

A Review of Studies on Bilingual Children's Word Awareness Development*

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Bilingual children's word awareness can reflect the impact of bilingualism on language cognition from the aspect of psycholinguistics. The current studies on bilingual children's word awareness both at home and abroad show that there exist quite opposite points of views: bilingual disadvantage and bilingual advantage. The interpretation mechanisms of interference effect, word frequency, and mutual exclusivity constraint are used to support the bilingual disadvantage; while the interpretation mechanisms of bilingual advantage include sound coding, short-term memory, and inhibitory control. In effect, there is no negative impact of bilingualism on children's word awareness, and the so-called negative effects only exist on the theoretical aspect of research. The development of children's word awareness is influenced by many factors including age of acquisition, learning environment, and bilingual proficiency, etc.

Keywords: bilingual children, word awareness, language cognition, interpretation mechanism

Through reviewing the related studies on bilingual children's word awareness development, the current study is going to analyze the negative and positive influence of bilingualism on children's word awareness, and tries to offer some observations on New English Curriculum for Chinese Primary Schools issued by Ministry of Education of the People's Republic of China in 2011.

Word Awareness Disadvantage

Many words task tests have confirmed the bilingual word awareness disadvantage. For example, in the picture naming task, bilinguals named slowly and with high error rate. In the verbal fluency test, the phenomenon of tip-of-the-tongue is more obvious among bilinguals (Gollan & Silverberg, 2001). Even in the tests in bilingual's dominant language, bilinguals have high failure rate in the words extraction (Gollan, & Acenas, 2004). In the language producing tasks, bilingual underperformed the monolingual in their dominant language. In language proficiency tasks, namely participants are asked to produce as more words in the same semantic category as possible in a limited time, or to produce words with the same initial letter, bilinguals produce fewer

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words than monolinguals the same age (Gollan, Montoya, & Werner, 2002). Aiming at the above disadvantages of bilinguals in word awareness testing tasks, researchers have proposed many interpretation mechanisms.

Interference Effects

Besides the shorter duration of exposing to any one of the two languages and low frequency of word output, Gollan, Montoya, Cera, and Sandoval (2008) attributed the disadvantage of word output to the following: the interference produced by the competition between the two languages in the control process. Take picture naming task for example, as bilinguals can name a picture with two types of languages simultaneously when they are looking at a picture, both the speech code and orthographic code of the two languages will be activated. Making a response by selecting the target word from the two optional objects, cross-linguistic interference is thus produced. Moreover, it is often difficult for bilinguals to inhibit the target word from being activated in such a case.

Interference effect is bidirectional. On the one hand, cross-linguistic interference means that the activation of the first language interferes with the processing of the second language. Lee and Williams (2001) find in the bilingual picture naming experiment that, if the two pictures share a similar priming effect, to name a picture in first language, correspondingly, will slow down naming the picture in the second language. The picture naming task among Dutch/English proficient bilinguals (Hermans, Bongaerts, De Bot, & Schreuder, 1998) also shows that, if the sounds of the target words were similar to those in the first language, the picture naming performance in second language would be slowed down. On the other hand, second language may cause interference on first language, but compared to the interference caused by the first language on the second language, it is weaker. Only in such tasks that the second language is fully activated, the second language is likely to interfere with the first language, otherwise the interference will be very limited (Jared & Kroll, 2011). What is more, interference effect not only exists in the same language, ZHAO (2007) finds in an auditory model research that there even is an interaction between Chinese and English at the phonological level.

However, studies also find there are differences in duration and error rate between Chinese priming English and English priming Chinese among Chinese-English bilinguals, which means that orthographic property of an alphabetic system has a significant effect on sound priming. The intensity of bilingual interference effect in Chinese-English bilinguals' word learning is to be evaluated. At the same time, the interference effect is questioned by the theory of facilitation effect of words translatability. Facilitation effect of translatability (Gollan, Rosa, & Chrisine, 2005) means although the both languages of a bilingual will be activated in the course of words extraction, interference is not necessarily produced, while facilitation effect may be generated. For example, in the picture naming task, when supplemented by equivalence interference of written translation on the picture, bilinguals will speed up picture names. Although translation equivalences are the real stimulus, and will certainly generate strong cross-language competition, they can still promote the speed and accuracy of picture naming. In addition, through the implicit control of bilingual activation, facilitation effect can also be produced. Take high translatable words (bilinguals' known words shared by two languages) and low translatable words (bilinguals' known words only in their dominant language) for example, bilinguals can name the translatable words significantly faster and with higher accuracy (Gollan & Acenas, 2004). The reasons are as follows: High translatable words have higher frequency than that of low translatable words; high translatable words are generally familiar names of pictures with shorter syllables (Gollan, Rosa, & Christine, 2005). For high

translatable target words, each picture will be able to activate two word representations, while the lower translatable target words corresponded pictures can only activate the target word representation. Although both word representations have been activated, there is no selective competition. On the contrary, the activation of the non-target word representations helps to maintain the semantic node for the target words, thus facilitation effect is generated. At the level of word concept processing, there is no difference between bilingual and monolingual performance; but at the level of word processing, the number of words bilinguals needs to process is twice as many words as the word representation, so bilinguals will perform worse than monolinguals.

Word Frequency Effects

Word frequency effect refers to the weak link of the lexical semantics and sounds, which is attributed to less exposure to words in mental lexicon and low frequency of word processing. Compared with monolinguals who employ only one certain language, bilinguals employ two languages simultaneously, so word frequency is the key factor which influences word acquisition, word representation, and the structure of mental lexicon. Recently, many behavior studies on bilingual high frequency and low frequency words reveal that there is an obvious effect of word frequency in word acquisition; there is significant word frequency effect even in picture naming task in bilinguals' dominant language. It also shows that, bilinguals in essence are not as proficient and fluent as monolinguals (Gollan, Montoya, & Notestine, 2005; Gollan, Montoya, Cera, & Sandoval, 2008; Gollan, Slattery, Goldenberg, Van Assche, Duyck, & Rayner, 2011).

Word frequency effect also leads to the phenomenon that it is more difficult for bilingual children to extract word presentation in their weaker language than in their dominant language (Francis, Augustini, & Sáenz, 2003). Many researchers also find in the visual lexical decision task that, the word response latency is longer in early bilinguals than in monolinguals; there is significant word frequency effect between the late bilinguals' weaker language and dominant language; but there is no word frequency effect between bilinguals' dominant language and monolinguals' native language (Lehtonen, Niska, Wande, Niemi, & Laine, 2006; Duyck, 2008).

However, there are still some questions in word frequency effect. Morton (1970) takes word frequency effect as a gradual process of language learning. As the degree of a term being activated will be gradually strengthened by frequent language contact, word frequency effect will be weakened over time instead. However, some experiments (Ivanova & Costa, 2008) find that, word frequency effect remains in spite of stimulants being repeated many times. Murray and Forster (2004) argue that the repetition effect in word recognition is just based on some experiments with the stimulus terms repeated, while a small amount of word repetitions will not affect word processing duration, instead, word repetition effect reflects the change of familiarity, which comes from the discontinuous memory trace generated by recent exposure to the stimulants.

Mutual Exclusivity Constraint

Mutual exclusivity constraint means, under the circumstance of semantic vagueness, young children generally follow the principle that the name of an object is mutually exclusive, namely, an object has only one name. The basis of this principle is: The basic concepts of class are often mutually exclusive (Baldwin, 1992). For example, a single object cannot be named as "cat" and "dog" at the same time. That is the reason why monolingual children often make the wrong judgment in classification and interpretation task.

Accordingly, multilanguage learning may influence children's application of mutual exclusivity constraint. Although it has been proved that bilingual and monolingual adults do not differ in the application of mutual exclusivity constraint, bilingual and monolingual children are quite different in the principles of language learning. In order to acquire the name of an object in both languages, bilingual children have to master a set of principles which are consistent with multiple words referring to the same item, and suspend the principle of mutual exclusivity constraint (Davidson & Tell, 2005; Au & Glusman, 1990). With the increasing exposure to bilinguals and the growth of age, bilingual children are less dependent on mutual exclusivity constraint than monolingual children. Of course, others believe that bilingual children aged 5–6 are not as good as the monolingual children at mutual exclusivity constraint, but this does not mean that bilingual children do not use mutual exclusivity constraint (Davidson, Jergovic, Imami, & Theodos, 1997). The mutual exclusivity constraint of word learning in fact should be considered as a default choice, and the probable tendency appears in bilingual children's experiments can be ignored (Markman, 1992). What is more, some experiments find that bilingual and monolingual adults are quite similar in applying mutual exclusivity constraint in the same language (Au & Glusman, 1999). This may be due to the fact that bilingual adults have a stronger ability of separating the two languages which they have acquired than that of children (Au & Glusman, 1999).

For bilingual children, the suspension of mutual exclusivity constraint has both advantages and disadvantages. On the one hand, bilingual children are more flexible in word learning. They can interpret an item in a way of either the whole object or a part of the object, so the flexibility is not only beneficial to word learning but also can be extended to learning others (Davidson & Tell, 2005). On the other hand, bilingual children's word learning process will be more difficult due to the lack of facilitation of mutual exclusivity constraint.

Word Awareness Advantages

Bilingual disadvantages shown in language task are generally considered coming from the bilingualism itself. But taking vocabulary size as the variable, the difference between bilingual and monolingual disappears (Bialystok, Craik, & Luka, 2008; Fernandes, Craik, Bialystok, & Kreuger, 2007). Thus, although bilingual study may lead to vocabulary decrease, the bilingual disadvantage in language testing is not originated from bilingualism. Bialystok and Feng (2009) once again proved the important role of vocabulary in language execution and memory in their experiment of words recall. The vocabulary size is controlled in this experiment, and bilinguals show greater attentional control to words in short-term memory. Except for less vocabulary, the bilinguals in this experiment outperformed the monolinguals in other language memory tasks. The bilinguals even can take the advantage of attentional control to assist in memorizing difficult language tasks.

Sound Encoding

Early experience of two phonological systems can improve the ability of bilinguals learning new sound messages. Bilingual babies can first benefit from the parents' different language input as the detection experience of two different kinds of sound symbols can strengthen the ability of analyzing the language input. Actually, babies are able to observe not only the systematic co-occurrence of some of the characteristics in two languages, but also the obviously inconsistent sounds, and store them in two different files respectively. Therefore, early exposure to two languages can improve children's early perception in the first language cognition. Early bilingualism may help babies store some hints of inconsistent rhythms, or even some regular replacements of

variable sounds, which can improve their ability of sound recognition and make their maturity of language recognition ability advanced, accordingly, improving their ability of acquiring new sound forms (Bialystok, Majumder, & Martin, 2003).

Kaushanskaya and Viorica (2009) found in a comparative study that different types of bilinguals and monolinguals, including different types of languages, different ages of bilingual acquisition, and different bilingual environment, etc., all have word awareness advantages. Word awareness of bilingual children's is not affected by the language types and age of acquisition, and any early learning experience of the two different phonological systems can promote the follow-up sound learning. The formation of word awareness is a process of information processing, namely, sound information is encoded, stored, and extracted in the process. The reasons why bilinguals can encode unfamiliar sounds more efficiently are as follows: One is that bilingual phonological system is more inclusive, which prepares bilinguals to decode unfamiliar sounds. The other is that early exposure to two different phonological systems can delay the beginning of the specific sound system adjustment (Bosch, Van Hell, & Mahn, 1997). Generally in a year or so, young children's phonological ability begins to language specified. However, children of 20 months with even limited exposure to another language show the flexibility of word learning (Bijeljac-Babic, Nassurally, Havy, & Nazzi, 2009).

Short Term Memory

The formation of word awareness is directly related to short-term memory, especially sound working memory capacity. Language short-term memory ability can restrict the development of the individual words awareness, as short-term memory system is the basis of creating long-term words representation (Baddeley, Gathercole, & Papagno, 1998; Gathercole, 2006) and the quality of short-term sound representation of a new word determines the formation of stable, long-term sound representation (Gupta, 2003; Burgess & Hitch, 2005). Short-term memory effect on vocabulary learning has been confirmed by many empirical studies (Michas & Henry, 1994; Mosse & Jarrold, 2008; Gupta, 2003; Jarrold, Thron, & Stephens, 2009). Especially, Jarrold finds that when the short-term memory of the patients with down syndrome is impaired, their language form will be damaged, too. In short, the development of word awareness and the increase of vocabulary will directly lead to the development of phonological awareness; the gradually developed phonological awareness contributes the obvious relationship between short-term memory and novel words learning (Bowey, 1996). With the development of word awareness and the growth of the knowledge about acceptive words, sound representation will become more specific and precise. Moreover, it will be more effective to represent an item with a limited number of ordinary phonemes than to represent the phonological structure of each word respectively (Metsala & Walley, 1998).

Bilingualism can promote the formation and development of short-term memory ability. On the one hand, the cognitive requirement of foreign vocabulary acquisition can improve sound memory ability; on the other hand, the acquisition of novel words benefits from the previously existing vocabulary knowledge. Because there are more alternative terms, bilinguals can effectively select and produce sound patterns similar to that of the novel words (Gathercole, Willis, & Baddeley, 1991).

Kaushanskaya Marian's (2009) digit-span task seems to deny the relationship between bilingual novel word learning advantage and sound memory. But because there is not a detailed introduction to the process of

digit-span test, it is difficult to speculate the reasons. There is a problem of control in test process or the results of digit-span test cannot fully reflect a person's sound memory ability.

Inhibitory Control

Inhibitory control is an important cognitive ability of bilingual children which is to inhibit the interferential prepotent response in order to achieve a special goal. It is consistent with the bilingual feature that multiple words refer to the same referent. The bilingual children's suspension of inhibitory control in whole object naming task shows that there maybe other different and more flexible ways of processing in their language learning.

The representation analysis and the development of attentional control of early bilingual children's are different from that of monolingual children. First of all, compared with the link of a particular word and its meaning, the link between the words from the two languages is at a higher and more abstract level, so encoding, decoding and associating words from two languages with a common concept need much more advanced representing ability. Secondly, while bilinguals are paying attention to a set of symbols, they have to ignore meaningful symbols from another language. It is constantly focusing on one language and ignoring another language, or selectively paying attention to proper cues and inhibiting other clues, habitually inhibiting words from one language and choosing the target word that give rise to bilinguals' greater abilities to resist interference and extracting information. At the same time, in the process of bilingual learning, bilinguals have to pick up appropriate and correct language and constantly shift codes in specific situations in the face of a particular speaker, thus, the flexibility of accomplishing various cognitive tasks is developed.

Bialystok and Martin (2004) elaborated in detail that bilingualism can promote the development of children's inhibitory control ability in an experiment. As bilinguals' language representations coexist, one of the languages must often be inhibited in order to prevent the invasion; such early similar experiences have influence on children. Kroll and De Groot (1997) explained that bilinguals share a concept storage, causing one-to-many or many-to-one mapping modes between words and concepts. Hence bilinguals focus more on linguistic forms, and the language representations are clearer to them, so they are more able to resist the irrelevant influence. That is why bilinguals have stronger cognitive flexibility and sharpness in elective attention, resulting in fast extracting the target items. Bialystok, Craik, and Luka (2008) explored the impact of vocabulary size and executive control on word extraction among proficient bilinguals, low-proficient bilinguals, and monolinguals on a larger scale, and confirmed that bilingual effect is associated with vocabulary size; bilingualism can strengthen the executive processing ability; bilinguals' disadvantage of small vocabulary size can be offset by their advantage of stronger executive control ability.

Conclusion

Influence of the bilingual learning on children's word awareness development has always been the focus of academic circles. Studies both in domestic and abroad put forward different interpretation mechanism to word awareness disadvantages and advantages. However, the interpretation and analysis of bilingual effect find that, there is no negative effect on children's word awareness, in other words, these so-called negative effects only exist on the theoretical aspect of research. It has reached a consensus that bilingualism acts as a positive role in the development of children's cognitive processing control ability and the ability of selective attention. This

literature review will open a new window for a better interpretation of the impact of bilingualism on children's language and cognitive development.

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