

How Can Syntactic Priming Studies Contribute to the Second Language Acquisition Theory?

NAKAYAMA, Tomokazu

Abstract

This literature review investigates how syntactic priming studies contribute to the field of second language acquisition. It revealed three major findings. Firstly, the brief review of language distance and language revealed that the syntactic or phonetic similarities between languages impact the acquisition of languages. Secondly, through reviews of cross-linguistic syntactic priming studies, which target the syntactic transfer between two languages, previous studies suggest that certain conditions, such as relatedness between the languages and learners' expectancy or awareness of the syntactic similarity between the languages, relate to the magnitude of syntactic priming effects. Finally, previous studies, on the conditions under which syntactic priming in L2 occurs, suggest that comprehension of text and peer interaction can promote learning of the target structures. In addition, the effects can be accumulated and syntactic priming persists between different modalities.

Keywords: syntactic priming, second language acquisition, language distance, language transfer

Introduction

Syntactic priming studies in psycholinguistics began in the 1980s to investigate how human beings store syntactic information in their minds. Then, the findings in this field started influencing the field of second language acquisition (SLA), later in the 1990s. However, even though the findings in priming studies showed potential for SLA, very few researchers or practitioners attempted to apply the findings to SLA. This article attempts to connect syntactic priming studies in psycholinguistics and SLA. It covers the basic concept of the relationship between languages, then discusses the findings of syntactic priming studies and cross-linguistic priming studies, and finally introduces the findings targeted in SLA.

Linguistic Distance Between Languages and Language Transfer

Studies on immigrants from various countries in connection to the process of second language acquisition have led linguists to assume that there are different distances between languages (Chiswick & Miller, 2005). Linguists argue that immigrants can learn a language much faster than another. Some linguists (Chiswick & Miller, 2005) have been attempting to construct a methodology to measure the distance between English and other languages.

Regarding relations between languages, it is known that people try to make the most of the linguistic knowledge they have when they are faced with extracting the meaning of the language they do not know. Furthermore, the closer the relation between the language they know and the language they do not know, the better chances they have of successfully extracting the meaning of the language they do not know. The awareness of the distance between those languages facilitates the transfer from one language to another (Corder, 1982; Singleton & Little, 1984).

The above discussion leads to the following insights: First, the knowledge of the first language (L1) influences the second language (L2) acquisition. Second, learners depend on L1 knowledge when they try to convey the meaning in L2. Lastly, the awareness of linguistic distance among learners facilitates the learning of L2.

Corder (1982) divided the influences of L1 into two categories: positive transfer and negative transfer (pp.98-99). Positive transfer occurs when L1 knowledge facilitates the learning of L2, if L1 knowledge is close enough to that of L2. On the other hand, negative transfer occurs when the learning of L2 is affected by L1 knowledge since the aspect of L2 is unknown or different from L1. The interaction between L1 and L2 builds a language between them called interlanguage.

The term interlanguage, coined by Selinker (1972), refers to “the product of psycholinguistic process of interaction between linguistic systems, those of the mother tongue, and the target language” (Corder, 1982, p.87). Corder (1982) further argues that interlanguage is a continuum between L1 and L2 (p.87) and is “changing all the time” by revisions that learners make (p.57).

Priming Effect and Syntactic Priming Paradigm

Language transfer studies have been investigated in the field of cross-linguistic syntactic priming paradigm since the 1980s. In this section, I will discuss cross-linguistic syntactic priming research after briefly discussing the definition of priming effect and syntactic priming.

Priming effect is a well-known phenomenon where the processing of an advanced stimulus impacts the later processing of a different stimulus. For example, if people are exposed to the name of an animal (e.g., dog) in advance, they respond to another animal word (e.g., cat) faster than a different kind of word (e.g., bread). The priming effect paradigm has been used in research on semantic memory to investigate how vocabulary is stored in our brains. However, the priming effect is not only carried out with isolated words but occurs in syntactic structure as well. Bock (1986) found that people tend to use a syntactic

structure that they have been previously exposed (hear or read) to, even if it is in a different context. In her study, Bock used a picture description task in which participants were asked to describe pictures (target) after they were asked to read a sentence (prime) out loud, which had a syntactic structure that was mostly to be used in the picture description tasks. The participants of this study most likely used the same structure that was read aloud in the priming condition, even though there were no semantic relations between the prime and the target. Now, the priming effect that occurs in syntactic structures is known as syntactic priming effects. Syntactic priming effects have been confirmed in various aspects of language: two dative constructions (e.g., Bock, 1986, 1989; Bock & Loebell, 1990; Corley & Scheepers, 2002) and different modalities (e.g., spoken: Bock, 1986; written: Pickering & Branigan, 1998; and heard: Branigan, Pickering, & Cleland, 1999).

Cross-Linguistic Syntactic Priming

The impact of L1 is known to be so large that even proficient bilinguals interact their L1 with their L2 in their mind, even when they communicate in L1 (Desmet & Duyck, 2007). Syntactic priming is known to occur even between L1 and L2. Most of the studies utilize the syntactic priming paradigm (e.g., Hartsuiker, Pickering, & Velkamp, 2004; Kootstra, Van Hell, & Dijkstra, 2010; Loebell & Bock, 2003), the details of which will be discussed later.

The Motives of the Research on Cross-Linguistic Syntactic Priming Effect

The motive of the research on cross-linguistic syntactic priming is to investigate how people store syntactic knowledge in their brain. There are no unified conclusions so far on this topic, but there are three major views. The first is called “the shared syntax account” view. According to the shared-syntax account view, all the syntactic knowledge and procedures are stored in one single unit (e.g., Hartsuiker et al., 2004), after learners reach a certain proficiency level (Bernolet, Hartsuiker, & Pickering, 2013). The second view is that bilinguals have separate syntactic knowledge for each of the languages, but the knowledge between the languages interact with each other when necessary (De Bot, 1992). The third is called the interactive model. According to this model, each language has a separate store but the corresponding nodes are connected to each other. The above three are the major models for bilingual syntactic representations. However, no conclusion on how people store syntactic knowledge in their brain has been drawn from this discussion as yet.

Cross-Linguistic Syntactic Priming Effects in Different Languages

Hartsuiker et al. (2004) investigated whether cross-linguistic syntactic priming occurs in a shared syntactic structure between Spanish and English. They asked Spanish-English bilinguals to participate in picture-description tasks in English, under the condition that the confederate, the interlocutor who generates primes to the participants, described other pictures in Spanish. They found that the participants used the passive voice more significantly than the active voice after the confederate described pictures in the passive voice, and the same results were obtained for active voice conditions.

Loebell and Bock (2003) investigated whether cross-linguistic syntactic priming would occur among fluent German-English bilingual speakers with three different prime conditions: dative (double-object and prepositional-object sentences), which share the same structure between German and English, and transitive structures, using active voice, which share the same structure between the two languages, and passive voice, which differs between the two. In their study, the participants were asked to repeat the prime sentences and then asked to describe pictures that had no semantic relations to the prime sentences in cross-linguistic conditions. If the participants were asked to process the prime in German, they were asked to process the target in English. The results indicated that priming effect occurred between the syntactic structures within the languages (datives and active voice), but did not occur in passive voice, which differs between the languages. Loebell and Bock (2003) concluded that it is necessary to share the same syntactic structure for cross-linguistic syntactic priming to occur between the languages.

On the other hand, other studies indicated different results for cross-linguistic syntactic effects from Loebell and Bock (2003). Chen, Jia, Wang, Dunlap, and Shin (2013) investigated whether cross-linguistic syntactic priming occurs in the passive voice, which differs in word order between Chinese and English, targeting Chinese-English bilingual university students. The results indicated that cross-linguistic syntactic priming occurred between the two languages, even though the word order differs in the two languages.

Hartsuiker, Beerts, Loncke, Desmet, and Bernolet (2016) investigated whether the differences in the magnitude of cross-linguistic syntactic priming would occur among multilinguals (Dutch-French-English-German speakers). They compared the within-language condition (Dutch to Dutch) and between-languages condition (Dutch to French, Dutch to English, Dutch to German) through four experiments. The results indicated that there were no differences in magnitude between the within- and between-language conditions.

Differences in the Magnitude of Priming Effects Depending on Proficiency Levels

Bernolet et al. (2013) investigated whether there were any differences in the magnitude of cross-linguistic syntactic priming effect, depending on the participants' L2 proficiency, targeting Dutch-English speakers of various English proficiency levels. They found that the cross-linguistic syntactic priming effects increased in line with the learners' proficiency.

Nakagawa, Morishita, and Yokokawa (2013) also investigated whether there were any differences in the magnitude of cross-linguistic syntactic priming effects depending on English proficiencies. They asked four groups with different English proficiencies to participate in picture description tasks after reading target sentences aloud. Their study found that the syntactic priming effect was only observed in intermediate groups but not in upper and lower groups.

This section reviewed major research findings on cross-linguistic syntactic priming and revealed the following three points: one, enough syntactic similarity is necessary for the priming effect to occur (Chen et al., 2013; Hartsuiker et al., 2004; Hartsuiker et al., 2016; Loebell & Bock, 2003); two, the magnitude of its similarity may differ between languages (Chen et al., 2013; Hartsuiker et al., 2016; Loebell & Bock, 2003); and three, learners' proficiency levels affect or facilitate the cross-linguistic syntactic priming effects (Nakagawa et al., 2013). Furthermore, Desmet and Declercq (2006) stated that proficient bilinguals are aware of the existence of the similarity in syntactic structures across languages and try to take advantage of it whereas less proficient learners are not able to take advantage of syntactic similarities of languages.

Relatedness Proportion Effect and Expectancy

The previous section described conditions in which cross-linguistic syntactic priming effects occur. The review found that there are two distinctive conditions necessary for the priming effects: the factor of syntactic similarities between the languages and the factor of students' proficiency of the target language. This section discusses the theoretical background of the necessary conditions for priming effects, in relation to these findings.

The study of priming effects emerged from the study of semantic memory in which researchers investigated how human beings stored vocabulary in their brain. There are two major findings in semantic priming paradigms. One is that people are more accurate and are faster in responding to a word when they are shown a word that is semantically related to the target word, which is called semantic priming effect (Meyer & Schvaneveldt, 1971), and two, its magnitude increases if the proportion of priming and target combination increases. This is called the relatedness proportion effect (Neely, Keefe, & Ross, 1989). The semantic priming effect occurs unconsciously, however, the relatedness proportion effect occurs consciously (Neely et al., 1989). The relatedness proportion effect occurs under an expectancy-based priming mechanism in which subjects control their strategies to succeed in the task (Neely et al., 1989; Posner & Snyder, 1975). In the semantic priming paradigm, the lexical decision task has been used in many studies. In the task, participants are asked to make a judgment on whether a shown letter string is a word or non-word. Because of repeated exposures to words in similar categories, participants expect to see a word from a similar category and respond faster to the word if it is a word from the same category as shown before. According to Neely et al. (1989), the magnitude of priming effect is controlled greatly by this expectancy or the strategies that participants use, and the

relatedness proportion effect is so robust that it cannot be easily affected by other biases (Neely et al., 1989). In addition, the relatedness proportion effect occurs in the syntactic priming paradigm as well (e.g., Deutsch & Bentin, 1994; Segal, Kempen, Petersson, & Hagoort, 2013).

Past research findings on relatedness proportion effects have shown that expectancy, which can be stated as the awareness or understanding of the relationship between prime and target syntactic structure, promotes related proportion effects. The literature review above is from psycholinguistic perspectives, where the motives of researchers were to investigate the human memory system, not pedagogy to promote second language acquisition. From pedagogical perspectives, there are some new insights that can be drawn from the cross-linguistic syntactic priming research. If the syntactic structures between L1 and L2 are similar enough, positive transfer, which facilitates the learning of the L2 syntactic structure in this sense, occurs. However, if the syntactic structures between L1 and L2 are not similar enough, positive transfer does not occur. More importantly, if learners are aware of the similarity in the syntactic structure, the learning of the structure will be facilitated. The proficiency level affects or facilitates the cross-linguistic syntactic priming effects. It is necessary for the learners to reach the level of basic lexical knowledge (Nakagawa, et al, 2013).

Necessary Conditions for Syntactic Priming Among L2 Speakers

The previous section discussed the role of expectancy in generating cross-linguistic syntactic priming effects and concluded that expectancy plays a significant role in the effect. This section discusses the conditions in which syntactic priming among L2 speakers occur, based on past research findings. Major findings suggest the following four conditions that facilitate syntactic priming among L2 speakers: 1. Comprehension effect, 2. Cumulative effect, 3. Modality difference effect, and 4. Peer interaction effect.

Comprehension effect. In the syntactic paradigm, naming tasks (prime) are major tasks that proceed to picture selection tasks (target). A naming task is a task where participants are asked to read the target sentences aloud. On the other hand, Nitschke, Kidd, and Serratrice (2010) investigated whether syntactic priming occurs in comprehension. They asked L1 German speakers, L1 Italian speakers, English-German speakers, and English-Italian speakers to participate in a picture selection task in English. In the experiments, the participants were first asked to read the target sentences on the screen and then asked to choose a picture that properly described the sentences, at their own pace. The findings revealed that the participants used L1 language processing strategies at first but, after more exposure to the L2 structural patterns, they were able to process the target sentences in L2 language processing strategies. In addition, the priming effects were long lasting and stronger in L2 than L1. The above results reveal that syntactic priming occurs in comprehension.

Cumulative effect. It is known that the syntactic priming effect can accumulate over many

sentences. Kaschak, Kutta, and Schatschneider (2011) asked 40 university students to participate in two sessions of experiments. In the first week, the participants were asked to participate in a written sentence stem task where they were to complete a grammatically correct English sentence, using either English sentences with a double object (DO) or English sentences with a prepositional object (PO). There were two groups of participants: one group was asked to complete the sentence with a DO and the other group with a PO. In the second week, the participants were asked to complete the written sentence stem task, but this time the tasks were randomly assigned. The results indicated that participants of the DO condition in the first session were significantly more likely to produce DO sentences in the second session, and participants of the PO condition in the first session were significantly more likely to produce PO sentences in the second session, providing evidence of long-term cumulative structural priming effects (Kaschak et al., 2011).

Modality difference effect: It is known that syntactic priming persists between different modalities. Hartsuiker, Bernolet, Schoonbaert, Speybroeck, and Vanderelst (2008) asked 48 university students, who were Dutch native speakers, to participate in two session studies. Half of the students participated in a computer mediated written dialogue task in the first session and in a spoken dialogue task in the second session, using DO and PO sentences. The other group participated in a spoken dialogue task in the first session and in a computer mediated written dialogue task in the second session. The results indicated cross-modality syntactic priming effects.

Peer interaction effect: McDonough (2011) used interlocutors to provide prime sentences to the participants. Interlocutors provided a model structure so that participants used the same syntactic structure provided by the interlocutor even when participants were asked to describe different contexts from the model. They argued that no feedback, no modified input, and no discussion with interlocutors were necessary for the priming effect to occur because those interactions with interlocutors have possibilities to affect the impacts of priming effects (p.132).

This section discussed the conditions in which linguistic syntactic priming among L2 speakers occurs, based on past research findings, and introduced four major priming effects that can be applied in pedagogical settings. Major findings suggested that 1. linguistic syntactic priming occurs during comprehension of texts, 2. the effects can be strengthened by repetition, 3. linguistic transfer can even occur in a different modality, and 4. interaction with peers is effective for linguistic transfer under set conditions.

Conclusion

This study investigated how recent linguistic priming studies can contribute to SLA. I first discussed the concept of language distance by Corder (1982) and that of interlanguage by Selinker (1972) to understand the relationship between languages. Then, I discussed the brief history and concepts of priming effect and syntactic priming paradigm and found that past research mainly investigated how

syntactic knowledge is stored in our brain, but not for pedagogical purposes. However, cross-linguistic syntactic priming studies have shown informative insights for pedagogy, that is, if the two languages are close enough in syntactic structures, the linguistic knowledge of L1 can support the learning of the target language syntactic structure. In addition, the magnitude of priming effects differs depending on learners' proficiency levels. Furthermore, the learners' expectancy or awareness of the similarities in syntactic structures between the languages might facilitate the acquisition of the target language syntactic structures. In the last section of this article, I discussed the conditions under which syntactic priming in L2 might be facilitated. I found that comprehension processes and peer interaction can facilitate the acquisition of the target syntactic structures and that the effects can be accumulated and occur among different modalities. I hope this literature review of syntactic priming will provide some insights into the development of a new methodology for the second language acquisition.

References

- Bernolet, S., Hartsuiker, R. J., & Pickering, M. J. (2013). From language specific to shared syntactic representations: The influence of second language proficiency on syntactic sharing in bilinguals. *Cognition*, 127, 287–306.
- Bock, J. K. (1986). Syntactic persistence in language production. *Cognitive Psychology*, 18, 355–387.
- Bock, J. K. (1989). Closed class immanence in sentence production. *Cognition*, 31, 163–186.
- Bock, J. K., & Loebell, H. (1990). Framing sentences. *Cognition*, 35, 1–39.
- Branigan, H. P., Pickering, M. J., & Cleland, A. A. (1999). Syntactic priming in written production: Evidence for rapid decay. *Psychonomic Bulletin & Review*, 6, 635–640.
- Chen, B., Jia, Y., Wang, Z., Dunlap, S., & Shin, J. A. (2013). Is word-order similarity necessary for cross-linguistic structural priming? *Second Language Research*, 29(4), 375–389.
- Chiswick, B. R., & Miller, P. W. (2005). Linguistic distance: A quantitative measure of the distance between English and other languages. *Journal of Multilingual and Multicultural Development*, 26(1), 1–11.
- Corder, S. P. (1982). *Error analysis and interlanguage*, 198(1). Oxford University Press.
- Corley, M., & Scheepers, C. (2002). Syntactic priming in English sentence production: Categorical and latency evidence from an Internet-based study. *Psychonomic Bulletin & Review*, 9(1), 126–131.
- De Bot, K. (1992). A bilingual production model: Levelt's "Speaking" model adapted. *Applied Linguistics*, 13, 1–24.
- Desmet, T., & Declercq, M. (2006). Cross-linguistic priming of syntactic hierarchical configuration information. *Journal of Memory and Language*, 54(4), 610–632.
- Desmet, T., & Duyck, W. (2007). Bilingual language processing. *Language and linguistics compass*, 1(3), 168–194.
- Deutsch, A., & Bentin, S. (1994). Attention mechanisms mediate the syntactic priming effect in auditory

- word identification. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20(3), 595.
- Hartsuiker, R. J., Beerts, S., Loncke, M., Desmet, T., & Bernolet, S. (2016). Cross-linguistic structural priming in multilinguals: Further evidence for shared syntax. *Journal of Memory and Language*, 90, 14–30.
- Hartsuiker, R. J., Bernolet, S., Schoonbaert, S., Speybroeck, S., & Vanderelst, D. (2008). Syntactic priming persists while the lexical boost decays: Evidence from written and spoken dialogue. *Journal of Memory and Language*, 58(2), 214–238.
- Hartsuiker, R. J., Pickering, M. J., & Veltkamp, E. (2004). Is syntax separate or shared between languages? *Psychological Science*, 15, 409–414.
- Kaschak, M. P., Kutta, T. J., & Schatschneider, C. (2011). Long-term cumulative structural priming persists for (at least) one week. *Memory & Cognition*, 39(3), 381–388.
- Kootstra, G. J., Van Hell, J. G., & Dijkstra, T. (2010). Syntactic alignment and shared word order in code-switched sentence production: Evidence from bilingual monologue and dialogue. *Journal of Memory and Language*, 63, 210–231.
- Loebell, H., & Bock, K. (2003). Structural priming across languages. *Linguistics*, 41, 791–824.
- McDonough, K. (2011). Eliciting wh-questions through collaborative syntactic priming activities during peer interaction. In P. Trofimovich & K. McDonough (Eds.), *Applying priming methods to L2 learning, teaching and research: Insights from psycholinguistics* (pp. 131–151). Philadelphia, PA: John Benjamins
- Meyer, D., & Schvaneveldt, R. (1971). Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. *Journal of Experimental Psychology*, 90, 227–234.
- Nakagawa, E., Morishita, M., & Yokokawa, H. (2013). The effects of lexical processing and proficiency on syntactic priming during sentence production by Japanese learners of English. *ARELE: Annual review of English language education in Japan*, 24, 189–204.
- Neely, J. H., Keefe, D. E., & Ross, K. L. (1989). Semantic priming in the lexical decision task: Roles of prospective prime-generated expectancies and retrospective semantic matching. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15(6), 1003.
- Nitschke, S., Kidd, E., & Serratrice, L. (2010). First language transfer and long-term structural priming in comprehension. *Language and Cognitive Processes*, 25(1), 94–114.
- Pickering, M. J., & Branigan, H. P. (1998). The representation of verbs: Evidence from syntactic priming in language production. *Journal of Memory & Language*, 39, 633–651.
- Posner, M. I., & Snyder, C. (1975). Attention and cognitive control. In R. L. Solso (Ed.), *Information processing and cognition. The Loyola symposium* (pp. 55–85). Hillsdale, NJ: Erlbaum.
- Segaert, K., Kempen, G., Petersson, K. M., & Hagoort, P. (2013). Syntactic priming and the lexical boost effect during sentence production and sentence comprehension: An fMRI study. *Brain and Language*, 124(2), 174–183.

Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics* 10, 209–231.

Singleton, D., & Little, D. (1984). A first encounter with Dutch: Perceived language distance and language transfer as factors in comprehension. In L. Mac Mathúna and D. Singleton (eds), *Language across cultures: Proceedings of a symposium held at St Patrick's College, Dublin, 8–9 July 1983*, 259–270. Dublin: Irish Association for Applied Linguistics.