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THE EFFECTIVENESS OF INITIAL SYLLABLE CUE FOR WORD-

RETRIEVAL IN CANTONESE-SPEAKING APHASICS

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ABSTRACT

Studies conducted on English-speakers found that phonemic cueing is an effective therapeutic technique in treating aphasic patients with word-retrieval problem. Cantonese is a syllabic language. So, initial syllable cue is applied in treatment for Cantonese-speaking aphasics instead of phonemic cue. However, no research has been done to evaluate its effectiveness. In this study, confrontation naming task was used to investigate the effectiveness of initial syllable cue to the Cantonese-speaking aphasics. Subjects were chosen to meet criteria based on previous studies which should make them responsive to phonemic cue. The initial syllable cue was found to be effective for Cantonese-speaking aphasics to retrieve words in picture naming. Two types of initial syllable cues in Cantonese were tested: (1) semantically related to the target compound word; (2) semantically unrelated to the target word. Results showed that the addition of semantic element in the initial syllable in Cantonese would not increase the cueing effectiveness.

INTRODUCTION

A primary characteristic of persons with aphasia is difficulty in word-retrieval, both during spontaneous speech and in confrontation naming (Stimley & Noll, 1991). The results of word retrieval studies have important clinical implications for aphasiology. Such results can aid in the development of effective therapeutic techniques for facilitating word retrieval in aphasia. So, many studies investigate the word-retrieval mechanisms (Li & Canter, 1991; Howard & Orchard-Lisle, 1984; Marshall, Pound, White-Thomson, M. & Pring, 1990).

Cueing techniques have been widely used in the remediation of aphasics with word-retrieval deficits. Several studies using English speakers (Love & Webb, 1977, Pease & Goodglass, 1978), show that the presentation of the initial syllable of a polysyllabic word was the most beneficial cueing technique for aphasic patients. The initial syllable of the English word usually consists of one or two phonemes which do not carry meaning by themselves, e.g. um- in umbrella. This type of cue is sometimes also called a 'phonemic cue'. Howard & Orchard-Lisle (1984) argue that whether phonemic cues are effective for an individual patient is related to the level at which the naming process is breaking down. They propose an information processing model

of naming which consists of stages as illustrated in Fig.1.

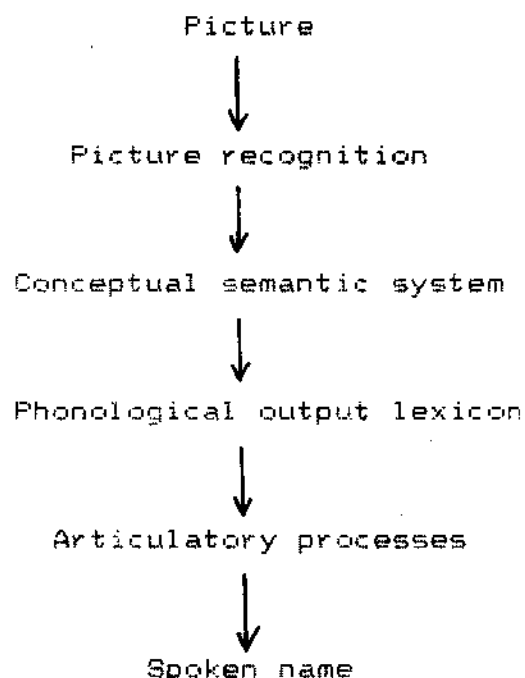


Fig.1. The sequence of information processing stages in picture naming. (Bruce & Howard, 1988)

From the above model, a visual stimulus is categorized by an 'object recognition system', this yields an output which is used to access information about the picture's (or object's) meaning in a central conceptual semantic system. If a complete and correct semantic description is retrieved, this can, in turn, be used to access an entry in the phonological output lexicon, which produces a specification of the phonological form of the word. This is then

converted to a set of articulatory commands, used to produce the spoken name.

Howard & Orchard-Lisle (1984) claim that phonemic cues must operate at the level of the phonological output lexicon, because this is the point in the system at which phonologically-coded information becomes available. In general, phonemic cues, which by definition offer only partial information about a word, will only be effective if the correct entry in the phonological output lexicon is receiving partial activation from the semantic system. The combination of (partial) information from the phonemic cue and activation from the semantic system should be sufficient to elicit the correct name. Phonemic cues, therefore, are likely to elicit correct responses where addressing of the phonological output lexicon is inadequate, or, when there is a deficit in the semantic system or in the process of output from it. We would not, on the other hand, expect phonemic cues to have any effect on word-retrieval if naming failures were due either to defective phonological specifications in the phonological output lexicon, or to failures in the processes of articulatory encoding. Li & Canter (1983, 1987) note that the English-speaking Broca's (motor) or non-fluent aphasic patients were responsive to phonemic cueing while Wernicke's and Conduction

aphasics were not.

Howard & Orchard-Lisle (1984) offer a model for the effective function of phonemic cueing when the verbal semantic system is deficient. Failure to retrieve the correct target frequently stems from a deficit in semantic processing. Two possibilities exist at this level: difficulty in accessing the correct semantic specifications or a problem with the semantic representations themselves. Under both of these circumstances, Howard notes that semantic activation could result in a range of semantically related words rather than a single word entry. The role of the phonemic cue is to provide additional information to supplement the inadequate semantic system.

Huntley, Pindzola & Weidner (1986) investigated the effects of increased information redundancy on word retrieval in aphasic patients. All of the cue combinations they used were found to be effective in facilitating picture-naming performance, with the severe group demonstrating the most dramatic improvement when simultaneous prompts were utilized. However, a semantic cue was not included in the cue combinations.

While studies of naming in aphasia found phonemic cues to be among the most effective aids to word-retrieval, other studies have tried to establish the characteristics of patients who benefit from phone-

mic cues. Li & Canter (1983) investigate subject variables in relation to phonemic cueing. Results showed that severity of naming impairment had the strongest relationship with cueing responsiveness. Clinically, they suggested that phonemic cueing for aphasic patients should be reserved for those with mild to moderate naming difficulties.

Auditory comprehension was also found to be significantly related to cueing responsiveness. Some studies examined differences between different aphasic subgroups e.g. Pease and Goodglass (1978) find that anomic aphasic persons responded best to various cues. Goodglass & Stuss (1979), Li & Canter (1983) and Kohn & Goodglass (1985) all claim that, when severity is controlled, phonemic cues are more effective with Broca's than Wernicke's aphasics. Li & Canter (1987) consistently find that the auditory image of the word is relatively intact in Broca's (motor) aphasia enabling these patients to utilize phonemic cueing. On the other hand, Wernicke's (sensory) aphasic patients are unable to use prompting as the auditory image is disrupted to such a degree that phonemic cueing does not aid in word retrieval.

In Chinese, there is usually a one-to-one relationship between syllables (a phonological unit) and morphemes (a minimal unit of meaning). This one-to-

one relationship is also preserved in the written language, where each individual syllable/morpheme is represented by a single character (although some homophonous morphemes can be represented by several different characters, depending on the particular meaning that the speaker/writer has in mind). All Chinese words are made up of one or more of these monosyllabic units. Chinese content words (nouns, verbs, adjectives) fall into two basic categories: free-standing monosyllables (represented by one character) and compounds made up of two or more of these single-syllable morphemes (represented by two or more written characters). Most of the monosyllabic elements that make up compound words can also occur alone, although the meaning of an isolated element may alter when it is combined with others to form a compound (Bates et al. 1991).

Cantonese also follows similar patterns in word formation. Thus, in cueing techniques for the Cantonese-speaking aphasics, presentation of the initial syllable cue introduces the first single-syllable of the compound word. The meaning represented by this single-syllable may or may not be related to the meaning of the compound word. For instance, the first morpheme of the compound word '眼鏡' /ŋan₅ keŋ₂/ (spectacles) means 'eye' which is semantically related to the compound word. On the contrary, the initial morpheme of '老虎' /lou₅ fu₂/

(lion) means 'old' which is semantically different from the compound word (lion).

This feature of Chinese seen in Cantonese raises an interesting question in the application of first syllable cue to aid retrieval of word in Cantonese-speaking aphasics. The first syllable cue will be purely phonemic when the first morpheme does not carry related meaning with the compound word. For those words which have initial syllable semantically related with the words, the first syllable cue consists of both the phonetic and semantic elements.

PURPOSE

The purpose of this study is to investigate the following issues:

1. The effectiveness of the initial syllable cue for word-retrieval in Cantonese-speaking aphasics.

Previous studies confirmed the effectiveness of phonemic cue to word-retrieval in English-speaking aphasic patients. It is hoped that the results of this study can support this finding in Cantonese-speaking aphasics as the initial syllable cue is widely used for intervening word-retrieval problem.

2. The differences in the patients' responsiveness to the initial syllable cues (i.e. the first syllable of the compound word) which are semantically related or unrelated to the word.

There appear to be two types of initial syllable

cues in Cantonese: one is purely phonetic while another consists of a combination of phonological and partial semantic information, it is hypothesized that the later cue combination will increase the redundant information and be more effective in cueing responses than the purely phonemic cue.

METHOD

Subjects

Subjects were selected to meet the criteria found to be responsive to phonemic cue in those studies done in English-speaking aphasic subjects. The Cantonese Aphasia Battery was used to select the appropriate subjects. They were aphasic patients with unilateral left hemisphere lesion but excluding Wernicke's and conduction aphasics. They had mild to moderate naming impairment and their auditory comprehension was relatively good. Besides these three criteria, they were native Cantonese speakers, alert, cooperative and medically stable at the time of testing. They had no significant hearing and visual disabilities, and they did not have severe articulatory problems.

Five subjects were chosen for this study who met all of the above criteria. A summary of subjects' data is recorded in Table 1.

Table 1. A summary of the subjects' information and the WAB scores.

Sub- ject	Sex /Age	Post- onset (Months)	Diagnostic group	WAB Score		
				AG	Audi. Compre- hension	Naming
1	M/15	18	Broca's	53.2	5.7	5.3
2	M/32	15	Broca's	51.1	6.8	5.9
3	F/33	3	Trans- cortical motor	74.7	8.5	6.7
4	M/56	34	Broca's	42.8	5.5	4.3
5	F/60	2	Anomic	80.2	7.0	6.8

Test stimuli

Pictures were used to test confrontation naming responses. To ensure that these stimulus pictures were visually unambiguous and likely to elicit the desired target words, one hundred pictures were presented to ten normal adults prior to testing the aphasic subjects. The normal adults were asked to give the common synonyms for the target words. Synonyms produced by the control group were considered as correct responses when said by aphasic subjects. After this pilot test, some pictures were excluded from the confrontation naming task because they were unfamiliar, unambiguous, or more than one

subject could not name them. In all, seventy-five clear pictures of common objects and familiar animals which were culturally relevant to Hong Kong Chinese remained for use. Of these three were chosen for initial trial.

There were two sets of items for a confrontation naming task: Set one consisted of initial syllable semantically related to target word e.g. 眼鏡 /ŋan, keŋ/ means spectacles, the first syllable /nan/ means 'eye'. Set two consisted of initial syllable semantically unrelated to the target word e.g. 馬猴 /ma, lau/ means monkey, the first syllable /ma/ means horse. Each set of item consisted of thirty-six pictures of which twenty-seven were bisyllabic words and nine were trisyllabic words. The sequence of pictures was random.

The lists of the testing stimuli are recorded in Appendix.

Procedure

Three pictures were used for the learning trial to find out if the client's vision was adequate for picture recognition. During test administration, each picture was first presented without providing a cue. The subject had up to five seconds to respond. If the correct target word or a reasonably synonym was not produced within five seconds, no further

response was accepted and the initial syllable cue was presented immediately. The subject was instructed to 'listen and watch' the examiner. The subject had another five seconds to respond to the cue. The confrontation naming task was continued until all seventy-two cards had been tested. (The subject was required to miss at least 20% i.e. fourteen words of the confrontation naming task so as to provide an adequate pool of misnamed words to assess responsiveness to cueing.)

Scoring responses

Responses scored as errors included semantic paraphasias, neologisms, circumlocutory responses, perseverative responses. Normal responses, together with those errors with phonemic paraphasias were all be scored as correct. With reference to Li & Canter's scoring system (1983, 1987), it was desirable to separate articulatory difficulties from true word-retrieval problems. The percentage of errors corrected by cueing constituted the subject's cueing response score. The percentage of errors obtained in no cue condition was used as control for investigating the cueing effectiveness.

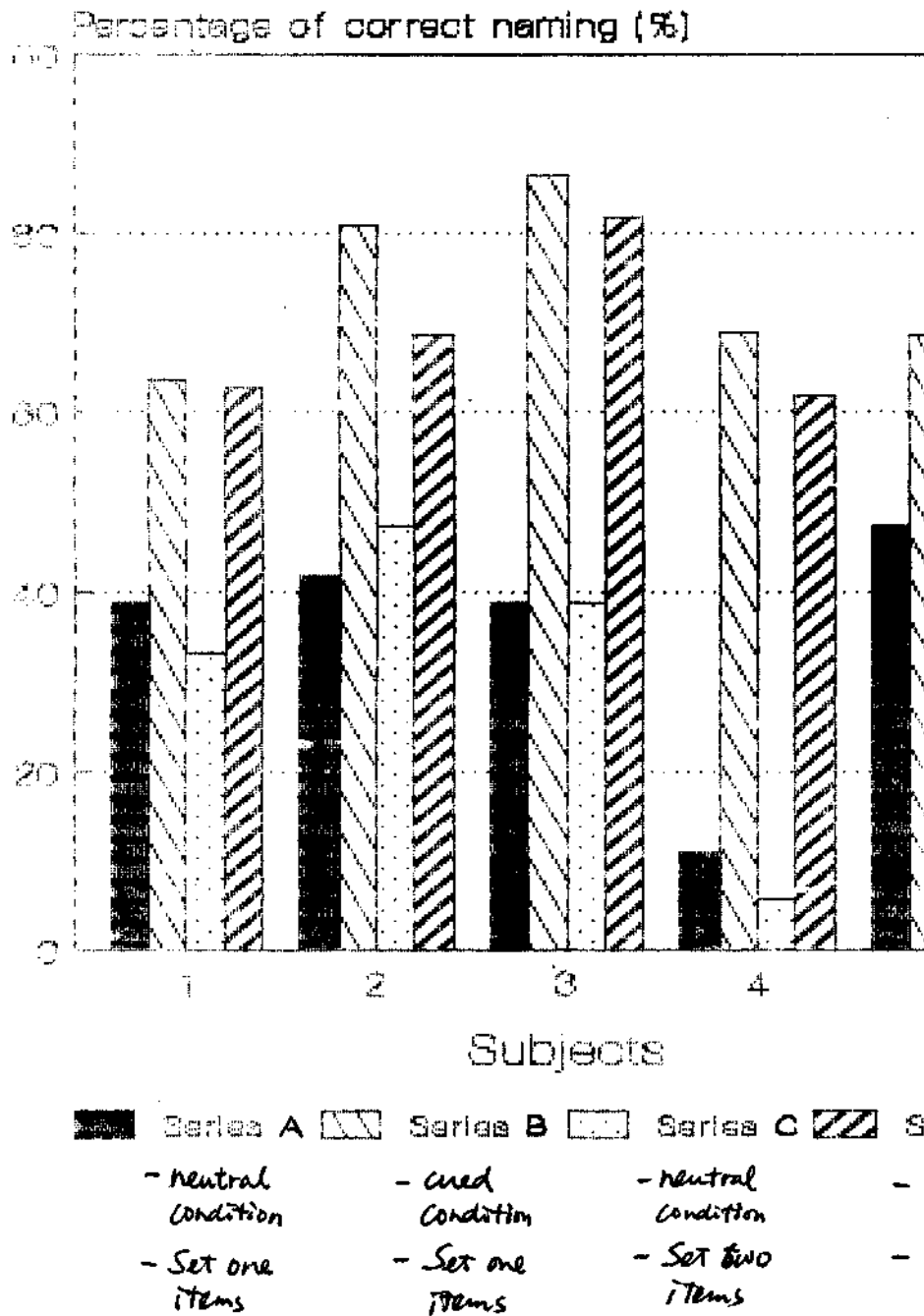
To assess intrasubject reliability, each subject completed the confrontation naming task again one month after the first testing. Both the 'no cue'

and the 'cued score' were used for comparison.

RESULTS

The percentages of correct naming in neutral and cued conditions for the five subjects are reported in Fig.2.. All five subjects showed greater success in naming with the cued than in the neutral condition. By comparison, the set provided few contrasts.

Fig.2. Percentages of successful naming in five subjects under neutral and cued conditions



t-tests were performed using the SPSS/PC+ Program to find if group differences exist in neutral and cued conditions, and in using initial syllable cues semantically unrelated and related to the word.

Table 2. Probability (p) Levels from the t-Test Values for the percentage of correct naming in neutral and cued conditions.

Paired variables	Trial	Item	p level
neutral with cued conditions	1st	Set one	.006
	2nd	Set one	.027
	1st	Set two	.012
	2nd	Set two	.005

t-tests were performed to determine if significant differences existed between the correct responses in the neutral and the cued conditions. Table 2 presents the probability (p) levels for these t-tests. The results from these t-tests revealed significant differences between the subjects' responses with and without cue. The results also revealed a wide range of successful naming percentages. In the first trial, the ranges for correct responses under neutral condition were 11.11%-47.22% for Set one items, 5.56%-47.22% for Set two items, and those under cueing condition were 63.64%-95.45% for Set one items, 57.14%-86.36% for Set two items.

Table 3. Probability (p) Levels from the t-Test Values for the percentage of correct naming with Set one cue and Set two cue.

Paired variables	Response type	Trial	p level
Set one with Set two	Correct responses	1st	.015
	after cued	2nd	.966

Two t-tests were computed to determine if a significant difference existed between the patients' responsiveness to the initial syllable cues which are semantically unrelated (Set one) or related (Set two) to the word. Results presented in Table 3 showed discrepancy between the first and second trials. In the first trial, the initial syllable cues semantically unrelated to the word were statistically different from those semantically related to the word. The mean percent of correct scores in cued condition with Set one items was greater than that with Set two items by 8.2044%. In the second trial, there was no significant difference in the correct response after cued. This result refuted the hypothesis that the simultaneous cueing (phonemic + semantic) embedded in the Set two Cantonese initial syllable cue would elicit more correct naming than the Set one with only purely phonemic cue.

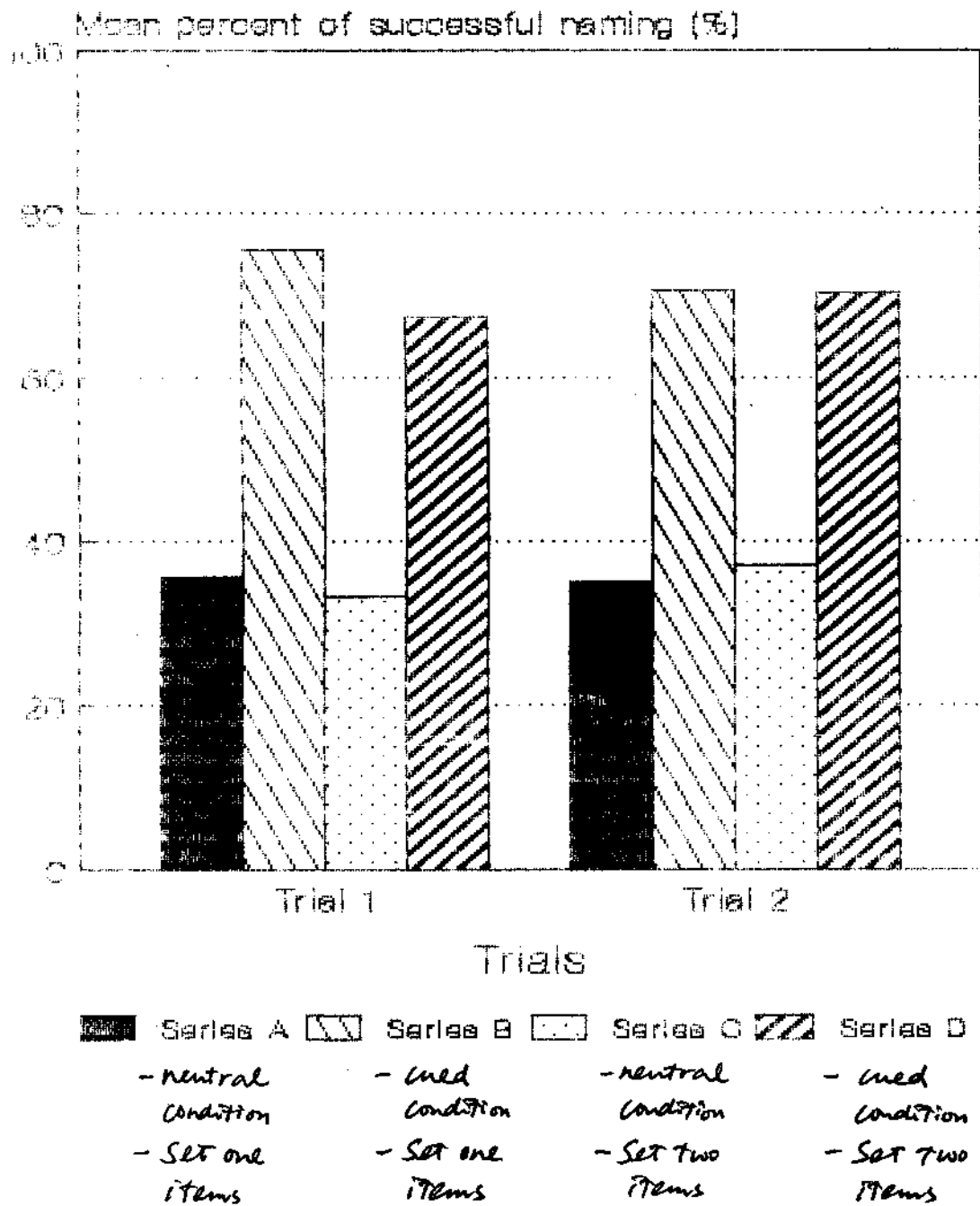
To determine the relationship between subjects' performances over time, a Pearson product-moment correlation was performed between the subjects' performances in two trials with one month time interval. Correlations were computed for data collected in neutral and cued conditions and the results are shown in Table 4.

Table 4. shows the correlation relationship between the subjects' percentages of successful naming in the two trials both in neutral and cued conditions.

Variables	Conditions	Types of items	Correlation coefficient
Trial 1 with	neutral	Set one	.9475*
	cued	Set one	.8282
Trial 2	neutral	Set two	.9820*
	cued	Set two	.9493*

Table 4 reveals a strong relationship between the subjects' performances in both trials. Fig.3 shows similar results too.

Fig.3. Mean percentages of successful naming in Trial 1 and Trial 2.



DISCUSSION

Results of this study indicate that Cantonese-speaking aphasic subjects produced more correct naming with the initial syllable cue than in the neutral condition. This supports the hypothesis that the initial syllable cue is effective for word-retrieval in picture naming task in Cantonese-speaking aphasic patients and thus confirms the general findings of previous studies on phonemic cues with English-speakers (Li & Canter, 1983; Li & Williams, 1989; Love & Webb, 1977; Pease & Goodglass, 1978; Podraza & Darley, 1977; Stimley & Noll, 1991). The clinical implication from this present study can be shown by Fig. 2 that all five subjects produced significantly more correct naming in cued condition. So, applying initial syllable cue to Cantonese-speaking aphasics is really a very effective therapeutic technique. However, it has to be stated clearly that the current study only confirms the effectiveness of initial syllable cue for word-retrieval in picture naming of a particular group of subjects which were found to be responsive to phonemic cue in English-speaking subjects, but its effect on word-retrieval in spontaneous speech with other aphasic types is got to be investigated.

Nonsignificant differences between the subjects' responsiveness to initial syllable cue semantically unrelated and related to the target word indicate

that the semantic element embedded in the first syllable cue in Cantonese did not have much effect on cueing effectiveness.

Li & Williams (1990) suggest that in the case of nouns, the phonemic cue functions well at the articulatory level, facilitating word production. It is likely that aphasic patients retrieve semantic information with greater ease in nouns than verbs. During noun naming, the semantic cue is likely to be redundant. Subjects derive greater benefit from phonemic cueing which is likely to operate at a later stage of processing--the articulatory level.

Since all the pictures used in the naming task presented common objects and familiar animals (all nouns), the semantic cue embedded in the initial syllable cue might be a redundant information that had little supplementary effect on the retrieval of nouns in addition to phonemic cue.

Several previous findings suggested that phonemic cueing is more beneficial than semantic cueing on noun target words (Pease & Goodglass, 1978; Love & Webb, 1977; Li & Williams, 1990). The results of this study showed that the first syllable cue in Cantonese is effective for noun-retrieval in picture naming. This powerful effect might have masked the effect of the semantic cue embedded in the syllable cue.

Some caution is necessary in considering the methodology of this study. In response to the claim from a series of studies that cues are most effective with less impaired patients, Bruce & Howard (1988) suggested that their findings may be due simply to non-specific effects of extra time, rather than any real effects of phonemic cues. To eliminate this extra time effect, Li & Canter (1991) found the 'expected response period' for each subject by using naming latencies on a confrontation naming task administered prior to the cueing test. This 'expected response period' varied depending on the individual subject and was given before the phonemic cue so as to maximize naming success before the cue was given. Since all subjects participated in this study were less impaired aphasics, the study can be modified to include the 'expected response period' for each subject.

Besides, the choice of subjects also had some effects on the findings. The five subjects were chosen to meet criteria based on previous studies which should make them responsive to phonemic cue in English-speakers. Thus, the results of this study do not have direct clinical implication to other aphasic types. In fact, the small number of subjects used would restrict the subject variables. This present study can be modified to include more different aphasics and also to investigate if there

is difference in effectiveness of initial syllable cue for different aphasic types.

One more interesting finding of this study highlights the importance of knowing the pre-morbid language used by the aphasic patients. Some subjects did not respond to the first syllable cue provided by the examiner because they were not familiar with the target word but their own synonyms. So, to apply initial syllable cue in therapy, the synonyms for the stimulus words usually used by the patients can be collected from the family in order to maximize our knowledge about the patients' actual responsiveness to the cue.

Clinically, many researchers investigate therapeutic techniques for remediation of word-retrieval problem as it is a widespread difficulty found in aphasics though with different severity. The ultimate goal shared by all these researchers is to help the patients find the way to cue themselves. Barton (1971) reports that English-speaking aphasic patients with word-retrieval problem could usually recall the first letter or the number of syllables of the target word. So, aphasic patients are sometimes able to engage in self-generated cues.

Berman & Peelle (1967) describe how they taught a patient to generate his own phonemic cues to aid word retrieval: write down the first letter of names

he could not find, sound out letters, establish the third link in the self-cueing chain and reveal letter-to-sound correspondences. Moreover, cueing was not effective unless time was spent in teaching the patient to utilize the cues. Bruce & Howard (1988) claim that for patients to generate their own phonemic cues they would need to be able to (i) indicate the initial letter of a word which cannot be retrieved, (ii) convert this letter into a phoneme, and (iii) use a phonemic cue to aid word retrieval. However, this self-cueing chain cannot be exactly replicable in Cantonese.

Native Cantonese-speakers do not learn Cantonese phonetically. As it has been mentioned, the phonemic cue in Cantonese is the initial syllable cue which either exists as free-standing monosyllable by itself that carries meaning, or combines with other syllables to form compound word in which this latter first syllable cue may or may not carry meaning by itself.

So, before a particular self-cueing chain for Cantonese-speaking aphasics is generated, how Cantonese-speakers learn compound words must be investigated. Do they learn the individual syllables first and then combine them to form a compound word, or do they learn the compound word as a whole? The characteristics of the self-generated cues produced by the Cantonese-speaking aphasics would also be

valuable information because what the aphasics can do by themselves is an important pre-requisite for generating self-cueing chain. For instance, do they usually self-generate initial or final syllables? Does final syllable cue share similar effectiveness to word-retrieval in aphasics?

According to Norman (1989), morphemes/syllables in Cantonese can be characterized by the degree of versatility with which they occur with other morphemes. They are considered versatile if they enter into combination with relative ease and restricted if they occur only a very small number of contexts. For example, the syllable /tin₁/ which means electricity is versatile because it combines readily with other syllables to form the names of a series of electrical appliances, while the syllable /t₃/ which means drag is restricted for it only enters into a few combinations to form compound words.

Howard & Orchard-Lisle (1984) mention that semantic activation would result in a range of semantically related words rather than a single target word. If the initial syllable cue is more versatile, more alternative words may be activated and this may increase the difficulty in retrieving the single target word. So, it is interesting to investigate whether the degree of versatility of the initial syllable cue has any effect on its effec-

tiveness to word-retrieval.

The results of this study suggest that the application of initial syllable cue is effective for word-retrieval in Cantonese-speaking aphasics just like the effect of phonemic cue on English-speaking aphasics. This study also suggests some directions for future research on Cantonese-speaking aphasics as it is still rare.

APPENDIX

The lists of the names of the test stimuli:

Set one items (initial syllable with unrelated meaning with the target word)

Bisyllabic

1. 新 秋
2. 芝 泉
3. 巴 士
4. 龍 白
5. 麻 花
6. 烟 煤
7. 蛇 美
8. 蛟 菊
9. 龜 菊
10. 冬 菇
11. 拖 鞋
12. 老 鞋
13. 香 鞋
14. 呼 子
15. 曲 牌
16. 的 瓜
17. 冬 瓜
18. 香 瓜
19. 梳 化
20. 花 生
21. 花 生
22. 馬 生
23. 生 菜
24. 生 菜
25. 廁 所
26. 廁 所
27. 恆 衫

Trisyllabic

1. 香 口 膠
2. 漢 堡 胞
3. 三 文 治
4. 收 音 机
5. 埃 坡 [tsam₂]
6. 螺 絲 批
7. 刺 長 釘
8. 埃 坡 角
9. 米 古 力

Set two items (initial syllable with related meaning with the target word)

Bisyllabic

1. 柴腸
2. 臘腸
3. 皮襪
4. 牙擦
5. 銀鑲包頭
6. 鑲牙
7. 牙風
8. 風梳
9. 梳頭
10. 梳頭
11. 梳頭
12. 唇膏
13. 唱皮
14. 皮貨
15. 眼鏡
16. 眼鏡
17. 眼鏡
18. 心水
19. 梳水
20. 梳水
21. 梳水
22. 梳水
23. 梳水
24. 梳水
25. 梳水
26. 牙膏
27. [wɔk₆ ts'an₂]

Trisyllabic

1. 釘數梳
2. 鑲頭刀
3. 親毛梳
4. 電梳
5. 電梳
6. 洗髮梳
7. 梳髮
8. 梳髮
9. 打梳

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