The Role of Syntactic Priming in Second Language Comprehension

Zhang[1]

[1] North China Electric Power University

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Abstract

The role of syntactic priming is one central topic in language acquisition research. The paper is to investigate the role of syntactic priming in language acquisition. In this context, the paper firstly reviews the related study on the role of syntactic priming in language acquisition. Then further studies on the relationship between syntactic priming and lexical structure are made. Following this, syntactic priming effect on self-embedded sentences is evaluated and extended in second language complex sentence comprehension. Finally, a number of conclusions are drawn with respect to the role of syntactic effect on complex second language sentence comprehension.

Index terms— syntactic priming; sentence comprehension; language acquisition.

1 Introduction

yntactic priming is the facilitation of processing that occurs when a sentence has the same syntactic form as a preceding sentence (Ledoux et al., 2007), is one central topic in the study of language acquisition. A number of researchers show great interest in the role of syntactic priming in language comprehension. **??**ranigan, Pickering, and Stewart (2005) sought to provide evidence for syntactic priming in comprehension. They used whole sentence presentation of garden path sentences in prime and target pairs. They found that relative clause targets were read faster after relative clause primes than after complement clause primes. However complement clause targets were not read significantly faster after complement clause primes than after relative clause primes. Thus priming effects were found only for one structure but not for the other. In another test, transitive and intransitive sentences were used. It showed that transitive targets were read faster after transitive primes than after intransitive primes. Intransitive targets were also read faster after intransitive primes than after transitive primes. The last result was slightly significant, however, and only by items. In a third test, main and reduced clause sentences were used. Reduced clause targets were read faster after reduced clause primes than after main clause primes ($p<0.05$), but main clause targets were read significantly faster after main clause primes than after reduced clause primes only by subjects. Thus the three tests found weak effects of structural priming on a whole.

Author: Associate Professor, Department of English, North China Electric Power University, P. R. China. e-mail: zhangzhanhd@163.com Based on their results, Branigan et. al give some explanation on the mechanism of syntactic priming, they propose that the process of sentence comprehension involves activating procedures associated with syntactic rules or principles, and that these procedures remain at a heightened activation level after being applied. It is therefore easier to apply these procedures next time they are required. Clearly priming effects were purely syntactic; however, semantic influences were not excluded from the test materials, so the results cannot be attributed solely to syntactic factors. Branigan et al also acknowledge that their results do not make it possible to decide whether priming takes place on the basis of a single rule, a set of rules or a set of rules applied in a specific order. They interpreted that, given that the study found evidence for pure syntactic priming, it still does not make it possible to decide between principle-generated and schematic syntactic structures. So in this sense it is necessary to investigate the relationship between syntactic priming and lexical structure.

2 II.

3 Syntactic Priming and Lexical Structure

Regarding the relationship between syntactic priming and lexical structure, Pickering and Branigan (1998) found that when the same verb was used in both prime and target, subjects produced 17.2% more same type target prime completions than target completions that were of the alternative type to the prime. This percentage dropped to 4.4 % when the sentences had different verbs. Priming with different verbs was stronger only when two priming sentences were used before each target sentence. However, the study did not control for thematic structure, so it is not sure that the priming effect was purely syntactic. Since a) thematic structure might be encoded in the lexical entry of a verb; and b) a stronger priming effect was found when the verb was repeated, it is likely that the effect was largely thematic. The authors also acknowledge that their results do not distinguish between syntactic rules and sub categorization frames. Assuming that sub categorization frames are fixed schemata, the results are ambiguous between rule-generated and schematic syntactic structures.

Cuetos, Mitchell and Corley (1996) made a study which provided evidence for long-term syntactic priming. Two groups of Spanish seven-year olds participated in the study and were asked to read, over a two week period, stories containing sentences which were biased towards a high attachment or low attachment relative clause interpretation. For instance, in the sentence the daughter of the colonel with the limp, the relative clause with the limp can be attached to the noun phrase headed by the daughter (high attachment) or to the colonel (low attachment). Two weeks later, the children received no materials concerned with the study for a week, after which they were tested for attachment preference. It was found that the children exposed to high attachment bias materials tended to prefer high over low attachment relative to their pre-test performance. No effect of the intervention was found for the children given the low attachment biased materials however. This result was explained by saying that, while the study was under way, the children were exposed to materials with a high attachment bias (a high attachment preference in Spanish had been established in an earlier study). If priming is a long-term effect, then it cannot be explained in terms of the temporary raising of activation in a procedure. It seems more plausible to suggests that exposure to a certain structure leads to a long-term change in the language processing system in a manner akin to learning. Their last study suggests that syntactic priming is a form of learning.

Cuetos et al.'s findings seem to provide support for the authors' tuning hypothesis. According to this hypothesis, parsing preferences reflect the statistical regularities found in natural language. If tuning can be equated with priming, then priming can be described as a kind of statistically driven learning, as suggested by Bock, Dell, Griffin, Chang and Ferreira (1996). Bock et al. (1996) found an effect of priming even when ten unrelated sentences intervened between prime and target. It was concluded that:

The persistence of structural priming over 10 unrelated sentences drives home the point that these effects are not transient, and cannot be attributed to a momentary change of activation. We need to consider an alternative mechanism for the priming effect, one that entails a more persistent change in the processing system (8).

Based on this, the authors propose the following account of priming:

[...] Structural priming can be seen as a dynamic vestige of the process of learning to perform language. We call this process "learning to talk", in a very literal sense. It is not learning language, but learning to produce it. So "learning to talk" is learning procedures for efficiently formulating and producing utterances. What structural priming shows is that these procedures undergo fine-tuning in every episode of language production (11).

Not truly as the expectation that syntactic priming would provide evidence for phrase structure rules, research on long-term memory for surface form provided evidence which is more consistent with the experience-based approach, which takes language exposure is vital to language comprehension. Taken together, the work on long-term memory for sentences shows that previous sentence comprehension episodes can influence subsequent sentence comprehension. Therefore it appears that sentence comprehension makes use of long-term sentence memory. This possibility also allows for individual differences in grammatical knowledge to arise from individual differences in linguistic experience. Research on such differences is reviewed in the next section. The review is focused on comprehending self-embedded sentences.

4 III. Comprehension of Self-Embedded Sentences

It is important to point out why experiments were carried out to study the comprehension of selfembedded sentences. As we know, Chomsky (1965) considered the principle-based approach can give a good account for the creativity of self-embedded sentences. However, such account was criticized by experience-based approach and related evidence for phrase structure did not constitute evidence for the principle-based approach, since such evidence could be explained just as well in terms of the experiencebased approach. This observation was made quite early on by **??**iller (1962), who noted an effect of grammatical structure on sentence comprehension 'does not show that some form of grammatical structure must be preferred to, say, a Markovian structure of the sort that communication theorists talk about.' (754). Similarly, after Miller and Isard (1963) found effects of grammar on sentence comprehension, they stated that, 'It is not possible to discredit [the] Markovian model in terms of our present data.' (224). It was suggested in both studies that the only way to discriminate between probabilistic and principle-based accounts of sentence comprehension was to investigate the comprehension of self-embedded sentences: experience-based models like that of Hockett (1955) indicate that subjects should not

be able to comprehend such sentences, while Chomsky's principle-based theory indicates that subjects should be able to comprehend them.

To clarify this, Miller and Isard carried out two experiments. In the first informal experiment, they found that subjects did not treat self-embedded sentences as normal sentences. Firstly, when asked to repeat the sentences, subjects repeated them with list intonation. Secondly, subjects could only recall about seven words from the sentences, suggesting that they were treating the sentences as lists of words. A third result was that subjects needed to be presented with each selfembedded sentence two or three times before they could understand it. This study therefore indicated that center-embedded constructions are harder to comprehend than normal sentences. However, Miller did not explain these results, in spite of the fact that it his original aim to distinguish between principle-based and probabilistic finite state accounts.

The difficulty of self-embedded sentences relative to non-self-embedded sentences is the primary evidence for a finite state model. This is because the finite state model depicts humans as weakly productive. Given the rarity of self-embedded sentences in natural discourse, difficulties in comprehending them can simply be attributed to insufficient experience with such structures. It is not clear, however, why subjects should have been able to understand the sentences after several presentations. It is supposed that there might be some inductive process going on. The problem for Hockett's model is that it does not possess a mechanism for inductive reasoning. Hockett himself did believe that self-embedded sentences could be understood through induction, and it might be assumed that he simply could not find a way to incorporate this capability into his model. Syntactic priming effects in comprehension were supported with event-related potentials (ERP) evidence (e.g. Ledoux et al, 2007). These effects were observed to be dissociable from effects of the repetition of verbs across prime and target sentences. Repetition of syntactic form may result in changes in the electrophysiological response associated with a facilitation of syntactic analysis. Thus, it is reasonable that comprehension changes of verbs in self-embedded sentences that followed reduced relative prime sentences might be at least partially localized to changes in the representation of syntactic information at the verbs.

Arai and Mazuka (2014) tested priming phenomena in adult Japanese participants. The results showed adults relative to children had stronger priming. Furthermore language users with greater linguistic competence of the passives showed stronger priming, suggesting a tight relationship between the effect of priming and the development of grammatical competence. In addition, they found that priming effect decreased over time. It is logic that second language complex sentence comprehension is affected by priming effect, and such effect is correlated with second language grammatical competence.

IV.

5 Conclusion

The paper examines syntactic priming effect in language acquisition; it shows that the syntactic priming effects are clearly seen in sentence comprehension, especially in complex second sentence comprehension. Priming effect is correlated with grammatical knowledge, strong priming effect can be observed obviously in self- [1]

Figure 1: The

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