EFFECT OF AGING ON ORAL AND WRITTEN CONFRONTATION NAMING IN KANNADA AND ENGLISH

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Abstract

A most common feature seen in normal individuals and disordered population's utterance is word-finding difficulty. The study was aimed to analyze the accuracy and type of responses and effect of aging in oral and written naming in orthographically regular language (Kannada) and irregular language (English) in bilingual individuals across age groups (25-45, 45-65, 65-85 years). Ten neuro-typical participants in each of the three age groups were studied. The stimuli included a set of twelve picture cards (nouns), which were presented individually. Two tasks were carried out in which one included the oral naming of the stimuli in one language and a simultaneous written naming in the other language. Similarly, the second task was carried out in the reverse order. The data was subjected to quantitative analysis and qualitative analysis. A significant difference (p < 0.05) was obtained within the English written naming tasks for the 65-85 years age group compared to the other age groups. With respect to the mode of response, the participants in both 65-85 years and 45-65 years age group showed a significantly better result in the English oral naming than the English written task. Qualitative analysis on the type of errors exhibited relatively higher semantic errors in the older age group. The results revealed an overall decline in the accuracy of naming responses with age. Semantic errors were more evident in the older age group for oral and written naming in both the languages. Kannada written naming was found to be better than English written naming across all the age groups, emphasizing the role of orthographic regularity in naming. This study also provides a basis that naming responses differ with the modality used for an irregular language.

Keywords: Word-finding difficulty, aging, oral naming, written naming, semantic errors

Introduction

Confrontation naming has been used widely to assess word finding difficulties in normals and disordered population. This is because the examiner knows the target word (i.e. the name of the presented picture or object) without any ambiguity, as compared to the studying word-finding difficulties in conversations (Deloche, Hannequin, Dordain, Perrier, Pichard, Quint, Metz-Lutz, Kremin, & Cardebat, 1996). However, the confronted target pictures could generally elicit more than one name, and hence, the reliability of the particular lexical entry the person is searching for is questioned.

The models of information processing generally distinguish three major levels in confrontation-picture naming (Deloche, Hannequin, Dordain, Perrier, Pichard, Quint, Metz-Lutz, Kremin, & Cardebat, 1996):

1. The extraction of a pre-semantic structural description requires the perceptual analysis of the picture presented
2. The preceding structural knowledge paves way for the access to stored semantic information
3. Finally, the target word to be produced is selected of the output verbal representation (Morton & Patterson, 1980; Morton, 1985; Howard & Orchard-Lisle, 1984; Kirshner, Webb & Kelly, 1984; Riddoch & Humphreys, 1987; Hillis & Caramazza, 1991; Semenza, Bisiacchi, & Romani, 1992).

This denotes that naming errors could occur at various stages (perceptual, semantic, and lexical).

Confrontation naming is studied using oral and written modalities of responses. Orthographic variables like regularity of a language can also influence naming tasks (Deloche, Hannequin, Dordain, Perrier, Cardebat, Metz-Lutz, Pichard, Quint, & Kremin, 1997).

A regular (transparent/shallow) language is a formal language which follows the phoneme-to-grapheme correspondence rules having a finite sequence of symbols from a finite alphabet; whereas an irregular (opaque/ deep) language is also a formal language which does not always follow the phoneme-to-grapheme correspondence rules using the finite set of alphabets.

Effect of aging on confrontation naming is also of interest to researchers. It is a well known fact that there is a declination of various linguistic skills as the age progresses. Thus, the effects of aging on such naming tasks have been probed widely in recent studies.

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Review of Literature

Picture confrontation and oral naming have been studied widely in normals and persons with brain damage. Deloche, Hannequin, Dordain, Perrier, Pichard, Quint, Metz-Lutz, Kremin, and Cardebat (1996) studied verbal confrontation naming in neuro-typical subjects and persons with aphasia (Wernicke's, Broca's, anomics and globals) using a set of pictures. The study concluded that the picture-image familiarity and agreement were significant factors in the responses of neuro-typical individuals. Word and phoneme frequency were relevant in determining the responses in persons with aphasia.

Another study done by Deloche, Hannequin, Dordain, Perrier, Cardebat, Metz-Lutz, Pichard, Quint, and Kremin (1997) compared a group of persons with aphasia (Wernicke's, Broca's, anomics and globals) and a group of normals on the performance on written responses with that of picture confrontation naming. The results revealed the superiority of normal participants over persons with aphasia in their correct response rates. Also, there was moderate percentage of discrepancy suggesting that the misnaming were incidentally seen in neuro-typical participants, but regularly found in persons with aphasia. The two misnaming types observed in persons with aphasia were neologisms (11%) and no-responses (21%).

A longitudinal study was conducted by Ronald, Stephen, Nicole, and Deb (2005) on confrontation naming in 541 normal elderly (ages 50–99) using the 60-item Boston Naming Test (BNT). A rise in the mean rate of change on the BNT was noticed till the 50s age group with no change in the 60s age group, and a decline in the 70s and 80s age groups. These findings demonstrate that during aging, there is a well preserved lexical retrieval as measured by a visual object confrontation naming task, with only minimal variations in the seventh and eighth decades of age.
Ronald, Nicole, Stephen, Deb (2007) conducted a cross-sectional study on the effects of age, education, and gender on the 60-item Boston Naming Test (BNT) in 1111 normal elderly (ages 50-101) and 61 younger adults (ages 20-49). The results revealed a significant inferior mean BNT scores with successively older age groups and lower educational grades. However, the males showed a non-significant trend to score slightly higher than females.

The above studies highlight the differences in naming across modalities and across age groups.

Need for the study

Most studies on confrontation naming have concentrated on a single language and on a single mode of naming response. However, reports which address the issue of orthographic variables across languages (such as, orthographic irregularities) are limited. Moreover, there is a dearth of such research across age groups.

Thus, the need to address the effects of aging on oral and written confrontation naming and the effects of orthographic variables in the performance across two different languages - orthographically regular language (e.g. Kannada) and irregular language (e.g. English).

Aim

- To analyze the accuracy and type of responses in oral and written naming in orthographically regular language (Kannada) and irregular language (English) in bilingual individuals across age groups.
- To study oral and written confrontation naming across the two languages in the different age groups.
- To study the effect of aging on the naming tasks in the two languages.

Method

Participants were normal individuals within the age range of 25 - 85 years. They were divided into the following age ranges with ten in each group:

1. 25 – 45 years
2. 45 - 65 years
3. 65 – 85 years.

They were bilinguals having Kannada as their mother tongue and English as their second language. They had undergone a minimum of ten years of formal training in both the languages (regular and irregular). They had no history of neurological, psychological or any known sensory or organic deficit.

Stimuli: Twelve picture cards (nouns) of size 4" x 6" (black and white line drawings) were used to elicit responses from participants. These included pictures from Western Aphasic Battery (Kertesz, 1982) and Linguistic Profile Test (Karanth, 1980). The same pictures were used across the two tasks considered in the study.

Tasks: The following two tasks were carried out in the study:
- Task 1- Simultaneous oral confrontation naming in English and written confrontation naming in Kannada.
- Task 2- Simultaneous oral confrontation naming in Kannada and written confrontation naming in English.

Each task was for the duration of five minutes with pictures randomized into two sets (set 1 and set 2).

Procedure

Task 1: Twelve picture cards were used in this task, where one picture, at a time, was placed in front of the participant. They were asked to name each picture orally in one of the languages (English) and simultaneously to write the name in the other language (Kannada). Oral responses were audio recorded and transcribed for further analysis. Written responses were recorded in a response sheet and were analyzed.

Task 2: The same twelve picture cards were used in this task, where one picture, at a time, was placed in front of the subject. They were asked to name each picture orally in one of the languages (Kannada) and simultaneously to write the name in the other language (English). Responses were recorded and analyzed in the similar way as in task 1.

Scoring

The following scores were calculated:
- For each acceptable correct response (in oral and written confrontation naming task), a score of one was given.
- Score of zero was given for each incorrect response.

The incorrect responses included semantic errors, spelling errors [grapheme-phoneme correspondence (GPC) errors] and no responses. These errors were subjected to qualitative analysis.

The same procedure was carried out in both the languages and across all three age groups for both the tasks.

Data Analysis: The data was subjected to the following statistical analysis. One-way ANOVA was carried out to make comparisons within the different parameters (language and mode of naming) across age groups. The significant measures were further analyzed using Duncan's Post-Hoc analysis. A paired t-test was used to compare responses across each of the different parameters within each age group. Later, qualitative analysis was done to describe the type of errors.

Results

The study compared responses between oral and written naming tasks across two languages in three different age groups.
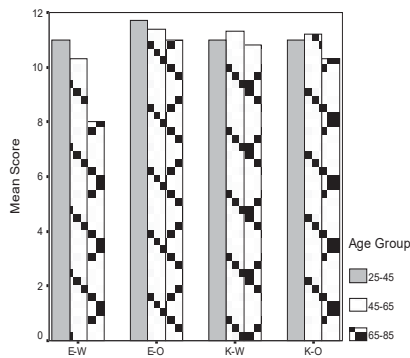
(a) Quantitative Analysis

One-way ANOVA revealed a significant difference within the English written (EW) naming task [$F_{(2, 27)} = 5.274$, $p < 0.05$], whereas, there was no significant differences for the other parameters [English oral (EO), Kannada written (KW) and Kannada oral (KO)] across age groups. Duncan's Post-Hoc analysis for the English written (EW) naming task was significant for individuals in the age range of 65-85 years ($p < 0.05$) as compared to the other two age groups (25-45 and 45-65 years).

Table 1: Mean and Standard deviation values across age groups for the different parameters

Parameter	Age Group	Number of subjects	Mean (Standard Deviation)
English Written (EW)	25-45	10	11.00 (1.24)
	45-65	10	10.30 (1.76)
	65-85	10	8.00 (3.05)
	Total	30	9.7667 (2.45)
English Oral (EO)	25-45	10	11.70 (.48)
	45-65	10	11.40 (.69)
	65-85	10	11.00 (1.24)
	Total	30	11.36 (.88)
Kannada Written (KW)	25-45	10	11.00 (.66)
	45-65	10	11.30 (.48)
	65-85	10	10.80 (.63)
	Total	30	11.03 (.61)
Kannada Oral (KO)	25-45	10	11.00 (.66)
	45-65	10	11.20 (.42)
	65-85	10	10.30 (1.49)
	Total	30	10.83 (1.01)

Within the 25-45 years age group, a significant difference was found between the English oral and Kannada oral naming tasks [$t_{(9)} = 2.689$, $p < 0.025$]. Similarly, a significant result [$t_{(9)} = 2.703$, $p < 0.024$] was obtained between English written and English oral tasks within the 45-65 years age group. Finally, for the 65-85 years age group, significant results were found between English written and English oral [$t_{(9)} = 4.108$, $p < 0.003$] and also between English written and Kannada written [$t_{(9)} = 2.717$, $p < 0.024$].

Graph 1: Mean scores across age groups for each of the tasks

(b) Qualitative Analysis

The individual responses across age groups yielded various type of errors. The errors were classified as semantic errors, spelling errors [grapheme-phoneme correspondence (GPC) errors] and no responses.

In the youngest age group, i.e., 25-45 years, the written tasks (Kannada and English) revealed semantic errors, incorrect responses and self corrections, whereas GPC errors (additions and substitutions) were found only in the English written naming task. In the Kannada oral task, semantic errors were prominent.

Individuals in the 45-65 years age group exhibited semantic and no response errors for the Kannada oral and written and English oral naming tasks. Semantic errors, GPC errors (omissions and substitutions), no response and self corrections errors were seen in the English written naming task.

Kannada oral and written and English oral naming tasks revealed semantic errors and no response errors for individuals in the 65-85 years age group. Similarly, in the English written tasks, these individuals made semantic errors and no response errors along with GPC errors (additions, omissions, substitutions and reversals) and self corrections.
Overall, individuals in the older age group exhibited more types of errors for the different tasks in both the languages compared to the younger and middle age groups.

Discussion

Poor performance in terms of the accuracy and type of responses of individuals in English written naming task compared to Kannada in 65-85 years age group could be attributed to the orthographic irregularity in English. This group had exhibited

varied GPC errors in the English written naming task as English does not always adhere to the GPC rules. A great number of theorists have highlighted the fact that writing is channelized entirely by the core sound constituents of words (Geschwind, 1969 & Luria, 1960). Frith (1979) commented on the importance of phonology for writing. A decline in the short term memory with respect to the complexity of information to be recalled has been reported by Craik and Rabinowitz (1985). Further, the decline in the long term memory with age is primarily attributed to the encoding and organizational difficulties (Rankin & Collins, 1985). Dobbs and Rule (1989) reported that even though the working memory capacity remains unaffected by normal aging, the ability to manipulate information in the working memory may decline with age. Thus, the significantly poorer scores seen in this particular age group of this study could be a reflection of the effect of aging on retrieval of the written form in a regular and an irregular language. The retention and/or retrieval of orthographically irregular words are comparatively more stressful than the regular words. With age, this difficulty increases, thus, indicating a reduction in cognitive skills. Cavanaugh, (1983) reported that changes in memory with age are necessarily detrimental to the ability to use the language effectively. This was evident from the finding that Kannada being the mother tongue, showed a relatively slower decline for these tasks than the second language, i.e., English. This also highlights that the usage and storage for Kannada words is more in terms of duration, which is in agreement with the theory of evolution and dissolution of language.

In 45-65 years and 65-85 years, a significantly poorer naming scores in English written and oral naming tasks were found in comparison to the younger age group (25- 45 years). This could again be an indication of the aging effect on these tasks. In the two age groups, the English oral naming task was better than the English written. Although, both oral and written naming are identically affected (qualitatively), the written responses are usually performed, to some extent, more poorly than speech (Goodglass and Hunter, 1970). The poorer written scores confirm that writing depends on a sound based strategy. In addition, English having a more irregular orthographic form, manifested GPC errors. It could also be postulated that the sub-vocal rehearsals, a phenomenon which facilitates the memorizing abilities of an individual, in turn strengthens the retention skills, facilitating oral naming. The automatic habit of continual repetition may be what helps to preserve the syntax in the elderly aphasics (Geschwind, 1972) and a similar trend has been noticed for the words

too. It has been reported that individuals with aphasia showed better performance with sub-vocal rehearsals, indicating that this strategy helps in retaining the linguistic stimuli for a longer duration (Goswami, 2004). This type of obvious strategy is not seen in a written task, showing that, while retrieving written responses, the amount of cues available are less, which has an impact on the written naming performances.

In 25-45 years age group, better performance in the English oral compared to the Kannada oral naming could be attributed to the recent trend of English language usage as a marked feature of cultural, technological and societal demands on the performances of younger population compared to the other two groups.

All groups had almost similar performances across tasks, with the exception of the older age group (65-85 years) who showed a decline in performance in the English written naming task alone, highlighting the role of factors like aging and orthographic regularity of languages.

There is greater demand and usage of the second language, resulting in better activation and hence enhancing the proficiency in the younger age group contrarary to the older age groups. In the older age groups, the demand and usage of native language is more compared to the second language, bringing about a better proficiency in the native language.

With respect to the type of responses, it was observed that the older age group (65-85 years) showed relatively more semantic errors and self corrections compared to the younger age groups. In older adults, true semantic and neologistic jargons are prominent (Brown, 1978). It is considered that the conceptual system in a bilingual individual is common for all languages (based on the revised hierarchical model proposed by Kroll and Stewart, 1994). Several lexical nodes of the different languages get activated on the presentation of a stimulus, irrespective of the language in which the task is being performed. Hence, during the lexical selection, these multiple activated nodes function as competitors. Regardless of the competition, an inhibitory process mechanism suppresses the activation of the non-target language words (Green, 1998; Hermans and Schreuder, 1998; Lee & Williams, 2001). Thus, it could be stated that an inappropriate inhibition and/or selection mechanism could result in a semantic error. The increased semantic errors with age highlight a putative indication of a decreased inhibition mechanism in the conceptual system during the naming task.

Overall, the quantitative and the qualitative results reveal an obvious difference in the performances of the younger and older groups, especially in the written naming task.

Conclusion

The confrontation naming task has been extensively used to tap naming deficits in the elderly and in the population with disorders. Both oral and written modes of responses have been used. However, these studies have been confined to the use of only a single language for such naming tasks.

The present study was done across three age groups- young adults to old age. Oral and written naming was explored in two languages- Kannada and English. The results revealed an overall decline in the accuracy of naming responses with age. Semantic errors were more evident in the older age group for oral and written naming in both the languages. Kannada written naming was found to be better than English written naming across all the age groups, emphasizing the role of orthographic regularity in naming. There were instances of difference in responses across oral and written naming tasks in English for the age groups providing an assumption that naming responses differ with the modality used for an irregular language. The results of the study are suggestive of the importance of an active exposure and active usage of a language rather than an active exposure and passive usage. However, the results of this study need to be generalized with caution and warrants further research in this area.

Implications of the study

This study had attempted to compare oral and written confrontation naming in bilingual individuals across age groups. Further, the influences of orthographic variables across languages were also accounted for.

Such information can help the Speech Language Pathologists to compare the nature of responses in normals and disordered population.
Studies on confrontation naming with aging can give an insight into such patterns in normal and pathological aging conditions.

This also highlights the use of modality specific responses in naming tasks in different languages.

The results also imply that during assessment and management, the active usage of a language is an important factor to be considered.

Further extensive research in different orthographically opaque and shallow languages can provide a better insight into the variables affecting naming tests.

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