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Effects of Cognate and Relatedness Status on Word Recognition in Russian-English Bilinguals of Upper-Intermediate and Advanced Levels

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Abstract

By this study we intend to contribute to understanding the role lexical and semantic information play across languages (the native language L1 and the second language L2) during the early stages of word recognition. Our study focuses on lexical and semantic levels of language processing using cross-language semantic and lexical priming as a tool to reveal the relationship between the two languages in bilingual mind. The phenomena under study are cognate words and semantically related words effects on language processing in bilinguals. Basing on the results of two experiments, differing in language proficiency characteristics of the participants, a consistent inhibitory cognate effect was obtained in both groups, with cross language semantic priming effect being facilitating also irrespective of the language proficiency characteristics of the participants.

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1. Introduction

A key issue of study for language researchers all over the world is how bilinguals process and represent their multiple languages preventing interference and lexical intrusions from one or another language. The special representational status of cognate translation equivalents and semantically related words is an important dimension where the language performance of bilingual speakers can be revealed and studied. It is the sharing of form and

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meaning across languages that makes cognates be so special for bilinguals. The language overlap and characteristics of its processing attract researchers addressing different questions of bilingual lexical access. It is presumed that because of the form shared with L1 items, cognates, during L2 acquisition, could be a learner's first path into the new lexicon, which would result in different pattern of processing for cognates and noncognates. The different pattern of processing would point to an integrated lexicon with nonselective or selective access for the two languages. Behavioral studies (word recognition tasks (Lemhöfer & Dijkstra, 2004); translation task (De Groot, 1992; Sanchez-Casas et al., 1992); priming paradigm (Lalor & Kirsner, 2001)), show a robust different response patterns for cognate and noncognate items. Agreeing on the effect the researchers present different views on its explanation. Numerous studies have shown that cognates generally facilitate word processing (see Desmet and Duyck, 2007 for a review) due to high superficial overlap irrespective of language nature. Though most of the related studies were done employing two languages with the Latin alphabet there are also studies employing one language with the Latin alphabet and the other one with the Cyrillic alphabet (Sherkina-Lieber 2004; Hristova & Janayan, 2007, 2008). De Groot (De Groot, 1994) proposed the Distributed Feature Model (DFM) presenting words as sets of distributed features at different representation levels and assumed that because of overlapping features on lexical and semantic levels the processing of cognates and related words is expected to be faster. A between-language semantic priming effect for cognates was obtained by de Groot and Nas (1991) in fluent Dutch–English bilinguals. The presence of masked translation priming for noncognates was found in highly fluent Basque–Spanish bilinguals (Perea et al., 2006). But recently reviewed papers by Sanchez-Casas and Garcia-Albea (2005) provide the empirical evidence of the result controversy and inconclusiveness concerning masked translation priming effects as there are reports of a significant masked translation priming effect as well as reports with mixed evidence (e.g., Finkbeiner et al., 2004). Combination of cross language semantically related prime and target cognate status conditions would result in lexical and semantic activation during language processing.

To address the issues stated above the cognate effect and prime relatedness effect were studied in Russian-English bilinguals at the upper-intermediate level of the second language acquisition in Experiment 1 and Russian-English bilinguals at the advanced level of the second language acquisition in Experiment 2. The second experiment was conducted to check the validity of the results obtained in the first experiment. It is stated that the factor that may contribute to making word processing vigorous is the degree of second language proficiency, which is implied by the revised hierarchical model (Kroll et al., 2010) assuming that at the initial stages of L2 learning, learners have access to the conceptual system via their native language (L1). Only when the learners have a high degree of proficiency is there direct semantic processing from L2 which results in facilitating effect.

2. Methodology

2.1. Hypothesis

First, the general prediction for cognate processing was that a cognate word is more quickly identified (e.g. Cristoffanini, Kirsner & Milech, 1986; de Groot, Dannenburg & van Hell, 1994) than a non-cognate word by Russian-English bilinguals no matter how related the languages are.

Second, as previous studies (e.g. Fox 1996; Costa, Miozzo & Caramazza, 1999) have shown, semantic processing in one language may interfere with processing in the other language. For instance, in the studies employing priming methodology it has also been stated that recognition of a word is facilitated when it is preceded by a semantic associate in the other language (de Groot and Nas, 1991; Grainger & Frenck-Mestre, 1998, Francis, 1999).

Thus, we expected the facilitation effect on Russian (prime) and English (target) material in both (cognate and prime) conditions, hoping for possible interaction of the two factors: Prime Relatedness (Related vs. Unrelated) x Target Cognate status (Cognate vs. Non-cognate).

2.2. Experimental study

Two experiments were conducted to reveal the processing pattern for cognates and semantically related and unrelated cross language pairs.

Experiment 1 was conducted employing a lexical-decision task used for bilinguals (e.g. Meyer & Schvaneveldt 1971; Perea et al., 2008). 25 students aged 19 – 24 (23 females and 2 males) studying at the Faculty of Foreign Languages, National Research Tomsk State University, participated in the experiment. The degree of L2 proficiency

in the participants was measured with an upper-intermediate lexical and grammatical placement test. All the participants displayed the sufficient results. All the participants gave the details of the history of their L2 acquisition, the mean period of studying L2 being 11 years.

Stimuli and design. All the stimuli used in the present study were nouns controlled for frequency and matched for length measured in number of letters. There were 60 Russian-English word pairs. To achieve the aim of the study we used cognates, words that have high cross-language form-function overlap (e.g., ‘banana’-‘банан’ [banan]) and contrasted their processing to non-cognates (words that have only functional overlap (e.g., ‘chair’- ‘стол’ [stol]). To investigate the semantic variable of relatedness we used the words with functional overlap (e.g. ‘карман’ [karman] pocket – ‘cigarette’) to compare their processing to the words without it (e.g. ‘книга’ [kniga] a book-‘banana’). The experiment design was 2×2 : 1) Word Type: cognates vs. noncognates; 2) Semantic relatedness: semantically related words vs. semantically unrelated words.

Procedure. To conduct the experiment we used E-Prime 2.0 (Copyright 1996-2012 Psychology Software Tools). Two pseudo-randomized lists (words and nonwords) containing 120 stimuli were made so that the same condition in the word list was presented no more than 3 times at a run. The participants were tested in a computer class in groups of 3 - 5 people at a time, before doing the test they had been instructed not to comment on what they were doing to avoid distracting other participants. Before the experimental session the participants had a practice session (15 original items, which were not included into the experiment) after which they were free to ask questions if they had any before starting the experimental session. Both the practice session and the experimental session were preceded by the instruction on LDT. Subjects were to make judgments about whether or not a string of letters appearing in the center of the screen is a common English word (“press 1 if it is a word and 0 if it is a non word”). In the experiment each trial started with a fixation cross appearing in the center of the screen (500ms) followed by a Russian prime in upper case letters (100ms) and an English target in upper case letters which remained on the screen till a response but not more than 2000 ms. The trial ended in intertrial interval (250ms). The experiment session lasted for 9 minutes average.

3. Discussion of Results

5.7 % of errors as well as trials with $RT < M - 2sd$ (5.4%) were cut from the report. A two-way ANOVA obtained main effect of cognate status ($F(1, 116) = 16.23$; $p < 0.001$) which suggested that cognates significantly slower down the reaction time in comparison with non-cognates (802 ms vs. 739 ms) (Fig.1).

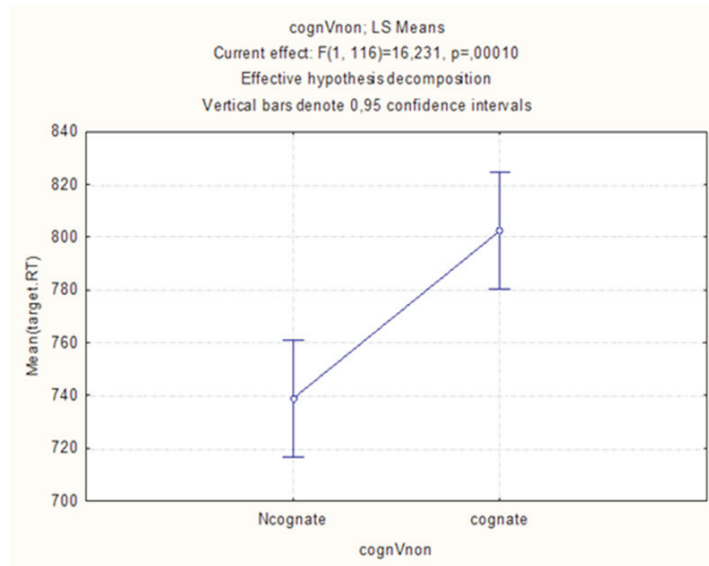


Figure 1. The main effect of cognate status (analysis by items).

Main effect of relatedness also reached significance $F(1,116) = 7.68; p < 0.01$, suggesting faster RT on related (749 ms) than on unrelated (793 ms) word pairs. The interaction was highly insignificant: $F(1; 116) = 0.49; p > 0.4$. Table 1 shows means and standard deviations per condition.

Table 1 Means and standard deviations per condition.

	related	unrelated
Cognate	775(111)	829(106)
Non-cognate	722(56)	755(54)

The failure of facilitation hypothesis brought into light the hypothesis of the language acquisition level influencing the processing pattern (in accordance with the revised hierarchical model).

The design of Experiment 2 was similar to the Experiment 1, but the participants were different (9 students from Tomsk State University, Faculty of Foreign Languages). The degree of L2 proficiency in the participants was measured with an advanced lexical and grammatical placement test. All the participants displayed the sufficient results. The participants also gave the details of the history of their L2 acquisition, the mean period of studying L2 being 15 years.

Repeated Measures ANOVA on subjects and items revealed the main effect of cognate status $F(1,57)=10.420, p < 0.002$, which suggested that cognates significantly slower down the reaction time in comparison with non-cognates (800 ms vs. 732 ms) (Fig.2).

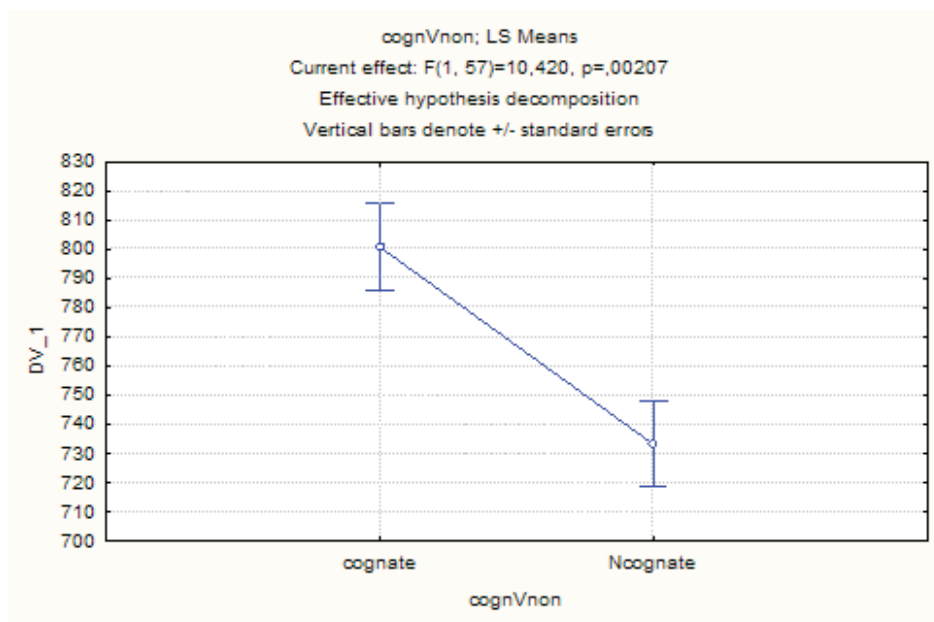


Figure 2 The main effect of cognate status (analysis by subjects).

Main effect of relatedness also reached significance $F(1,57)=7.39; p < 0.008$, suggesting faster RT on related (744 ms) than on unrelated (790 ms) word pairs. The interaction of cognate and relatedness status was highly insignificant $F(1; 57)= 0.31; p > 0.56$.

4. Conclusion

The results of two LDT experiments contradicted our prediction on facilitation cognate effect. In both experiment cognates significantly slow down the reaction time in comparison with non-cognates, thus, revealing inhibitory effect irrespective of the participants' language proficiency. As for the second prediction it was shown that main effect of relatedness reached significance. No interaction of two conditions was obtained in both experiments.

The obtained results bring into discussion the two controversial issues of L1 interference onto L2 processing. The first relates to a facilitating effect of L1 related prime advocating the idea of simultaneous activation of L1 and L2 within a certain semantic field. The second one on the contrary reveals non-activation of L1 in case of L2 non-cognate target and language conflict in case of L2 cognate target, which brings in a discussion about blocking mechanism of language representation. The speculation about the reason of target recognition delay could be grounded on the participant characteristic questioning their language proficiency and ability to switch language codes automatically failed.

Contradictory results stipulate further research in the origin of the reversed cognate effect on patterns of bilingual language processing in L1 and L2.

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References

- Costa, A., Miozzo, M., & Caramazza, A. (1999). Lexical selection in bilinguals: do words in the bilingual's two lexicons compete for selection. *Journal of Memory and Language*, 41, 365–397.
- Cristoffanini, P., Kirsner, K. & Milech, D. (1986). Bilingual lexical representation – the status of Spanish-English cognates. *Quarterly Journal of Experimental Psychology: Section A – Human Experimental Psychology*, 38, 367–393.
- De Groot, A. M. B., & Nas, G. L. J. (1991). Lexical representation of cognates and noncognate in compound bilinguals. *Journal of Memory and Language*, 30, 90–123.
- De Groot, A. M. B. (1992). Determinants of word translation. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 18, 1001–1018.
- De Groot, A. M. B., Dannenburg, L., & van Hell, J. G. (1994). Forward and backward word translation by bilinguals. *Journal of Memory and Language*, 33, 600–629.
- Desmet, T., & Duyck, W. (2007). Bilingual Language Processing. *Language and Linguistics Compass*. Volume 1, Issue 3, 133–226.
- Finkbeiner, M., Forster, K. I., Nicol, J., & Nakamura, K. (2004). The role of polysemy in masked semantic and translation priming. *Journal of Memory and Language*, 51, 1–22.
- Fox, E. (1996). Cross-language priming from ignored words: evidence for a common representational system in bilinguals. *Journal of Memory and Language*, 35, 353–370.
- Francis, W. S. (1999). Cognitive integration of language and memory in bilinguals: semantic representation. *Psychological Bulletin*, 125, 193–222.
- Grainger, J., & Frenck-Mestre, C. (1998). Masked priming by translation equivalents in proficient bilinguals. *Language and Cognitive Processes*, 13, 601–623.
- Hristova, M., & Janayn, A. (2007). Gender congruency and cognate effect in Bulgarian-English bilinguals: Evidence from a word-translation task. In D. S. McNamara & J.G. Trafton (Eds.), *Proceedings of the 29th Annual Conference of the Cognitive Science Society* (pp. 1121-1126), Nashville, TN: Cognitive Science Society.
- Hristova, M., & Janayn, A. (2008). Reversed concreteness effect and differentiated cognate processing determined by direction of translation and L2 proficiency. In B. C. Love, K. McRae, & V. M. Sloutsky (Eds.), *Proceedings of the 30th Annual Conference of the Cognitive Science Society* (pp. 2203-2208). Austin, TX: Cognitive Science Society.
- Kroll J., van Hell J., Tokowicz N., & Green D. (2010). The Revised Hierarchical Model: A critical review and assessment. *Bilingualism: Language and Cognition*. Volume 13, Issue 03, 373-381.
- Lalor, E., & Kirsner, K. (2001). The representation of “false cognates” in the bilingual lexicon. *Psychonomic Bulletin & Review*, 8, 552–559.
- Lemhofer, K., & Dijkstra, T. (2004). Recognizing cognates and interlingual homographs: Effects of code similarity in language-specific and generalized lexical decision. *Memory & Cognition*, 32, 533–550.
- Meyer, D.E., & Schvaneveldt, R.W. (1971). Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. *Journal of Experimental Psychology*, 90, 227-234.
- Perea, M., Urkia, M., Davis, C., Agirre, A., Laseka, E., & Carreiras, M. (2006). E-Hitz: A word-frequency list and a program for deriving psycholinguistic statistics in an agglutinative language (Basque). *Behavior Research Methods*, 38, 610–615.

- Perea, M., Duñabeitia, J.A., & Carreiras, M. (2008). Masked associative/semantic and identity priming effects across languages with highly proficient bilinguals. *Journal of Memory and Language*, 58, 916-930.
- Sanchez-Casas, R.M., Davis, C.W., & Garcia-Albea, J. E. (1992). Bilingual lexical processing: Exploring the cognate/non-cognate distinction. *European Journal of Cognitive Psychology*, 4, 293–310.
- Sherkina-Lieber, M. (2004). The cognate facilitation effect in bilingual speech processing: the case of Russian-English bilingualism. *Cahiers linguistiques d'Ottawa*, June/juin, 32, 108-121.
- Sanchez-Casas, R.M., & Garcia-Albea, J. E. (2005). The representation of cognate and noncognate words in bilingual memory: Can cognate status be characterized as a special kind of morphological relation? In J. F. Kroll & A.M.B.de Groot (Eds.), *Handbook of bilingualism*. Psycholinguistic approaches (pp.226–250). Oxford: Oxford University Press.