

Lexical Access and Cognitive Processes in Sequential Spanish-English Multilinguals

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ABSTRACT

Fewer studies on trilinguals' linguistic performance have been conducted than on bilinguals', concerning cognates vs. non-cognates. The purpose of this study is to investigate whether Spanish-English cognates' cross-language overlap has any negative effect on sequential trilinguals' working memory. In order to do so, a verbal picture-naming task was applied to sequential trilinguals whose first language was Persian and had formal exposure to English (L2) and Spanish (L3) respectively. The participants were 36 female students who had learned English in the EFL educational context and were learning Spanish (semester 3, equal to A1 level of International Spanish Test: ELLE) at Allame Tabataba'i University. Learners with behavioral, attention, or learning delays/disorders were excluded from the experiment. At first, the standardized Oxford vocabulary test was given to a large group of trilinguals in order to check their L2 homogeneity, and then students with an upper-intermediate level were selected based on the availability sampling. After that, a timed picture-naming task was applied to test the participants' lexical access. Also, their cognitive development regarding resistance to inter-linguistic interference was investigated through low- (blocked) and high-competition (mixed) conditions. For this aim, 43 colored pictures including cognate and non-cognate common nouns of both Spanish and English were used in three conditions, two blocked and one mixed. All the nouns were singular. The plural ones like "las gafas" (the glasses) or "las pantalones" (the pants) were omitted from the set of the words. The Spanish articles 'la' for the feminine, 'el' for masculine, and their plurals 'las' and 'los' were not included in the conditions. The dependent variable was the number of correct answers in all the three conditions and also for the cognate and non-cognate words in the mixed block. The results showed less accurate responses, more inter-linguistic interference, and lower response times in the mixed condition than in the blocked ones.

1. Introduction

Picture-naming tasks

Many educational, experimental and clinical studies have applied picture-naming tasks to measure the lexical-semantic knowledge. By seeing a picture, the subject should recognize the meaning and then retrieve the appropriate verbal label from his/her mental lexicon (Glaser, 1992). In picture-naming tasks, the error and response latencies reduce across age in both languages (German, 1994). Many researchers have reached this conclusion that bilinguals and multilinguals are slower in picture naming tasks. They experience more tip of the tongue and also more interference in their appropriate lexical decision. Two possible reasons have been presented for this reduction in lexical access phenomenon: 1. connection model and 2. competition model. The connectionist model says that an associative neural network links the words and the concepts. Regarding the fact that this network is distributed among all the languages, then by learning another language, these pathways are less practiced (Dijkstra, 2005; Michael & Gollan, 2005). In competition model; however, it is said that a conflict from the corresponding item in the non-target language causes the reduction in lexical access (Green, 1998). In bilinguals' or multilinguals' competing system, an appropriate form corresponding to the exact criteria of form and meaning should be selected. From the neurolinguistics point of view, left inferior parietal cortex (LIPC) of the brain is responsible for vocabulary acquisition in both monolinguals and

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bilinguals. The density of grey matter in this part has increased in early bilinguals and proficient second language learners. One of the important questions in psycholinguistic studies on multilinguals is about their lexical access and cognitive processes pertaining to mental lexicon. Two opposing hypotheses have been proposed regarding bilingual/multilingual mental lexicon: language selective vs. language non-selective. A great number of empirical studies have offered evidence supporting the language non-selective access hypothesis (Lijewska A., Chmiel A., 2014) which is about the automatic and simultaneous co-activation of information in all mental language systems (De Groot A.M. 2011). Most current models in word recognition fall into non-selective category such as:

Bilingual Interactive Activation (BIA) model:

It is the executive form of connectionist model regarding visual word recognition. BIA proposes a complex interactive process of activation and inhibition leading to the representation of the corresponding lexical unit (Dijkstra et al. 1998).

Inhibitory Control (IC) model:

This model is developed as supplementary for BIA model. It concerns the language task schema which regulates the output and inhibits the incongruous (Green D.W. 1998).

Cognates:

They are word pairs with similarities across two or more languages. Although they are not always translation equivalents, they share some linguistic features including orthographic, phonological, and/or semantic. Cognates are among the signifying methods for foreign and second language research. A significant number of Spanish and English words are Latin-based; hence there exist a great number of cognate pairs in these two languages. A limited number of surveys have been conducted on cognates' dominance over working memory in trilinguals' performance in their L3. This study gains more value as it seeks to 1.explore this issue in trilinguals who have low proficiency in their L3 (Spanish) and to 2.offer a broad perspective from several models and hypotheses. An aspect of cognitive development is the ability to resist interference, a part of inhibitory processes (Dempster & Brainerd, 1995; Harnishfeger, 1995). Through applying high- and low-competition tasks, this study tries to make an evaluation of trilinguals' linguistic performance regarding their interference and accuracy.

2. Literature review

Previous studies on cognates have proved that these words trigger cross-linguistic interference: either as a positive transfer or a negative one (Meara, 1993; Nation, 1990; Odlin, 2004; Ringborn, 1987; Friel & Kenninson, 2001). Cognates also affect the linguistic performance of and lexical organization of multilinguals to a great extent. In a study on speakers of four languages done by Herwig (2001), the results from think-aloud tasks revealed that they strongly relied on cognate forms in translation. Fotovatnia z. and Taleb F. (2012) carried out an investigation on twelve Persian learners of English, all of whom were undergraduate students of TEFL at the University of Najaf Abad. Their research included two experiments: In the first one a group of cognate-noncognate pairs were tested in Persian-English direction. The primes were in L1 (Persian) and the targets were in L2 (English). The second experiment was the same as the first one except the direction which was the reverse: English-Persian. Their findings confirmed the dual lexicon model presented by Gollan et al. (1997) regarding mental representation of cognate pairs across languages with different scripts. According to Bravo et al. (2005), students can use cognates as vocabulary learning strategies. Through explicit lessons or instructions to find the words' similarities, they showed a significant progress both in their vocabulary scores and reading comprehension (Grasso S.M., 2014; Proctor & Mo, 2011; Bravo et al. 2005). Molnar T. (2010) proposes that taking advantage of cognate knowledge helps the learners to figure out the words' meanings. Rodriguez (2001) suggests that implementing L1/L2 cognates in educational framework improves the students' ability to better analyze and understand texts in L2. Mitkov et al. (2007) conducted a research on English learners whose L1 was Spanish. They were instructed to pay attention to cognate relationships as a strategy in reading English texts. These students were more successful in recognizing the meaning of untaught cognates than the students in control group. Cristoffanini et al. carried out two separate experiments (1986); in the first one a lexical decision task including repetition priming was applied. The participants' memory for language was tested in their second experiment by using four types of Spanish-English cognates: orthographically identical cognates, regular cognates with cion/tion substitution, regular cognates with dad/y substitution, and irregularly derived cognates. They concluded that it is the morphology that governs the lexical function rather than the language.

3. Method

Participants

36 Iranian female Spanish learners at the university of Allameh Tabataba'i, aged between 18 to 23 years, were chosen for this study. They all resided in Tehran and were from working class and middle socioeconomic background. Their first language was Persian, and had formal exposure to English prior to beginning Spanish. They all had an upper-intermediate English proficiency level and were matched in length of their exposure time to Spanish because at the time of the study they were all at semester 3 of Spanish learning (equal to A1 level of international Spanish test: ELLE).

Instrument and Experimental Design

The experiment included 43 colored pictures of common nouns. The same set of pictures was used in all the three blocks; single ones (English and Spanish) and mixed one. The pictures were among the well-identified nouns in both languages, and they were chosen from the standardized teaching Spanish book: Prisma, Instituto Cervantes press, and English book: Top Notch, Pearson Press. Of the total 43 pictures, 20 were cognates and 23 non-cognates. Examples of cognates are: "carpenter, carpintero", "cauliflower, coliflor", "lemon, lima", "cave, cuave" and "bicycle, bicicleta", and non-

cognates: “house, casa”, “book, libro”, “key, llave” and “fish, pescado”. In order not to overload the participants’ working memory, the task was not cued. The standard response time was set 3-5 seconds.

Procedure

The participants were all tested individually in a quiet room. At the beginning of the test they were instructed to name the pictures, and their responses were recorded with their permission. In each block, pictures were shown only once. The picture stimuli were presented on the laptop screen. At the end of both two single blocks, they were provided with correct answers in case they had told a mistaken word or a non-target one. The single blocks followed by a short break, preceded the mixed one in which they were asked to name each picture both in English and Spanish. All the production errors, hesitations, interferences and wrong answers as well as the correct ones were written on the paper by the examiner.

4. Data analysis and results

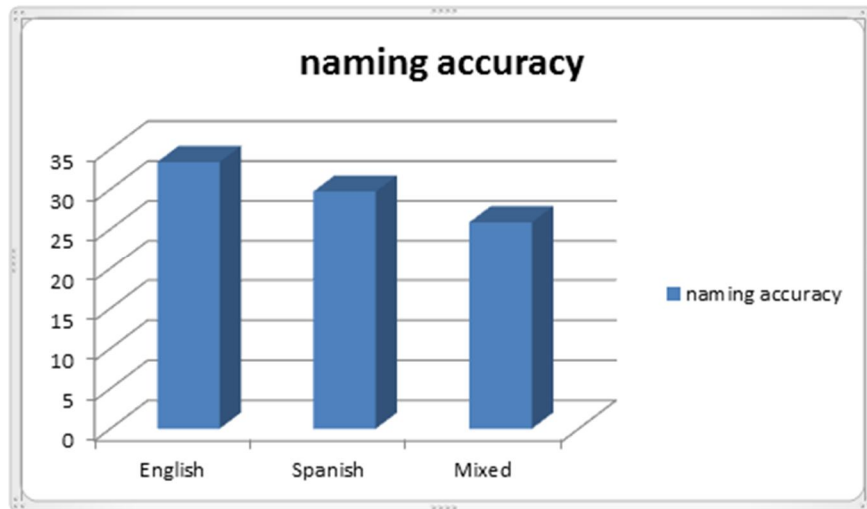
The number of accurate answers in each block was counted. It should be mentioned that a moderate criterion was implemented such that synonyms were considered accurate as well (e.g. ‘doctora’ and ‘medica’ are both accepted for ‘doctor’). If the hesitation time of a correct answer was more than 5 seconds, it was excluded from the set of the correct ones. The eliminated items from the set of the correct responses were: no responses mostly stated by : ‘no se’ in Spanish and ‘I don’t know’ in English, hesitations more than 5 seconds, recalling the superordinate word like ‘job’ for ‘engineer’, ‘animal’ for ‘cat’ or ‘verdura’ (vegetable) for ‘coliflor’ (cauliflower), and of course the wrong answers.

According to the results gained by Kruskal-Wallis test and compared mean scores, a discrepancy was visible between the performances in single blocks and the mixed one, and also within the mixed block: between cognates and non-cognates. The participants were more accurate and faster in English block, and then in the Spanish one. Although it was expected that they should perform better in the last (mixed) block because they had been provided with the correct answers in single blocks, they indicated a decline in their performance especially in cognates. Their scores in this block were the least among all three blocks.

Table1. descriptive statistics for correct answers in all blocks			
block	Mean	N	Std. Deviation
English	33.4167	36	4.39724
Spanish	29.7222	36	3.96853
Mixed	25.8889	36	4.41282
Total	29.6759	108	5.23259

Kruskal-Wallis Test

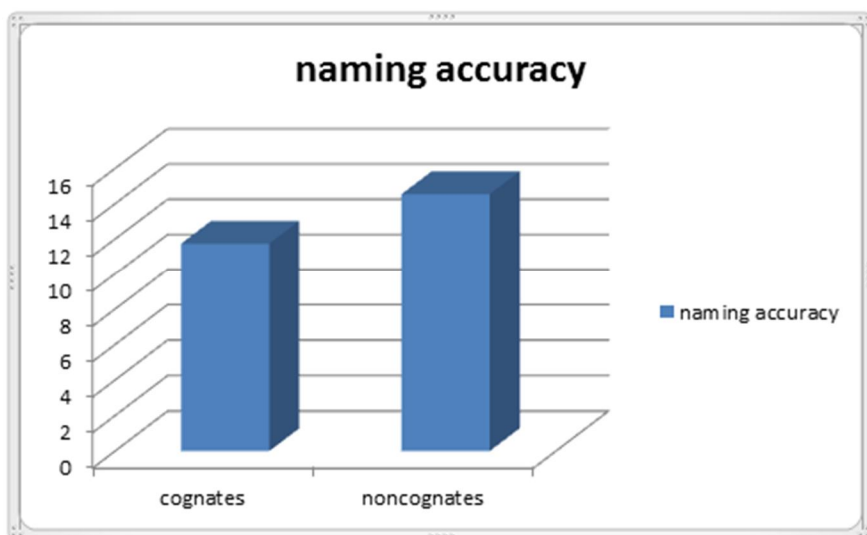
Table2. Ranks			
	block	N	Mean Rank
correct	English	36	76.46
	Spanish	36	54.89
	Mixed	36	32.15
	Total	108	

**Table3. correct answers for cognates**

Mean	N	Std. Deviation
11.7500	36	2.77102

Table4. correct answers for non-cognates

Mean	N	Std. Deviation
14.5556	36	2.34758



5. Conclusion and practical implications

The distributed memory representation model by De Groot (1992) proposes that representation of cognates associates to both lexical (form) and conceptual (meaning) levels; whereas, non-cognates relate only to the conceptual level. Thus the access to the exact lexical label for cognates takes longer time. Besides this model, the results can be interpreted in terms of the participants' lower proficiency in L3 (Spanish) relative to their L2 (English). Based on Cummins' Threshold Hypothesis, having reached the first critical threshold in both languages' proficiency, the learner is then able to overcome the negative effects of bilingualism, and the second threshold to get access to its benefits (Gabrys-Barker D. & Otwinowska A. 2012). Later Lasagabaster tried to make a relationship between this hypothesis and trilingualism, and gained similar results. Thus, it can be concluded that the participants' not having reached the cognitive thresholds in their L3 results in a gap in their Spanish and English performance, and also in cognates and non-cognates. According to Revised Hierarchical Model (RHM) by Kroll and Stewart (1994) which was later extended to multilingualism, bilingual memory organization is comprised of three interconnected systems: two independent lexicons for L1 and L2, and a unified conceptual system (CS) for the two languages. A crucial notion of this model is that improvement in L2 proficiency leads to a positive change in associations between the two lexicons and the CS (Gholami et al., 2015). Consistent with Cummins' Threshold Hypothesis and RHM, by the transition of a trilingual from low proficiency stage to high competence, the inter-linguistic interferences and response times reduce. The observed difference in performance cannot possibly be attributed to Spanish and English same scripts. Hoshino and Kroll (2008) conducted a research on Japanese-English and Spanish-English bilinguals. The results of picture-naming tasks on cognates and non-cognates revealed that both groups performed similarly although Japanese and English scripts are different. In fact their evidence, consistent with prior studies (Alario et al., 2007; Roelofs, 2006), was against the idea that even the absent orthography modulates the phonological processing. Based on the findings of this study, incorporation of cognate-based instructions in foreign and second language pedagogical framework can lead to the students' better learning, retention and performance.

6. Suggestions for further studies

Concerning a great increase in language learners' enthusiasm to learn a third or fourth language, more research pertaining to teaching and learning foreign languages need to be conducted. Furthermore, a comprehensive investigation comparing the trilinguals in two groups having low and high proficiency in L3 might provide more detailed results on this issue.

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