This is to certify that the

thesis entitled

Syntactic Aspects of Bilingual Language Production

presented by

Helga Loebell

has been accepted towards fulfillment
of the requirements for

Master of Arts_____ degree in __Psychology

_____
Major professor

Date__3/21/1989_____

**PLACE IN RETURN BOX** to remove this checkout from your record.
**TO AVOID FINES** return on or before date due.

| DATE DUE | DATE DUE | DATE DUE |
|----------|----------|----------|
| | AUG 589 | |
| | APR 1 2 2004 | |
| MAY 2 8 5 93 | | |
| FEB 0 7 1994 | | |
| | | |
| MAY 0 6 2001 | | |
| APR 1 2 2002 | | |
| FEB 2 5 2003   0 9 0 2 0 3   0 9 1 7 0 3 | | |
| | | |

SYNTACTIC ASPECTS

OF BILINGUAL LANGUAGE PRODUCTION

By

Helga Loebell

A THESIS

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

MASTER OF ARTS

Department of Psychology

1989

ABSTRACT

SYNTACTIC ASPECTS OF BILINGUAL LANGUAGE PRODUCTION

By

Helga Loebell

Bilinguals have knowledge of two linguistic systems. The phenomena associated with code switching suggest that both systems can be active and available during language production. Two experiments were conducted to examine the implications of this for syntactic processes in bilingual speech. Experiment 1, using fluent German/English bilinguals, investigated whether producing a construction in one language influences the probability of using the same construction in the other language to describe a subsequent, unrelated picture. It was found that dative sentences in one language primed the later use of dative forms in the other language. Experiment 2 attempted to extend this experiment to a monolingual German setting, with native German speakers producing the priming sentences and picture descriptions in German. Although the priming effects failed to achieve significance, they followed the general pattern of the cross-language results for datives. Implications for models of bilingual sentence production are discussed.

# ACKNOWLEDGEMENTS

# TABLE OF CONTENTS

# LIST OF TABLES

Syntactic Aspects of Bilingual Language Production

# CHAPTER I
## INTRODUCTION AND LITERATURE REVIEW

Bilingualism has intrigued researchers and theoreticians from a variety of fields for decades. This interest is most prominently reflected in controversies over its merits. Some studies seem to indicate that speaking more than one language can lead to increased linguistic flexibility and intellectual diversity (Bain & Yu, 1980 ; Cummins, 1977; Landry, 1974; Peal & Lambert, 1962). Others have labelled bilinguals morally and intellectually deficient, suffering from weakened self-discipline and general decay of character ( Weisgerber, 1966). But regardless of whether bilingualism is a handicap or an asset, questions arise about how the knowledge of multiple languages is represented and used. How are the languages of a bilingual speaker organized? To what degree and in which domains of language functioning are the languages interrelated? How do they interact in language use? This paper will focus on problems associated with structural aspects of language patterning in bilingual speech production.

In recent years interest in the processes operating when bilingual speakers switch languages within sentences (code-switching) has sparked research on the syntactic aspects of bilingual language processes. This research, to be examined in more detail below, converges on the hypothesis that both languages of the bilingual are simultaneously active during the speech formation process. This, in turn, leads to a reconceptualization of the phenomenon of transfer, the imposition of the the pattern of one language on

1

another, and ties it to the phenomenon of code-switching. The purpose of this paper is to assess this simultaneous activation hypothesis in a controlled setting and to outline its implications for a model of bilingual language production. The first section of the introduction lays out some terminological conventions. The second reviews the role of language transfer in second language acquisition and bilingual production. In the last part of the introduction, the relevance of code-switching to explanations of syntactic processing in bilingual speech will be assessed. The results of an experiment designed to examine syntactic processes in bilingual speech will be reported. A second experiment replicated and extended this experiment in a monolingual setting. Finally, outcomes are evaluated and discussed with regard to their implications for bilingual language production.

## The Characterization of Bilingualism

Informally, individuals who have substantial mastery of two languages can be regarded as bilingual. There is no agreement among researchers about what constitutes substantial mastery and how or even whether it relates to labelling a person bilingual. The term 'bilingual' has been used very narrowly by Bloomfield (1933), among others, to refer only to native-like mastery of another language. A different view is that people who have even minimal competency in at least one language skill (speaking, writing, listening, or reading) should be regarded as bilingual (Macnamara, 1967). With the former definition there would be few (if any) 'true' bilinguals; the latter definition would include almost everyone who has ever come in contact with another language.

As a practical matter, the all-or-none view of bilingualism is untenable because of the difficulty of adequately characterizing asymptotic attainment of a language. Recent studies have revealed that individuals judged to have native-like competence in two languages nevertheless differ from native

speakers on more subtle measures of linguistic intuitions (Coppieters, 1987) and processing strategies (Bates, McNew, MacWhinney, Devescovi, & Smith, 1982).

For the purpose of this paper, I will adopt the view that "...bilingualism is not an all-or-none property, but is an individual characteristic that may exist to degrees varying from minimal competency to complete mastery of more than one language" (Hornby, 1977). However, the research to be considered and proposed emphasizes individuals at the upper end of the continuum. These are speakers who, while not necessarily 'native like' in all their linguistic competences in both languages, are able to understand and converse fluently in both. The first language learned by these speakers in childhood will be termed the native language. Any language that is acquired after the first will be termed a second language. Given these definitions, children who acquire more than one language simultaneously in childhood will have more than one native language. In the more usual case of asynchronous acquisition of two languages, the term 'target language' will be used to denote the language that a second language learner is trying to acquire.

## Language Transfer

In the literature of bilingualism, transfer is the paradigm case of crosslanguage influence. Language transfer occurs when a language user appears to impose the pattern of one language on another (at any level of structure, including both the forms and functions of elements; Gass, 1983). Although most authors agree with this basic definition, some include additional phenomena such as failure to use target language forms that have no source language analogs (Kellerman & Sharwood Smith, 1986), overproduction of target forms that have source language analogs (Selinker, 1983), and transfer of typological organization (roughly, basic word order, Rutherford, 1983). In its broadest sense, any effect that one language has one

producing utterances in an other language might be termed 'transfer'.

In this broad sense, borrowing and interference might be regarded as specific instances of transfer. Borrowing refers to the incorporation of specific lexical elements from one language into another. This is often done to make up for lexical gaps, as in English borrowings of terms like detente and coup. Though this may originate in transfer, the result is that the borrowed items become part of the language into which they are incorporated. These lexical borrowings often lose their language specificity during the incorporation process, in that the new words are assimilated (by changing and adjusting their pronunciation and morphology to fit the host language). Interference, on the other hand, is a form of transfer in which a second language learner uses linguistic structures of the source language that are incompatible with the patterns of the language being spoken. One common form of language interference is seen in second language learners who fail to attain native-like pronunciation. Instead, they retain an accent that reflects the phonology of their native language.

## The History of the Construct of Transfer

Within linguistics, particularly in applications of linguistic theory to second language learning, research on transfer has been closely associated with behaviorist accounts of language learning (Skinner, 1957) and the use of contrastive analysis (Lado, 1957). By comparing the grammatical structures of different languages, contrastive analysis tried to identify likely difficulties of second language learners (James, 1980). However, language learning turned out to be poorly explained in contrastive terms. This produced a lasting disenchantment with the notion of transfer, a disenchantment that was enhanced by dissatisfaction with anything remotely behavioristic (Dulay & Burt, 1974; Felix, 1982).

Although there is nothing obviously objectionable in the contrastive analysis program, it depends crucially on identifying psychologically real

structures and their roles in language use. Klein (1986) , for example, has suggested that predictions of possible transfer should not be based on comparisons of structural properties but rather on the way in which the learner processes these structural properties. Contrastive analysis did not do this.

The dismissal of transfer in second language acquisition, linked as it was to contrastive analysis and behaviorism, reflected more the reaction against behaviorist theories than a careful evaluation of the role of transfer in language processing. Gass and Selinker (1983) pointed out that the negative associations connected with transfer should not lead to a denial of the fact that existing linguistic knowledge will influence the way second language learners acquire another language. This is implicitly acknowledged in the terminological revisions that have appeared, with some researchers suggesting the substitution of terms such as 'mother tongue influence' (Corder, 1967), or 'crosslinguistic influence' (Kellerman & Sharwood Smith, 1986) for the tarnished construct of transfer.

## The phenomena and interpretation of transfer

It has been found that lexical, phonological, syntactic, pragmatic, rhetorical, conversational, and discourse factors from the native language can all be identified as influencing the learner's struggle in acquiring a new language (Gass & Selinker, 1983). In what follows, some instances of syntactic transfer will be highlighted.

Syntactic transfer is evident when the structural aspects of the native language influence sentence construction in the target language. Adjémian (1983) investigated transfer processes involving the English verb 'fight'. The verb 'fight' corresponds to the French verb 'se battre', a reflexive verb. Transferring these reflexive properties of the verb to English, French second language learners produced sentences like:

'They want to fight themselves against this [tuition increase]'.

Syntactic transfer is seen in the configurational features of sentences as well. In producing the incorrect German sentence:

*Bringen Sie mir ein Glas von Bier. (Kufner, 1962)

(Bring me a glass of beer)

a native English speaker was influenced by the English construction 'glass of beer'. The correct German construction does not take a preposition: 'Bringen Sie mir ein Glas Bier.' Other instances of syntactic transfer include the incorrect ordering of adjectives and adverbs, depending on the rules of the native language. For example, a French-English bilingual produced the sentence

* I started only to learn Russian grammar in high school (Sheen, 1980).

(Je commencé seulement a apprendre le Russe a l'école élémentaire)

Likewise, differences in adjunction and complementation cause native German speakers to use incorrect English verbs forms, as in

*It has stopped to rain (Mack, 1986)

which corresponds to the German equivalent of : 'Es hat aufgehört zu regnen'.

Traditionally, the use of the term transfer has been restricted to this one-way, native to target language transfer of linguistic elements and forms. However, transfer may not occur only from the speaker's native to his or her second language, but also vice versa, from the second to the native language.

A study by Van Vlerken (1980, cited by Sharwood Smith, 1983) supports this more symmetrical notion of transfer. In Van Vlerken's experiment, English speaking school-aged children who had lived in the Netherlands for a minimum of two years were given an English sentence building task, and an English acceptability judgment task. An analysis of the word order errors revealed that 83% of the errors produced were attributable to transfer from Dutch to English. Sharwood Smith concluded that native language competences are not fixed constructs, but should be regarded as "permeable"

(p.225). That is, transfer processes cannot be regarded as fixed, one-way influences.

In general, speakers might draw on their knowledge of different languages to produce sentences in another language. Transfer, as it occurs in second language learning, seems to involve primarily influence of the native language on the acquisition of the second language. The idea of symmetrical transfer implies that this influence might be more bidirectional, and suggests the possibility of considerable language interaction during the production process. This contradicts the idea that the languages of the bilingual are independent entities. The suggestion has been made (Macnamara & Kushnir, 1971; Kolers, 1963) that the ability of bilinguals to keep their langauges apart while talking to monolinguals indicates that the languages are processed independently, with translation serving as the connecting link. Others (Obler & Albert, 1978; McCormack, 1977), have proposed that bilinguals cannot block out their knowledge of the other language.

To investigate the rules and patterns of language interaction, researchers have studied the tendency of bilingual speakers to mix languages within utterances. In the next section I will address the question of how languages might interact in language use in terms of this phenomenon of code-switching.

## Code-switching

Code-switching is characterized by the mixing of two languages. This mixing might involve, e.g., the incorporation of single lexical items in an otherwise monolingual sentence:

"'Si va a ir *shopping*, vaya con Mickey' (Pfaff, 1979)."

(If you go shopping, go with Mickey),

or the switching of languages within the sentence:

'"*Yo sé, porque* I went to the hospital to find out.... ' (Reyes, 1974)"

(I know, because I went .......)

or the incorporation of idiomatic expressions:

'"Yo anduve *in a state of shock* por dos dias' (Pfaff, 1979)."

(I went around.....for two days)

Such mixing of languages provides an opportunity to observe language interaction during normal, time-constrained speech production. The constraints on code-switching may reveal underlying organizational factors that limit or promote the interplay of different syntactic systems.

The fact that bilinguals do switch, seemingly without effort, from one language to another while producing fluent speech led to the proposal of a mechanism in the brain which turns linguistic channels on or off depending on the language of discourse (Penfield & Roberts, 1977). Code-switching has been studied extensively for evidence of such a mechanism.

Some have tried to specify the operation time of the proposed switch. Macnamara, Krauthammer, and Bolgar (1968) showed that expressing 'linguistically neutral' stimuli (such as numbers) in linguistic form took longer for mixed language responses than for unilingual responses. The difference was taken to represent the operating time of a consciously controlled output switch. In a subsequent study, Macnamara and Kushnir (1971) compared the reading times for monolingual passages with translation-equivalent mixed language passages. The passages contained sentences with one, two, or three language switches, with the sentences being either " basically English with French words in place of English ones" (p.482), or vice versa. Half the sentences represented true statements , such as '*Douze choses* make *une dozen*', and the other half contained false sentences, such as : 'Most *fenêtres* have *cheveux*'. The reading times for switched passages were longer than for either monolingual passage. The extra reading time for the bilingual passage, divided by the number of code-switches it contained, was taken as an index of the operating time of an input switch. Macnamara and Kushnir

(1971) concluded that bilinguals have psychologically distinct language systems, and proposed a two-switch model of bilingual functioning. It included an automatic input switch (one does not choose to listen in a particular language), and an output switch that is under voluntary control. Both switches work sequentially and independently and require an observable amount of time.

The proposal has been attacked on several grounds. First, the proposal of functionally distinct language systems that can be voluntarily switched on or off may be untenable. Obler and Albert (1978), in a bilingual version of the Stroop test, asked Hebrew/English bilinguals to label in English the colors of color words written in Hebrew. The color words conflicted with the ink colors they were written in. They found that even with dissimilar orthographic systems such as Hebrew and English, subjects were unable to completely suppress the interfering stimulus words, and consequently produced errors. To the degree that Stroop interference is an output effect due to response competition (Morton & Chambers,1973; Palef & Olson, 1975; Posner,1978; but see Dunbar & MacLeod, 1984 ), this finding casts doubt on any simple, voluntary on/off switching mechanism.

Second, with respect to syntactic mechanisms, the study of Macnamara and Kushnir has also been criticized for its artificially constructed code-switches (e.g. Chan, Chan & Hoosain, 1982; Dalrymple-Alford, 1985). Some of Macnamara and Kushnir's (1971) language-mixed sentences, such as *Douze choses make une dozen,* would never be uttered by a code-switching English/French bilingual speaker. The use of such sentences reflects an underlying assumption that where and when code-switching occurs is irrelevant to its linguistic processing. Experimenters who have used natural code-switched speech, rather than constructed sentences, did not find any evidence for additional processing time for linguistically mixed texts as compared to monolingual passages (Timm, 1983).

Code-switching is probably constrained by the syntactic structure of the

languages involved and is a rule-governed rather than a random word mixing process (Pfaff,1979). Analysis of spontaneous speech has shown that the placement of code-switches occurs in regular patterns (Pfaff, 1979; Timm, 1983). In addition, subjects asked to evaluate the acceptability of code-mixed sentences consistently agree to accept some sentences while rejecting others (Poplack, 1980). Such work has suggested several syntactic constraints on code-switching. It is generally unacceptable to switch languages within words (Poplack, 1980), as in switching between a root and an inflectional morpheme (Berk-Seligson, 1986) or within the elements of the verb, for example between an auxiliary and a main verb (Timm, 1983). In contrast, code-switching is permitted at major constituent boundaries, between sentences and clauses (Pfaff, 1979). Although the switching of single words does occur in code-switched speech, the higher the constituency of an element, the more likely it is to be code-switched (Sridhar & Sridhar, 1980). So main clauses, relative clauses, noun phrases, and verb phrases are frequently switched, but the code-switching of function words, such as articles, quantifiers, and prepositions rarely occurs.

The systematicity of code-switching has led to the proposal that, through exposure to code-switched speech, code-switching bilinguals form a third grammar which is based on an integration of their separate languages (Poplack, 1980). If this is true, then bilinguals who have extensive exposure to code-switched speech should be better at judging the acceptability of mixed sentences than speakers who have little or no exposure to code-switching.

Lederberg and Morales (1985) tested this hypothesis by comparing the grammatical intuitions of Mexican-American subjects who were born in the United States, lived in a Mexican-American environment, and frequently code-switched, with those of Latin Americans who moved as adults to the United States, reportedly did not code-switch, and had no contact with code-switching communities. The groups did differ in their judgment of the

acceptability of certain constructions. The Latin Americans were less willing to accept code-switches within a noun phrase, or switches where the language of the stem of the main verb and the language of the inflection differed than the Mexican-Americans. However, the overall response patterns were similar. Both groups agreed, for example, that a code-switched verb is more acceptable than a code-switched auxiliary, and switches within noun phrases containing Spanish adjectives are less acceptable than other types of mixed noun phrases. Code-switching experience did not significantly affect the pattern of grammaticality judgments. Lederberg and Morales (1985) concluded that the rules of code-switching are primarily based on the knowledge of the grammars of the two code-switching languages, without the need to postulate a third grammar.

A quantitative analysis of mixing in conversations of Mexican-Americans supports this argument (Pfaff, 1979). It revealed that code-switching occurred mainly at points which did not entail a syntactic conflict between the two languages. For example,

I put the knives *en la mesa* ('I put the knives on the table')
is acceptable, because the phrase structure rules for generating this sentence are identical in English and Spanish, whereas the sentence

* He ran to the house *chiquita*. ('He ran to the little house')
is unacceptable, because Spanish requires the adjective to follow the noun in this case, whereas English requires the adjective to precede the noun. Recorded interviews with a Puerto Rico-American woman similarly showed that out of 400 recorded instances of code-switching, only one did not satisfy either English or Spanish surface structure constraints (Poplack, 1981). The remaining 399 instances obeyed the structural rules for both languages.

This conclusion, that the rules of code-switching are based on the grammars of the languages involved, implies that a bilingual code-switching speaker has simultaneous access to both grammatical systems. Traditionally, an "ideal" bilingual was one regarded as having equal proficiency in two

distinct languages, languages kept segregated from each other. Code-mixing was thought to be an indicator of deficient linguistic mastery (Weinreich, 1963). However, in order to fluently code-mix, bilinguals must have sufficient proficiency to observe the linguistic constraints of both languages. In the production of mixed sentences ".. not only the lexicons but the entire rule system of both languages must be simultaneously active..." (Sridhar &Sridhar, 1980, p.411).

Code-switching, then, may be the result not of deficient language mastery, but a sign of high proficiency. As Timm (1983) points out, less proficient bilinguals do not code-switch the way fluent bilinguals do. Rather, they tend to code-switch only at the level of single words, to fill lexical gaps.

A similar proposal has been made regarding native language interference in second language learners (Wode, 1977). During an eight-month observation of foreign language learning, Felix (1982) found that interference increased with proficiency level in the second language. He pointed out that this was true only for syntactic interference; phonological interference was negatively correlated with proficiency level. Felix concluded that the second language learner has to reach a certain competence in the new language before native grammatical knowledge influences the second language. This makes it unlikely that syntactic transfer involves only a translation process. If it did, beginning second language learners should show extensive syntactic transfer. Instead, it suggests that syntactic transfer, like code-switching ability, may only emerge when a second language learner attains some competence in the target language.

## Language Interaction in Models of Language Use

The evidence is strong that the syntactic systems of both languages are simultaneously active during bilingual code-switching. It is possible that such simultaneous activity is also responsible for transfer between the structural

systems of the two languages. The simultaneous activation of both languages might result in code-switching in fluent bilinguals, whereas this activation might result in structural interference in second language learners. Code-switching and transfer, though treated by researchers as separate, independent phenomena might, thus, be both a manifestation of simultaneously active languages. However, these structural factors have received little attention in recent examinations of the transfer process. Rather, researchers have focused on the roles of semantic and pragmatic factors.

The competition model represents one attempt to explain crosslinguistic interference in terms of general, nonstructural forces ( Bates & MacWhinney, 1982; MacWhinney, 1987). According to the competition model, the interpretation of a sentence relies on language specific cues based on the relationships among four language elements: lexical items, morphological markers, word order[1], and prosody. The utilization and relative dominance of these cues in assigning thematic roles to a given element varies across languages. In an attempt to explain crosslinguistic differences in sentence interpretation, Bates et al. (1982) showed that monolingual English speakers relied more heavily on word order cues in interpreting anomalous sentences than did monolingual Italian speakers, who relied more on semantic and pragmatic cues. That is, cue strength differences across languages can lead to differences in strategies of sentence interpretation. One issue in transfer is whether such strategies are applied to second languages, too.

Harrington (1987) found some support for the applicability of the competition model to second language acquisition, showing that native Japanese speakers seem to make greater use of animacy cues, whereas native English speakers seem to rely more on word order cues, consistent with the cue strength differences of the respective languages. Native Japanese second language learners, responding to sentences in English, showed both the animacy biases typical for Japanese sentence

interpretations, and the word order effects typical of English sentence processing.

The competition model points to an important factor in multi-language processing, that is, that the processing of a second language may reflect encoding and decoding patterns appropriate for one's native language. It is, however, based on the premise that there is no syntax per se, so that all instances of transfer must be reducible to cue use keyed to semantic, positional, and lexical form class information, not more abstract constituency or syntactic role information.

In a different attempt to explain a transfer phenomenon, Jordens (1986) drew on a discourse-functional distinction between 'given' information and 'new' information. He hypothesized that the given and new information are independently produced, one before the other, and that some second language acquisition errors are attributable to this independence. In spontaneous speech samples from monolingual Dutch speakers, Jordens found that native Dutch speakers acquiring German made case-marking errors in their German utterances that could be attributed to their habitual assignment of the preverbal noun phrase to subject function, as it occurs in Dutch. Jordens interpreted this as evidence for the independent production of 'given' and 'new' information. However, the same case marking errors were also produced by native German speakers, suggesting that the observed errors represent general breakdowns in sentence planning rather than syntactic transfer.

A model that emphasizes the semantic underpinnings of transfer has been proposed by MacKay (MacKay & Bowman, 1969; MacKay,1982). The model was developed to account for increasing fluency in high proficiency skills such as speech production, and how the skills acquired in practicing one performance transfer to other performances. According to MacKay, the process of language production proceeds in a hierarchical fashion. The basic components for organizing complex actions are nodes, which are

organized into different subsystems. Action planning proceeds in a top-down fashion, from the formation of a thought (arrayed over propositional nodes) to the activation of relevant muscle movement nodes for the articulation process.

Phonological and muscle movement nodes are especially well practiced for common words. However, higher level nodes, such as propositional nodes, are less well practiced because, unlike phonemes or muscle movement sequences, particular concepts do not occur as often in the same form as do phonemes. As propositional nodes are less practiced than other nodes, they should benefit most from transfer because other nodes have attained asymptotic levels. In bilingual speech production, transfer, and with it a facilitation in production speed, should occur at the level of propositional nodes rather than at the level of muscle movement nodes, as the set of muscle movements involved in the language production of a given thought varies widely from language to language.

To test this, MacKay and Bowman (1969) had German/English bilingual subjects produce a practice sentence in one language twelve times at a maximal rate. Then subjects were given either word-for-word translation equivalent sentences in the other language, or semantically equivalent sentences with different word order. The researchers found higher speech rates when the translations were phrased as word-for-word equivalents as compared to semantically equivalent sentences. MacKay (1982) attributed this effect to a contextually dependent integration of the meanings of individual words, and concluded that the observed priming effect could not be attributed to phonological or muscle movement priming, because those varied as a result of the use of different languages. Instead, according to MacKay, conceptual meaning nodes are activated during bilingual sentence production, which in turn are connected to different phonological representations.

Clearly, word-for-word translations of sentences from one language to another not only share the same semantic properties, but also many syntactic

properties. Although MacKay and Bowman (1969) found an increased priming effect for word-for-word translations as compared to sentences with different word orders, they did not attribute this to the effects that syntactic properties can have on the transfer process, but exclusively to semantic factors. Although the conceptual similarity between the experimental sentences probably contributed greatly to the observed transfer effect, the increased facilitation for word-for-word translations leaves room for syntactic transfer to have contributed to the results.

Models of the code-switching process provide a number of clues to the possible loci of syntactic transfer. Sridhar and Sridhar (1980) proposed an interactionist model of overlapping systems to explain the patterns of bilingual code-switching. A distinction was made between the host language, the primary language of the discourse, and the guest language, the source language for mixed elements. The model proposed a comparison stage, where the guest constituents are checked for their syntactic compatibility with the host language. According to Sridhar and Sridhar, the placement of a guest element has to obey the rules of the host language, regardless of the internal structure of the guest element. They suggested that bilingual mixed language production involves an "assembly line process"(p.414) where the syntactic fit of the guest elements into the host language is checked before the mixed language is produced.

In this model, the constituent structures for the sentence are generated, and elements of another language are inserted into this frame. Applied to the phenomenon of transfer, such a model does not encompass the possibility of structural influence across languages in fluent bilinguals. Although the model involves the simultaneous activation of both syntactic systems, there is no interaction between both systems at a level prior to the specification of lexical elements of the guest language. These elements of the guest language are checked for their syntactic compatability within the host language only after the host language has been assigned to the sentence. Thus, one language

provides the structural frame of the sentence, with elements of the other language being checked for their syntactic fit before insertion into the host language. The model does not predict any structural interaction independent of the lexical elements.

In contrast, Woolford (1983) has proposed a linguistic model of code-switching in which bilinguals switch freely between grammatical systems to generate a constituent structure tree. The two grammars of a bilingual are not altered in any way, but operate just as they do in producing monolingual speech. However, during code-switching each grammar generates only part of the sentence. At places where the structural rules of the two languages overlap, the speaker has joint access to both grammars because the rules are in fact indistinguishable, eliminating the need for a specific language assignment.

For the case of transfer, Woolford's model would make different predictions depending on whether there is phrase structure overlap between the languages involved. If there is no constituent structure overlap, Woolford's model would not predict transfer, since only one grammar would generate sentence parts where there is incompatibility of the grammars of both languages. However, if there is constituent structure overlap between languages, then transfer should occur as the speaker has simultaneous access to both grammars. According to Woolford's model, both lexicons of bilinguals remain entirely separate from each other. If a phrase structure rule is drawn from an area of constituent structure overlap between both languages, it cannot be distinguished as either language, and belongs to simultaneously to both grammars. Thus, this model would predict structural influence across languages at places of constituent structure overlap, independent of lexical elements, as the sentence frame is formed prior to the insertion of lexical elements.

Although models of code-switching emphasize syntactic aspects of bilingual speech production, they have had no impact on explanations of

transfer. Models of transfer focus on semantic and pragmatic factors, which may be necessary to explain transfer, but may not be sufficient. If the syntactic systems of both languages can be simultaneously accessed during bilingual production, then certain of the phenomena associated with code-switching and transfer might both be explained in these terms. But to my knowledge, the role of syntactic transfer in bilingual language production has not been assessed under circumstances that minimize the contribution of semantic and pragmatic factors.

## An Experimental Paradigm to Study Syntactic Transfer

The studies on bilingual code-switching seem to point to the simultaneous availability of the structural systems of both languages during code-mixed speech, with shared constituent structures favored for switches. The relevance of this to transfer can be assessed with a phenomenon that is common in normal monolingual speech production. It shows up as a tendency to repeat syntactic structures which have occurred in previous sentences. In conducting sociolinguistic interviews, Weiner and Labov (1983) found that the probability of a passive construction increased after the occurrence of another passive in the previous five sentences. Levelt and Kelter (1982) compared the responses to telephone questions such as 'At what time does your shop close?' with responses to questions like 'What time does your stop close?'. The form of the answers depended on whether the question was phrased in the prepositional form or not. The prepositional question was likely to be answered with 'At five o'clock', whereas the nonprepositional question was more likely to be responded to with the answer ' Five o'clock'.

Bock (1986,1987, in press), and Bock and Loebell (1988) have shown that this tendency cannot be explained by word repetitions, persistence of detailed meaning features, or event structure organizations. Instead, it seems

to involve the persistence of a syntactic structure. In the priming procedure used in these experiments, subjects produced a priming sentence in one of two different syntactic forms (e.g. 'The governess made a pot of tea for the princess' or 'The governess made the princess a pot of tea). Following such priming sentences subjects described a semantically and narratively unrelated picture (e.g. a man reading a story to a child) which could be described in either syntactic form ('the man is reading a story to the child' or ' the man is reading the child a story'). The frequency of use of a particular syntactic form changed as a function of the syntactic form of the priming sentence, with matching forms being used more often than mismatching forms. Similarly, Bock (1986) found that subjects' tendency to use a passive sentence increased as a function of having heard a passive priming sentence, compared to subjects who received the same priming sentence in the active form. The priming trials were embedded in a mixed list of sentences and pictures, introduced to the subject as a recognition memory test. The subject repeated the sentences, described the pictures, and indicated whether the item had occurred previously in the list. This was done as to minimize the subject's attention to his/her speech. The obtained findings of structural influence suggest syntactic forms can be primed, even when the semantic content of successive sentences is dissimilar.

This experimental procedure allows an empirical examination of syntactic transfer between languages in a controlled experimental setting, minimizing the effects of shared content. If, during bilingual language production, the activation of structural procedures in one language influences the use of corresponding procedures in the other language, or if the same procedures are involved at some level, then a syntactic priming effect should be elicited across languages just as it was found within a language. This prediction accords with Woolford's (1983) proposal that phrase structure rules that are identical in two languages belong simultaneously to both languages, as they cannot be distinguished as belonging to one particular language. In

contrast, if the processes that create syntactic forms in bilinguals are separate, come from isolated systems, or are controlled completely by the conceptual features of the thoughts that are communicated, then the syntactic form of a priming sentence should not influence the syntactic form of a picture description, unrelated to the prime in meaning, produced in a different language.

German and English are two languages that share several syntactic features, and are thus well suited for such an experimental assessment. Although German is a highly inflected language that shows greater constituent order flexibility than English, several grammatical functions are expressed similarly. Like English, German has two semantically comparable dative constructions. Thus,the sentence:

'The boy sent a letter to his pen pal'

can be expressed as an exact constituent-mapping equivalent in German:

'Der Junge schickte einen Brief an seinen Brieffreund'[2]

The double-object form of the English dative:

'The boy sent his pen pal a letter'

corresponds to the German:

'Der Junge schickte seinem Brieffreund eine Brief.'

Likewise, the transitive, active sentence

'The janitor cleans the floors daily'

corresponds to the German sentence

'Der Hausmeister reinigt die Böden täglich.'

However, German passive constructions are formed by moving the verb to the final position of the sentence. So, the sentence

'The floors are cleaned daily by the janitor'

translates to the German sentence

'Die Böden werden täglich von dem Hausmeister gereinigt'

where 'gereinigt' is the past participle of the verb 'reinigen' ('to clean'), and occurs at the end of the sentence.

The phrase structure rules for generating the German passive are thus not identical to the comparable English phrase structure rules. So, according to Woolford's (1983) model, the phrase structure rules for generating passive constructions do not belong simultaneously to both languages. If the overlap of phrase structure rules is crucial, then cross-linguistic syntactic priming effects would not be expected for German/English passive constructions.

Investigating the importance of phrase structure rules in monolingual sentence production, Bock and Loebell (1988) found evidence that phrase structure correspondence is essential for syntactic priming. The sentences:

a. Susan brought a book to study.

b. Susan brought a book to Stella.

have similar word orders and similar metrical patterns, but the constituent structures vary considerably. If phrase structure similarities are necessary for syntactic priming, then a priming sentence like (b) should increase the probability of subsequent use of the prepositional dative form, whereas priming sentences like (a) should not, relative to a control form. This is what Bock and Loebell found. Conversely, sentences with constituent structures similar to target forms but representing different thematic roles showed comparable priming effects, relative to control forms. Thus, 'the wealthy widow gave her Mercedes to the church' and 'the wealthy widow drove her Mercedes to the church' behaved similarly as primes, even though the thematic roles of 'the church' differ. Such findings suggest that the processes that create sentence structures are to some degree dissociable from underlying thematic relationships. So, monolingual priming effects seem to tap phrase structure similarities. Across languages, then, phrase structure similarity should yield cross-language priming effects, if the procedures for generating the structures are shared by both languages.

# CHAPTER II

## EXPERIMENT 1

### Method

Subjects. 48 native German speakers living in Michigan served as subjects. Each subject received $10 for participating in the two experimental sessions. In order to qualify as a subject, the German speakers had to have lived a minimum of 2 years in the United States. Most subjects had studied English extensively in school prior to coming to the United States. All of them were able to converse fluently in both languages. Their median age was 39 years (range 18-66), and the median length of residence in English speaking countries was 16 years (range 2-36). Appendix A lists the subjects, their age, occupation, and length of residency in an English speaking country.

Materials. The German materials were analogous to the English materials. For brevity, only the English ones will be described.

The experimental priming materials consisted of 16 sets of dative sentences, each paired with a dative target picture, and 16 sets of transitive sentences, each paired with a transitive target picture. Within the pairs, systematic narrative or semantic relationships were avoided. Appendix B contains a complete list of the priming materials.

Each of the 16 dative sentence sets included one prepositional dative (e.g. the girl read the newspaper to the blind woman), and the corresponding double-object form of the dative (the girl read the blind woman the newspaper). Each item was paired with a picture that could be described in either a prepositional or in a double-object dative form. All the dative priming pictures depicted an action that involved an agent, a patient, and a

beneficiary of the action (e.g. children giving flowers to a teacher). Half the pictures depicted an action proceeding from left to right (the actor situated in the left part of the picture, and the beneficiary in the right part of the picture). In the other half of the pictures, the action proceeded from right to left.

The remaining experimental items consisted of 16 transitive sentences pairs, each including an active and a corresponding full passive form. Each of these was paired with one of 16 pictures that could be described with a sentence in either an active or a passive form. All the transitive pictures involved an agent and a patient. All of the pictures depicted an event with an inanimate agent, one half with an animate patient, the other half with an inanimate patient. Half showed the agent on the left, and the other half on the right side of the picture.

In addition to the experimental priming materials, there were 80 filler items, 40 pictures and 40 sentences. Most of the filler pictures depicted actions or states that were described with intransitive sentences, e.g. a cat sleeping, two girls running. The filler pictures, as well as all experimental priming pictures, consisted of black and white line drawings. The filler sentences were in a variety of constructions, such as locatives, reflexives, and complement constructions. All the sentences had natural literal translations in German. Sentences that had language specific words in them, such as names that exist only in one language, were excluded. Most of the pictures and many of the sentences were adapted from experiments performed by Bock (1986).

From the pool of experimental priming and filler items, two lists of 224 items were created. They contained only English sentences. The grammatical correctness of the English sentences was checked by a native English speaker. Both lists had identical filler pictures, filler sentences, and experimental target pictures. Each list had an equal number of each type of priming trial (8 prepositional datives, 8 double-object datives, 8 active transitives, and 8 passive transitives). Each priming sentence set was

represented one and only one priming trial in each list. Across lists, both priming sentences from the set with which a picture was paired occurred once. The sentences from the same set appeared in the same location in both lists. Each priming sentence immediately preceded its paired picture. These priming trials were always separated by five filler items. Consecutive priming trials never involved the same type of sentence/picture pairs (transitives versus datives). There were no more than three consecutive sentences or pictures, and care was taken that consecutive items were semantically and narratively unrelated. The filler items were randomly arranged within the lists, with each filler item occurring twice within each list. One-sixth of the filler items were repeated in the first third of each list, an additional one third were repeated in the next third of each list, and the final half of the filler items occurred as repetitions in the last third of the list.

The pictures for each English list were photocopied and taped onto 15x22.5 cm index cards for presentation to the subjects. Blank index cards occurred in the list positions where sentences were presented. The sentences were read by the experimenter.

Two additional lists contained the literal translations of the English sentences into German. Their translations were checked by two native German speakers (other then the experimenter) for naturalness and grammaticality.

Procedure. The experiment was divided into two sessions for each subject. Both parts took place in the subjects' homes. Half the subjects received one of the German lists in the first session, and the other half received one of the English lists first. In the second session, the subject received the alternative list (not the translation-equivalent list) in the other language. The two sessions were separated by a minimum of one week, and each of them was recorded on audio tape. All the experimental meetings were conducted by the author who speaks fluent English, though it is accented.

The subjects were told that the experiment tested the influence of the two languages on picture and sentence recognition. They were instructed, in German, to carefully examine each picture and listen to each sentence in order to be able to recognize them later. Subjects indicated after each picture and each sentence whether they had encountered that particular item before in the experiment. This was the recognition-memory mask for the experiment, used to minimize the subject's attention to his or her speech. Three practice trials established that the subject correctly understood the procedure.

Subjects turned the index cards at their own pace. When they reached a picture, they described what was happening in the picture in one sentence without using personal pronouns, and then said 'yes' or 'no' depending on whether they had encountered the picture before during the session. Subjects described the pictures in the language that differed from that used in the list, so German primes (for example) were followed by English picture descriptions, and vice versa.

Whenever a subject reached a blank card, the experimenter read a sentence, at a normal rate and with normal intonation. Subjects were instructed to repeat the sentence after the experimenter and to indicate with 'yes' or 'no' whether they had heard the sentence before in the current experimental session. When repetition errors occurred, the experimenter repeated the entire sentence, and the subject said it again. In the rare cases when the subject was unable to retrieve a word needed to describe a picture, the experimenter supplied the relevant word. The experimenter provided feedback after each experimental item to indicate whether the subject's yes/no recognition response was correct.

After the first experimental session, the subjects answered questions concerning their language history. Appendix C gives the questionnaire, which was adopted and modified from a questionnaire by Schwanenflugel and Rey (1986). The questionnaire was phrased in German, and the subjects responses, also in German, were recorded. Finally, after completing the

second experimental session, subjects were asked, in English, whether they had recognized any similarities between the sentences and the pictures, whether they had mentally translated from one language to the other, whether the sentences appeared to be in any way unusual, and whether they thought that the sentences they heard influenced their picture descriptions. None of the subjects reported noticing any structural similarities between the priming sentences and experimental pictures or thought the sentences unusual. None of the subjects reported mentally translating from one language to the other before responding.

Scoring. The descriptions of the experimental pictures were transcribed from the audio tapes and scored for their syntactic form. Only the first full sentence in each picture description was scored. All responses in the categories described below had to include a complete clause without personal pronouns, except for omissions of articles and the copula. Only those picture descriptions were used for which the corresponding syntactic form was also possible. For example, to be scored as an English active, a sentence had to have a grammatical passive counterpart with its subject as the by-phrase object and its direct object as the subject.

Dative picture descriptions produced in English were scored as prepositional datives when the agent was the subject, the patient was the direct object immediately after the verb, and the beneficiary followed the direct object as the object of the prepositional phrase. Descriptions were scored as double-object datives when the agent was the subject, the beneficiary was the direct object, and the patient was the second object. Prepositional- and double-object datives produced in German were scored according to the same criteria.

Transitive picture descriptions produced in English were scored as active when the description included the agent of the depicted action in subject position and the patient in direct object position. Passives were scored when the patient was in subject position, and the agent in object position within a

by-phrase, and the main verb was preceded by a form of be or get. Transitive picture descriptions in German were scored as active according to the same criteria as the English descriptions. However, in the German passive, the main verb is placed at the end of the sentence, following the agent. The patient is in subject position, the agent in object position within a prepositional phrase (in German *von*), and the main verb is preceded by a form of *werden* (corresponding to the English verb 'be' ).

In cases when a subject asked the experimenter for lexical help before producing a sentence, the responses were scored as 'other'.

Design and Data Analysis. Every subject described 8 transitive pictures in each of the two transitive priming conditions (active and passive) in each language (German priming sentences with English picture descriptions; English priming sentences with German picture descriptions), and 8 dative pictures in each of the two dative priming conditions (double object and prepositional) in each language. The design was completely within subjects, with every subject contributing to every experimental condition.

Analyses of variance were performed on the number of responses produced by each subject in each experimental condition. Separate analyses were done for dative utterances, with prepositional and double object datives as dependent variables, and for transitives, with active and passive utterances as dependent variables. Analyses were also done separately treating subjects and items as random effects.

Results

The totals for each utterance type for the dative priming conditions are presented in Table 1.

---------------------------------------

Insert Table 1 about here

---------------------------------------

There was a general tendency for the form of the utterance to match the form

Table 1

<u>Number of Utterances in Dative Priming Conditions</u>
<u>Experiment 1</u>

Form of utterance

| Priming condition | Prepositional | Double-object |
|---|---|---|
| | German utterances | |
| English Prepositional dative | 42 | 196 |
| English Double-object dative | 39 | 211 |
| | English utterances | |
| German Prepositional dative | 210 | 52 |
| German Double-object dative | 185 | 79 |

of the prime, regardless of language. This effect was strongest for double object utterances. The number of double object utterances was higher when the preceding prime was a double object form than when the prime was a prepositional form ($F$ (1,47)=5.31, $p < .05$ for subjects; and $F$(1,15)=4.84, $p<.05$ for items).

For prepositional dative utterances, there was a similar tendency to use the same structural form that was provided in the priming sentence to describe pictures. However, it was only marginally significant over subjects ($F$(1,47)=2.79, $p=.10$), and not significant over items ($F$(1,15)=2.75, $p=.12$).

The pattern of results was roughly the same regardless of the language of the prime, as reflected in the absence of significant interactions between language and priming condition for the production of both prepositional ($F$(1,47)=1.90, $p>.10$ for subjects, and $F<1$ for items) and double object datives ($F$(1,47)=1.34, $p>.10$ for subjects, and $F< 1$ for items).

There were more prepositional dative utterances in English ($F$(1,47)=110.47, $p< .01$ for subjects, and $F$(1,15)=85.13, $p<.01$ for items), and more double object datives in German ($F$(1,47)=91.52, $p<.01$, and $F$(1,15)=75.41, $p<.01$). These differences reflect a language bias: The prepositional dative is much more restricted in German than in English.

The results for the transitive priming conditions are given in Table 2.

-----------------------------------

Insert Table 2 about here

-----------------------------------

There was no influence of the priming sentence in one language on the syntactic form of the picture description in the other language (for all actives F's < 1; for passives $F$(1,47)=2.34, $p>.10$ over subjects, and $F$(1,15)=1.24, $p>.10$ over items). Interactions with language were also nonsignificant (all F's < 1).

The fluency of the bilingual subjects is attested by their questionnaire responses. 56% of all subjects could not specify one particular language as

## Table 2

### Number of Utterances in Transitive Priming Conditions
### Experiment 1

Form of utterance

| Priming condition | Active transitive | Passive transitive |
|---|---|---|
| | German utterances | |
| English Active Transitive | 89 | 117 |
| English Passive Transitive | 89 | 105 |
| | English utterances | |
| German Active Transitive | 98 | 140 |
| German Passive Transitive | 94 | 132 |

being their strongest language. 42% of the subjects used English at home as the language of communication, with an additional 30% using both languages. Asked to subjectively rate their level of competence in their languages on a scale from 1(rather bad) to 7(native like), subjects ratings their English skills yielded a mean of 6.5, and their German skills a mean of 6.8, reflecting a high degree of perceived bilingual competence.

## Discussion

This study has provided some evidence that for sentence forms with similar constituent structures, in different languages, syntactic transfer may occur even when the possibilities for semantic transfer are minimized. For these forms, in the speech of very fluent bilinguals, the structural aspects of either language may transfer. Although this effect appears stronger when the native language primed the second language than vice versa, this interaction did not reach significance. If such results can be replicated and extended, it contradicts the common view that transfer is associated only with a weak second language. Instead, transfer may be more closely symmetric, and at best bidirectional.

The priming effect was more clearly evident for the double-object dative utterances than for the prepositional datives. This may be attributable in part to prescriptive German grammar rules that forbid the prepositional dative form when the preposition is followed by a dative-inflected noun phrase. Addressing the usage of this form, Kufner (1962) wrote: "Once again we must make it clear that this possibility is a peculiarity of English and it cannot be transferred to German. Extensive drills are needed to avoid this mistake (p.44)." These prescriptive grammar rules might contribute to a weaker tendency for prepositional dative utterances to be primed by preceding utterances of the same type. However, most of the native German speakers who participated in the study used this construction and none of them reported that it sounded awkward.

The transitive constructions failed to produce syntactic correspondence in the subsequent picture descriptions. For passives, this might be due to cross-language differences in constituent representations. The phrase structure of the English passive is different from the German, in that German puts the main verb at the end of the sentence.

The weakness in this account is that English and German active sentences do share the same constituent structure, and they also did not show a priming effect. A more parsimonious summation is that the priming effects for transitives were simply too weak to reveal differences between passives and actives. Bock's work (1986) suggests that transitive priming effects may be less stable than dative priming effects, so that any transfer of their syntactic structure might go undetected in a cross-language condition.

However, the absence of transfer in the mapping of thematic roles to grammatical functions in passives is consistent with other research on the effects of thematic role assignment on the priming of syntactic constructions (Bock and Loebell, 1988). As in intralanguage priming, cross-language phrase structure similarity may be the most important component of transfer. This accords with Woolford's (1983) proposal that phrase structure rules that are identical in two languages belong simultaneously to both languages, as they cannot be identified as belonging to one particular language. The priming of a structural representation in one language would then lead to an increased probability of using the same structural configuration in a subsequent sentence in either language.

# CHAPTER III
# EXPERIMENT 2

The first exeriment presupposes that structural priming occurs within each language. Thus, in a monolingual setting, the structure of one language should predispose the production of the same structure in a subsequent sentence. Bock (1986, 1987, in press) has shown that such processes occur for English speakers. The following experiment assessed whether such a structural influence can also be found within a monolingual German setting.

The dative priming effect in Experiment 1 may be attributable, at least in part, to a phrase structure overlap of the two languages involved, German and English. Such effects should also occur within a monolingual setting where there is phrase structure overlap. Moreover, active and passive priming should be obtained. To assess the reliability of within-language syntactic priming, the second experiment examined structural persistence effects in a monolingual German setting.

This experiment also examined a complexity of German dative forms. The inflectional system of German allows three possibilities for forming datives (prepositional, double object, and inflectional). Two of these correspond transparently to the English dative forms:

'Der Junge schrieb einen Brief an seinen Brieffreund.'

('The boy wrote a letter to his penpal.')

and

'Der Junge schrieb seinem Brieffreund einen Brief.'

('The boy wrote his penpal a letter.')

However, the third possibility has no exact English equivalent:

'Der Junge schrieb einen Brief seinem Brieffreund'.

This form corresponds roughly to the prepositional form, but with the preposition represented in appropriate noun inflections.

Experiment 1 employed only German prepositional dative constructions, ( constructions containing a free preposition), as priming sentences, since only this dative construction has a structural equivalent in English. In the English-German priming condition the inflectional dative form was occasionally used (out of 514 dative picture descriptions in 26 (5.06%) responses). However, the numbers were roughly equivalent across priming conditions.

Experiment 2 investigated priming effects for all three German dative constructions in a monolingual German setting. Each of the three forms served as priming sentences, followed by a picture that could be described in any of the forms. The results of this experiment should help to establish whether constituent structure is sufficient for syntactic priming to occur. If it is, all of the sentence forms examined should tend to be used more often after similar than after dissimilar primes.

To the extent that factors such as thematic or grammatical roles are involved, prepositional and inflectional forms should prime each other, as well as themselves. This is because the assignment of thematic roles to grammatical functions is the same in both dative forms. If the German inflectional dative is analogous to the German prepositional dative at some level of processing that trades in such roles, they should behave somewhat similarly as priming sentences, eliciting both prepositional and inflectional descriptions more often than double object descriptions.

## Method

Subjects. 48 monolingual native Germans living in West Germany participated as subjects. Although all West Germans have some contact with English, all the subjects were drawn from a largely monolingual German

environment. None of the subjects reported fluency in another language besides German, and none of the subjects had regular contact with speakers of other languages. An attempt was made to equate the subjects of Experiment 1 and 2 with respect to their age and educational level. The median age of the subjects was 41 (range 18-72).

Materials. There were 16 sets of transitive priming sentences, each paired with a transitive picture. These materials were identical to the German materials used in Experiment 1.

In addition to the transitive priming sets, there were 18 sets of dative priming sentences, each paired with a dative picture. Each set consisted of three different forms of the priming sentence, the prepositional form, the inflectional form, and the double object form, as described above.

Each priming trial was separated by 12 filler items, including one priming trial of the other type, with no two priming trials of the same type occurring consecutively within a list. To accommodate the two additional dative priming trials in this experiment, there were twenty additional filler items at the end of the list to separate these priming trials. These fillers were similar to the other filler items.

The priming sentences, the priming pictures and the filler items were assigned to six 244-item lists. The constraints on list construction were identical to those in experiment 1, with list arrangements that counterbalanced dative and transitive priming trials within and across the lists.

Procedure. The procedure followed that described for Experiment 1, except that each subject received only one list and repeated the sentences and described pictures only in German.

Scoring. The scoring of the transitive and dative picture descriptions was carried out as described in Experiment1. Additionally, an inflectional dative required the theme to be followed directly by beneficiary, with the theme marked with the accusative and the beneficiary with the dative inflection.

<u>Design and Data Analysis.</u> Each subject described 8 transitive pictures in each of the transitive priming conditions (active and passive) and 6 pictures in each of the dative priming conditions (prepositional, inflectional, and double object). The design was again completely within subjects. The analyses were done separately with subjects and items as random effects.

## Results

The total numbers of dative utterances as they occurred in each condition are presented in Table 3. Too few prepositional and inflectional forms were produced to merit analysis, so only the double object forms were evaluated statistically.

------------------------------------

Insert Table 3 about here

------------------------------------

Analyses of variance were performed on the number of responses produced by each subject in each experimental condition. For double object utterances, though there was a tendency toward increased occurrence after double object primes, this difference was not significant ($\underline{F}(2,94)=.71,\underline{p}>.10$, and $\underline{F}(2,34)=1.61,\underline{p}>.10$ respectively for subjects and items).

The results for the transitive priming conditions are given in Table 4.

------------------------------------

Insert Table 4 about here

------------------------------------

There was again a slight tendency for the primed syntactic form match the syntactic form of the following picture description, but again none of the effects reached significance; for actives( $\underline{F}(1,47)=1.00,\underline{p}>.10$, and $\underline{F}(1,15)=0.67,\underline{p}>.10$, for subjects and items respectively); or for passives ($\underline{F}(1,47)=0.71,\underline{p}>.10$, and $\underline{F}(1,15)=0.92,\underline{p}>.10$, for subjects and items respectively).

Table 3

Number of Utterances in Dative Priming Conditions
Experiment 2

|                     | Form of utterance | | |
|---------------------|---------------|---------------|--------------|
| Priming condition   | Prepositional | Double-object | Inflectional |
| Prepositional dative | 12           | 128           | 15           |
| Double-object dative | 6            | 146           | 4            |
| Inflectional dative  | 6            | 138           | 6            |

Table 4

Number of Utterances in Transitive Priming Conditions
Experiment 2

Form of utterance

| Priming condition | Active transitive | Passive transitive |
|---|---|---|
| Active Transitive | 115 | 86 |
| Passive Transitive | 106 | 93 |

Discussion

The monolingual experiment produced priming patterns that were generally in line with the predictions of the constituent structure hypothesis, but the trends were weak and unreliable. Overall, more double object utterances were produced after double object priming sentences than the other types of priming sentences, and more prepositional dative utterances followed prepositional priming sentences.

The only departure from the predicted results appeared for inflectional datives. Inflectional utterances more often followed prepositional priming sentences than others. Such a result suggests that the assignment of thematic roles to grammatical functions might have contributed to the choice of syntactic form in the production process, since prepositional and inflectional datives share thematic to grammatical role mappings. However, so few inflectional datives were used that this conclusion must remain tenuous, at best.

The small number of prepositional and inflectional dative utterances is traceable to their role in German. Just as prescriptive grammar rules do not allow for prepositions to be followed by dative objects (see Kufner,1962), the inflectional form of the dative is similarly problematic. It may sometimes be used to put emphasis on the second noun: Collins' German Grammar (1985) states that "A direct object usually follows an indirect..but the indirect object can be placed last for emphasis, providing it is not a pronoun (p.224)." However, the experimental conditions rarely should have satisfied the contextual conditions necessary for such constructions, resulting in very few appearances of the form.

For transitives, there was again a small but nonsignificant tendency for utterances to match the syntactic form of the prime. Though little can be made of such weak effects it may be worth observing that the transitive priming results differ from those obtained in Experiment 1. Whereas Experiment 1

obtained a somewhat reversed priming effect for passives, with utterances showing no positive tendency to match the priming sentence, both active and passives in Experiment 2 patterned in the expected direction. Thus, matching constituent structure might be the best predictor of priming effects both within and across languages.

# CHAPTER IV
## GENERAL DISCUSSION

Two experiments were conducted to investigate syntactic aspects of bilingual language production. Experiment 1, using fluent English/German bilinguals, showed that syntactic transfer can occur from English to German, and vice versa, at places where there is structural overlap between languages. In the dative condition the constituent structures of English and German double-object and prepositional datives are identical. As predicted, subjects more often produced a given syntactic form in their picture descriptions when it matched the form of the preceding priming sentence than when it mismatched, even though the priming sentences were in a different language from the picture descriptions. This effect was reliable for double-object datives but marginal for prepositional datives, perhaps because of the marginal status of such forms in German. Although the priming effects appear somewhat stronger for native language to second language priming than vice versa, the interaction was not significant. At a minimum, then, there appears to be some transfer from the weaker to the stronger language.

At the level of constituent structure elaboration, Woolford (1983) proposed that phrase structure rules common to both languages belong simultaneously to both languages. Since the phrase structure rules for generating English dative constructions have analogs in German, the production of a dative sentence in one language should predispose the use of the same sentence structure in a subsequent utterance in the other

41

language. The dative priming condition of Experiment 1 provided some support for this claim.

In the transitive priming condition, no significant priming effects were obtained. This was predicted for the passive sentence constructions, as the constituent structures of these constructions vary in English and German. However, active sentence constructions, which have the same constituent structure in both languages, also did not produce a significant increase in the number of active responses.

Experiment 2 replicated the first experiment in a monolingual setting. Although the overall pattern of results favored more frequent use of forms that matched primes among datives as well as passives, none of these effects reached significance.

The results of the first experiment have implications both for models of transfer as well as for attempts to explain code-switching phenomena. Attempts to explain transfer have been restricted to transfer of semantic and conceptual properties (MacKay, 1982; MacKay & Bowman, 1969; Harrington, 1987). These models do not address the possibility of syntactic transfer, independent of semantic properties. However, under circumstances that minimized semantic transfer, Experiment 1 showed that bilinguals transfer dative structures somewhat independently of semantic properties. Furthermore, these processes seem to operate in both directions in fluent bilinguals.

In contrast to models of transfer, models of code-switching do address syntactic processes in bilingual language production. Several investigators have pointed to the rule-governed occurrence of code-switches (Pfaff, 1979; Poplack, 1980,1981; Timm, 1983), and have suggested that the syntactic systems of both languages might be involved in determining the acceptability of code-switches (Sridhar & Sridhar, 1981; Woolford, 1983). However, the phenomena of code-switching are generally regarded as distinct from those of transfer. In light of these limitations of previous attempts to explain transfer

and code-switching, the present research might be regarded as a connecting link. It incorporates the transfer of structure with the issue of syntactic interaction in fluent bilinguals.

Although bilingual production is complicated by the need to segregate, integrate, and coordinate information from two languages, it can be viewed from the perspective of models of normal processes. Bilinguals have to transform an abstract thought representation into a structured linguistic form. On a non-linguistic thought-processing level, bilinguals probably have one conceptual store that serves as the input to either language (Hakuta,1986). On the other end, the phonological forms of words are separated. So, for example, the concept of 'tree' has two phonological representations for a German/English bilingual: The English /tri/ and the German /bawm/. Thus, somewhere in the transition from a thought to an actual utterance, a common system becomes divided.

Psycholinguistic models of language production have attempted to specify how abstract linguistic representations are transformed into speech. Such models suggest that the syntactic and lexical elements of a sentence are to some degree separable. Some of the evidence for such separability comes from naturally occurring speech-errors, such as "Start the boat on the motor" [motor on the boat], and "She's already trunked two packs"[packed two trunks] (Garrett, 1975). The natural account of such errors, found across virtually all models of production (Bock, 1982, 1987; Dell,1986; Garrett, 1975, 1980, 1982; Sternberger,1985) is that the syntactic frame for an utterance is specified somewhat independently of the words it contains.

If the syntactic elements of an utterance are specified to some degree independently of the lexical elements, then the possibility arises that during bilingual language production, the processes that create the syntactic frame of an utterance do not vary from the processes as they occur in monolingual production at places where there is constituent structure overlap between languages. If bilingual production is similar to normal production, the

phonological forms of words may be inserted into the slots of the frame as it develops. Considerable research has been concerned with whether these words originate in a common lexicon, though the questions have more often concerned semantics than phonology.

Some researchers have maintained that there are different lexicons, functionally separate (Kolers, 1963, 1966; Paivio & Lambert, 1981; Paivio & Lambert, 1988), while others maintained that they function interdependently (Caramazza & Brones, 1980; Mc Cormack, 1977; Schwanenflugel & Rey, 1986). Kolers and Gonzalez (1980, p.54) concluded that "on the basis of census alone, there is more evidence for the interdependence than for the independence hypothesis. However, Hakuta (1986) cautioned that it is often unclear what experimental studies are tapping, and that methodological problems and different procedures make it impossible to draw definite conclusions.

Grosjean (1982) noted that recall tasks of isolated words might reflect more about strategies for recalling word lists than about lexical organization. Paradis (1980) pointed out that many studies fail to make an explicit distinction between a conceptual memory store independent of language and a linguistically constrained semantic store. Whereas the conceptual representation of propositions is likely to be language independent, lexical items may be specified for their meaning and grammatical category in a language-dependent way. 'Data-driven' tasks, such as word fragment completion studies (e.g. Watkins & Peynircioglu, 1983), might successfully tap language dependent stores. On the other hand, conceptual representations in bilinguals are likely to be shared, and studies which report no evidence for language specificity, such as studies that show cross-language influences, might reflect this conceptual system.

Paradis (1980) proposed a model in which the bilingual has two lexicons, one for each language. These lexicons are in turn connected to a conceptual store that represents experiences, concepts and mental

representations in a language-free way. According to Paradis, the greater the number of conceptual features shared by a word and its translation equivalent, the more they will tend to elicit the same responses, i.e., they will tend to be associated with each other. Similarly, Potter,So, Von Eckardt, and Feldman (1984) proposed that lexical items are connected both within and between languages via a conceptual system that is independent of language. The contradictory findings about the semantic organization of bilinguals might reflect a confounding of lexical and conceptual factors which makes experimental outcomes task-dependent.

Thus, there is little consensus on the nature of the organization of the bilingual lexicon. Nevertheless, researchers have focused on the bilingual lexicon to the exclusion of syntactic factors to explain bilingual language production. The research presented here found evidence that syntactic factors play a role in bilingual language production somewhat independently of semantic factors.

Several questions remain. Although these experiments tried to eliminate most conceptual factors, there may be hidden influences of conceptual factors. It is possible that instead of or in addition to the phrase structure, the event role structure conveyed by an utterance plays an important part in cross language influences. Though event roles have been found to have little impact on the formation of constituent structures in English sentences, it is still necessary to look at these processes in bilingual production.

Furthermore, the sentence types employed to investigate syntactic transfer were limited to datives and transitives. It remains to be seen if the findings can be extended to include other types of sentences.

A further limitation of this study is its restriction to only two languages. English and German, both Germanic languages, share many sentence constructions with similar constituent structures. Constituent structure similarity appeared to be a major determiner of transfer in these closely related languages. Investigating transfer between less closely related

languages might reveal other factors that determine transfer.

Another possible extension of the present experiments might forge a tighter connection between transfer and code-switching. Using the same research paradigm, bilingual subjects could be asked to switch languages during their picture description. Depending on the form of the preceding priming sentence, the switching point in the picture description might change. Furthermore, in a highly inflected language such as German, the inflections on nouns and articles prior to the onset of a code-switch might reveal the structure of the attempted utterance prior to the code-switch. These inflections might be influenced by the syntactic form of the preceding utterance.

Finally, although the present research has found some support for cross-language transfer of syntactic factors, some effects were weak and unreliable, and need to be replicated with more subjects.


Conclusion

Two experiments explored a set of hypotheses about the functional separation of linguistic systems in bilinguals. Using an experimental paradigm that minimized content overlap across utterances in different languages, the experiments examined whether and how the production of sentences with certain structural features in one language changed the likelihood of producing sentences with similar structural features in a different language. Experiment 1 provided some evidence for the hypothesis that the processes that created the constituent structure representation of a sentence might be shared across languages when the phrase structure rules have analogs in both languages.

The literature on transfer has focused almost exclusively on the semantic aspects of transfer, largely ignoring syntactic aspects. The present experiments showed that structural transfer in bilinguals may be bidirectional. As the literature on code-switching suggests, during code-switching both

languages are simultaneously active. The current results suggest that transfer and code-switching might both be reflections of the same underlying processes of interacting linguistic systems.

Gass and Selinker (1983) pointed out that more analytical studies of transfer are needed to assess actual second language learners under clearly specified conditions. Addressing code-switching, Sridhar and Sridhar (1982) noted that "syntax has been a stranger to the psychology of bilingualism." They argued that here is a pressing need in psycholinguistic research on bilingualism to study sentential processing with adequate attention to syntactic factors. This study takes steps in these directions.

# Footnotes

[1]The use of 'word order' in the competition model refers to the serial string of words within a sentence, rather than a structural representation of a sentence.

[2]The sentence: 'Der Junge schickte einen Brief an seinen Brieffreund' does not contain dative case inflections. The case inflections indicate that both 'einen Brief' and 'seinen Brieffreund' are accusative noun phrases. However, the constituent structure of this sentence is equivalent to the English prepositional dative. Thus, this sentence structure will be referred to as the German prepositional dative to indicate the compatibility of the English and the German sentence form.

APPENDICES

# APPENDIX A

List of Bilingual Subjects, with Occupation, Age, and Length of Residency
in an English Speaking Country

# APPENDIX A

List of Bilingual Subjects, with Occupation, Age, and Length of Residency in an English Speaking Country.

| Subject# | Occupation | Age | Length of Residency in U.S. |
|---|---|---|---|
| 1 | Housewife | 50 | 29 |
| 2 | Graduate Student | 27 | 2 |
| 3 | Housewife | 49 | 25 |
| 4 | Graduate Student | 28 | 6 |
| 5 | Housewife | 66 | 31 |
| 6 | Graduate Student | 33 | 15 |
| 7 | Accountant | 53 | 32 |
| 8 | Professor | 37 | 29 |
| 9 | Librarian | 45 | 24 |
| 10 | Teacher | 41 | 12 |
| 11 | Professor | 26 | 2 |
| 12 | Graduate Student | 27 | 3 |
| 13 | Businesswoman | 47 | 27 |
| 14 | Housewife | 35 | 11 |
| 15 | Housewife | 45 | 24 |
| 16 | Graduate Student | 25 | 3 |
| 17 | Teacher | 50 | 22 |
| 18 | Professor | 44 | 2 |
| 19 | Graduate Student | 23 | 8 |
| 20 | Student | 21 | 4 |
| 21 | Psychologist | 32 | 3 |
| 22 | Professor | 31 | 5 |
| 23 | Student | 18 | 4 |
| 24 | Farmer | 26 | 2 |
| 25 | Real Estate Agent | 50 | 25 |
| 26 | Businesswoman | 47 | 18 |
| 27 | Secretary | 58 | 30 |
| 28 | Teacher | 33 | 2 |
| 29 | Secretary | 59 | 32 |
| 30 | Graduate Student | 25 | 5 |
| 31 | Graduate Student | 28 | 5 |
| 32 | Professor | 36 | 32 |

49

| | | | |
|---|---|---|---|
| 33 | Teacher | 35 | 10 |
| 34 | Graduate Student | 32 | 10 |
| 35 | Teacher | 53 | 28 |
| 36 | Teacher | 27 | 2 |
| 37 | Graduate Student | 27 | 3 |
| 38 | Librarian | 47 | 29 |
| 39 | Secretary | 42 | 29 |
| 40 | Secretary | 52 | 25 |
| 41 | Secretary | 37 | 26 |
| 42 | Professor | 51 | 24 |
| 43 | Teacher | 35 | 11 |
| 44 | Graduate Student | 26 | 2 |
| 45 | Professor | 59 | 46 |
| 46 | Professor | 43 | 18 |
| 47 | Professor | 44 | 20 |
| 48 | Professor | 47 | 27 |

# APPENDIX B


Dative and Transitive Priming sentences and Pictures
Experiment 1

APPENDIX B


<u>Dative and Transitive Priming Sentences and Pictures</u>
<u>Experiment 1</u>

<u>Dative experimental sentences</u>

1a. The girl bought a newspaper for the blind woman.
    Das Mädche kaufte eine Zeitung für die blinde Frau.
    b. The girl bought the blind woman a newspaper.
    Das Mädchen kaufte der blinden Frau eine Zeitung.
2a. The little boy wrote a letter to his pen pal.
    Der kleine Junge schrieb einen Brief an seinen Brieffreund.
    b. The little boy wrote his pen pal a letter.
    Der kleine Junge schrieb seinem Brieffreund einen Brief.
3a. The grandmother sewed a dress for her granddaughter.
    Die Großmutter nähte ein Kleid für ihre Enkeltochter.
    b. The grandmother sewed her granddaughter a dress.
    Die Großmutter nähte ihrer Enkeltochter ein Kleid.
4a. The old man left the valuable coin collection to his nephew.
    Der alte Mann hinterließ die wertvolle Münzsammlung für
    seinen Neffen.
    b. The old man left his nephew the valuable coin collection.
    Der alte Mann hinterließ seinem Neffen die wertvolle Münzsammlung.
5a. The woman handed the screaming baby to her husband.
    Die Frau reichte das schreinende Baby an ihren Mann.
    b. The woman handed her husband the screaming baby.
    Die Frau reichte ihrem Mann das schreinde Baby.
6a. The rich farmer bought a horse for his son.
    Der reiche Bauer kaufte ein Pferd für seinen Sohn.
    b. The rich farmer bought his son a horse.
    Der reiche Bauer kaufte seinem Sohn ein Pferd.
7a. The lawyer sent the contract to his client.
    Der Rechtsanwalt schickte den Vertrag an seinen Klienten.
    b. The lawyer sent his client the contract.
    Der Rechtsanwalt schickte seinem Klienten den Vertrag.
8a. The father promised a car to his daughter.
    Der Vater versprach ein Auto an seine Tochter.
    b. The father promised his daughter a car.

Der Vater versprach seiner Tochter ein Auto.
9a.The musician sold some cocaine to the undercover agent.
Der Musiker verkaufte etwas Kokain an den Agenten.
b.The musician sold the undercover agent some cocaine.
Der Musiker verkaufte dem Agenten etwas Kokain.
10a.The land lady rented three rooms to the couple.
Die Hausbesitzerin vermietete drei Zimmer an das Ehepaar.
b.The land lady rented the couple three rooms.
Die Hausbesitzerin vermietete dem Ehepaar drei Zimmer.
11a.The young woman made a cup of tea for her aunt.
Die junge Frau machte eine Tasse Tee für ihre Tante.
b.The young woman made her aunt a cup of tea.
Die junge Frau machte ihrer Tante eine Tasse Tee.
12a.The architect built a new house for his mother.
Der Architekt baute ein neues Haus für seine Mutter.
b.The architect built his mother a new house.
Der Architect baute seiner Mutter ein neues Haus.
13a.The man baked a cake for his wife.
Der Mann backte einen Kuchen für seine Frau.
b.The man baked his wife a cake.
Der Mann backte seiner Frau einen Kuchen.
14a.The hostess fixed some dessert for her guests.
Die Gastgeberin bereitete eine Nachtisch für ihre Gäste.
b.The hostess fixed her guests some dessert.
Die Gastgeberin bereitete ihren Gästen einen Nachtisch.
15a.The wealthy widow left her money to the church.
Die reiche Witwe vermachte ihr Geld an die Kirche.
b.The wealthy widow left the church her money.
Die reiche Witwe vermachte der Kirche ihr Geld.
16a.The young man wrote an apology to his fiancee.
Der junge Mann schrieb eine Entschuldigung an seine Verlobte.
b.The young man wrote his fiancee an apology.
Der junge Mann schrieb seiner Verlobten eine Entschuldigung.

Dative Experimental Pictures

1. Girl throwing ball to girl
2. Boy giving present to girl
3. Girl giving flowers to teacher
4. Woman showing dress to man
5. Liberian giving book to boy.
6. Salesman showing car to couple.
7. Boy handing plate to boy
8. Girl handing mug to boy.
9. Girl handing paintbrush to boy
10. Girl reading book to boy
11. Boy and girl giving flowers to man
12. Policeman giving ticket to man.
13. Boy giving "K" to girl
14. Woman throwing bone to dog
15. Boy and girl showing picture to teacher
16. Nurse giving stethoscope to doctor

## Transitive experimental sentences

1a. The engine turned the wheel slowly.
   Der Motor drehte langsam das Rad.
   b. The engine was turned slowly by the engine.
   Das Rad wurde langsam von dem Motor bewegt.
2a. Many people attended the concert.
   Viele Leute besuchten das Konzert.
   b. The concert was attended by many people.
   Das Konzert wurde von vielen Leuten besucht.
3a. The chemical waste poisoned the river.
   Der chemische Abfall vergiftete den Fluß.
   b. The river was poisoned by the chemical waste.
   Der Fluß wurde von dem chemischen Abfall vergiftet.
4a. The customs official opened the suspicious suitcase.
   Der Zollbeamte öffnete den verdächtigen Koffer.
   b. The suspicious suitcase was opened by the customs official.
   Der verdächtige Koffer wurde von dem Zollbeamten geöffnet.
5a. The picture on the wall concealed the safe.
   Das Bild an der Wand verbarg den Safe.
   b. The safe was concealed by the picture on the wall.
   Der Safe wurde von dem Bild an der Wand verborgen.
6a. The artist painted the nude woman.
   Der Künstler malte die nackte Frau.
   b. The nude woman was painted by the artist.
   Die nackte Frau wurde von dem Künstler gemalt.
7a. A gang of teenagers mugged the salesman.
   Eine Gruppe Jugendlicher überfiel den Verkäufer.
   b. The salesman was mugged by a gang of teenagers.
   Der Verkäufer wurde von einer Gruppe Jugendlicher überfallen.
8a. The sun warmed the streets.
   Die Sonne wärmte die Straßen.
   The streets were warmed by the sun.
   Die Straßen wurden von der Sonne erwärmt.
9a. The telephone call confused the young woman.
   Der Telephonanruf verwirrte die junge Frau.
   b. The young woman was confused by the telephone call.
   Die junge Frau wurde von dem Telephonanruf verwirrt.
10a. The police car forced the truck driver off the road.
   Das Polizeiauto drängte den Lastwagenfahrer von der Straße.
   b. The truck driver was forced off the road by the police car.

Der Lastwagenfahrer wurde von dem Polizeiauto von der Straße gedrängt.

11a.A policeman found the crying child.

Ein Polizist fand das schreiende Kind.

b.The crying child was found by a policeman.

Das schreinde Kind wurde von einem Polizisten gefunden.

12a.The bright light blinded the tennis player.

Das grelle Licht blendete den Tennisspieler.

b.The tennis player was blinded by the bright light.

Der Tennisspieler wurde von dem grellen Licht geblendet.

13a.A helicopter pursued the fleeing bankrobber.

Ein Hubschrauber verfolgte den fliehenden Bankräuber.

b.The fleeing bankrobber was pursued by a helicopter.

Der fliehende Bankräuber wurde von einem Hubschrauber verfolgt.

14a.The author discovered some old manuscripts.

Der Autor entdeckte einige alte Manuskripte.

b.Some old manuscripts were discovered by the author.

Einige alte Manuskripte wurden von dem Autoren entdeckt.

15a.The janitor cleans the floors daily.

Der Hausmeister reinigt die Böden täglich.

b.The floors are cleaned  by the janitor daily.

Die Böden werden täglich von dem Hausmeister gereinigt.

16a.A dog found the frightened child.

Ein Hund fand das verängstigte Kind.

b.The frightened child was found by a dog.

Das verängstigte Kind wurde von einem Hund gefunden.

## Transitive Experimental Pictures

1. Lightning striking church
2. Lightning hitting golfer
3. Firehydrant squirting firefighter
4. Flyswater killing fly
5. Tornado hitting barn
6. Missile hitting plane
7. Truck towing car
8. Ball hitting boy
9. Train hitting bus
10. Wave hitting boat
11. Ambulance hitting policeman
12. Torpedo hitting ship
13. Tank running over soldier.
14. Train about to run over woman
15. Avalanche burying skiers
16. Crane wrecking building

APPENDIX C


Questionnaire

APPENDIX C

<u>Questionnaire</u>

1. What is your age?
  Mean= 39 years
  Range=18-66

2. At what age did you learn English?
  Mean=12.0 years
  Range= 4-35

3. Did you learn English in a formal (school, books) or informal
( by living in the country) setting?
  Informally= 12.5%
  Both= 87.5%

4a. What language is spoken in your home?
  English= 41.6%
  German= 14.6%
  Both languages= 29.1%

4b. What is the language (if any) you are most comfortable speaking?
  English=14.6%
  German= 29.1%
  Equally comfortable= 56.2%

5. On a scale from 1(bad) to 7(very good) how would you rate your
  a. English skills  Mean=6.5
  b. German skills  Mean=6.8

6. Do you frequently talk to other people who know both German and English and
when you do, do you frequently mix languages?
  no mixing= 17.4%
  frequent mixing= 82.5%

7. When you read, do you read in English or in German? Approximately how
many hours per day do you read:
  English Mean= 1.5 hours
  German Mean= 0.6 hours

8. Do you know other languages, besides German and English? How many years did you study them ( or were you exposed to them)?

84.9% one or more languages besides German and English

15.1% none

All of the additional languages were learned in school. Three subjects indicated that they were able to converse near fluency in another language besides German and English.

LIST OF REFERENCES

# LIST OF REFERENCES

Adjémian, C. (1983). The transferability of lexical properties. In: S. Gass & L. Selinker (Eds.), Language transfer in language learning (pp. 250-267). Rowley, Massachusetts: Newbury House Publishers, Inc.

Bain, B. & Yu, A. (1980). Cognitive consequences of raising children bilingually: 'One parent, one language'. Canadian Journal of Psychology, 34, 304-313.

Bates, E. & MacWhinney, B. (1982). Functionalist approach to grammar. In E. Wanner & L. R. Gleitman (Eds.), Language Acquisition: State of the Art (pp. 173-218). Cambridge: Cambridge University Press.

Bates, E., McNew, S., MacWhinney, B., Delescovi, A., & Smith, S. (1982). Functional constraints on sentence processing: A cross-linguistic study. Cognition, 11, 245-299.

Berk-Seligson, S. (1986). Linguistic constraints on intrasentential code-switching: A study of Spanish/Hebrew bilingualsim. Language in Society, 15, 313-348.

Bloomfield, L. (1933). Language. New York: Holt, Rinehart and Winston.

Bock, J. K. (1986). Syntactic persistence in language production. Cognitive Psychology, 18, 355-387.

Bock, J. K. (1987). Coordinating words and syntax in speech plans. In A. Ellis (Ed.) Progress in the psychology of language (Vol.3, pp. 337-390). London: Erlbaum.


Bock, J. K. (in press). Closed-class immanence in sentence production. Cognition.


Bock, J. K. & Loebell, H. (1988). Framing sentences. [manuscript submitted for publication].


Caramazza, A. & Brones, I. (1979). Lexical access in bilinguals. Bulletin of the Psychonomic Society. 13, 212-214.


Chan, M, Chan, H. L. H. & Hoosain, R. (1983). Input output switch in bilingual code switching. Journal of Psycholinguistic research. 12, 407-416.


Collins Gem (1985). German Grammar. London: William Collins Sons & Co.Ltd.


Coppieters, R. (1987). Competence differences between native and near-native speakers. Language. 63, 544-573.


Corder, S. P. (1967). The significance of learner's errors. IRAL, 4, 161-170. Cited in: Selinker, L. (1983) Language Transfer. In: S. Gass & L. Selinker (Eds.), Language transfer in language learning. Rowley, Massachusetts: Newbury House Publishers, Inc.


Cummins, J. (1977). Cognitive factors associated with the attainment of intermediate levels of bilingual skills. Modern Language Journal. LXI. No.1-2, 3-12.


Dalrymple-Alford, E. C. (1985). Language switching during bilingual reading. British Journal of Psychology. 76, 11-122.

Dell, G. S. (1986). A spreading activation theory of retrieval in sentence production. Psychological Review. 93, 283-321.


Dulay, H. & Burt, M. (1974). Errors and strategies in child second language acquisition. TESOL Quarterly. 8, 129-136.


Dunbar, K. & MacLeod, C. M. (1984). A horse race of a different color: Stroop interference patterns with tranformed words. Journal of Experimental Psychology: Human Perception and Performance. 10, 622-639.


Felix, S. W. (1982). Psycholinguistische Aspekte des Zweitsprachenerwerbs. Tübingen: Gunter Narr Verlag Tübingen.


Garrett, M. F. (1975). The analysis of sentence production. In G.H. Bower (Ed.) The psychology of learning and motivation (Vol.9, pp.133-177). New York: Academic Press.


Garrett, M. F. (1980). Levels of processing in sentence production. In B. Butterworth (Ed.), Language Production. (Vol.1, pp.177-220). Orlando/London: Academic Press.


Garrett, M. F. (1982). Production of speech: Observations from normal and pathological language use. In A. Ellis (Ed.) Normality and pathology in cognitive functions.(pp.19-76). Orlando/London: Academic Press.


Gass, S. (1983). Language transfer and universal grammatical relations. In: S. Gass & L. Selinker (Eds.), Language transfer in language learning (pp. 69-85). Rowley, Massachusetts: Newbury House Publishers, Inc.


Gass, S. & Selinker, L.(Eds.)(1983). Language transfer in language learning. Rowley, Massachusetts: Newbury House Publishers, Inc.


Grosjean, F. (1982). Life with Two Languages. Cambridge, Massachusetts: Harvard University Press.

Hakuta, K. (1986). Mirror of language: The debate on bilingualism. New York: Basic Books, Inc.


Harrington, M. (1987). Processing transfer: Language-specific processing strategies as a source of interlanguage variation. Applied Psycholinguistics, 8, 351-377


Hornby, Peter A.(Ed.) (1977). Bilingualism: Psychological, Social, and Educational Implications. Academic Press, New York.


James, C. (1980). Contrastive Analysis. Essex: Longman Group Limited.


Jordens, P. (1986). Production rules in interlanguage: Evidence from case errors in L2 German. In: E. Kellerman & M. Sharwood Smith (Eds.), Crosslinguistic influence in second language acquisition (pp.91-110). New York: Pergamon Press.


Kellerman, E. & Sharwood Smith, M.( 1986). Crosslinguistic influence in second language acquisition. New York: Pergamon Press.


Klein, W. (1986). Second Language Aquisition. Cambridge: Cambridge University Press.


Kolers, P. A. (1963). Interlingual word associations. Journal of Verbal Learning and Verbal Behavior, 2, 291-300.


Kolers, P. A. (1966). Interlingual facilitation of short-term memory. Journal of Verbal Learning and Verbal Behavior, 5, 314-319.


Kolers, P. A. & Gonzalez, E. (1980). Memory for words, synonyms, and translations. Journal of Experimental Psychology: Human Learning and Memory, 6, 53-65.


Kufner, H. L. (1962). The grammatical structures of English and German. Chicago: The University of Chicago Press.

Lado, R. (1957). Linguistics across Cultures. Ann Arbor: University of Michigan Press.


Landry, R. G. (1974). A comparison of 2nd-language learners and monolinguals on divergent thinking tasks at the elementary school level. Modern Language Journal, 58, 10-15.


Lederberg, A. R. & Morales, C. (1985). Code switching by bilinguals: Evidence against a third grammar. Journal of Psycholinguistic Research, 14, 113-137.


Levelt, W. J. M. & Kelter, S.(1982). Surface form and memory in question answering. Cognitive Psychology, 14, 78-106.


Mack, M. (1986). A study of semantic and syntactic processing in monolinguals and fluent bilinguals. Journal of Psycholinguistic research, 15, 463-484.


MacKay, D. G. & Bowman, R. W. (1969). On producing the meaning in sentences. American Journal of Psychology, 82, 23-39.


MacKay, D. G. (1982). The problems of Flexibility, fluency, and speed-accuracy trade-off in skilled behavior. Psychological Review, 89, 483-506.


Macnamara, J. (1967). The Bilingual's Linguistic Performance- A Psychological Overview. Journal of Social Issues, 23(2), 58-77.


Macnamara, J., Krauthammer, M., & Bolgar, M. (1968). Language switching in bilinguals as a function of stimulus and response uncertainty. Journal of Experimental Psychology, 78, 208-215.


Macnamara, J., & Kushnir, S. L. (1971). The linguistic independence of bilinguals: The input switch. Journal of Verbal Learning and Verbal Behavior, 10, 480-487.

MacWhinney, B. (1987). Applying the competition model to bilingualism. Applied Psycholinguistics, 8, 315-327.


McCormack, P. D. (1977). Bilingual linguistic memory: The independence-interdependence issue revisited. In: P.A. Hornby (Ed.), Bilingualism. New York: Academic Press.


Morton, J. & Chambers, S. M. (1973). Selective attention to words and colours. Quarterly Journal of Experimental Psychology, 25, 387-37.


Obler, L. K. & Albert, M. L. (1978). A monitor system for bilingual language processing. In: Paradis, M. (Ed.), Aspects of Bilingualism (pp. 165-161). Columbia, S.C. : Hornbeam Press.


Paivio, A. & Lambert, W. E. (1981). Dual coding and bilingual memory. Journal of Verbal Learning and Verbal Behavior, 20, 532-539.


Paivio, A., Clark, J. & Lambert, W. E. (1988). Bilingual Dual-Coding Theory and Semantic Repetition Effects on Recall. Journal of Experimental Psychology: Learning, Memory, and Cognition, 14, 163-172.


Palef, S. R. & Olson, D. R. (1975). Spatial and verbal rivalry in a Stroop-like task. Canadian Journal of Psychology, 29, 201-209.


Paradis, M. (1980). The language switch in bilinguals: Psycholinguistic and Neurolinguistic perspectives. In P. Nelde (Ed.) Languages in contact and conflict. Wiesbaden: Franz Steiner Verlag


Pearl, E., & Lambert, W. E.(1962). The relation of bilingualism to intelligence. Psychological Monographs, 76, 1-23.


Penfield, W., & Roberts, L. (1959). Speech and brain mechanisms. Princeton, N.J.: Princeton University Press.

Pfaff, C. (1979). Constraints on language mixing: Intrasentential code-switching and borrowing in Spanish/English. Language, 55, 291-318.


Poplack, S. (1980). Sometimes I'll start a sentence in Spanish y termino en Español: Toward a typology of code-switching. Linguistics, 18, 581-618.


Poplack, S. (1981). Syntactic structure and social function of codeswitching. In: R. Durán (Ed.) Latino Language and Communicative Behavior (pp.169-185). Norwood, N.J.: ABLEX Publishing Corporation.


Posner, M. I. (1978). Chronometric explorations of mind. Hillsdale, N.J.: Erlbaum.


Potter, M. C., So, K., von Eckhard, B., & Feldman, L. B. (1984). Lexical and conceptual representation in beginning and proficient bilinguals. Journal of Verbal Learning and Verbal Behavior, 23, 23-38.


Reyes, Rogelio (1974). Studies in Chicano Spanish. Harvard dissertation.


Rutherford, W. E. (1983). Language typology and language transfer. In: S. Gass & L. Selinker (Eds.) Language transfer in language learning (pp.358-371). Rowley, Massachusetts: Newbury House Publishers, Inc.


Schwanenflugel, J. & Rey, M. (1986). Interlingual semantic facilitation: evidence for a common representational system in the bilingual lexicon. Journal of Memory and Language, 25, 605-618.


Sharwood Smith, M. (1983). On first language loss in the second language acquirer: Problems of transfer. In: S. Gass & L. Selinker (Eds.) Language transfer in language learning (pp.222-232). Rowley, Massachusetts: Newbury House Publishers, Inc.


Sheen, R. (1980). The importance of negative transfer in the speech of near bilinguals. International Review of Applied Linguitics. Cited in: Grosjean, F. (1982) Life with Two Languages. Cambridge, Massachusetts: Harvard

University Press.

Skinner, B.F. (1957). Verbal Behavior. Englewood Cliffs: Prentice Hall.

Sridhar, S. N., & Sridhar, K.K.(1980). The syntax and psycholinguistics of bilingual code mixing. Canadian Journal of Psychology, 34 (4), 407-416.

Sternberger, J. P. (1985). An interactive model of language production. In A. Ellis (Ed.) Progress in the psychology of language (Vol. 1, pp.143-186) London: Erlbaum.

Timm, L. A. (1983). Does code-switching take time? Hispanic Journal of Behavioural Sciences, 5, 401-416.

Van Vlerken, M. (1980). Adverbial placement in English: A study of first language loss. Master's dissertation, English department, Utrecht University. Cited in: Sharwood Smith, M. (1983) On first language loss in the second language aquirer: Problems of transfer. In: S. Gass, & L. Selinker (Eds.) Language transfer in language learning. Rowley, Massachusetts: Newbury House Publishers, Inc.

Watkins, M. J., & Peynircioglu, Z. F. (1983). On the nature of word recall: Evidence for linguisitc specificity. Journal of Verbal Learning and Verbal Behavior, 22, 385-394.

Weiner, E. J., & Labov, W. (1983). Constraints on the agentless passive. Journal of Linguistics, 19, 29-58.

Weinreich, V. (1963). Languages in Contact. The Hague: Mouton.

Weisgerber, L. (1966). Vorteile und Gefahren der Zweisprachigkeit. Wirkendes Wort, 16.Jahrgang, Heft 2, 73-89.

Wode, H. (1977). On the systematicity of L1 transfer in L2 acquisition. Cited in: S. W. Felix (1982) Psycholinguistische Aspekte des

Zweitsprachenerwerbs. Tübingen: Gunter Narr Verlag Tübingen.


Woolford, E. (1983). Bilingual code-switching and syntactic theory. Linguistic Inquiry, 14(3), 520-535.