

## THE MENTAL LEXICON IN SECOND LANGUAGE LEARNING

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### 1. An overview of the problem

The present paper addresses the issue of the second language mental lexicon. This aspect of language acquisition and processing has become a growing preoccupation of linguists and psycholinguists in recent years. William Marslen-Wilson (1989: IX) has described the lexicon as "the central link in language processing." This centrality of the lexicon is true of both first and second language acquisition. As Carroll (1992: 93-94) observes, "vocabulary has, in some fashion or other, always been central to discussions of bilingualism, but ... only recently has research in SLA focused on questions such as: what is the nature of the mental representations involved in lexical knowledge and lexical learning? How are these representations processed in language comprehension and language production?"

Channell (1988: 83) notices that, despite a large literature on psycholinguistic research into bilingual mental lexicon, a key question for L2 theory that still needs an answer is the one concerning the nature of the L2 mental dictionary. For L1, research on the structure and functioning of the lexicon is reasonably well developed, but the issue of the organization of the mental lexicon becomes controversial where more than one language is involved. The question that arises then is how the lexica associated with various languages learned relate to each other. More specifically, does the lexis of each language have its own, separate store, or are all lexical items from both languages gathered in a single, common store? And if the storage systems are not integrated, are they similarly or differently organized?

It is some of these questions that I would like to address in the following sections of my paper. Consequently, the first part of this paper will describe some relevant theoretical work on the psycholinguistics of L1, and the overall model of the L1 mental lexicon. Then, I will provide a brief summary of psychological studies of bilingualism in the 1960s and 1970s, which focused on the bilingual lexicon.

Finally, I will discuss the controversy around the common versus separate storage views of L1 and L2 lexica, arguing in favor of a single, integrated system.

Due to the absence of definite research evidence either for or against the similarity between the L2 learner's lexicon and the L1 lexicon, second language theorists have drawn on L1 models, trying to test their validity for L2 theory. There is now abundant literature addressing the question of how the monolingual speaker's lexicon is organized. The earlier view (cf. Miller – Johnson-Laird 1976; Jackendoff 1983) holds that the lexical entry of a word contains a phonological representation, a set of morphosyntactic representations, and semantic information. The semantic representation includes a logical form (information about the argument or predicate status of the item), information about the semantic roles that a predicate assigns to its arguments, and a conceptual representation involving information about the ontological categories that an element expresses.

More recently various psycholinguists (Monsell 1985; Fromkin 1987; Emmorey – Fromkin 1988; Carroll 1992) have argued for a multiple-lexicon view of storage. According to this model, there is a phonological lexicon, a semantic lexicon, a morphosyntactic lexicon, and a graphemic one. Each of these might have its particular pattern of organization. Thus, the phonological lexicon may be organized in terms of the underlying phonological representations of its entries, while the semantic lexicon may be organized in terms of semantic fields.

Evidence for the semantic organization of the L1 lexicon comes from three lines of research, namely, word association studies, speech error studies, and neurolinguistic research into the nature of aphasic speech. As Aitchison (1987: 72) observes, the consistency of the results obtained from numerous word association experiments has suggested to psycholinguists that the analysis of subjects' responses may provide valuable information about the organization of words in the mental lexicon. One of the findings repeatedly confirmed by word association studies points to the fact that subjects almost always provide a coordinate for a stimulus word, belonging to the same semantic field (Aitchison 1987: 73). Thus, for example, the usual response to the word *moon* would be *sun*, *night*, or *star*. All of these words belong to the same semantic field as the stimulus word *moon*, and they cluster together on the same level of detail, i.e., they are coordinates.

Another finding which emerged from word association experiments was that people very often responded with a word likely to be collocated with the stimulus word in connected speech, for example *bank robber*, *brush teeth*, *slow train* (Meara 1978). Table I/A of the Appendix lists the results of word association tests conducted by Jenkins in 1970 (quoted in Aitchison, 1987). The figure shows the commonest responses to the words *butterfly*, *hungry*, *red*, and *salt* (Aitchison 1987: 74).

Another line of research, which provides additional support for the existence of strong semantic links between words in the L1 lexicon, is based on native speaker speech errors, or slips of the tongue. Errors in English have been extensively studied and analyzed into types (Fromkin 1980 provides a useful survey). The type of error relevant to the present discussion are semantic errors called *blends*, that is, nonexistent words consisting of a mixture of sounds from two semantically related words, both of which could be appropriate in a given context. Point I/B of

the Appendix lists a number of blends from the corpus collected by Garman (1990). Blends seem to confirm the results of word association experiments supporting the hypothesis that words are stored in semantic fields and that coordinates are closely associated.

Finally, case studies of patients with speech disorders suggest that topic areas are stored to some extent independently and that some semantic fields can be damaged without involving others. There is an accumulating body of evidence concerning the occurrence of selective impairments for semantically related sets of lexical items. There are cases documenting a loss of capacity to produce lexical targets in specific semantic areas, or even losses as specific as food or color terms (Garrett 1992: 143-180).

In addition to semantic information, the lexical entry for each word must necessarily contain syntactic information, which, as the findings suggest, is tightly attached to word meaning. The fact that information about word's part of speech is tightly attached to its meaning in storage is confirmed by slips of the tongue, in which we erroneously select a wrong word. As examples by Garman, 1990 show (see Appendix II/A), word selection errors tend to preserve the word class of the target. Thus, nouns replace nouns, verbs replace verbs, and adjectives take the place of adjectives.

A close connection between words from the same word class is also suggested by *tip of the tongue* (TOT) guesses, in which the syntactic category is mostly retained. Examples of TOT guesses obtained by Brown and McNeill in 1966 are shown in III/A of the Appendix. Both target words and subjects' guesses at these words share the same syntactic category.

Word association experiments provide further evidence, where the commonest adult response is a word from the same class. Aphasia studies, evidencing separation of words belonging to different syntactic categories, corroborate the view about strong links between words of the same class (Ellis 1985, 2: 107-142). Appendix II/B shows an attempt by an aphasic patient to describe a picture of a busy kitchen scene. The patient is incapable of retrieving any verbs and uses nouns mostly to deal with the description of various activities performed by people in the picture.

Another issue that needs to be considered in relation to the storage of words in native speaker's mental lexicon concerns the sound structure of words. A key observation on the TOT phenomenon and malapropisms is the correspondence of initial sounds, syllable structure and general rhythmic pattern between errors and targets.

The preservation of initial and final syllables between target words and word selection errors has been metaphorically referred to as *the bathtub effect* (Aitchison 1987: 119); the word being compared to a person sitting in a bathtub with their head and feet above the surface of water. Examples of this effect are shown in Appendix III/C, from which we can clearly see that initial and final syllables of target words are mostly retained in erroneous attempts to produce them. Incorrect forms preserved the initial consonant of the target word in 86% of short words and in 82% of long words in a corpus of 500 malapropisms collected by Aitchison

and Straf 1982 (referred to in Aitchison 1987: 118-127) (see Appendix III/D). The percentages for final consonants were, respectively, 70% and 82%.

Recall for the number of syllables in TOT and malapropisms is shown in Appendix III/E. The figures confirm the prediction about the number of syllables being relatively well recalled in both TOT guesses and speech errors. The correspondence of the general rhythmic pattern between targets and errors in word slips is shown in Appendix III/F.

All of these results have led psycholinguists to argue that phonological entries in the lexicon are coded first by initial consonants, stress and syllable structure, and only then analyzed into exact sound sequences. As Channell (1988: 88) rightly observes, this arrangement is likely to be optimal for fast identification of sounds in language comprehension, with words sounding similar tightly bonded together. The comprehension device can then segment incoming speech into words, using syllables and stress to do so, examining several similarly sounding words, and finding the best fit for what has been heard.

Thus, the native speaker's mental lexicon may be viewed as composed of interrelated components (semantic-syntactic, morphological and phonological). According to the model postulated by Aitchison (1987), the boundaries between these components, or, to use the Fodorian (1983) term *modules*, overlap with each other and with adjoining modules relating to syntax and general cognitive abilities. Unlike the phonological component, organized optimally for comprehension, the semantic-syntactic module is arranged conveniently for production, with words from the same semantic field tightly connected and with strong links between coordinates sharing the same category.

## 2. Organization of the lexicon in bilingual speakers

I turn next to the issue of how the lexicon is organized in the minds of bilingual speakers. Research on bilingual semantic memory has concentrated on the degree to which a bilingual's representation of lexical information is common to, or separate for, both languages. This distinction is referred to in pertinent literature as the compound-coordinate dichotomy (Ervin – Osgood 1954).

The distinction goes back to 1953, when Uriel Weinreich categorized bilinguals into three types, which have subsequently become known as compound, coordinate and subordinate. For coordinate bilinguals the *signs* of each language separately combine one unit of expression with one unit of content, while for compound ones, the signs combine one single unit of content with two units of expression, one for each language. Subordinate bilinguals would be those for whom a term in L2 signifies first an L1 term, and then, indirectly, a unit of content (Macnamara 1985: 27). Appendix IV presents Weinreich's original illustrations depicting the distinction between the three types of bilingual on the basis of the representation of the word *book* and its Russian translation equivalent *kniga*.

Much of the existing literature on neurological and psychological aspects of bilingualism indicates lack of agreement on the issue of lexical organization. Numerous experiments carried out during the last thirty years, with the aim of testing the degree of independence and/or interdependence of the bilingual lexical

storage systems, provide largely inconclusive and contradictory results. Some studies seem to point to separate listings for the two languages, while others argue for a single lexical store (see Albert – Obler 1978; Hamers – Blanc 1989, for extensive review of the research). The controversy has not been resolved. Likewise, Albert and Obler (1978: 246) conclude their book *The bilingual brain* by stating that "the lexicons of the two languages of a bilingual seem to be more or less compounded", a conclusion quite vague and far from definitive. The elusive nature of this conclusion seems to be emphasized by yet another, even more ambiguous, if not contradictory, conclusion provided by the same authors a few pages later, when they claim that "certain systems ... will be compound for all bilinguals, while other systems (e.g., lexicon and syntax) will be coordinate to a greater or lesser extent." (Albert – Obler 1978: 252).

Hamers and Blanc (1989: 101) arrive at a much more explicit and definite conclusion as to the interpretation of the different research results. They state that, "although there appear to be some contradictions ... the sum of empirical evidence seems to favour the single-store model ... the common-memory model makes most sense both in terms of parsimony and in terms of explanatory power."

A view held among some of the psycholinguists (Fromkin 1971; Soudek 1982 quoted in Singleton – Little 1991; Hatch 1983 quoted in Singleton – Little 1991; Meara – Ingle 1986) is that the L2 mental lexicon differs qualitatively from the L1 mental lexicon in that it is more *loosely* and phonologically, rather than semantically, organized. One body of evidence quoted in support of this claim comes from word association tests conducted by Meara (1983) and Meara and Ingle (1986). Meara analyzed inappropriate L2 word associations, indicating the predominance of the so-called *clang* associates (i.e., responses phonologically similar to stimuli) in L2 learners' production. Since clang associates are not likely to characterize L1 performance on word association tests, Meara concluded that the results of the study provide support for the largely phonological nature of L2 learners' mental lexicon.

On the other side of the debate one finds a group of psycholinguists (Green 1986 in Perecman 1989; Laufer-Dvorkin 1991; Singleton – Little 1991; Carroll 1992) who favor the notion of a single integrated system. According to this view, the main organizational principle for both L1 and L2 lexicons seems to be semantic. Words are classified into semantic categories, each of them being further subdivided into a set of L1 and L2 lexical units. In addition to the semantic principle of organization, a phonological principle has also been postulated. Words are organized into phonological networks (clusters of words sharing the same sounds), with strong associative links between similarly sounding ones. What follows from the above is that, since L1 and L2 words are stored together, the L2 words interact with semantically and phonologically related words both in L1 and L2.

Strong evidence for this view of lexical processing in the bilingual comes from language mixing. Data from language mixing in aphasia and in normal bilinguals suggest that, when a bilingual prepares to speak, both languages become activated and the two language systems interact with each other. The different manifestations of language mixing are reflective of the interaction of language systems at different

levels of language processing (Perecman 1989: 227-242). The fact that words from both languages are activated in language production is shown by the occurrence of blends, such as *springling* (a blend of the English word *spring* and the equivalent German word *Frühling*) (Green quoted in Aitchison 1987: 206). From my personal observation, I would feel justified in arguing that this fact is also vividly demonstrated by bilingual persons' conversations, in which they often switch from one language to another.

### 3. Bilingual language processing

It follows from the foregoing that *language mixing* predominates in bilingual behavior. To explain the mechanism of language mixing, Green (1986: 210-223) proposes the so-called threshold hypothesis, according to which a word must reach a certain level of activation to become available as a response, and "the appropriate name comes to dominate other possible candidate names by reducing their level of activation [and] speakers can output whichever expression first achieves threshold." Grosjean (in Perecman 1989) seems to hold the same view, since he refers to the phenomenon of language mixing as taking advantage of the currently most available word. Such multiple activation may then be seen as a normal feature of lexical selection in language production – the consideration of multiple lexical candidates can be the consequence of the way in which the production system copes with the existence of many ways to express a given message. This view about the activation of multiple lexical candidates at the stage of message to lemma processing (selection, during language production, of the appropriate lexical items, the so-called *lemmas*, that correspond to the target meaning) seems to be held consistently in a number of language production models (Dell – Reich 1981; Stemberger 1985; Rumelhart – McClelland 1986; Bierwisch – Schreuder 1992; Roelofs 1992; Levelt 1992), which derive their notion of *lemma* from studies on Artificial Intelligence (see Woods 1982).

Another important source of data on bilingual language processing comes from bilingual aphasics. There have been a number of reports of patients using words from different languages in the same utterance, blending syllables from different languages in a single word, using syntax of one language with vocabulary of another, responding in a language different from the language of the address or with a phonetically similar word from the mother tongue (see Perecman 1989: 227-244 for a detailed survey). All of these results provide support for simultaneous activation of both language systems at different levels of processing, including the lexical level. It seems difficult to incorporate these observations into the separate-storage view of the bilingual lexical representation.

Further evidence bearing on the nature of bilingual lexical processing stems from the results of the project carried out by Singleton and Little (1991). The analysis of data collected in this study has provided strong evidence in favor of a single integrated system for L1 and L2 lexical storage and processing. The elicitation instrument through which the data were collected was the so-called C-test,

a short written passage in which every second word had its second half deleted. The subjects' task was to restore the blanked passage to completeness.

The study revealed that, contrary to what Meara's (1983; 1986) experiments showed, L2 lexical processing relies heavily on semantic cues and connections, not on phonological ones. The L2 words selected by subjects in filling the C-test blanks appeared to be primarily semantically motivated, i.e., relatable to some semantic aspect of the stimulus. Sometimes such responses were formally deviant versions of the items in the original text or their acceptable substitutes. Examples of semantically motivated incorrect responses are provided in Appendix V/A. The statistical analysis of semantically motivated incorrect responses in relation to all incorrect responses, clearly indicated a preponderance of semantic over non-semantic errors. This has been interpreted by Singleton and Little as strong counterevidence to the claim that the L2 lexical processing is largely phonology-driven, as Meara and his followers would have it.

The study also documented instances of connections and convergences between the operation of the L2 mental lexicon and that of the L1 mental lexicon, by providing numerous examples of cross-linguistic influence in L2 lexical processing. The relevance of evidence of cross-linguistic influence in bilingual lexical processing lies in the fact that any manifestation of connections between the operations of the L1 and L2 lexicons can be taken as an argument against the notion that the two lexicons process language entirely separately. Some of the instances of cross-linguistic influence in L2 lexical processing, produced by the subjects in Singleton and Little's study, are shown in V/B of the Appendix. All in all, the findings described by Singleton and Little seem to disconfirm the claim that the organization and functioning of the L2 mental lexicon are separate and different from those of the L1 mental lexicon.

The issue of bilingual language processing is also addressed by Paradis (referred to in Perecman, 1989: 236), who proposes that bilinguals have one *conceptual memory store* (a general store for the representation of knowledge) and two distinct *semantic stores* (stores containing sets of units, each of which corresponding to a word in the language). Thus, this view maintains that, while the essentially pre-linguistic conceptual level, reflecting properties of the human mind, is common to the bilingual's two language systems, the lexical-semantic level differs for each language. While this view does assume some degree of independence between L1 and L2 lexicons, in no way does it preclude the possibility of interrelationships between the two networks. Paradis actually makes no attempt at claiming the existence of qualitative differences between the organization and functioning of the bilingual's two lexicons. Conversely, he proposes that both L1 and L2 lexicons can be viewed as uniquely defined networks of language-specific semantic fields. Since he does not explicitly address the question of whether there exist interlanguage links between units from the two lexical-semantic levels, it is possible to treat this account of bilingual lexical representation, at least until proven otherwise, as supporting the notion of the essential similarity and interrelatedness between the two lexicons.

This view can actually be treated as a possible way of reconciling the two op-

posing hypotheses concerning the nature of bilingual language representation and processing. Paradis' postulate as to the existence of one conceptual memory store would indicate a single storage system for both languages at the conceptual level. The two semantic stores would be consistent with claims made by *separate storage* followers, while at the same time allowing for the essential similarity and interrelatedness of the two stores, thus satisfying, at least partially, demands made by the advocates of the *single storage* approach.

#### 4. Conclusion

To summarize, even though the debate concerning the nature of the bilingual lexical representation and processing is still open, there is, as Aitchison (1987: 205) points out, "increasing evidence in favor of a single integrated network." The discussion in this paper points to the directions for further research. First of all, it seems that considerably more work is needed in order to fully understand how the various languages known by a single speaker are interwoven. We need more studies of L2 speech errors to enable us comparisons with the results of L1 speech error data and to provide a clearer understanding of the structure and functioning of the L2 mental lexicon. The second direction concerns pedagogical implications for vocabulary teaching. Understanding the nature of associations between lexical items in the language learner's lexicon will provide guidelines for designing the most suitable teaching and testing techniques. Perhaps the best summary of the conflicting views and controversial issues discussed in this paper will be a quote from Singleton and Little (1991: 62) who state that "for all that has been written about the mental lexicon, it still remains a mysterious and controversial subject."

### APPENDIX I

Evidence for semantic organization of L1 lexicon.

I/A. Word association experiments. (The commonest responses in word association tests to the words *butterfly*, *hungry*, *red*, and *salt*. (Jenkins, in Aitchison 1987.)

	BUTTERFLY	HUNGRY	RED	SALT
1	moth	food	white	pepper
2	insect	eat	blue	sugar
3	wing(s)	thirsty	black	water
4	bird	full	green	taste
5	fly	starved	colour	sea

I/B. Slips of the tongue. Blending together words from the same semantic field:

that's **torrible** (terrible + horrible).

gone **mild** (mad + wild)

have you ever **flivven** (flown + driven) (Garman 1990)

### APPENDIX II

II/A Preservation of the word class of the target in word selection errors:

No – I'm **amphibian** (ambidextrous)

because I've got an **apartment** (appointment) now

they have been **married** (measured) (Garman 1990)

II/B Preservation of the word class of the target in aphasia studies (separation of words belonging to different word classes in certain cases of aphasia)

'Water ... man, no woman ... child ... no, man ... and girl ... oh dear ... cupboard ... man, falling ... jar ... cakes ... head ... face ... window ... tap ... ' (Allport and Funnell 1981)

### APPENDIX III

Phonological component of the mental lexicon.

III/A. TOT phenomenon (Brown and McNeill 1966).

TARGET WORD	TOT GUESSES
symphony	sympathy
sampan	sarong, Siam, sympoon

III/B. TOT in aphasiacs (Gardner, in Aitchison 1987).

TARGET WORD	TOT GUESSES
ankle	ankely, mankel, kankle
paper	pauper, hand pepper, piece of hand paper
butter	tubber
fork	fung

III/C. 'The bathtub effect' in malapropisms (Aitchison and Straf 1982, quoted in Aitchison 1987; Fay and Cutler 1977).

TARGET WORD	WORD SELECTION ERROR
syllables	cylinders
antidote	anectode
musician	magician
specialization	specification

III/D. Recall of initial and final consonants in a collection of 500 malapropisms (Aitchison and Straf 1982, quoted in Aitchison 1987):

	INITIAL CONSONANTS	FINAL CONSONANTS
SHORT WORDS (1-2 SYLLABLES)	86%	70%
LONG WORDS (3 OR MORE SYLLABLES)	82%	82%

III/E. Recall for the number of syllables in TOT and malapropisms:

TOT:	Brown and McNeill 1966	57% correct guesses
	Browman 1978	56%
MALAPROPISMS:	Fay and Cutler 1977	87%
	Aitchison and Straf 1982	67%

III/F. 'The bathtub effect' and preservation of the rhythmic pattern in tongue slips (Aitchison 1987).

Don't contact lenses make your ears (eyes) sore?  
I found it in the train component (compartment).  
There's a sparrow (swallow): summer's arrived.

#### APPENDIX IV

Coordinate-compound distinction, Weinreich 1953.

(1) Coordinate	(2) Compound	(3) Subordinate 'book'
'book' 'kniga'	'book' = 'kniga'	{ /buk/ }
/buk/ /kn iga/	/buk/ /kn iga/	/kn iga/

#### APPENDIX V

V/A. Semantic and lexical processing in L2 (Singleton and Little 1991)

TARGET	SEMANTICALLY MOTIVATED INCORRECT RESPONSE
südscho/ttischen (southern Scottish)	südschottlandischen
beri/chten (('report' [3rd person plural present]))	berichten, berichte, berichtet, berichtete, bericht

V/B. Cross-linguistic influences in L2 lexical processing:

*Army	(German C-test, target word: <i>Armee</i> ; cf. English <i>army</i> )
*asylum	(French C-test, target word: <i>asile</i> ; cf. English <i>asylum</i> )
*permittè	(French C-test, target word: <i>permis</i> ; cf. English <i>permitted</i> )

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