

# A Study on the Bilingual's Cognitive Mechanism of Code Switching

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**Abstract.** Bilingual switching refers to a process turning one language into another, including bilingual generating and understanding, and the two kinds of processing mechanisms are different. In conversation and communication, bilingual speakers often use two different languages in order to adapt to different conversation scenarios or to express their thoughts and intentions more clearly. At present, the research on the switching costs and characteristics of the bilingual understanding layer have not been agreed. Based on the author's teaching and practice experience, this paper first analyzed the code switching cost and its characteristics, and then discussed the cognitive mechanism of code switching.

## Introduction

The bilingual code switching mechanism is an important problem in the study of bilingual. It is found that, the time processing mixed language is longer and the error rate is higher compared with the single language series in the code switching. This difference between the two performance is called code switching cost. The switching cost is independent of the specific task, because the researchers found the switching cost in the digital naming, picture naming and other tasks. Previous studies have found that the skilled language generates greater switching costs than the unskilled language. So, what is the mode of switching costs in the process of language comprehension? This is the main concern of this study.

## Code Switching Cost and Its Characteristics

Bilingual proficiency is one of the important factors influencing the bilingual switching, and the current study is based on the different levels of bilingual proficiency. Bilingual switching cost asymmetry refers to the switching time is longer and the error rate is higher. There is no cost asymmetry between bilingual switching costs for skilled bilingual speakers, but the bilingual switching costs for unskilled bilingual people is more obvious, which has been demonstrated in both behavioral and EEG studies. Kroll used the start paradigm, and he is required to complete a different level of proficiency in language translation. Qi Zhiqiang used the true and false words to judge the non proficient bilingual person to carry on the switch research. The results of the two experiment showed that the switching costs of non proficient bilingual speakers are asymmetric. In the study of EEG, Chauncey and other selected English and French bilingual to study on brain

related potentials of priming paradigm. The results were found in N250 and N400 components, the Bifaying transcoding caused a bigger amplitude of transcoding. Chen Junhong, Wang Huili found that there are significant differences between Chinese and English transcoding and Chinese English transcoding in the 150 ~ 180ms (N150) and 260ms (P300) (240ms) components, and the average amplitude of transcoding is significantly larger than that of Chinese English transcoding. The researchers believe that the two language processing of English and Chinese bilingual speakers will continue to be subject to interference, and the second language proficiency and conflict resolution skills has a positive correlation, if the second language proficiency is small, the ability to activate and resolve conflicts is weaker, and the amplitude and activation area are smaller. Sheng Ruixin and others believe whether the Chinese or Uighur as primes, the priming stimulus has a significant effect on the target stimulus identification, and the phenomenon of switching costs asymmetry between the two languages is close to disappear. Brys baert used the Dutch, French words and pseudo words to start experiment for skilled Heying bilinguals and monolinguals. The results showed that there was no significant difference in the cross language priming response, that is, there was no asymmetry in switching costs.

### The Cognitive Mechanism of Code Switching

**Switching cost comes from the internal factors of the mental lexicon.** Studies have indicated that the switching costs of the bilingual may come from the interaction of the internal components of the mental lexicon. Grainge used the lexical decision task to study the switching costs of English - Chinese bilingual speakers. In the first experiment, he controlled the English and French words presented in the experiment. For each English words, which are similar to the words in French, they are spelled according to the rules of the shape of the French pronunciation. Again, for each French words which are similar to English words, they are spelled according to the rules of English pronunciation and pronunciation. It was found that there was a switching cost between the English and Chinese words. In the second experiment, he chose English words with language specific some form, namely the words in a language form, and its similar words do not exist in another language. It was found that the cost of language switching disappeared. The author believes that it is the morphological changes that led to the disappearance of switching cost in the second experiment, so the switching cost comes from the mutual inhibition between the two languages in the mental lexicon. But Thomas' research does not support this view. They believe in Grainger's second Experiment, words with specific words are true words, the subjects in the experiment, will soon find this feature, and the corresponding strategies are formed to help complete the task, which leads to the reaction time becomes fast, and the switching cost is lost. To this end, Thomas has added some form specific pseudo words in the experiment in order to prevent the formation of the test strategy. The results showed that the switching costs still exist, does not disappear with the specific form. Therefore, the researchers believe that the switching costs of the bilingual speakers are not caused by the internal factors of the mental lexicon.

**The switching cost comes from the external factors of the mental lexicon.** So where is the cost of switching from? Green put forward the idea of language task schema. In the use of language, in order to avoid the confusion of the two languages, the bilingual needs to establish the corresponding language task schema. The schema is independent of the mental lexicon system and is responsible for monitoring and organizing the process of individual lexical access and response execution. In the output of the target language, the bilingual need s to suppress the task schema of the non target language to ensure that it will not be disturbed by the non target language. When the bilingual switches to another language, the previously suppressed task schema needs to be restored

to the active state, which leads to the switching cost. Other studies suggest that switching costs may be closely related to the central executive control mechanism. For example, Munoz compares the language switching mode coming from four bilingual aphasia caused by left brain vascular injury and four normal bilinguals. Compared with normal people, patients with aphasia showed higher frequency of language switching mode. Patients seem to consciously rely on the interaction between the two languages to make up for the inadequacy of language functions. This suggests that language switching appears to be independent of another mechanism of language function. Hernandez found that with age, the switching costs of the bilingual would increase accordingly. He believes that the reason is that the central executive control ability of individuals decreased with age, which leads to an increased switching costs. That is to say, the switching process is closely related to the central executive control mechanism of the brain. Green argues that switching costs come from the suppression of the non target language task schema before switching. Hernandez believes that the switch mechanism is closely related to the central executive control mechanism. So whether the two are consistent? Central executive control mechanism is the core of working memory, and it is responsible for the contact among the phonological loop in working memory, visual spatial Sketchpad and episodic buffer, as well as the relation between the subsystems and the long time memory. Green has proposed that language task schema can be generated by the execution control system of working memory. Therefore, the two views do not conflict, so it can be said that the analysis of Green focuses on the specific processing process of code switching, and Hernandez's analysis focuses on a more general cognitive control mechanism.

**Asymmetry of switching cost.** Further study found that the switching costs of the two languages are asymmetric. Meuter uses the digital naming task to investigate the code switching in the process of bilingual language generation. It was found that the switching from the second language to the native language showed a greater switching cost than the switching from the native language to the second language. According to the theory of language task schema, it is believed that the bilingual person will be subjected to the strong interference of the language when they are not proficient in the language. Therefore, it is necessary to make a greater effort to suppress the task schema of the skilled language to ensure the generation of non proficient language. On the contrary, in the production of skilled language, the interference of non fluent language is much smaller, so the suppression of the task schema is much smaller, which has resulted in a skilled language is more costly to switch than the unskilled. At present, the internal factor theory of mental lexicon has not explained the asymmetry phenomenon. It is found that with the improvement of the second language proficiency, the asymmetry of the switching costs will disappear. Costa used a picture naming task to compare the code switching process of the bilingual person with a low level of proficiency in second languages and the bilingual person with a high degree of proficiency in second languages. It is found that the switching cost of the former is asymmetric, that is, the switching cost of the mother tongue is larger than that of the second language, and the switching cost of the latter is not asymmetric. In the experiment, he further found for the bilingual person with a high degree of proficiency in second languages, the switching cost between the mother tongue and the third language has no asymmetrical. Recently Costa has found that for the bilingual person with a high degree of proficiency in second languages, the switching cost is not affected by the symmetric similarity, and when the language switching process includes the language they are very not skilled, it will once again show the asymmetry.

## Conclusion and Expectation

Behavioral studies have indicated that there is a switching cost for bilingual language switching,

and the switching mechanism is closely related to the central executive control mechanism, but the current research is still not enough, the future research needs to pay attention to the following two questions. (1) Bilingual code switching includes two different processes of language comprehension and language production, and there may be significant differences in the cognitive processes and neural mechanisms. (2) Compared with the behavioral level, the study of the neural mechanism of the bilingual switching is just beginning, therefore, this aspect needs to be further studied.

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