Effects of Age of Acquisition on the Locus of Language Selection in Bilingual Speech Production

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study explores the locus of language selection during bilingual speech production. More specifically, it investigates whether age of acquisition has any effect on language selectivity and how competition is resolved between languages existing in the mind of a bilingual. For example, when an Urdu-English bilingual is asked to name a picture of a dog in English, at what point does his mind select English and not Urdu as the production language? Two different theories regarding language selection phenomenon are presented: Green's Inhibitory Control (IC) Model (1986; 1998) and The Concept Selection Hypothesis (La Heij, 2004). Costa and Santesteban (2004) have proposed that both the theories may be correct but may be dependent on proficiency level of the bilingual. They proposed that the IC Model and the Concept Selection Hypothesis can only depict lexical processing of bilinguals with low and high proficiency levels, respectively.

This study reaffirms Costa's and Santesteban's claim and investigates whether factors like age of acquisition affect the loci of language selection and competition, in addition to proficiency? In this study, early and late language acquirers participated in two language processing tasks. The first experiment was a word translation task in which participants translated words in their second language (L2) to their mother language (L1). Along with each target word was a distracter item in the form of a picture or word that was semantically related or unrelated to the target. Experiment 2 was a picture naming task in which participants were asked to switch back and forth between their two languages. The results suggest that age of acquisition does not affect the loci of language selection and competition during lexical processing. However, clear evidences were observed in the data that strengthened the belief in which L2 proficiency is a deciding factor in selecting the locus of language selection.

CHAPTER 1

1. INTRODUCTION AND BACKGROUND

When monolingual speakers of English or Urdu want to verbalize a particular concept (even as simple as naming a picture), it appears to be a very easy task. The speakers straight away say the right word. However, this task is cognitively very complicated in nature. For many years, psycholinguists have been working on the cognitive processes involved in speech production (i.e., going from concept to a verbalized word). One experimental design that instigates us for investigation of this process is picture naming. These experiments help researchers to predict that how the appropriate word is selected to be produced from a set of closely related alternatives. For example, when a picture of a desert is presented, how does an Urdu monolingual choose between the words 'regestan' and 'sehraa', both perfectly acceptable names for the object. How competition between words in the lexicon is resolved is the main concern for psycholinguists. Studies in speech production and lexical processing in the monolingual setup have created interest in the area of bilingualism. Basically, in the monolingual mind it is uncommon that one concept can refer to two or more words (as was seen in the above 'regestan-sehraa' example). Indeed, most concepts such as "kaghaz (paper)", "kambl (blanket)" and "qalm (pen)" only have one word to describe them. However, when we consider the bilingual case, most concepts will have more than one lexical item in the form of a translation equivalent. For example, if one were to show a picture of a cat to a speaker of Urdu and English, both the words "billi" and "cat" would become activated in his mind. This is a difficulty which bilinguals are constantly facing. Competition not only exists within the same language as is seen in the

monolingual case but it is even more prominent between languages of a bilingual speaker. Hence, the latter possibly is more challenging because now, the bilingual not only has to resolve competition that subsists between the two candidates (billi and cat) but also has to produce the word in the required language. Although bilinguals face this problem, they are however able to correctly speak in only one language and switch back and forth between both languages automatically. This proposes that there is some system that helps the bilingual mind to resolve the competition that may be present and eventually select the suitable lexical item for production.

This introductory chapter will briefly discuss two theories and models that have tried to explain how bilinguals are able to modulate competition and finally select and produce the proper word during speech production. Specially, it will discuss a primary research question regarding the age of acquisition and locus of selection: At what point of the speech production process is the target language selected and competition resolved? This chapter will have the following arrangement. First, it will be important to discuss the basic supposition of how speech production occurs in monolinguals because monolingual models have set the basis for studies in bilingualism. Second, this research will be extended towards bilingual speech production. Finally, there will be a discussion regarding how different these processes are depending on the language background and history of the bilingual. This latter section determines that the two theories discussed in this research have been empirically supported by bilingual participants that may not effectively represent the actuality of bilingualism in the Pakistan.

2. Monolingual Speech Production

The most quoted and significant model explaining how speech production in monolinguals proceeds has been put forth by Levelt (1989). His original "blueprint of the speaker," Levelt divides speech production into four steps: 1) message generation; 2) grammatical encoding; 3) phonological encoding; and 4) articulation. These four steps occur over three independent processing components: 1) the conceptualizer; 2) the formulator; and the 3) articulator.

Levelt's "blueprint of the speaker" can be described with an example. Let's imagine that we show a picture of a cat to a monolingual Urdu speaker. According to Levelt's model, the picture would activate the suitable concept (in the conceptualizer component). In the formulator, once this concept has been recognized, activation will be sent to the lexical level, where a group of related words 'kutta' (dog), 'chooha' (mouse), 'parinda'" (bird), etc.) becomes activated. Lexical selection takes place at that point, meaning that the word "billi" is chosen for production. This lexical item is then selected for production, phonetically encoded and spoken (articulator).

2.1 Discrete and Cascaded Models

Levelt's model is considered to be a discrete model. A discrete model is one in which activation from the lexical level is only sent to the phonological elements of the target word. Activation occurs when certain linguistic features (semantic, lexical, and phonological) are triggered because of other linguistic cues. In a discrete model, activation sent from the target word does not spread itself to activate the phonology of the words 'kutta' (dog), 'chooha' (mouse), 'parinda' (bird), etc.

In contrast to Levelt's discrete-type model, cascaded models have been put forward in which activation moves more freely throughout the conceptual, lexical, and phonological levels in a language non-selective manner (Dell, 1986; Starreveld & La Heij, 1995, 1996; Caramazza, 1997; Rapp & Goldrick, 2000; Navarrete & Costa, 2005). In cascaded models, any lexical items that have received activation from the target concept will spread activation to their respective phonology. Thus in our example in which an Urdu-English bilingual must name a picture of a cat in Urdu, the phonology of the related words and their translation equivalents (kutta (dog), chooha (mouse), parinda (bird), etc.) in addition to the phonology of the words "billi" and "cat" will all receive activation.

Both the discrete and cascaded models conceive different predictions of how activation moves through each level of lexical processing. These models have put forth the basic theoretical contributions for models of bilingual speech production. One main difference between speech production of monolinguals and bilinguals is that bilinguals must also select the suitable language in which to produce the word. To some extent, this is similar to the monolingual case in which they have to decide in what register of language to speak. For example, an Urdu speaker will probably not approach his medical doctor and speak in the same way that he would speak with his best friends. This, however, is to some extent different than the bilingual case that includes competition not only within the target language but also between languages.

Most of the research in bilingual speech production has focused, therefore, not only on the competition that occurs between activated lexical items but also on the locus of selection—at what point during the speech production process does the bilingual mind specify the target language? This is to say that in order to name a picture of a dog in Urdu,

something must point the bilingual to the word “kutta” while at the same time control the word “dog” from being selected. The next section deals with the problem that how speech production proceeds in the bilingual mind?

3. Bilingual Speech Production

Many similarities can be observed between models of monolingual speech production and current bilingual speech production models. For example, if we consider Levelt’s conceptualizer, it can be assumed that the situational or contextual information would proceed similarly in bilinguals. However, some changes had to be made to bilingual models because it was put forth that lexicon in both languages share a common conceptual system (de Groot, 1992; Kroll & Stewart, 1994; Kroll & de Groot, 1997). It means that the concept of a dog is the same in both languages but happens to be mapped on to two lexical entries (dog and kutta). Although the latter is still debatable in the field as mentioned above, it is problematic that when we show a picture of a dog to a bilingual and both the words “dog” and “kutta” receive activation from the semantic system (triggered by the picture). Moreover, a group of words (cat, billi, tiger, sher, etc.) related to the target is activated in both languages causing a control/selection problem (as shown in Figure1.1).

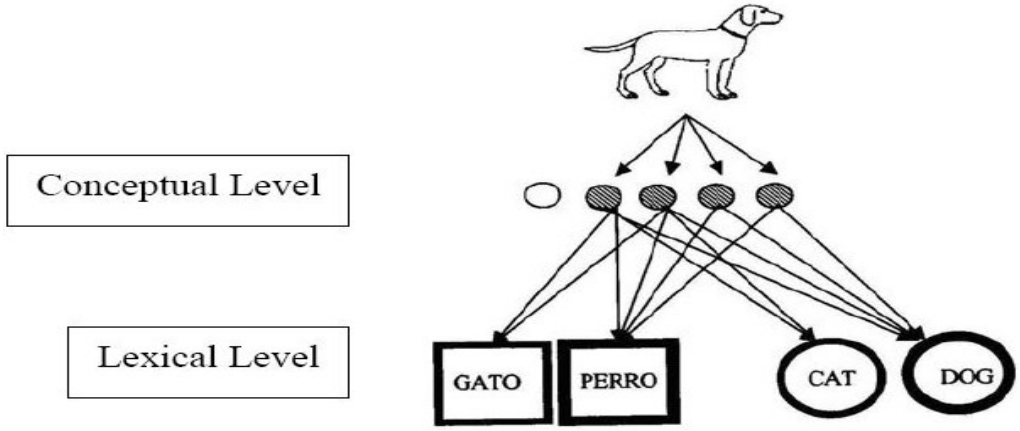

Figure 1.1. The selection/control problem in bilingual lexical selection (Costa, 2005).

Essentially the control/selection problem refers to how the appropriate word is selected and unwanted words are controlled.

Figure 1.1 elaborates the process of lexical selection at the conceptual and lexical levels during bilingual speech production. As in monolingual models, the picture of a dog will trigger certain features at the semantic level. These concepts (e.g., four-legged, furry, animal, pet, etc.) are illustrated by the darkened circles. These semantic cues work together to stimulate the suitable words which they are describing. In this case, other semantically related words (such as cat and gato(billi)) have been activated. However, with so many related words activated, a problem arises. Now the bilingual mind must process these many activated words in order to select the right word. Basically the question is: at what stage of lexical selection is the target language selected? Is there something that facilitates the selection of "dog" instead of "perro (kutta)"? What underlying processes are controlling the non-target words in the bilingual mind that help in proper selection? The control or selection problem is also known as "the hard problem." This mystery has been explained via several proposals that share the idea that lexical selection is competitive. In other words, it is presumed that there is a competition between the elements in the target language and those in the non-target language. Under this assumption, two possible solutions to this hard problem regarding the locus of selection are: 1) selection occurs at the conceptual level; or 2) selection occurs at the lexical level. In the first case, the locus of selection exists at the conceptual level by first launching the language of production. This removes competition from the non-target language words because they do not belong to the language that has already been specified for production. In the second assumption, the locus of selection exists at the lexical level and words in both languages are considered as possible contestants for

production. Competition is resolved by mechanisms of inhibition i.e., all non-target language words are suppressed.

This research will explore both of these possibilities regarding the loci of selection and competition via concept selection (La Heij, 2005) and selection by inhibition (Green, 1986; 1998). The Concept Selection Hypothesis suggests that certain important information found in the preverbal message (in particular, the language cue which specifies the target language) ensures that the activation levels of the translation equivalents are significantly lower than those of the target language word. Under this assumption, when an Urdu-English bilingual is told to name a picture of a dog in Urdu, the preverbal message will first specify the language of production (and other elements such as register and concept) and will ensure that the activation level of the word "kutta" is higher than "dog." According to this hypothesis, the locus of selection is at the conceptual level and competition is resolved by ensuring that the target language's words have higher activation levels than their non-target word equivalents.

The second theory that will be brought under discussion regarding the loci of selection and competition is selection by inhibition. Green (1986; 1998) describes this as the Inhibitory Control (IC) Model. This model suggests that the hard problem is solved by decreasing the activation levels of words in the non-target language through suppression. Here, activation from the semantic system provoked by a picture flows to the lexical level in a non-selective manner i.e., the language of production has not yet been established. Going back to the example of the Urdu-English bilingual who is told to name a picture of a dog in Urdu, the words in English that have received activation from the semantic system would be

turned off, so to speak. In this way, the target language is selected at the lexical level and competition is resolved by inhibition.

As mentioned above, both of these theories suggest that competition occurs at different levels of lexical selection. The Concept Selection Hypothesis proposes that competition and the locus of selection are at the conceptual level whereas the IC Model proposes that competition and selection occur at the lexical level. Each hypothesis suggests a different underlying process that resolves this competition and allows for the selection of the right target word as briefly described in the previous paragraphs. More details regarding both theories are explained in the next sections.

3.1 Concept Selection Hypothesis

The primary assumption of a model in which selection is controlled at the conceptual level is that the language of the target word is selected sometime before lexical retrieval (i.e., during pre-verbalization). As can be seen in Figure 1.2, which is a representation of La Heij's model, the result of the latter is that when the word is to be produced in English, although some Spanish words are also activated, only the English ones are considered in the lexical selection process. According to this model, there is no competition at the lexical level, but is present at the conceptual level (Bloem & La Heij, 2003). The language cue (La Heij, 2005) is responsible for abolishing competition at the lexical level. The language cue/signal forms part of the preverbal message and includes important information including the interlocutor, linguistic register, and language of production. The language cue ensures that activation levels of the to-be-produced words in the target language are higher than those of the non-target language.

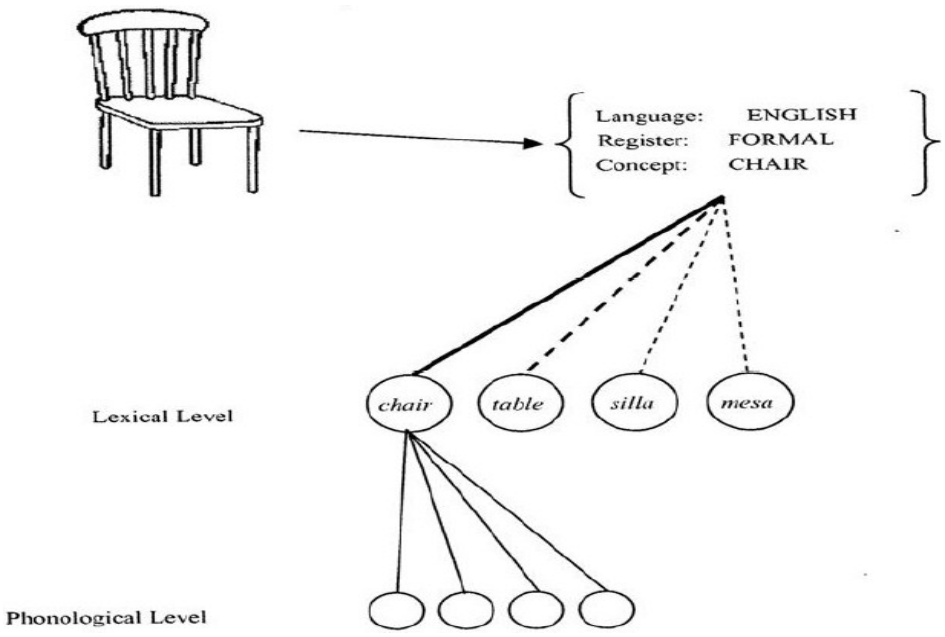

Figure 1.2. Lexical selection according to La Heij's (2005) Concept Selection Hypothesis (adapted from Finkbeiner et al., 2006a).

Let's consider Figure 1.2, an example explained by the Concept Selection Hypothesis. In this example a picture of a chair is shown to an English-Spanish bilingual who is asked to name the picture in English. Under the Concept Selection Hypothesis, the preverbal message is responsible for identifying the concept and the target language in addition to other elements as mentioned above. Consequently, the target lexical items receive more activation from the preverbal message than the non-target lexical items as represented by the darker lines. Although the non-target language's lexical nodes receive some degree of activation, the extent is much less as shown by the dotted lines. It will be easy, then, to choose the suitable word because of the large difference in activation levels: the target word will consequently receive the highest activation level and will be selected for production based on that. La Heij (2005) refers to this process as "complex access, easy selection." Finkbeiner, Gollán, and Caramazza (2006a) propose that the term "complex access, easy selection" suggests that the locus of the hard problem has been moved up to the

conceptual level and as described by the Concept Selection Hypothesis, selection of the suitable word occurs easily because of its greater activation level.

3.2 Inhibitory Control Model

The basic supposition of Green's (1986, 1998) IC Model is that the problem of lexical selection is not resolved by the conceptual level but by mechanisms of inhibitory control at the lexical level. According to this model, each lexical item includes a "language tag" that allows the words to express to which language they belong. As opposed to the Concept Selection Hypothesis, the IC Model does not assume a preverbal message that guarantees higher activation levels of the target words. According to the IC Model, lexical selection overcomes the hard problem because activated words in the non-target language are inhibited. Therefore, in IC Model, the semantic system flows equal amounts of activation to both the lexical nodes of the target and non-target language because the language of production has not yet been determined. According to IC model, lexical selection would proceed as follows: 1) the semantic system sends activation to the lexical nodes of both the languages (target and non-target); 2) based on language tags, the non-target words are inhibited; and 3) the degree of inhibition is adjusted to be proportional to the level of activation (i.e., the greater activation sent to the non-target language, the greater amount of inhibition will be required). Because of the difference in size and proficiency level of the first language (L1) and second language (L2), more suppression is applied to the L1 when the L2 is the language to be produced (i.e., more inhibition is required to "turn off" the larger system). On contrary smaller, L2 system: less inhibition is applied to the L2 when the L1 is the language of production (i.e., less inhibition is required to "turn off" the small system).