues used post-rehabilitation}as shown in (Table 4 & Figure 3).

There was direct correlation between naming objects & naming actions using Phonemic & semantic cues. While, there was no correlation between naming objects & spontaneous picture description post rehabilitation (Figure 4).
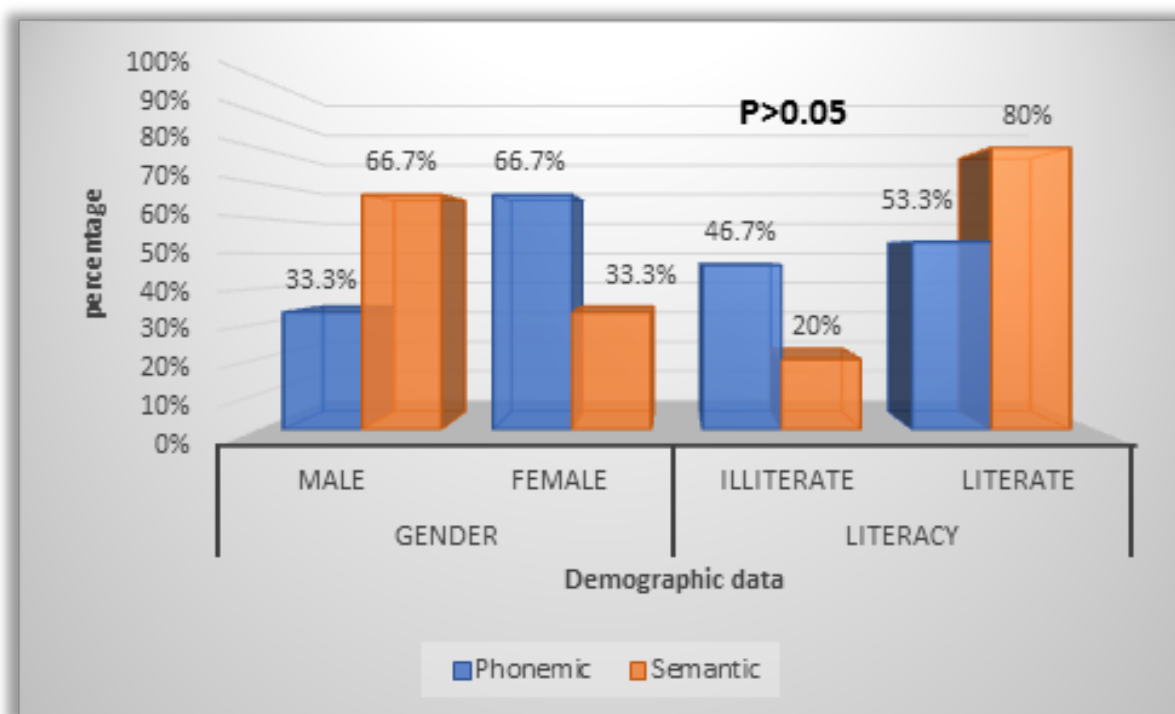
**Fig. 1:** Bar chart representing comparison between phonemic & semantic cues regards Demographic Data

**Table 1:** Comparison between pre & post therapy regards naming objects, naming actions and spontaneous picture description among phonemic group using phonemic cues therapy.

| Phonemic cues | | N | Mean | SD | Median | Range | | 95%CI | | t | *P Value* | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min. | Max. | L. Bound | U. Bound | | | |
| Naming objects | Pre | 15 | 30 | 10.2 | 34 | 6 | 44 | 25 | 36 | 8.35 | *<0.001* | HS |
| | Post | 15 | 39 | 9.1 | 42 | 21 | 46 | 34 | 44 | | | |
| Naming action | Pre | 15 | 6 | 2.7 | 6 | 2 | 10 | 4 | 7 | 7.12 | *<0.001* | HS |
| | Post | 15 | 7 | 2.1 | 8 | 4 | 10 | 6 | 8 | | | |
| Spontaneous picture description | Pre | 15 | 14 | 3.9 | 14 | 9 | 21 | 12 | 16 | 7.59 | *<0.001* | HS |
| | Post | 15 | 27 | 5.4 | 30 | 18 | 32 | 24 | 30 | | | |

SD; standard deviation, HS; highly significant

**Table 2:** Comparison between pre & post therapy regards naming objects and actions using semantic cues therapy

| semantic cues | | N | Mean | SD | Median | Range | | 95% CI | | t | *P Value* | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min. | Max. | L Bound | U Bound | | | |
| Naming objects | Pre | 15 | 25 | 12.1 | 30 | 6 | 42 | 18 | 32 | 9.45 | *<0.001* | HS |
| | Post | 15 | 34 | 8.9 | 36 | 21 | 46 | 30 | 39 | | | |
| Naming action | Pre | 15 | 6 | 1.9 | 5 | 4 | 8 | 5 | 7 | 11.50 | *<0.001* | HS |
| | Post | 15 | 7 | 1.5 | 6 | 6 | 9 | 7 | 8 | | | |

SD; standard deviation, HS; highly significant

**Table 3:** Comparison between pre & post therapy regards spontaneous picture description using semantic cues

| semantic cues | | N | Mean | SD | Median | Range | | 95% CI | | Z | *P Value* | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min. | Max. | L Bound | U Bound | | | |
| Spontaneous picture description | Pre | 15 | 16 | 7.3 | 12 | 9 | 32 | 12 | 20 | 3.21 | *0.001* | HS |
| | Post | 15 | 30 | 2.9 | 30 | 22 | 32 | 28 | 31 | | | |

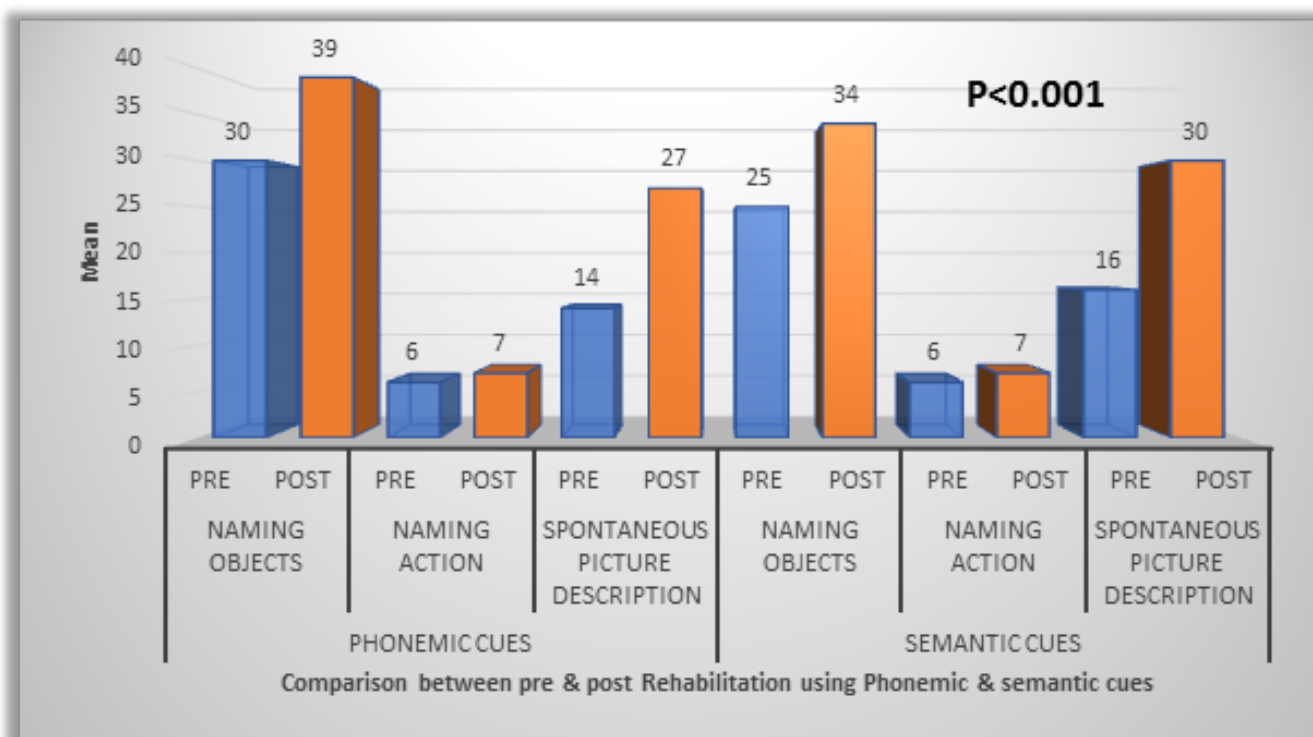SD; standard deviation, HS; highly significant

**Fig. 2:** Comparison between pre & post rehabilitation using phonemic & semantic cues.

**Table 4:** Comparison between change in phonemic & semantic cues used in pre- rehabilitation & post-rehabilitation.

| Change in cues used | N | Mean | SD | Median | Range | | 95% CI | | t | *P Value* | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Min. | Max. | L Bound | U Bound | | | |
| Phonemic | 15 | -4.5 | 2.6 | -4 | -10 | 0 | -5.9 | -3.0 | 3.19 | 0.004 | HS |
| Semantic | 15 | -2.0 | 1.5 | -2 | -4 | 0 | -2.8 | -1 | | | |

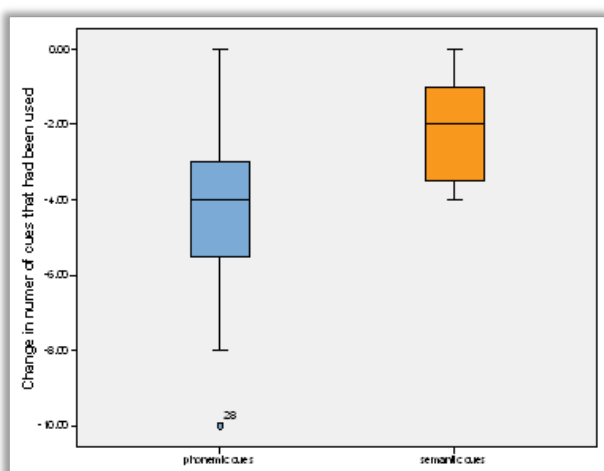SD; standard deviation , HS; highly significant. Independent- Samples Test



**Fig. 3:** Boxplot representing comparison between change in numbers of cues that had been used from pre rehabilitation till post rehabilitation using phonemic & semantic cues
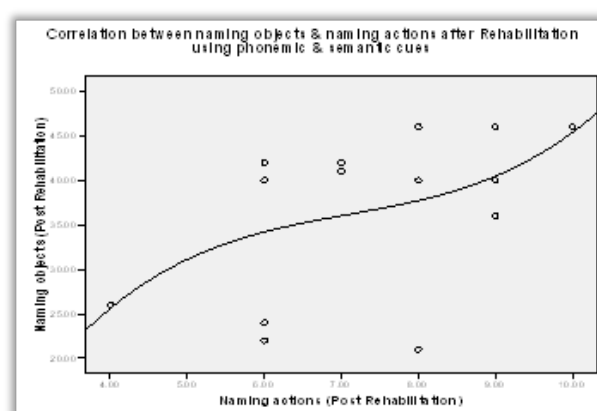


**Fig. 4:** Scatter Dot representing correlation between naming objects and naming actions post rehabilitation using phonemic & semantic cues

## DISCUSSION

The purpose of this study was to focus on effect of using cueing either phonemic cues or semantic cues in assessment and therapy to facilitate word retrieval and improve the naming ability in participants with anomic aphasia. There were two main aims in this study; the first aim was to detect the level of improvement among two groups; a group with lexical phonologic errors and a group with lexical semantic errors using phonemic and semantic cueing during rehabilitation. The second aim was to compare between using the two cues on the level improvement of naming ability which will therefore affect other expressive abilities as naming actions and spontaneous picture description.

Regarding the first aim of this study, participants in both groups showed significant improvement on the naming ability post rehabilitation using both phonemic and semantic cues during therapy. There was highly significant improvement in the results of the subtest of naming objects pre & post-rehabilitation. The results were reflected on the other expressive abilities as naming actions and spontaneous picture description which also revealed a significant difference in improvement using the cueing therapy. The study revealed that there was a direct correlation between naming objects & naming actions using both phonemic & semantic cues. While, there was no correlation between naming objects & spontaneous picture description post rehabilitation.

It was noticed that the group with phonemic errors, there was a direct correlation between; naming objects & naming actions. While, there was no correlation between; naming objects & spontaneous picture description post rehabilitation using Phonemic cues. However, in the other group with semantic errors, there was no correlation between; naming objects & naming actions. Also, there was no correlation between; naming objects & spontaneous picture description post rehabilitation using semantic cues. These results may reflect that the intervention with semantic cues may improve naming ability but may not be generalized to the other expressive abilities. These results are similar to the study done by Best *et al*.[10-12] that also reveal the lack of generalization to other abilities.

Regarding the second aim, the change in the number of times of using the phonemic and semantic cues was calculated and it was noticed that there was a decrease in number of cues used post-rehabilitation regarding the use of phonemic cues in comparison to the use of semantic cues which was highly significant. Meanwhile, the improvement detected in the results may explain the reason behind this decrease as it was not needed as much as before therapy. However,

the change was more relevant in the number of the phonemic cues which may verify that the participants in both groups benefited more from phonemic cues than semantic cues.

Many therapy studies also have demonstrated that phonological cues are effective not only in individuals with phonological process impairments but also for individuals with semantic impairments[9]. Other researches had shown semantic cues to be effective ways to improve picture naming, while some studies comparing both facilitation techniques within the same aphasic individuals suggested an advantage of semantic cueing over phonological cueing[12]. Other facilitation studies either found comparable effectiveness of these two types of cues or revealed that phonological cueing was overall more effective than semantic cueing[14]. A recent computational model simulating naming tasks also concluded that phonological cues could potentially induce greater facilitation than semantic cues[5]. Patterns of cueing are not consistent in aphasia; it is not the case that phonological impairments always benefit from phonological cues and semantic impairments form semantic cues[15].

## CONCLUSION

Phonemic and semantic cueing is one of the treatment approaches used to improve the expressive language of naming or efficiency in word retrieval of patients with aphasia. Responsiveness to cues in picture naming assessment might provide a positive prognostic indicator for treatment. There was an improvement in the pre & post rehabilitation scores regarding naming objects, naming actions and spontaneous picture description among the two groups using phonemic & semantic cueing therapy.

## CONFLICT OF INTEREST

There are no conflicts of interest.

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