

WHY INVESTIGATE THE MULTILINGUAL LEXICON?

Multilingualism both as an individual and social phenomenon is very common in the world considering that there are approximately 5,000 languages and speakers of different languages which have contact with each other in everyday life. Some specific historical, social, economic and political factors have contributed to the development of multilingualism in recent years. Among these factors we can consider the economic difficulties of some countries that result in immigration or the economic and political power of some English speaking countries that have had important implications for the spread of English. Nowadays, it is extremely common to find individuals who can speak more than two languages.

In spite of its importance as a global phenomenon, multilingualism has not received much attention on part of researchers in linguistics, psycholinguistics and applied linguistics. For many years linguists have tried to describe and explain the way human languages work by focusing on monolingual speakers and have ignored bilingual and multilingual speakers. Bilingualism has received a lot of attention in psycholinguistics and applied linguistics in the last few decades but most researchers have not gone beyond bilingualism and have limited their theoretical proposals and empirical work to two languages. For example, most research on language acquisition focuses on first and second language acquisition. Even in cases in which the term 'second language acquisition' is said to be used for the acquisition of languages other than the first language, no distinction is made between the acquisition of a second language and additional languages (see for example Sharwood-Smith, 1994). Similarly, the extensive research on the effects of bilingualism on cognitive development devotes very little attention to the effects of bilingualism on the acquisition of additional languages.

So apart from its limited tradition of research, the study of multilingualism has not benefited from the statements made by some researchers about including situations involving the use of more than two languages as part of bilingualism (see for example Schreuder & Weltens, 1993, 3).

Furthermore, the word 'bilingualism' which includes the Latin prefix 'bi' (two), is not appropriate to refer to more than two languages. In contrast, the term 'multilingualism' encompasses not only 'bilingualism' but also additional

languages, three, four or more, and is the most appropriate term to be the cover term for phenomena involving more than one language.

The need to use the term 'multilingualism' and to conduct specific research that goes beyond bilingualism has a theoretical and empirical basis. Bilingualism is a phenomenon that may have a lot in common with multilingualism, but research on the acquisition and processing of two languages cannot explain the specific processes resulting from the interaction between the languages that may result from the simultaneous presence of more than two languages in the multilingual person's mind. Research on multilingualism is more complex than research on bilingualism. Apart from all the factors and processes involved in bilingualism, it has to take into account the implications that the knowledge of more than the first language has on the acquisition of an additional language or the multiple relationships between the different linguistic systems in language comprehension and production. Theoretical models of multilingualism (see for example Herdina & Jessner, 2002) emphasize these differences, and recent research on different aspects of multilingualism provides additional evidence of the differences between second and third language acquisition (Cenoz & Genesee, 1998b, Jessner, 1999; Cenoz, Hufeisen & Jessner, 2001a). Furthermore, specific research on the cross-linguistic influence of previously acquired languages on third language acquisition has reported interesting patterns that indicate that third language production has specific characteristics that distinguish it from second language production (see Cenoz, Hufeisen & Jessner, 2001b).

This volume focuses on a specific aspect of multilingualism, the multilingual lexicon, and aims at contributing to develop our knowledge of the way multilingual individuals acquire and process language. To date, books on the mental lexicon have mainly been concerned with the processing of one or two languages. The present volume goes beyond this and provides an additional theoretical and empirical basis to justify the development of multilingualism as a specific area of research.

A multilingual individual can be defined as a person who is able to communicate in two or more languages. As is the case with definitions of bilingualism, the ability to communicate covers a broad spectrum of proficiencies from having a native-like command of more than one language to the general ability to function and communicate in more than one language at almost any proficiency level. Balanced bilingualism is highly infrequent and a balanced level of proficiency in several languages is not to be expected if we take into account the different dimensions of communicative competence including linguistic, pragmatic, sociolinguistic, discourse and strategic competence (Celce-Murcia, Dörnyei & Thurrell, 1995). As has been proposed by Grosjean (1985) and Cook (1992), a multilingual speaker has a specific type of competence which is different from monolingual competence in each of the languages s/he speaks. This volume provides interesting insights into the analysis of one of the areas of multicompetence, the multilingual lexicon.

1. THE MULTILINGUAL LEXICON

The lexicon has always been at the centre of interest in studies on bilingual individuals and/or second language learners. Discussions on the nature of the acquisition of the lexicon have concentrated on questions concerning similarities and differences between lexical operations in L1 and L2 learning and the relationship between form and meaning in processing one or two languages. One of the main questions in research on the mental lexicon is still formed by the discussion on the L1/L2 interdependence/dependence – linked to the classic compound/coordinate dichotomy. But researchers dealing with the question of separation/integration have now shifted their attention to the degree of interconnectivity. Many of the studies on bilingual representation and processing focus on the conceptual and lexical or associative links in the bilingual mental lexicon (several studies in Harris 1992 and Schreuder & Weltens 1993; Singleton 1999, 167ff.).

Processing models which have been developed so far are models adapted from monolingual processing models such as de Bot's (1992), which is based on Levelt's production model (e.g. 1989) where lexical knowledge including lemmas and forms, i.e. sematico-grammatical and morphophonological knowledge, is a part of declarative knowledge.

Other studies on the nature of the lexicon often stem from acquisition studies which were originally motivated by classroom research and concentrate on the connections between the languages which are in contact in a language learning situation. In these studies of cross-linguistic influence the prominent role of the lexicon in language acquisition becomes very obvious. Investigations of codeswitching and –borrowing have formed another research area where the bilingual lexicon has always been a crucial part of the discussion.

To find out whether there are interconnections between the various lexicons in the multilingual's mind is certainly a burning question for research on multilingualism. Other related issues deal with the way the various lexicons are organized and can be accessed and under which conditions they appear. Whereas many scholars, depending on their theoretical approach and scientific background tend to subsume multilingualism under bilingualism and/or second language acquisition (e.g. Singleton, 1999: 130), others have started to concentrate on specific aspects of third language acquisition in order to pinpoint the differences between the processes involved in the acquisition and processing of two or more languages. Some important indicators for the activation of languages in a multilingual individual include recency of activation and use of different languages together with the role assignment of specific languages in an individual (Williams & Hammarberg, 1998). The role of typological factors in a more complex language contact situation where more than two languages are involved has also to be reassigned (Cenoz, 2001).

Furthermore, studies employing trilingual or multilingual subjects not only offer the opportunity to investigate the acquisition and processing by testees representing the majority of the world's population but also offer new perspectives on the study of language acquisition in general. For instance, a study by Abunawara (1992) showed that the number of connections between the lexicons is higher at lower

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LEXICAL PROCESSING IN BILINGUALS AND MULTILINGUALS: THE WORD SELECTION PROBLEM

1. INTRODUCTION

Some multilinguals understand and speak many different languages. A lecture at the Second International Conference on Third Language Acquisition and Trilingualism (Leeuwarden, the Netherlands, September 13-15, 2001) discussed the linguistic abilities of a person who mastered 17 different languages at least reasonably fluently. Such multilinguals must have stored vast numbers of words in their mental lexicon, and it would appear to be as difficult to retrieve just the right word from such a large database as it would be to find a needle in a haystack. Still, these multilinguals appear to be able to communicate rather smoothly, without suffering from many misperceptions of words or cross-linguistically based speech errors. How can their word retrieval system operate so efficiently? We will refer to this issue as the *word selection problem*.

Derailements of language processing in multilinguals might especially be expected if one realizes that already monolinguals are capable of selecting/identifying a word within a third of a second from a lexicon of 50,000 words or more (see Aitchison, 1987: 5-7). If they are reasonably fluent in their L2, proficient bilinguals must have 10,000s of additional word forms for use in their second language, and the number of extra words from yet other languages in multilinguals must be considerable. This implies that during reading and speaking, thousands of extra words are possible targets for recognition or articulation. And yet, the cost associated to the ability of processing more than one language seems to be relatively mild. In their comparison of bilingual and monolingual performance in different tasks, Ransdell and Fischler (1987: 400) concluded that “Becoming fluent in a second language appears to have only slight impact on the ability to process the first”. They observed, for instance, that bilinguals made English (L1) lexical decisions on words that were only about 125 ms slower than those of monolinguals (given RTs of 700-900 ms), but just as accurate. In all, multilinguals thus appear to perform an amazing feat when they recognize and produce words from their many

languages, not (just) in the sense that they are able to store so many words, but especially in that they are able to retrieve the right ones so quickly and without flaw.

This chapter considers which factors may help multilinguals to solve their word selection problem during visual word recognition. Basing ourselves upon evidence from the bilingual domain, we will evaluate a number of solutions to the problem of word selection in the multilingual:

(a) Multilinguals are able to access just the task-relevant language (language selective access) and to switch between their languages when needed.

(b) Word candidates from different languages are automatically activated during lexical selection (language nonselective access), but multilinguals can control their relative language activation in a top-down way (i.e., if they want to).

(c) The characteristics of lexical items from different languages suffice to account for the word selection process in multilinguals. Word candidates from different languages are activated during lexical selection, and multilinguals have no top-down control over the activation of words from different languages.

During our evaluation, we will contrast available models of word recognition with respect to their basic underlying assumptions, and extend their views from monolinguals and bilinguals to multilinguals.

2. THE INTERACTIVE ACTIVATION MODEL FOR MONOLINGUAL WORD RECOGNITION

As a starting point, let us consider what we know about word selection in monolingual language comprehension (see also de Bot, *in press*). A well-known monolingual model for visual word recognition is the Interactive Activation (IA) model (McClelland & Rumelhart, 1981, see Figure 1). This model comprises units (nodes) corresponding to linguistic representations at three hierarchically arranged levels: features, letters, and words. Feature nodes detect the presence or absence of visual features (i.e. line segments) of letters at different positions in a word. Facilitatory connections exist between nodes from adjacent representation levels and inhibitory connections between nodes at the same level. An input letter string "switches on" particular features at each letter position, which subsequently excite letters that contain them and inhibit letters for which they are absent. Each activated letter then excites in parallel all words having that letter at the correct spatial position, while all other words and letters in that position are inhibited. Subsequently, all activated words inhibit each other (lateral inhibition) while they excite their component letters (top-down feedback). After a number of processing cycles, an asymptotic activation value is reached in some word and letter units. Word recognition can be assumed to take place if an activation threshold set at the word level is crossed. When the input is turned off, activation gradually decreases towards initial or resting level values due to activation decay.

In the first stages of word recognition, many word candidates are activated in parallel (see also Schönplüß, *this volume*). Especially words that differ from the presented target word in only one letter become activated, because they match the target to such a large extent. Words that differ from a target word at only one letter

position are called *neighbors*. For instance, upon presentation of a four-letter word like WIND, words that share three letters with the target word become relatively active because of the bottom-up support from the three activated letter units. Examples of neighbors of WIND are BIND, KIND, WAND, WILD, and WINK. (Further note that WIND is a homograph, implying that without context several meanings could become available). These neighbors subsequently inhibit other less activated words, thus helping each other (gang effect). Over time, they also start to affect each other's activation and that of the target word negatively through lateral inhibition. The IA model has been able to account for many neighborhood effects reported in the literature (for a discussion in the context of bilingualism, see Van Heuven, Dijkstra, & Grainger, 1998).

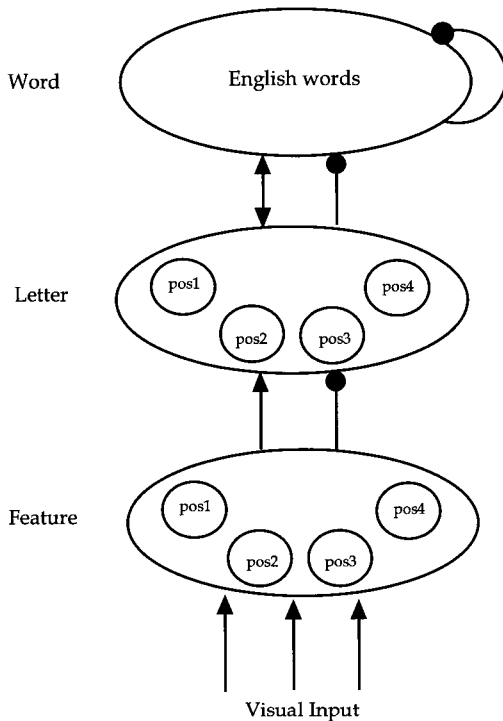


Figure 1. The Interactive Activation model of visual word recognition. Normal arrows indicate excitatory connections, lines with ball heads indicate inhibitory connections.

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THE TRANSFER-APPROPRIATE-PROCESSING APPROACH AND THE TRILINGUAL'S ORGANISATION OF THE LEXICON

1. INTRODUCTION

A critical question with reference to the theoretical basis of multilingualism is whether the trilingual speaker's total lexicon represents different sets of lexica depending on the similarity of the languages involved. The languages given have different similarities or distances from each other, and thus interconnections have different strengths when they are derived from phonological, morphological and syntactical features of the given languages. In addition, the issue of semantic or conceptual interconnections between languages has to be considered and associated with the question of semantic similarity. The aim of this research is to clarify the issue of conceptual interconnections between second and third language.

2. BILINGUAL AND TRILINGUAL LANGUAGE PROCESSING

Both Paradis and Goldblum (1989) and Perecman (1989) see language processing as taking place on different levels: a prelinguistic conceptual level which reflects properties of the human mind and is common to both of the bilingual's languages because it is independent of language, and then the functionally different semantic – conceptual - lexical level. Perecman (1989) outlines a neurolinguistic model for language processing in bilinguals and then accounts for language variation. The model assumes a hierarchy of processing, at the top of which there is the conceptual level with shared processing of language independent information. Below that there are various linguistic strata – the lexical-semantic, the syntactic, the phonological and the phonetic articulatory levels. Perecman assumes that for monolinguals where the conceptual systems feeds into only one linguistic system, the processing routines from the conceptual down to the phonological forms have become automatized. For the bilingual and the trilingual speaker less routine can be expected: The conceptual level feeds into more than one linguistic system, and the distinction between levels of representation will be more marked (see also Dijkstra, and Franceschini et al., this volume). Perecman stipulates that multiple languages are unified in a single system at the prelinguistic conceptual level, that they are strongly linked at the lexical-

semantic level, and that the links get progressively weaker as processing moves from the lexical-semantic to the articulatory-phonetic level. This may explain the observation frequently made that interference is more likely to occur at the conceptual-lexical level than at levels further down where the links between systems are weaker. The larger the number of linguistic systems at work the more interactions between the various levels of the system are to be expected. Hence, trilingual language processing is more complex than just the doubling of the interactions of a bilingual system. In a trilingual system one or two language systems may be dominant, thus offering the unique opportunity to observe two dominant and one weak system.

The transfer-appropriate-processing approach states that people are generally faster or more efficient in performing a task on a stimulus when there has been previous experience in performing the same task on the same stimulus. The approach applies specifically to memory processes. The degree of overlap between processes engaged during a first study exposure and those engaged during a second test exposure (Bransford, 1979). More recently, the framework has been extended to implicit memory phenomena (Blaxton, 1989; Graf & Ryan, 1990; Roediger & Blaxton, 1987; Roediger, Weldon & Challis, 1989; Srinivas, 1996).

Dissociations between explicit and implicit memory tests are now documented in memory research. Explicit memory tasks are those in which instructions are given to subjects to retrieve the items from the study episode. Standard examples of some explicit tasks are free recall, cued recall and recognition. In implicit memory tasks, subjects are simply asked to complete the tasks with the first solution that comes to mind, to identify speeded presentations of stimuli, or to respond as quickly as possible. For example, in an implicit memory task such as word fragment completion, subjects complete fragments of studied and non-studied items with the first solution that comes to mind. Explicit tasks such as free recall and recognition greatly benefit from conceptual elaboration of material compared to encoding that focuses on perceptual features. In contrast, in implicit tasks such as speeded word identification, word stem completion, and word fragment completion, this conceptual advantage is not obtained; priming on these implicit tests is usually equally facilitated following conceptual or perceptual encoding of the target word (Roediger et al., 1992). Roediger postulated that explicit memory tasks are conceptually driven whereas most implicit memory tasks depend on perceptual processes. Implicit memory tasks such as word fragment completion appear to be relatively insensitive to semantic elaboration at encoding (Srinivas & Roediger, 1990). But Weldon and Roediger (1987) and Challis and Brodbeck (1992) show that word fragment completion is also subject to manipulations concerning the activation of concepts. In tasks like the word fragment completion task in absence of a biasing context, dominant alternatives of possible meanings are activated. In the case of trilingual persons the search strategies for fragment completion include the priority of finding words in the dominant language(s). Furthermore, Basden's et al. (1994) experiments yielded also support for a revised transfer-appropriate-processing framework involving three processes: conceptual processing, lexical access and perceptual overlap.

A study reported by Schönplflug (2000) dealt with the same problem employing the word fragment completion test method to explore the processes used for completing words in a trilingual context. The relationship between the first and the second and the first and the third and the second and the third language are seen as the results of developmental processes. According to Dufour and Kroll (1995) bilingual language competence is a development in the direction of an independent conceptual system for the two languages. Novices in a second language process semantic information through the semantic-conceptual store of their first language.

A recent study by Hamilton and Rajaram (2001) tested the concreteness effect on implicit and explicit memory tests. The rationale of introducing this variable is that concreteness effects indicate that conceptual processes are involved in word fragment completion.

On the other hand, concrete and abstract words have a different number of translation equivalents (Schönplflug, 2000). Concrete words tend to have one translation equivalent whereas abstract ones tend to have more than one. This is the case when translating German words into English and English words into German. Word completions may also be influenced by the number of translation equivalents as Schönplflug's study shows. The study finds differential uniqueness points (number of letters given when correct target word was found) for concrete and abstract words, words with either one or more than one translation equivalent, and long and short words in the subjects second and third language, German and English, respectively. Generally, concrete words have a later uniqueness point than abstract words, words with more than one translation have a later uniqueness point, and words from the third language, English, have a relatively later uniqueness point than words from the second language, German. The subject took more letters to correctly complete word fragments of short words as compared to long words.

3. THE PRESENT STUDY

This study aims at exploring the effects of second and third language active and passive competence on word fragment completions of words of either language. It may be hypothesized that

H1: A trilingual speaker's active and passive competence in their second and third language have an effect on word fragment completions: The more competent the speakers are in their second and third language, the later their uniqueness points in word fragment completions in the respective language. The argument is based on decision theory: The more alternatives there are in the decision-making process the longer takes the process of finding the right alternative.

H2: Trilingual speakers with greater competence in the second than the third language will reveal in their second language more conceptually driven word fragment completions than in their third language. Conceptually driven processing is indicated by effects of concreteness and number of translation equivalents on word fragment completions. The weaker the speaker's