

Review of Semantic Priming Research Applied in Second Language (L2) Acquisition

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ABSTRACT

This paper synthesizes and evaluates semantic priming research applied in second language research. It first provides the definitions of semantic priming and its types. Then the relationship between semantic priming research and second language research is discussed. The empirical studies concerning semantic priming in second language research are elaborated from two aspects: studies outside China and in mainland China. Finally, the implications and suggestions for future studies will be drawn from the analysis.

Keywords: *Psycholinguistics, Second language research, Semantic priming.*

1. INTRODUCTION

Psycholinguistics, as an interdisciplinary field, related to cognitive science, has aroused many scholars and teachers' interest early from 1879. Nowadays, they are attempting to apply some of the principles of psycholinguistics to society [2]. It seems that there is an increasing interest to characterize cognitive processes to explore second language acquisition from the perspective of cognitive psychology and psycholinguistics. One of the focuses is to address the representations, processes, and strategies for skilled adult bilinguals to read and speak words and process sentences in each of the two languages, which has incorporated psycholinguistics in second language research. Based on the idea that bilingual performance reflects the cognitive processes, some psycholinguistic research is applied in second language field [5].

It is gratifying that once a research indicates that from 2006 to 2010, there are 340 citations of studies, exploring psycholinguistic aspects of

second language, and there is nearly thirty percent increase from the number of studies (266) published from 2001 to 2005 with similar or related topics [11] [12]. With researchers' great interest, though many are purely psychological studies, mainly theoretical, which are rarely related to the studies of the application and pedagogical studies of second language, in fact, the very interest of many teachers and researchers. In addition, the book *Applying Priming Methods to L2 Learning, Teaching and Research: Insights from Psycholinguistics* has contributed to the application of semantic priming in second language research.

However, priming is one of the predominant experimental paradigm employed to study cognitive aspects of language learning and use, in which, semantic priming has been a focus of research in the cognitive sciences for more than thirty years and is commonly used as a tool for investigating other aspects of perception and cognition, such as word recognition, language comprehension, and knowledge representations [10]. In the past three decades, semantic priming has been used to "explore the nature of semantic network in the mental lexicons of L1 and L2 speakers [12]".

This paper will mainly synthesize and evaluate documents using semantic priming research in second language research. It first provides the

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definitions of semantic priming and classifications. Then the relationship between semantic priming research and second language research is discussed. The empirical studies concerning semantic priming in second language research are elaborated from two aspects: studies outside China and in mainland China. Finally, the implications and suggestions for future studies will be drawn from the analysis.

2. THE DEFINITION OF SEMANTIC PRIMING

The definition of semantic priming has to begin with priming since semantic priming is a kind of priming. Hence, its understanding largely depends on that of priming.

It was more than 100 years ago that people have the ability to recognize a word more quickly if its meaning is related to the word they have recently heard. In order to study cognitive aspect of language learning and use, priming methods are predominant in psycholinguistic research [9]. Priming method, though originated in psycholinguistics, is now becoming increasingly common in applied linguistics, which is based on the idea that "if two things are similar to each other and involved together in processing, they will either assist with or interfere with each other, but if they are unrelated, they will have no effect"[4]. Priming method was first defined as "a state of attentional preparedness for perception (e.g. a decision to wake up early increases the likelihood that the alarm will be heard)" by Feldman and Weld [3] and later by Lashley [6] to "describe internal activation or readiness of linguistic elements in speech production (i.e. preparing a structural configuration of an utterance before producing it)" [12]. That is to say, priming actually refers to all the situations in which prior exposure influences subsequent language processing [12]. Thus, the priming research, especially in the field of second language research, involves learners' exposure and learning processes. It is significant to apply its relative research findings into second language research and consequently elicit some pedagogical implications. And priming is believed to be a large system of human memory — implicit memory, which "involves memory for cognitive operations or procedures which are learned through repeated use", and it indicates that learners' prior knowledge

influences their subsequent language use, as a form of implicit learning[12]".

After the definition of priming is given, it is much easier to understand semantic priming. Semantic priming also refers to the prior exposure, but especially in research about semantic memory. Due to the convenience of understanding semantic priming, most of the definitions are given in examples, such as "Semantic priming demonstrates how learners access and use their L2 lexicon [12]". To be specific, it refers to the situation, for example, if the word "butter" is given prior to "bread", the meaning of "bread" is easier to be recognized, i. e. priming affects a response to a target through presenting a related item prior to it. If the two items assist each other, that is, priming accelerate the processing, it is called "facilitation"; otherwise, when interfere happens and the processing is slowed down, it is called "inhibition"[4].

2.1 Types of Semantic Priming

Semantic priming emphasizes on L2 processing and learning in particular. There are three types of semantic priming according to the "particular semantic relationship between prime and target words", which are "associative priming", "category priming" and "mediated priming". The first refers to the semantic priming in which prime and target words are semantically close, but are not members of the same semantic category, such as the pairs of related words "*sugar-sweet*" and "*grass-green*". The second indicates the semantic priming where the prime and the target belong to the same semantic category, such as "*bird-robin*" and "*furniture-table*". The last one refers to that prime and target words are not related directly, such as "*stripes-lion*" and the semantic relationship between the two words is mediated by the word "*tiger*" (McDonough & Trofimovich, 2009, p. 62).

3. THE RELATIONSHIP BETWEEN SEMANTIC PRIMING AND SECOND LANGUAGE RESEARCH

Semantic priming can be applied to second language research since semantic priming research has been frequently employed in research in semantic memory [14]. And many a research conducts priming and lexicon to "explore how

speakers access word meaning and retrieve word forms from memory when presented with individual words"[11]. What's more, by adopting semantic priming, some researchers want to find out "how bilinguals organize words in their two languages", others have interest in finding "whether L1 and L2 speakers differ in their patterns of semantic priming in a language" [11]. In the past decades, semantic priming research "in bilinguals and L2 learners" has continued along two ways. One is *within-language* semantic priming; the other is *cross-language* semantic priming. The former refers to the experiment in which "participants respond to prime-target pairs with lexical items from the same language" such as, an English prime and English target are always paired, and a French prime is always paired with a French target [9]. The latter refers to the experiment in which participants of the experiments have to respond to prime-target pairs with lexical items from both languages. And usually cross-language priming has been proved by facilitation in the speed and accuracy to identify or pronounce words in one language because of the brief exposure to translation equivalents from another language [15]. There are three commonly used in the semantic priming research—lexical decision task (LDT), pronunciation (naming) task, and semantic categorization task [9].

4. EMPIRICAL RESEARCH OF SEMANTIC PRIMING RELATED TO SECOND LANGUAGE RESEARCH

Generally speaking, most of the semantic priming research has been published in psychology or psycholinguistic journals, only with a slight part of which in linguistic journals. And it seems that each semantic priming research focuses differently due to many factors to be considered in this method in psycholinguistics as well as second language research.

4.1 Semantic Priming Studies Outside China

Rosa SaÂnchez-Casas, Pilar FerreÂ, JoseÂ E. GarcÃa-Albea, and Marc Guasch's study[14], published in *European Journal of Cognitive Psychology* with the target readers of researchers or scholars interested in psychology, has used both LDT and semantic decision task, finding that in the

two experiments evidence of automatic semantic priming was obtained in both the very close semantic conditions and priming was higher for very close than close semantic words. Based on the findings, it can be concluded that the degree of automatic semantic priming seems to depend on how similar the primes and targets are. One advantage of the study is that semantically related prime-target pairs are controlled to avoid participants detecting the relationship between them because the more similar, the more likely the priming works. What's more, it adopted multiple measures, which is similar to Kim McDonough and Pavel Trofimovich's[9] suggestion that researchers can include "multiple measures" to identify similarities and differences in L1 and L2 processing or to clarify proficiency differences in L2 processing that may not be apparent when reaction times are used as the only measure".

Yuan Yanli and Woltz Dan's[15] study, published in *Language Learning*, is cross-language semantic priming research, which explores the advantage to the second language sentence comprehension with brief visual exposure to L1 translation equivalents. One of the implications is that cross-language priming is so strong in the task with greater semantic complexity than those of lexical decision or word naming which are commonly used. The suggestion for future research is to explore more complex listening tasks (using longer sentences with varied structure). Then the question is "whether this form of facilitation during speech comprehension benefits the L2 learner in the acquisition of language skills." Though someone may argue, the researchers thinks that L1 priming can help to reduce the slow or inaccurate meaning retrieval, but it requires "more ambitious experiments that investigate the impact of consistent L2 comprehension practice over time in the context of L1 priming[15]".

Jeanette Altarriba and Hugh Knickerbocker conducted a cross-language priming of three experiments. Two has explored "the benefit of learning vocabulary in a second language by varying the learning formats both within and between participants" [1] [11]. It adopted the LDT to test the newly acquired words, using images and words as primes in order to use multiple learning procedures to gain full mastery over an L2 in two experiments, priming effects emerged in all of the three learning conditions (word-priming procedure,

letter strings, black-and-white picture condition). The findings indicate that the word-word condition appears to have easier retrieval, however, the research suggests that "word learning is important for the early development of reading/writing skills, yet perhaps learning via images may be useful for other kinds of tasks, such as the acquisition of conversational skills or the attempt to teach a new language to very young children (p.43)" and suggest future research to use color images, particularly for teaching a new language, and adopting multiple learning procedures. This paper was published in Trofimovich, P., & McDonough's book *Applying priming methods to L2 learning, teaching and research: Insights from psycholinguistics* as a chapter.

4.2 Semantic Priming Studies in Mainland China

Dong Yanping[16] has carried out an analysis of the previous priming experiments, focusing on the validity of semantic priming experiment. The research contends that bilingual lexical memory deals with the main question — what kind of memory structure the two languages have in learners' minds. The answer to the question may account for the phenomenon of translation of language codes. For the hundreds of experiments carried out by researchers, they have different, even contradictory results. The researcher has reviewed the experiments and found that many of which are invalid in terms of operation. Since validity plays a decisive role in findings, the researcher aims to find valid operation condition and thus provide comparatively reasonable and systematic criteria for the future study. Kim McDonough and Pavel Trofimovich (2009)[9] also emphasize the importance to consider the validity of priming research since it is usually experimental methods. Though the article is not directly related to second language research but focuses on psychological field, the article was published in a foreign language journal. It shows that more and more researchers have realized that semantic priming can be applied in second language research.

It is interesting that a new attempt is proposed by one Chinese researcher who has explored the relationship between semantic priming and cultural script, suggesting that future research can be conducted from the perspective based on corpus

and understanding language [18]. The paper has analyzed and discussed semantic priming and cultural script based on a corpus study and psycholinguistic experiment, and found that "semantic prime is language-universal and cultural script is powerful for explaining cultural characters". The paper was published in the journal of *Foreign Language*, reflecting researchers' attention on the influence of semantic priming in second language research.

Jiang Lin[17] studies the semantic priming in structures of ditransitive structure, prepositional and case structure, whose article was published in Chinese linguistic journal "Modern Foreign Language". One of the findings is that there is no possibility of the existence of pure syntactic priming without semantic priming, in other words, priming process is the result of the co-function of structural priming. The findings are in accord with McDonough & Trofimovich's[11] suggestion to "investigate how speakers access and use the semantic and phonological information when comprehending or producing phrases, sentences, or even longer units of discourse." Their suggestion is exemplified with Hu and Jiang's research, which explored L2 learners' processing of sentences instead of words, and found that when a new word is put in a sentential context, it is faster when this word appeared in a predictable context instead of a neutral context. Therefore, it is important to investigate word processing in sentential contexts, rather than in individual word lists. They also suggest that future research may study more diverse discourse contexts.

The above shows that Chinese researchers have also contributed a lot to semantic priming research theoretically and empirically. In mainland China, a lot of semantic priming research has been published in linguistic journals, a bit different from those outside China focusing on psycholinguistic issues. The phenomenon indicates Chinese researchers' awareness of the significance of researching semantic priming in second language research, which will bring benefit to pedagogy accordingly.

To sum up, to some extent, it can be said that the diverse semantic priming research outside and inside mainland China can be complementary. However, applying the semantic priming research into second language research is still insufficient. Furthermore, semantic priming in second language

research still needs further research so as to serve pedagogy. But it is a pity that most of the priming research in L2 acquisition has been published in psychological journals with many "inaccessible" [9] terminologies and obscure theories of psychology or cognitive psychology, creating a gap for the development of priming research and L2 research.

5. IMPLICATIONS ON RESEARCH AND INSTRUCTION

As for the implications on research, priming methods can be used in L2 learning, teaching and research. And "Several researchers have pointed out that dialogue is the most natural and basic form of language use... can be adopted for situated language use" [11]. In light of the great amount of research conducted in psycholinguistics, researchers and teachers can gain benefit from the research findings, conduct their own research by using priming methods, and implement the findings in L2 teaching. After searching the data on the Internet at <http://www.Goolescholar.com>, the author finds a sharp difference in the number of research conducted in psychology and second language acquisition using semantic priming methods. In addition, the author has also used the NTU's "one search engine" (<http://www.ntu.edu.sg/library/Pages/default.aspx>) for the key words of "priming in psycholinguistics" with 1021 results, and "priming in second language acquisition" with 84 results. The suggestion comes out from the above findings that more relative priming research should be conducted in second language field.

Libben and Jarema [7] [8] suggest that the ecological validity of priming research can be influenced by whether it involves many "target languages and forms", "select samples that represent various categories of language users", and "design experimental tasks that resemble naturally-occurring language use and include multiple experimental techniques and /or new paradigms in priming research such as eye-tracking and neuroimaging [9]". [13] They pointed that researcher also can influence the results, such as the "reaction time", usually the only measure in a lot of research.

As for the implications on instruction, researchers and teachers can make use of the findings of the relative research, then adopting

corresponding teaching methods in the real class by using some primes (visual and images as well as literal) and targets, which makes learning easier, interesting and effective.

6. CONCLUSION

To sum up, semantic priming still needs researchers' attention in order to be taken advantage of in second language research. And it is really a predominant method used in semantic memory as mentioned above. However, teachers should understand that word in sentential contexts can be faster to be learned rather than in the individual word lists and try to explore more issues related to second language research.

AUTHORS' CONTRIBUTIONS

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REFERENCES

- [1] Altarriba, J., & Knickerbocker, H. Acquiring second language vocabulary through the use of images and words. In Trofimovich, P., & Mcdonough, K. (Eds.). *Applying priming methods to l2 learning, teaching and research: insights from psycholinguistics.* (pp.21-48). Amsterdam/Philadelphia: John Benjamins Publishing Company. 2011.
- [2] Carroll, D. *Psychology of language.* USA: Thomson Wadsworth. 2008.
- [3] Feldman, S., & Weld, H.P. Perception. In E. G. Boring, H. S. Langfeld, H. P. Weld, et al. (Eds.), *Introduction to psychology* (pp. 411-438). New York: John Wiley. 1939.
- [4] Harley, T. *The psychology of language: from data to theory.* Hove and New York: Taylor & Francis Group. 2008.
- [5] Kroll, J. & Sunderman, G. Cognitive Processes in Second Language Learners and Bilinguals: The Development of Lexical and Conceptual Representations. In Catherine J. Doughty & Michael H. Long (Eds.). *The handbook of second language acquisition.* USA: Blackwell publishing Ltd. p.104. 2003.

- [6] Lashley, K. S. The problem of serial order. In L. A. Jeffress (Ed.), *Cerebral mechanisms in behavior: The Hixon symposium* (pp.112-146). New York: John Wiley.1951.
- [7] Libben, G., & Jarema, G. Mental lexicon research in the new millennium. *Brain and Language*, 81, 2-11.2002.
- [8] Libben, G., & Jarema, G. Conceptions and questions concerning morphological processing. *Brain and Language*, vol. 90, 2-8.2004.
- [9] McDonough, K. & Trofimovich, P. *Using priming methods in second language research*. New York and London: Taylor & Francis Group. 2009.
- [10] McNamara, T. P. *Semantic priming: Perspective from memory and word recognition*. New York, NY: Psychology Press. 2005.
- [11] Trofimovich, P., & McDonough, K. Expanding the scope of priming research. In Trofimovich, P., & McDonough, K. (Eds.). *Applying priming methods to L2 learning, teaching and research: insights from psycholinguistics*. (pp.241-250).Amsterdam/Philadelphia: John Benjamins Publishing Company. 2011.
- [12] Trofimovich, P., & McDonough, K.Using priming methods to study L2 learning and teaching. In Trofimovich, P., & McDonough, K. (Eds.). *Applying priming methods to L2 learning, teaching and research: insights from psycholinguistics*. (pp.3-17).Amsterdam/Philadelphia: John Benjamins Publishing Company. 2011.
- [13] Pickering, M., & Garrod, S. Toward a mechanistic psychology of dialogue. *Behavioral and Brain sciences*, vol. 27, 169-190. 2004.
- [14] SaÂnchez-Casas, R., FerreÂ, P., JoseÂ E., GarcÃa-Albea & Guasch, M. The nature of semantic priming: Effects of the degree of semantic similarity between primes and targets in Spanish. *European Journal of Cognitive Psychology*.vol. 18(2), pp.161-184. 2006.
- [15] Yuan, Y. & Woltz, D. Cross-language priming of word meaning during second language sentence comprehension. *Language Learning*, vol. 60(2), pp.447-469. 2010.
- [16] Dong, YP. On experimental way of bilingual vocabulary memory priming: the effective conditions of priming experiment. *Journal of PLA University of Foreign Languages*, vol. 21(5), pp. 1-8. 1998.
- [17] Jiang, L. The semantic priming in double object structure and preposition and case structure. *Modern Foreign Languages*, vol. 32(1), pp. 59-67. 2009.
- [18] Lu, Z. On semantic priming and cultural scripts , *Foreign Languages*, vol. 147(5), pp. 27-34. 2003.