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Transfer in bilingual first language acquisition*

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Much research on bilingual first language acquisition has stressed the role of the dominant or preferred language when the two languages have some influence on one another. The present paper tries to look at transfer or interference from the perspective of the input the child is exposed to. Transfer will be argued to occur in those domains of the grammar where the language learner is confronted with ambiguous input. The bilingual child may, as a relief strategy, use parts of the analysis of one language in order to cope with ambiguous properties of the other. Ambiguity of input is crucial and will be evaluated through a comparison with monolingual language acquisition: if monolingual children have problems with the language material in question, it may be suggested that the input contains evidence for more than only one grammatical analysis. A quantitative difference between monolingual and bilingual language acquisition will be interpreted as evidence in favor of cross linguistic influence in bilingual language development. The paper reviews longitudinal studies on the acquisition of word order in German subordinate clauses.

If we open a German grammar book, we are told that subordinate clauses are verb-final: the finite verb has to be placed clause-finally. In main clauses, however, the finite verb is placed in the position following the first constituent. Thus, German evidences a clear root/non-root asymmetry. If we are exposed to spoken German, however, the variation of word orders is surprising. The non-verb-final orders presented in the following paragraphs are very frequent in the spoken language (see Penner & Bader 1991, 1995). There are subordinate clauses where both orders, the verb-final and the non-verb-final order, are allowed, as in (1):

(1) Verb-final and non-verb-final orders with German *weil*
a. *Ich mag Nebensätze, weil sie so kompliziert sind*
I like subordinate clauses because they that complicated are
"I like subordinate clauses because they are so complicated."
b. *Ich mag Nebensätze, weil sie sind so kompliziert*

Furthermore, there are conjunctions which are always used with non-verb-final word order, such as *denn* "since" and *sondern* "but". In addition to word order, the language learner has to be very sensitive to pauses made within the utterance stream and to intonation, since they also may indicate whether a subordinate clause is involved or not, as in (2):

(2) German *die* and *wie* as relative pronouns (a) or demonstrative pronouns (b), and as question words introducing an indirect (c) and a direct (d) question
a. *Das sind Kräuter, die in meinem Garten wachsen*
These are herbs which in my garden grow
"These are herbs which grow in my garden."
b. *Das sind Kräuter, [small pause] die wachsen in meinem Garten*
These are herbs, they grow in my garden
"These are herbs and they grow in my garden."
c. *Sag mal, wie du die deutschen Nebensätze analysierst*!
Tell [particle] how you the German subordinate clauses analyze
"Tell me how you analyze German subordinate clauses!"
d. *Sag mal, wie analysierst du die Nebensätze*?
Tell [particle] how analyze you the subordinate clauses
"Tell me, how do you analyze subordinate clauses?"

In other cases, constructions with main clause word order can be subordinated, as in (3):

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(3) Main clause word order in German subordinate clauses

a. *Ich weiß, die Nebensätze sind sehr kompliziert*
I know the subordinate clauses are very complicated

Finally, there are root clauses (exclamations and echo-questions) which show the verb-final pattern, as in (4):[1]

(4) Root clauses with the finite verb in clause-final position

a. *Daß du deutsche Nebensätze analysieren kannst*!
That you German subordinate clauses analyze can
"[I am surprised] That you can analyze German subordinate clauses."

b. *Wie ich die deutschen Nebensätze analysiere*?
How I the German subordinate clauses analyze
"How I analyze German subordinate clauses?"

All the constructions mentioned represent positive evidence for the language learner. It should not be surprising if s/he makes errors in this domain; on the contrary, it would be astonishing if s/he did not. We can predict, then, that German word order in subordinate clauses represents something of a puzzle to the language learner. In the case of such ambiguous input, the bilingual learner, being exposed to German and French/Italian/English (where no such problems arise) may be tempted to transfer features from the language presenting unambiguous input into the one which is ambiguous.

The organization of the rest of this paper is as follows: the second section aims at a definition of transfer in terms of a relief strategy, available to bilingual speakers. It is thus viewed positively, as a strategy to cope with problematic input. In the third section, the syntactic analysis of German and French/Italian/English subordinate clauses is presented. The fourth section contains the analysis of the development of subordinate clauses in bilingual children who acquire German and one of the other languages mentioned. German is chosen as the target of transfer since this domain of the gramma subordinate clauses represents a problem space in German, not in the other languages involved. It will be argued that ambiguity of the German input is the source for transfer in this domain of the grammar. Interestingly, the grammars which result from transfer of grammatical features are compatible with natural languages to which the child has not been exposed. These grammars are thus possible systems with regard to Universal Grammar. This is also predicted within the present analysis, since it is assumed that parameter values are transferred by the children. At the same time, it will be shown that the children develop separate grammatical systems in the languages involved, although these systems in part result from transfer. Finally, there is a summary of the main findings.

[1] One reviewer suggests that the sentences are subordinate clauses, and the main clause, *I am surprised* ... for example, has been omitted. This is a possible interpretation. However, one has to take the child's perspective here who hears such sentences where the finite verb is placed clause finally and where the main clause is missing. Thus, it is not implausible to use constructions such as (4a) and (4b) as instances of confusing input.

Transfer as a relief strategy

The big question in bilingual first language acquisition (simultaneous acquisition of two languages from birth) has been whether bilingual children develop their languages separately from one another or not. The existence of mixed utterances of the type *mac-china kaputt* and *Auto rotto* (car broken), and the usage of incorrect word orders such as *wenn hast du alles das hier gelesen, kriegst du das hier* (when have you all this read, get you this here), for example, has led researchers to hypothesize that the bilingual child starts out with an undifferentiated, hybrid system which incorporates elements from both of the languages the child is exposed to (Arnberg, 1987; Grosjean, 1982; Saunders, 1982; Taeschner, 1983; Volterra & Taeschner, 1978). Another issue has been the importance of the type of exposure to the two languages involved. It has been argued that in order for the child to develop two languages separately, s/he should be exposed to their languages in a separate fashion, that is, each person should address the child in mainly one language (Arnberg, 1987; De Houwer, 1990; Kielhöfer & Jonekeit, 1983; Meisel, 1989; Ronjat, 1913).

However, language mixing, that is, utterances or discourse containing elements of both of the languages the child is exposed to, may also be interpreted as *code-switching*, the bilingual speaker's ability to switch languages within a single utterance or within discourse. Code-switching has been shown to be constrained by sociolinguistic and grammatical constraints (see among others Grosjean, 1982; Muysken, 1995; Poplack, 1980; for an overview of the literature see Köppe, 1997; Veh, 1990). Of course, the child's usage of code-switching may not fully correspond to the sociolinguistic and grammatical

rules of the adults (Meisel, 1989). However, code-switching presupposes the existence of two separate linguistic systems, as has been pointed out by Meisel (1989) and Köppe (1996).[2] Doubts about the *fusion* of the two systems which constitute the bilingual child's input are also in order with respect to word order, which will be the focus of this contribution. The analyses by Genesee (1989), Genesee, Nicoladis & Paradis (1995), De Houwer (1990), Köppe (1997), Meisel (1986), and Müller (1993) show in fact that bilingual children are able to distinguish two linguistic systems from very early on and that they do not necessarily pass through a stage of fusion in their linguistic development. Evidence for the claim that bilingual children are able to differentiate their two linguistic systems comes from the comparison of the two systems of which the child is showing evidence during language development. Furthermore, the degree to which the language development of bilingual children resembles that of monolingual children is an important issue.

Although it has been convincingly argued that the development of a bilingual child proceeds along two language-specific paths, the two languages are in contact and may have some influence on each other. The terms "transfer" and "interference", which are used to describe this specific contact situation, are well known from the literature on second language acquisition (for an overview see Bausch & Kasper 1979).[3] Weinreich (1968) uses the term "interference" to describe any difference between the speech of a monolingual and a bilingual speaker. He further restricts the usage of the term to cases where the speaker rearranges the patterns of speech. This excludes simple borrowing of a word from one language into the other. Mackey (1968) stresses the distinction between borrowing and interference and defines interference as being contingent and individual, whereas borrowing is systematic and collective (see Romaine, 1995). Weinreich (1968) also makes this distinction, but uses the cover term "interference" for both phenomena.

In the following, I will investigate transfer as an individual process. The contingency of transfer, however, will be questioned, both on a theoretical and an empirical level. If we want to integrate the concept of transfer into a theory of language acquisition, we would want it to be an explanatory, predictable concept, not only an observationally adequate notion (Hornstein & Lightfoot, 1981). It will turn out to be the case that this aim is attainable. Transferability will be argued to be a function of ambiguous properties of the recipient language: the child encounters language material which does not allow an unambiguous interpretation, or, put differently, two different grammatical hypotheses are compatible with the same surface string or a particular type of construction here subordinate clauses.[4] In this case, the bilingual child, as a relief strategy, tries to solve the ambiguity by using features of the source language. The assumption about the ambiguity of the input will be evaluated against monolingual language acquisition: if monolingual children have difficulty with the language phenomenon in question and choose "wrong paths" during their linguistic development (which may or may not correspond to those chosen by bilingual children), it may be suggested that the input contains evidence for more than only one grammatical analysis. A further observation supporting the assumption about the ambiguity of the input is that transfer is unidirectional: if transfer occurs in subordinate clauses produced by bilingual children who acquire German and another language such as Italian, English or French, German always is the target of transfer. The present study intends to show that it is plausible to assume that transfer is at work in the bilingual child since bilinguals tend to proceed more frequently along "wrong paths" than monolinguals do and they take much more time to "correct the error." This quantitative difference between bilingual and monolingual language acquisi-

[2] One reviewer points out that this view is debatable, see e.g. Clyne (1987) and Muysken (1995). As far as the bilingual children from the DUFDE project which are studied here are concerned (Ivar, Caroline, Pascal, Pierre), convincing arguments have been ad vanced by Meisel (1989) and Koppe (1996) in favor of the separation of the two languages, German and French. These arguments come from the acquisition of phenomena such as subject verb agreement, the structuring of early two word utter ances and case for example. They are therefore independent of the children's ability to make productive use of code switching. For a theoretical discussion of this issue see Koppe (1997).

[3] The *contrastive hypothesis* in particular relied heavily on the concept of transfer or interference in order to explain how a second language learner comes to know a second language. According to this view, the L2 learner transfers his L1 knowledge into his developing L2 system. Where the L2 differs from the L1, transfer has a negative effect ("difference" = "difficulty"); where the L2 is similar to the L1, transfer has a positive effect and thus facilitates the learning task. The other extreme has been called the *L1=L2 hypothesis*; the acquisition of a particular language as a second language or a first language proceeds in a parallel fashion. In between these extremes, the *interlanguage hypothesis* has been formulated, stating that the L2 learner develops an interlanguage, characteristic of the L1, the L2, and with independent features. Language transfer represents only one determinant of the lear ner's interlanguage. Within the interlanguage hypothesis, the conditions which favor or block transfer are investigated.

[4] See Lightfoot (1991) for the existence of a transition period in language change where two different grammatical systems can produce the same surface strings.

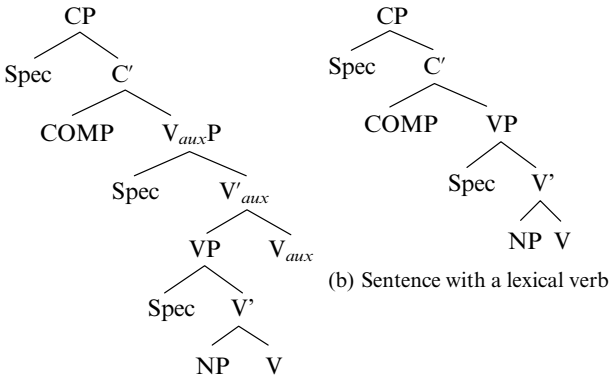
tion will be interpreted as evidence in favor of cross-linguistic influence in bilingual language acquisition.

Relief strategies which allow the bilingual child to profit from her/his bilingualism have been assumed by Genesee (1989) and Meisel (1989). If the bilingual child happens to know particular lexical items in only one of the two languages, s/he may borrow the lexical items from the source language and use them in the recipient language. ''Like monolingual children, bilingual children make do with whatever linguistic resources they have available to express themselves ... the only difference being that, unlike monolingual children who are limited to the resources of one language, bilingual children can draw on two'' (Genesee et al. 1995, p. 629). Gawlitzek-Maiwald and Tracy (1996) argue for syntactic borrowing as a temporary relief strategy. They analyze a child who develops specific constructions, the lexical instantiation of the category INFL as modal and temporal auxiliaries and infinitival constructions, at a different pace. The language for which these specific constructions develop at a slower rate may profit from the faster language. The question why one of the languages develops at a slower rate for the specific constructions remains open in Gawlitzek-Maiwald and Tracy's (1996) analysis. The authors point out that it could be the complexity of a particular construction or lack of perceptual saliency which prevent early usage. The most interesting result of their analysis, however, is that the German/English bilingual child they investigate explores both languages when acquiring a particular construction type: the German IP system, including the V2 property, is much more advanced in the child's grammatical system of German as compared with that of English. The child thus produces mixed utterances with an English VP and a left periphery borrowed from German. One example of syntactic borrowing is *Kannst Du move a bit* (Can you move a bit), where a German left periphery is combined with an English VP structure.[5] In infinitival constructions, the child profits from her knowledge of the English construction. The authors mentioned thus far all consider mixed utterances, that is, utterances where elements of language A and B are contained.[6] Hulk and Van der Linden (1996) analyze utterances which are made up of elements of only one language and report on a French/Dutch bilingual child who produces OV sequences of the type *livre lire* (book to read) in the child's French. Monolingual French children use OV sequences as well, although marginally. The authors hypothesize that OV sequences are the result of a Focus movement rule which moves topicalized XPs in front of the clause. ''This constitutes the basis of our argument that the presence of OV patterns in the Dutch input of this bilingual child may very well be the factor that 'pushes up' the production of [XP V] patterns in the child's French. In other words, there is a form of interaction between the two languages: it is not mixing of the structure of one language into the other however, but rather 'activation' of a possible, but rare, pattern in one language by the input of a superficially similar, frequent pattern in the other'' (Hulk & Van der Linden 1996, p. 100). In the following, I shall also deal with utterances which are made up of elements of one language.

Transfer or interference has been described at the various linguistic levels (see Clyne (1975) for an overview). The present paper will consider grammatical transfer or interference, that is, language contact at the syntactic level which refers to particular syntactic features, not to elements of language A being present in language B. Kielhöfer and Jonekeit (1983), to name just one study of bilingual language development where grammatical transfer plays an important role, stress that grammatical interference is unidirectional and that the dominant / preferred language (in the case of their children German) influences the weaker language (French) (see also Döpke (1992), for example). Even with a very loose definition of ''dominant language'', Kielhöfer and Jonekeit (1983) still have to admit that sometimes the reverse direction is observed, namely that the ''weaker language'' influences the ''stronger language''. This is the case for the position of French adjectives. The authors admit that the positioning of French adjectives is a complex matter (both positions, pre- and postnominal, are possible in adult French) and that even monolingual children have problems with this domain of the grammar. It may be much more plausible, therefore, to account for the unidirectionality of transfer in terms of the structural ambiguities of the languages involved, not in terms of language dominance, at least in the bilingual individual who is exposed to both languages from birth. It is the purpose of the following analysis to determine where the ambiguity lies and what exactly is transferred.

[5] In addition, they notice that utterances with only English lexical items and those with only German lexical items perfectly correspond to the respective adult systems (e.g., VO and OV). The adult like surface ordering of elements is violated only in lexically mixed utterances. The observation by Gawlitzek Maiwald & Tracy (1996) nicely shows that mixed utterances are not due to fusion of two grammatical systems.

[6] This, of course, does not mean that studies of utterances containing only lexical elements of one language and syntactic elements of the other language do not exist, see e.g. Poplack (1980), Dopke (1992). For an overview of the literature see Koppe (1997).



(a) Sentence with a temporal auxiliary verb

(b) Sentence with a lexical verb

Figure 1. Haider's (1993a) conception of the phrase structure configuration of a German sentence.

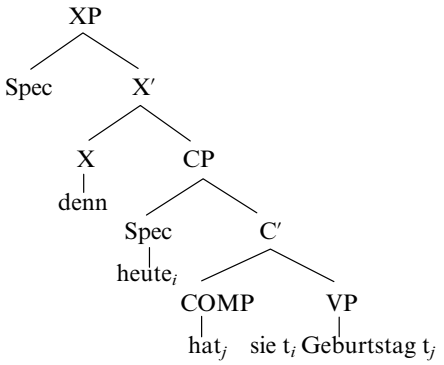


Figure 2. Surface structure of a German sentence introduced by *denn*.

Subordinate clauses in German and in French/Italian/English

German is a verb second language where the finite verb surfaces in the position following the first constituent in main clauses, independently of the grammatical function of the first constituent. In subordinate clauses, the finite verb occurs clause-finally.

(5) Adult German

a. *Gestern ging er in das neue Kino*
Yesterday went he in the new cinema
"He went to the new cinema yesterday."

b. *Er ging gestern in das neue Kino*
He went yesterday in the new cinema

c. *Ich vermute, daß er gestern in das neue Kino gegangen ist*
I think that he yesterday in the new cinema gone is
"I think that he went to the new cinema yesterday.'

In addition, German is an OV language, i.e. non-finite verbs precede their complement(s). Following Haider (1993a), the phrase structure configuration of a German sentence is assumed to look like in Figure 1.

In main clauses, the finite verb raises to COMP and any constituent moves into the specifier position of CP. In subordinate clauses, the CP is already occupied by an element, a complementizer or a wh-word, and therefore the verb remains in its base position, giving rise to the clause-final surface position. German phrase structure thus contains only one functional category, namely the CP (see also Platzack (1983), who assumes that German has a CONFL node, a merger of COMP and INFL). Finite as well as non-finite verbs are inserted into the verb node as fully inflected forms from the lexicon: temporal auxiliary verbs (if there are any) into V_{aux} and all other verbs into V.[7] The important generalizations are: (i) There is a head-final position for finite verbs in German phrase structure; (ii) Finite verbs raise into COMP in main clauses, the position where complementizers are base-generated. For main clause order in subordinate clauses as in the sentence ... *denn heute hat sie Geburtstag* "since today has she birthday" (cf. section 1), we need a further layer above the CP in the structure in Figure 1, to the head of which is attached the label X in Figure 2.

French, Italian and English are VO languages, i.e. the nonfinite verb precedes its complement(s). Furthermore, although all languages have residual V2 phenomena (e.g., triggered by the presence of a wh-word in the specifier position of CP), the verb does not regularly move into COMP in declarative main clauses.[8] Another difference with German is

[7] Following Chomsky (1993), German phrase structure would contain at least four functional heads, COMP, AGR_S for subject verb agreement, T for tense marking, and AGR_O for Case marking of the direct object. The choice between the two representations is an empirical and theoretical question which will be of no importance for the argument presented here. I think, however, that there are good reasons to prefer Haider's (1993a) analysis (for further discussion of this issue see Muller to appear,a).

[8] One reviewer mentions that at least French and Italian also present the learner with variable orders (free inversion of the subject in Italian and inversion in French) and thus, we may say that the child's input is ambiguous. This could be the case, of course. Indeed, we could predict that due to French inversion patterns of the type *Nous connaissons bien les articles qu'a écrits Chomsky* an Italian/French bilingual child may assume that French, like Italian, is a null subject language. Ambiguity is thus not meant to cover a whole language. It is not my intention to classify German as an ambiguous and French as a non ambig uous language. The particular construction, however, may contain features which do not unambiguously lead the child into only one the correct grammatical representation. The ex istence of inversion of the type given in the example above is not

that there is no head-final position available which hosts finite verbs. In other words, all projections are head-initial, as in Figure 3. In contrast to German, Haider (1993a) assumes that French, Italian and English have at least one verbal functional category (INFL).

The important generalizations for the analysis of child language are: (i) there are only head-initial positions for finite verbs in French, Italian and English phrase structure; (ii) finite verbs do not regularly raise into COMP in main clauses.

The differences mentioned between German on the one hand and French, Italian and English on the other are described in terms of different parameter settings in the respective languages: in German, COMP is specified for finiteness (it contains the finiteness operator [+F]), whereas in French, Italian and English it is the category INFL which is marked for finiteness (the finiteness parameter). German phrase structure contains head-final projections, whereas French, Italian and English phrase structure only contains head-initial projections (the head-position parameter).

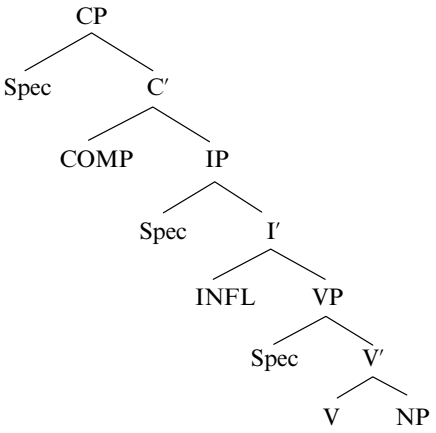


Figure 3. Haider's (1993a) conception of the phrase struc ture configuration of a French, Italian or English sentence.

Subordinate clauses in bilingual first language acquisition

German as the target of transfer: some empirical observations

It has been noted that some bilingual children pass through a stage where they use subordinate clauses which are not introduced by a complementizer (see Kielhöfer & Jonekeit, 1983; Müller, 1993, 1994 (German/French); Leopold, 1949a, 1949b (German/English); Taeschner, 1983 (German/Italian)). Müller and Penner (1996) suggest the term "preconjunctional subordinate clauses" for these early complementizerless subordinate clauses.

The use of complementizerless subordinate clauses is also a common observation with monolingual children (Fritzenschaft, Gawlitzek-Maiwald, Tracy & Winkler, 1990; Gawlitzek-Maiwald, Tracy & Fritzenschaft, 1992; Mills, 1985; Rothweiler, 1994; Stern & Stern, 1928; Tracy, 1991; Weissenborn, 1990 (German); Clark, 1985; Cohen, 1925; Cohen, 1968; Guillaume, 1927; Heinen & Kadow, 1990 (French); Radford, 1987 (English)). Müller and Penner (1996) provide an overview of the literature. In this respect, bilingual children seem to pattern with monolingual children.

As far as word order in French, Italian and English subordinate clauses is concerned, no specific problems are reported for children in the literature. This holds for monolingual (see e.g. Brown, 1973; Clark, 1985; Heinen & Kadow, 1990) as well as for bilingual children where the second language is German (see e.g. Kielhöfer & Jonekeit, 1983; Müller, 1993, 1994 (German/French); Leopold, 1949a, 1949b (German/English); Taeschner, 1983 (German/Italian)). At first glance this finding is surprising since there are root/non-root asymmetries in French, Italian and English as well. French subject inversion, for example, is possible in main clauses but generally blocked in subordinate clauses. This would be a potential source of error, for example, the use of subject inversion in subordinate clauses. Although French children use subject inversion, they appear to know that it is impossible in non-root clauses.

The acquisition of non-root word order in German monolingual children is reported to be an area of error-free acquisition. As soon as the first complementizers appear, the finite verb is used correctly in clause-final position (Rothweiler, 1994; Mills, 1985; Stern & Stern, 1928). Some children mark subordinate clauses by using verb-final patterns even before they produce complementizers, namely during the early stage of complementizerless subordinate clauses (see Müller & Penner, 1996). In most studies on the development of German word order in subordinate clauses, only temporary difficulties are mentioned. Park (1971) for example reports on *weil*+V_{fin}+NP_{subj} orders: *weil hast du das gesagt* (because have you it said). Other researchers such as

relevant for determining the status/number of functional projec tions in a given language, which I will explore in the present paper, since it reveals properties of subjects in general and the subject position, but not properties of verb raising. In other words, constructions of the type given in the example above may not mislead the learner with respect to whether finite verbs raise into INFL or COMP in the target language. Notice also that inversion is extremely infrequent in spoken French.

Mills (1985), Scupin and Scupin (1907, 1910), and Stern amd Stern (1928) observe difficulties in subordinate clauses which contain more than two verbal elements and in conditionals: *wenn ihr würdet immerfort in Berlin geblieben sein, so würdet ihr immerfort Berliner gewesen sein* (if you would have always in Berlin stayed, then would have you always Berliners been). The errors appear, however, quite late in language development, that is, at the age of four and five.

In contrast to monolingual children, bilingual children are reported to have great difficulty with word order in German subordinate clauses. This seems to be the case independently of whether German is the preferred/dominant language or of factors such as the language of the country where the child was raised. The one-sidedness of the difficulty in this domain of the grammar was first noted by Ronjat (1913) in a diary study. He observed many erroneous word order patterns in the early speech of his bilingual French/German son (father speaks French, mother speaks German, raised in French-speaking environment) of the type *wenn der Bubi ist lieb* (when the Bubi is nice). Since Louis' subordinate clauses in French are target-like, Ronjat (1913) concludes that "l'influence du français me paraît en résumé inutile pour expliquer la position incorrecte du verbe allemand en hypotaxe" (p. 67). It is important to note that Louis preferred German during the first three years of his language development.

The terms preferred/dominant language are fuzzy concepts in Ronjat's (1913) study. In other words, the reader does not come to know the criteria on the basis of which language dominance is being defined. Recently, Genesee et al. (1995) have suggested four criteria in order to determine the preferred/dominant language in bilingual children: MLU, upper bound (number of morphemes in the longest utterance), MMU (Multi-Morphemic Utterances), word types. Döpke (1992) uses a combination of MLU and the amount of each language used with each parent.

Independently of the exact definition of preferred/dominant language in Ronjat's (1913) study, we would not expect the preferred language to show features of the non-preferred language. Rather, we would predict the reverse situation. Yet, Louis' subordinate clauses in German, his preferred language according to Ronjat (1913), show adult French word order.

The next child to be studied is Ivar, a French/German bilingual child, raised in Germany by a French mother and a German father. In this respect, he represents the reverse case of Louis. Ivar's data originate from the longitudinal DUFDE study (Deutsch Und Französisch Doppelter Erstspracherwerb "German and French Simultaneous First Language Acquisition")[9]. It is interesting to note that French, the language of Ivar's mother, is not the preferred language in his early language development. First, Ivar's MLU is a little higher in German than in French until the age of 2;5 (see Schlyter, 1990; Köppe, 1994; Table 1). Therefore, if at all, we could say that German is Ivar's preferred language during the early developmental phases. Second, Köppe's (1997) findings for code mixing support this result for this age. With respect to the development of particular grammatical phenomena, however, Ivar proceeds in a parallel fashion in both languages: First preconjunctional subordinate clauses are evidenced at 2;4 in both languages (Müller 1993) and first adult-like complementizers are used at 2;11 in both languages. Further parallel developments in Ivar during earlier phases are presented in Meisel (ed.) (1990, 1994). Parallel grammatical development may indicate that Ivar does not have a preferred language. Like Louis, Ivar uses correct word orders in his French subordinate clauses from very early on (Müller, 1993). In German, first subordinate clauses introduced by a complementizer start to appear around the age of 3. Until the age of 4;4, target-like subordinate clauses amount to 4 per cent of all subordinate clauses (7 out of a total of 167). The finite verb surfaces in the position immediately following the subject or a topicalized constituent, i.e. in third position in subordinate clauses. Some examples are given in (6):

Table 1. *MLU Ivar*

Recording	Age	MLU German (base)[10]	MLU French (base)[10]
07	1;10,12	1.12 (69)	1.13
09	1;11,17	1.41 (99)	1.31 (68)
10	2;0,2	1.68	[11]
12	2;0,29	1.63	1.31
14	2;2,7	1.71	1.47
16	2;3,5	1.80	1.35
18	2;4,9	1.83	1.29
20	2;5,7	2.76	2.93

[9] In the DUFDE project, bilingual German/French children are studied longitudinally. They are videotaped once a fortnight from the age of approximately 1;0,0 (Years;Months,Days) 1;6 up to the age of 5;0 6;0 years. For further details see Meisel (ed.) (1990, 1994). The project has been financed by a grant from the Deutsche Forschungsgemeinschaft (DFG) to Jurgen M. Meisel.

[10] The base is indicated if below 100.

[11] The base is insufficient.

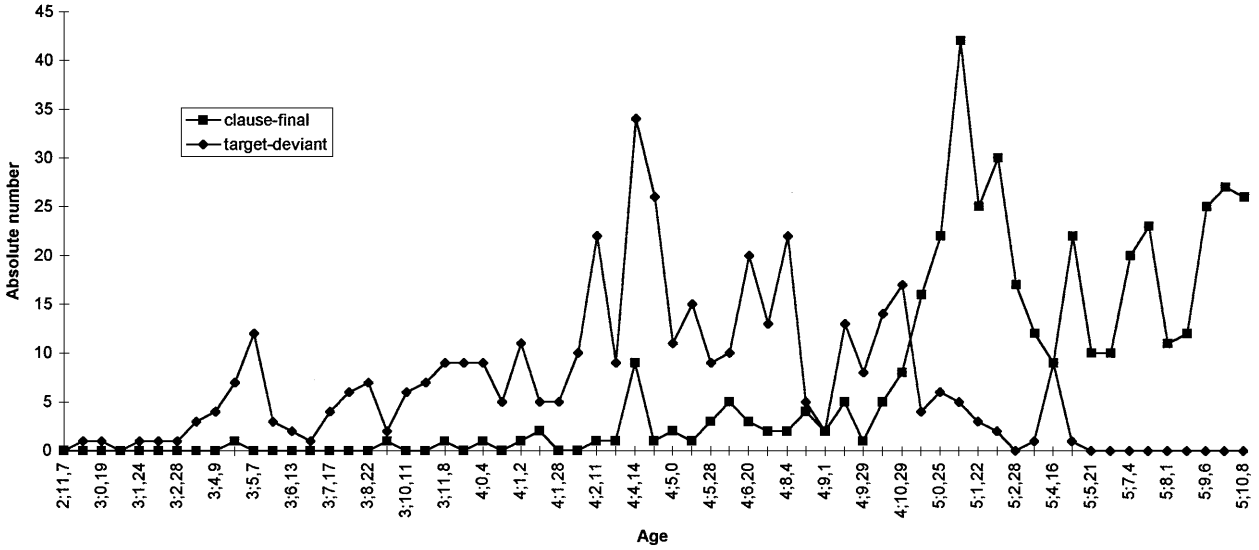


Figure 4. Position of finite verbs in Ivar's German subordinate clauses.

(6) Target-deviant subordinate clauses in Ivar
a. *wenn da komm andere schiffe* . . . (3;5,7)
when there come other boats . . .
"When other boats arrive."
b. *sagen wir mal daß das is ein baum* (3;10,25)
say we [particle] that this is a tree
"Let's say that this is a tree."
c. . . . *daß dann sagt er* . . . (4;4,14)
. . . that then says he . . .
" . . . that he then says."

A quantitative analysis is shown in Figure 4.

Interestingly enough, if the embedded clause is introduced by a wh-word or a relative pronoun such as *der*, *die*, *das*, the word order depends on the function of that wh-word or relative pronoun. If the wh-word or relative pronoun represents the subject of the clause, the finite verb has to be adjacent to it, i.e. in second position (see (7 b)). If the wh-word or relative pronoun functions as the object of the clause, the finite verb surfaces in third position (see (7 a)).

(7) Target-deviant clauses introduced by a wh-word in Ivar
a. *guck mal was ich hab gemacht* (3;10,25)
look [particle] what I have done
b. *guck was is hier* (3;7,17)
look what is here

From the age of 4;4,14 onwards, Ivar uses the target-like verb-final pattern for the first time more than once per recording. He produces many more embedded clauses per recording than before and the target-like pattern becomes progressively more frequent. During the period from 4;4 until 4;11, 28 per cent of all subordinate clauses (52 out of a total of 186) show the correct verb final pattern. However, the verb-final pattern is restricted to subordinate clauses which contain a lexical verb in the present tense. Temporal and modal auxiliaries, as well as past tense lexical verbs, are never found in clause-final position. The correct word order thus seems to be a function of the verb type and the verb's tense marking. Furthermore, with lexical verbs in the present tense we may observe that the verb-final pattern is learned with each complementizer separately. In Müller (1993, 1994) it is shown that the verb-final pattern is not learned for the whole class of wh-words introducing subordinate clauses, but it is first used productively with *was* (what), then with *wer* (who), still later with *wo* (where) and then with *wie* (how).

From 4;11 onwards, the complementizers *daß* (that) and *ob* (if/whether) are integrated into the verb-final pattern. Temporal and modal auxiliaries, as well as past tense lexical verbs are by now used clause-finally. It is interesting to note that in this domain of the grammar we do not observe a step-by-step process: these verbs are integrated into the target-like system instantaneously. We may from now on also observe overgeneralizations of verb-final patterns with subordinate conjunctions that are excluded from the verb-final pattern in adult German, such as *denn* for example: *denn Björn auch fünf is* (since Björn also five years old is) (5;2,6), where adult German has *denn Björn ist auch fünf*.

To summarize, we may conclude that Ivar needs approximately two years in order to acquire the correct position of the finite verb in German subordi-

nate clauses. Interestingly enough, it takes him more than one year to recognize that the grammatical representation which allows the usage of target-deviant clauses has to be revised. French is clearly not the preferred language, although it may be the case that Ivar is a balanced bilingual child in the sense that he acquires different grammatical phenomena at an equal pace in both languages.

Meisel (1986) has studied two other children of the DUFDE research project and found that the French/German bilingual girl Caroline although she does not produce many utterances per recording makes productive use of subordinate clauses with SVX order. At the time when Caroline first uses subordinate clauses, Meisel (1986) notes that German clearly is her preferred language (because she speaks almost no French during this period for reasons related to the family situation).

Bilingual children with a second language different from French are also reported to have problems with the verb-final pattern in German subordinate clauses. In addition to the correct verb-final pattern, they use target-deviant patterns. Leopold (1949a, 1949b) observes many target-deviant word orders in Hildegard's German subordinate clauses. Hildegard is a German/English bilingual child. The language of the mother (English) agrees with that of the environment and English is strongly favored during her first three or four years. But as in the case of Ivar, where the language of the mother (French) does not correspond to the language of the environment (German), Hildegard seems to take a long time to acquire the correct word order: From the age of 5;3/5;4 onwards Leopold (1949b) reports no incorrect positions for the finite verb anymore. But there is a difference between Ivar's (and Louis') case and Hildegard, because Hildegard's progress in German is very slow. During her first three years, she did not use much more than formulaic expressions on the clause level and simple structures, for example, clauses which contain the verb *sein* (to be). Some examples of erroneous word orders in her German subordinate clauses are given in (8):

(8) Target-deviant subordinate clauses in Hildegard
a. *ich bin so satt daß ich mag kein blatt* (4;6/4;7)
   I am so full that I like no leaf
   "I'm so full I don't want more."
b. *ich hab ein buch wo die name ist struwwelpeter* (5;0/5;1)
   I have a book where the name is struwelpeter
   "I have a book that is called struwelpeter."

A gradual development of verb-final patterns is also observed by Taeschner (1983) in her two German/Italian bilingual girls (the mother speaks German, the father speaks Italian, raised in an Italian-speaking environment), Lisa and Giulia. Some examples of erroneous orders are given below in (9) from Lisa:

(9) Target-deviant subordinate clauses in Lisa
a. *wenn lisa hat kaputt gemacht dann ist tasche wie papi* (3;4)
   when Lisa has broken had then is bag like Daddy
   "When Lisa broke it . . . ."
b. *mami guck da lisa was hat gemacht* (3;4)
   Mummy look there Lisa what has done
   "Mummy look what Lisa did."

At least Lisa also seems to use patterns where the finite verb immediately follows the subordinating conjunction. Like Ivar, she uses this pattern when the wh-word has the function of the subject in the subordinate clause. However, differing from Ivar, she also uses this pattern with subordinating conjunctions such as *wenn* (when) and *weil* (because): *wenn hast du alles das hier gelesen, kriegst du das hier* (when have you all this read get you this one).[12] Sometimes, the subject occurs twice, immediately preceding and following the finite verb, showing that both orders are possible with these conjunctions: *wenn du hast du geschlafen, dann tun wir das nehmen* (when you have you finished sleeping then do we this one take).[13]

Let us now turn to the special cases in both acquisition types, bilingual and monolingual language acquisition. There are some bilingual children studied in the literature who seem to acquire the correct word order in German subordinate clauses instantaneously, that is, with the use of first subordinating conjunctions or even before, with the first preconjunctional subordinate clauses. One of the children studied in Meisel (1986), Pierre (French/German), and one of the children observed by Müller (1993), Pascal (French/German), are examples of instantaneous acquisition. Kielhöfer and Jonekeit (1983) come to the same conclusion for their French/German bilingual children Jens and Olivier (the mother speaks French, the father speaks German, raised in a German-speaking environment). Therefore, we may conclude that although "erroneous paths" in the acquisition of word order in German subordinate clauses are frequently attested in bilingual children, their appearance is not a necessary feature of bilingual first language acquisition (see Table 2).

What about monolingual German children? Until recently, most researchers have taken for granted

[12] Unfortunately, Taeschner (1983) does not mention Lisa's age.
[13] Again, Lisa's age is not mentioned.

Table 2. *Bilingual children's usage of erroneous word orders and V-final in German subordinate clauses*

Child	V final	SVX	VSX	XVS	wh subject +V+X	author
Louis	+	+	?	?	?	Ronjat (1913)
Ivar	+	+		+	+	Müller (1993)
Hildegard	+	+			+	Leopold (1949a,b)
Giulia	+	+				Taeschner (1983)
Lisa	+	+	+		+	Taeschner (1983)
Caroline[14]	+	+			+	Meisel (1986)
Pierre	+					Meisel (1986)
Pascal	+					Müller (1993)
Jens	+					Kielhöfer & Jonekeit (1983)
Olivier	+					Kielhöfer & Jonekeit (1983)

that the acquisition of word order in German subordinate clauses represents an error-free area. However, Penner (1990) reports on target-deviant patterns in subordinate clauses in Bernese Swiss German, where the children place the finite verb in second or third position. Schaner-Wolles (1990) observes subordinate clauses where the finite verb surfaces in third position in her Austrian children. Unfortunately, one does not know whether the "errors" are exceptional or they are characteristic of a developmental phase. Like the bilingual children, monolingual children also use the correct verb-final pattern during the time when they produce target-deviant word orders.

The studies by Fritzenschaft et al. (1990) and Gawlitzek-Maiwald et al. (1992) are the first to show that a monolingual German child, in this case called Benny, may take ten months to learn the verb-final pattern in German subordinate clauses. Benny uses the same deviant patterns as the German/Italian bilingual child Lisa (see (10)), in addition to the target-like verb-final pattern (with the same complementizers).

(10) Target-deviant subordinate clauses in Benny

a. *will die meerjungfrau haben daß du has net die meerjungfrau* (3;0,19)
want the mermaid have that you have not the mermaid
"I want to have the mermaid so that you won't get it."

b. *weißt du we geht jetzt daraus*? (3;6,2)
know you who goes now out-there
"Do you know who goes outside now?"

As noted above, in adult German some subordinate conjunctions such as *weil* "because" also license root word order, that is, the finite verb appears in third position, immediately following the conjunction and the subject/topicalized constituent. Benny's data show the same word order variation with *weil* as with other conjunctions, namely SVX, VSX and verb-final patterns. VSX is not grammatical in adult German *weil*-clauses: *weil hast du das doch gesagt* (3;2,29) "Because have you it really said".

We may conclude then by saying that the same types of errors which have been found in bilingual children are also evidenced in monolingual children. There is, however, a quantitative difference between the two acquisition types: whereas the error types presented here are frequently encountered in bilingual language development, they seem to represent rather an exception in monolingual language acquisition. This quantitative difference should of course be accounted for.

To summarize:

- When children acquire German and a second language such as French, Italian, or English, difficulty seems to be asymmetrical, that is, word order in French, Italian, and English subordinate clauses does not represent a problem space for the children, in contrast to German, where various error types are attested. This is the case independently of whether German is the preferred language or not.
- There appears to be no qualitative difference between the error types produced by bilingual and by monolingual children.
- The learning procedures observed for bilingual and monolingual children who "chose the wrong path" are very similar. Erroneous decisions are not revised within a very short period of time, but the revision process takes one or even two years (see Müller, 1996, where this is discussed in the light of parameter mis-setting).
- Bilingual children who learn German and a second language such as French, Italian, or English are much more easily "misled" and produce target-deviant word orders much more frequently than monolingual children. There is an important quantitative difference between bilingual first and monolingual language acquisition.
- Difficulty with word order in German subordinate clauses is not a necessary feature of bilingual language development.

[14] Caroline has only very few subordinate clauses.

There is another important conclusion we may draw from the observations: the children under investigation who produce erroneous word orders in German subordinate clauses have two separate grammatical systems. They come up with word orders in subordinate clauses which can neither be completely explained by the German input nor by the grammar of the other language involved, namely cases where the finite (lexical or auxiliary) verb precedes the subject in VSX and XVS orders. Interestingly enough, the children do not use these incorrect word orders in French, Italian and English, indicating that they have acquired two separate grammatical systems.

I want to suggest that the errors made in bilingual language development are due to transfer of features of the other language. In the following sections, I will try to shed some light on the question of what exactly can be transferred. The transfer approach favored here explains why there is such a quantitative difference between bilingual first and monolingual language acquisition with respect to the choice of "erroneous paths". The observation that monolingual children produce target-deviant word orders as well will be taken as evidence in favor of the assumption that transfer cannot be the whole story.

Ambiguous input as the source for transfer

I want to show here that adult German is ambiguous from the child's perspective and that transfer of features from the other language occurs exactly when the input leaves open the possibility for more than one grammatical analysis. What is so special about German subordinate clauses?

The first thing the child has to detect is that complementizers are functional elements in German, or in other words that complementizers are generated in the position where the finite verb moves to in main clauses. The second characteristic is that German phrase structure provides a head-final position for the finite verb in subordinate clauses.

The status of complementizers is not easy to detect from the input the child receives. First, as has already been noticed in the introduction, German has conjunctions which disallow the verb-final pattern such as denn (since) and *sondern* (but). With other conjunctions, the verb-final pattern is optional and coexists with main clause word order: *weil* (because) and *obwohl* (although) in spoken German. A further problem concerns the categorization of conjunctions. Adverbial conjunctions such as *weil* and *nachdem* (after) share many properties with adverbs such as *darum* (about that) and *danach* (afterwards) and prepositions such as *wegen* (because of) and *nach* (after). All encode similar semantic relations (causal, temporal) and prepositions and conjunctions appear in a position preceding NPs and clauses respectively. There are also many homonyms in German, such as *bis* which is used as a preposition with the meaning "until"/"as far as", and as a conjunction with the meaning "until". Another example is *denn*, which functions as an adverb in spoken German with the meaning "then" (colloquial form of *dann*) and as a conjunction with the meaning "for". We must not forget that children use prepositions and adverbs long before they use conjunctions (Müller 1993).

As far as the children under investigation are concerned, it can be shown that both parallels are discovered by them, the similarities between prepositions and conjunctions on the one hand, and between adverbs and conjunctions on the other. The category COMP in Ivar's grammar of German develops out of a lexical category, namely the preposition für "for". In Müller (1993, 1994, 1996) and Meisel and Müller (1992) I hypothesized that the usage of the lexical forerunner *für* indicates that Ivar projects a new category that is first classified as being lexical (not functional) in syntax in order to generate complementizers. If complementizers are first analyzed as lexical categories, they are not associated with finiteness and the position in which they are generated cannot count as a landing site for finite verb movement.

At the age of 2;7, i.e. four months before the first adult-like subordinate conjunctions are being used, Ivar also starts to introduce whole sentences (finite and infinitival) with the preposition *für*. Some examples of this distribution are given below in (11).

(11) The distribution of *für* in Ivar

a. *fum tiere weg nicht [n]aufen* (2;7,17)
for animals away not run
"In order for the animals not to run away."

b. *das für k[j]emmen deine haare* (2;10,11)
this for to-put your hair
"This is for to put in your hair."

At later developmental stages we still find clear evidence for the use of a preposition to introduce finite subordinate clauses, for example, *das is für der rauch geht hoch in das hau* (in order for the smoke to go up in the house) (3;4,9).

The same development can be observed in Ivar's French, where he introduces his first subordinate clauses with the French equivalent of German *für*, namely *pour*. At least for English, a similar developmental path has been attested, namely in the children studied by Brown (1973), Adam and Eve: *for for bus stops* (Eve), *for the sun get in my eyes* (Adam). Jespersen (1964) notes that many English comple-

mentizers evolved historically from prepositions.[15] Pinker (1984) argues for the development of complementizers from prepositions in language acquisition. Usage of the real complementizers *daß*, *que*, *that* and *ob*, *si*, *if* may trigger the reanalysis of elements introducing clauses as complementizers (see Müller 1993). It has been observed by researchers such as Bickerton (1981), Koopman and Lefebvre (1981), Washabaugh (1975), and Woolford (1979) that in French- and English-based creole languages the prepositions which are first used by children to introduce subordinate clauses in English and French, *for* and *pour*, are precursors of complementizers. Perhaps it is not a trivial finding that it is exactly those creoles where one of the contact languages is English or French which develop their complementizer system from a preposition (for other sources for complementizers in other languages see e.g. Muysken (1977)).

How do we know that *für* is categorized as a preposition in Ivar's grammar and not as a complementizer? The examples show that besides the form *für* Ivar uses some variants such as *fo*, *fum*, *föm* which are not attested in adult German. However, these are potential forms of the German system, since some prepositions may fuse with case-marked articles: *an dem* "at/to+the (dat.masc.sing)" may fuse, giving rise to *am*. In contrast to prepositions, complementizers are invariant at least in the variety of German Ivar is exposed to. Note further that Ivar never uses complementizers in combination with NPs, but he uses *für* in this context.

At the time when Ivar starts to first use adult-like complementizers, many important developments within main clauses are to be observed:

- Target-deviant word order patterns disappear, i.e. the XSVY order *dadrauf papa baut ein ein ein ein turm* "there-on Daddy builds a a a a tower" and the verb-final order in declarative main clauses *ivar buch buch liest* "Ivar book book reads". Also, non-finite verbs are always placed correctly in German, i.e. VO patterns with these (which were used but infrequently) disappear.
- V2-like patterns are no longer limited to "light" adverbs such as *da* (there), *jetzt* (now), *so* (like this), *hier* (here), but there are genuine topicalized verb complements in first position (objects) (see Müller & Penner, 1996).
- V2-like patterns are no longer limited to a small class of verbs, including *sein* (to be), and unaccusative verbs such as *gehen* (to go) and *kommen* (to come).
- Target-consistent wh-questions are evidenced by now (i.e. questions other than *wo* (where) questions).

In French, the use of the first adult-like complementizers is correlated with the emergence of subject clitic inversion of the type *où vas-tu* (where go you).

In other words, the two languages approach the target-system with respect to main clauses. Ivar uses the correct word orders in German and a much greater variety of different construction types in both languages. Again, he separates the two languages, since V2 patterns are never used incorrectly in French, and even in German root clauses, incorrect word order patterns completely disappear. Ivar thus knows that German is a V2-language and French is a residual V2-language at the time when he uses incorrect word orders in German subordinate clauses. Since he has used finite verbs clause-finally in declarative main clauses before (see (13), below), it is plausible to assume that his phrase structure configuration of a German sentence makes available a head-final position for finite verbs. The problem is that V2 is independent of whether the clause is introduced by a complementizer or whether we are dealing with a main clause. In structural terms, this observation is equivalent to a structure where the finite verb may surface in the V2-position independently of whether a complementizer is present or not. Therefore, we have to assume that Ivar's phrase structure configuration of a German sentence has a functional projection (say: IP) which he can activate in subordinate clauses and where the finite verb must move. The specifier of such a projection can host subjects and also nonsubject constituents, since we observed SVX and XVS patterns in his subordinate clauses. Ivar, thus, has activated a functional projection in between CP and VP, which serves as a landing-site for finite verbs (see Figure 5).

This tree is similar to the tree of adult French, Italian and English with respect to the functional projections. It differs from French, Italian and English in one respect and this is exactly the reason why we have to assume that Ivar's phrase structure configuration of a German sentence differs from that of French: In this tree, the specifier of IP may host subjects (see sentence (7 a)) and non-subject constituents (see sentence (6 c)).

[15] Emonds (1985) goes even further by claiming that at least those adverbial conjunctions such as *in case of*, *although*, *since*, *while*, *before* and *because*, which have "intrinsic semantic content," are being categorized as prepositions in present day English. One reason for this classification is that these adverbial conjunctions, like prepositions, may be modified with *right*. Note that the children under investigation start out with these adverbial conjunctions. The real complementizers *daß*, *que*, *that* and *ob*, *si*, *if* occur late in the developmental process.

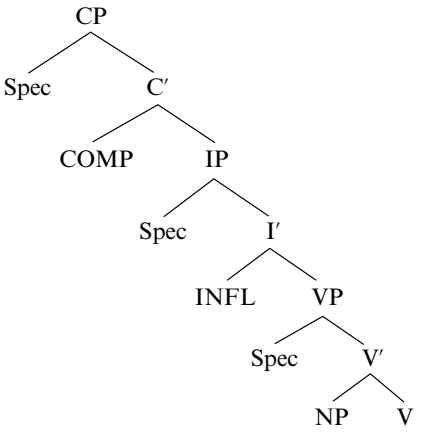


Figure 5. Phrase structure configuration of a German sentence in Ivar.

Is there a natural language with such a phrase structure configuration? The answer to this question is positive. There are several languages evidencing V2 in subordinate clauses: Yiddish (Diesing, 1990), Icelandic (Platzack, 1993) and Old High German (Tomaselli, 1991). One example from Yiddish is: *ir zolt visn zayn, mayne libe kinderlekh, az vayn ken men makhn fun troybn oykh* "You should know be, my dear children, that wine can one make from grapes also".[16]

But note also, that if we say that Ivar's phrase structure configuration of a German sentence corresponds to adult Yiddish, this does not apply to his VP, which is head-final in his grammar but head-initial in Yiddish.[17]

What is the learning task in Ivar? He has to learn that adult German has one functional category (CP) where complementizers are generated and where finite verbs move in main clauses, that is, no distinct INFL node is needed as in Figure 1. In terms of learnability theory, Ivar has to narrow down his grammar, which is a problem I discussed in Müller (1996). Notice that from 4;4,14 onwards, Ivar also uses the target-like verb-final pattern quite frequently and he learns this pattern for each complementizer separately. This observation suggests that Ivar's grammar makes available two phrase structure configurations for a German subordinate clause, depending on the type of element within CP, namely the structure in Figure 5 and that in Figure 1.

Let us now have a closer look at another developmental path for German, taken by the monolingual child Benny studied in Fritzenschaft et al. (1990) and Gawlitzek-Maiwald et al. (1992), where adverbs play a central role. Apart from SVX patterns, Benny also uses VSX patterns in subordinate clauses, which are introduced by conjunctions. Benny seems to have difficulty with the categorization of adverbial conjunctions too. However, he may treat them in his system as he treats adverbs, that is, as non-heads. Fritzenschaft et al. (1990) and Gawlitzek-Maiwald et al. (1992) hypothesize that the use of conjunctions (see (12a), (12b), (12c)) in Benny shows parallels to the use of adverbs (see (12d), (12e), (12f)). Some examples suggesting a parallel treatment of conjunctions and adverbs with respect to their integration into German clause structure are:

(12) The distribution of *wenn* as compared with adverbs in Benny

a. *du wenn des dreht sich was tut' s dann*? (3;2,26)
you when it turns itself what does it then
"When it turns what is it doing then?"
[*wenn*+S+V+X]

b. *wenn hab ich geburtstag habt* . . . (3;1,4)
when have I birthday had . . .
"When I've had my birthday . . . "
[*wenn*+V+S+X]

c. *wenn des der bub neischmeißt dann fährt schon* (3;1,13)
when this the boy in-throws then drives already
"When the boy throws this in . . . "
[*wenn*. . .+V-final]

d. *sonst da kann ich nich absteigen* (3;1,3)
otherwise there can I not off-get
"Otherwise I cannot get off."
(target-deviant) [*sonst* +X+V+S]

e. *jetzt hab i wieder unfall gemacht* (2;11,21)
now have I again accident made
"Now I've had an accident again."
(target-like) [*jetzt* +V+S+X]

f. *dann ich pipi mach* (2;11,21)
then I pee make
"Then I pee."
(target-deviant) [*dann*. . .+V-final]

Root wh-questions also follow the same patterns in Benny's speech, i.e. they are used with the following constructions: V2 *was macht du*? (2;11,21) "what makes you", verb-final *wo des da hinkomm*? (2;6,25) "where this one particle-goes", and V3

[16] The language specific variation as to the A or A′ status of the specifier of IP could be due to whether INFL assigns Nominative nondirectionally (as in Yiddish and German) or directionally (to the right or to the left, as in French for example).

[17] Diesing (1990) and Santorini (1992) show that Yiddish developed from a phrase structure where finite verbs were placed clause finally in subordinate clauses and in second position in main clauses to a phrase structure which regularly shows V2 in subordinate clauses as well. Interestingly enough, this syntactic change went hand in hand with a change from OV to VO (see also Travis 1984).

warum weiter geht nich? (2;11,21) "why further goes not".

Fritzenschaft et al. (1990) favor an asymmetric approach to sentence structure and assume that Benny has two phrase structure configurations available, one with a head-initial INFL and another with a head-final INFL. We may assume, however, the same phrase structure configuration for Benny as for Ivar (see Figure 5). In the structure in Figure 5, Benny also seems to interpret the specifier position of IP as a position which can host subjects and non-subject constituents, giving rise to SVX and XVS patterns (the latter exclusively with *weil* clauses, which corresponds to adult German) in subordinate clauses. Since Benny produces many target-like subordinate clauses at the same time when he uses target-deviant patterns, we may assume that the phrase structure configuration in Figure 1 is available to him as well.

The question, then, is how to describe VSX patterns in structural terms. The first thing to be noticed is that there are, once again, natural languages where this pattern is regular in subordinate clauses. These are Afrikaans (du Plessis, 1986), Welsh (Pollard, 1991), and Irish (McCloskey, 1991), for example. One example from Welsh is: *dywedodd Gwyny gwelodd ef y bechgyn* (said Gwyn that saw he the boys).

Two possible sources for V1 in subordinate clauses are plausible: we may say, as has been assumed for Welsh and Irish, that the subject does not necessarily have to move into the specifier of IP in order to be assigned the nominative Case. The subject may remain in its base position (which is the specifier of VP) and receives nominative Case from the finite verb raised into INFL. This analysis is problematic, because the empty specifier position of IP would not be licensed by the principles of Universal Grammar, since it would constitute a violation of the Empty Category Principle. There is, however, another explanation for the V1 pattern in Benny's subordinate clauses, which may be derived from the ambiguous input. Benny is raised in the surroundings of Tübingen. His mother speaks Swabian with him, his father Hessian. Many German dialects, Hessian included,[18] allow a doubly-filled COMP position, giving rise to sentences such as: *ich weiß* ***mit wem daß*** *Maria ausgegangen ist* (I know with whom that Mary went out) (Fanselow & Felix 1987, p. 178). Grewendorf (1988) has suggested, following Chomsky (1986), that in order to avoid doubly filled COMPs in those dialects of German which do not have this phenomenon, mostly the northern dialects, the specifier of CP and COMP share features. The wh-phrase in the specifier of CP may thus satisfy the selectional restrictions imposed by the matrix verb (e.g., *fragen* "to ask" selects an indirect question), where the selectional features are located within COMP. The COMP position in these dialects counts as being occupied and no element may be moved into it. Benny may assume now, that since doubly filled COMPs are allowed in the input, the finite verb may raise into COMP if the specifier position is occupied by another element, a wh-phrase for example. Note also that adult German regularly uses embedded V2 clauses of the type in (3). The existence of such data in addition to an analysis of adverbial conjunctions as non-heads (as their adverbial counterparts) may mislead the child. V1 in embedded clauses could then structurally be defined as follows: the finite verb raises into COMP and the adverbial conjunction is located in the specifier of CP. The CP would then be filled with two elements: Spec,CP with the adverbial conjunction and COMP with the finite verb.

To return to our earlier discussion, in both children, Ivar and Benny, we are dealing with a conspiracy between V2 in root and non-root clauses which leads the children to assume that a separate functional category (here: IP) has to be projected. The similar analyses given for the bilingual child Ivar and the monolingual child Benny nicely account for the observation that bilingual and monolingual children make very similar errors in the domain of German subordinate clauses. There is, however, a quantitative difference between these two groups: bilingual children tend to choose "wrong" paths much more often than monolingual children do.[19] We may account for this difference in terms of the second language which is in contact with German. In the case of ambiguous data, the bilingual child is tempted to use parts of the analysis for the unambiguous data in the second language. Or put differently: in case of doubt, the bilingual child, as a relief strategy, tries to solve the ambiguity by using transfer.

We have now determined the range where transfer occurs: ambiguous input. Let us now turn to the question of what exactly is transferred in the domain of subordinate clauses when German and another

[18] I want to thank Jurgen Meisel as a speaker of Hessian for this information.

[19] One reviewer suggests that this difference may be due to the fact that much more information is available about monolingual children. It is of course possible that further studies on bilingual language development will show that there are many more bilingual children than expected who choose the "right" path in the domain of German subordinate clauses. Nonetheless, it is surprising that "wrong" paths seem to be rather exceptional in monolingual language development at the current level of research in the domain of German subordinate clauses.

language such as French, Italian or English are in contact.

What is transferred?

The first hypothesis could be that surface strings are transferred. This assumption is, however, not plausible: The French/German and Italian/German bilingual children also use AUX-S-V sequences, i.e. subject auxiliary inversion in German subordinate clauses with nominal and pronominal subjects. This is ungrammatical in French and Italian, and the children do not use this pattern in these languages.

The second extreme would be the hypothesis advanced by Meisel (1983) for second language learners, that complete deep structures are transferred. But this approach, although plausible for second language acquisition, cannot account for bilingual first language development, since the children use verb-final patterns in German declarative clauses as soon as they make productive use of finite verbs. The pattern is completely absent in the children's second language, French, Italian or English, where it would also be ungrammatical. This shows that the children have a phrase structure configuration available in German with a head-final position for finite verbs. One example of a root verb-final clause for each child is given below in (13). The use of verb-final patterns in German declarative clauses has also been observed with monolingual German children (see Fritzenschaft et al., 1990, and Gawlitzek-Maiwald et al., 1992, and example (13 g) of Benny).

(13) root verb-final clauses in the German of bilingual children and in Benny

a. *ivar buch buch liest* (2;4,7; Ivar)
Ivar book book reads
"Ivar reads the book."

b. *denn ich auch schläf dann* (5;0,19; Hildegard)
then I also sleep then
"Then I sleep too."

c. *mama giulia schleibi* (1;9; Giulia)
Mummy Giulia writes
"Mummy writes Giulia."

d. *lisa mutsi macht* (2;4; Lisa)
Lisa dirty makes
"Lisa makes it dirty."

e. *diese da drauf is* (2;10; Caroline)
this one there on top is
"This one is there on top."

f. *ich ich wie hol* (2;4,21; Pascal)
I I back get
"I get it back."

g. *ich auch ein bauch möchte* (2;8,28; Benny)
I also a belly want
"I want a belly too."

As shown by Meisel (1986), Pierre places only non-finite verbs in clause final position, never finite verbs. In Hildegard, verb-final patterns could not be attested either, with one exception, but Leopold (1949a, 1949b) does not explicitly deny the usage of these patterns. Therefore, we may not conclude that Hildegard did not use this pattern at all. The examples for verb-final patterns are infinitives in clause final position: *wann traute kommen*? (when Traute to-come?). In Giulia another problem arises, since it is impossible to say without doubt whether the words to which she attaches an "i" are verbs: *schleibi* (write), *sitzi* (sit), *tinki* (drink), *badi* (take a bath). Giulia also uses non-finite verbs in clause final position to a greater extent than finite verbs: *giulia paola bleiben* (Giulia [with] Paola to-stay), *giulia nicht blot essen* (Giulia not bread to-eat). Ronjat (1913) and Kielhöfer and Jonekeit (1983) do not mention the usage of finite verb-final clauses in their children, but the reader in general does not learn very much about finite verb order in main clauses.

Another assumption could be that parameter values or feature specifications of categories are transferred. This is a more plausible hypothesis, since it may account for the data. The children may assume in contrast to adult German that the finiteness operator is located in INFL and not in COMP. This corresponds to the parameter setting of French, Italian and English. The relevant finiteness parameter would be: "[+F] in INFL" or "[+F] in COMP".

In the previous section, the development of German complementizers has been outlined. When discussing Ivar's data, parallels between the development of complementizers in German on the one hand and in French and English on the other hand were observed. If we assume that Ivar has transferred the value of the finiteness parameter or feature specification of functional categories from French into German, the question arises as to whether the "wrong" analysis of German complementizers triggers the wrong setting of the finiteness parameter/the wrong feature specification of functional categories or vice versa. The decision depends very much on the acquisition theory one has in mind. That the wrong analysis of complementizers triggers wrong parameter settings or wrong feature specifications of categories would be a plausible assumption under the *weak continuity hypothesis*, coupled with lexical learning (cf. Clahsen 1982, 1988). Recently, lexical learning has been called into doubt. Bottari, Cipriani and Chilosi (1992), and Penner and Weissenborn (1993) show that the monosyllabic place-holders used by very young children within the NP are not merely phonological chunks or imperfect imitations, but instead elements which should be seen as attempts to

reproduce the abstract pattern of the structure of NPs. This amounts to saying that the positional and structural properties of functional categories (here the determiners) are learned before the specific morphophonemic forms of the adult language. Syntactic learning thus is detached from lexical learning.

Under the *strong continuity hypothesis*, adopted here, parameter setting probably applies prior to the multiple-word stage and the wrong analysis of complementizers evidenced later in the production data of the children is an outcome of this. In Müller and Penner (1996) several arguments are advanced in favor of strong continuity in the domain of subordinate clauses. Under strong continuity the underlying structure of subordinate clauses is a complete clausal projection, CP (although underspecified; see Meisel & Müller (1992), where this is argued to be the case for verbal functional projections), rather than a "truncated" one (IP), even at the stage where the adult-like lexical complementizers are systematically lacking. The first kind of evidence is constituted by the verb placement particularities of preconjunctional subordinate clauses: Some children mark German subordinate clauses at the preconjunctional stage solely by verb-final patterns. The second kind of evidence are placeholders, inserted into the position where complementizers are used in the adult system. These placeholders mark the missing lexical complementizers. Thus, it may be proposed that the wrong analysis of conjunctions in German by the children is the result of an "error" that occurred a long time before the use of conjunctions. The error is that the children, due to a target-deviant feature specification of categories, have projected a functional category for German (here: IP) which is "superfluous". Note once more that this does not mean that the children, Benny and Ivar, have not acquired German as a V2 language (and for Ivar that French is not a generalized V2 language).

Consequences for language acquisition within parameter setting theory

In the present article, it has been argued that bilingual children may transfer parameter values in the case of ambiguous input.

One question which arises at this point is how children set parameters via positive evidence only, once we admit that the input may be ambiguous and, in principle, compatible with more than one grammatical representation. This represents a problem for parameter setting theory, since positive evidence should lead the learner directly to the correct grammar. In acquisition theory, the existence of triggering data guarantees the correct choice of parameter values. A trigger is a cue in the primary data which enables the language learner to set the parameter values. Recently, Gibson and Wexler (1994) have denied the existence of triggering data for all parameters. This idea will be explored for the case of word order errors studied in the children under investigation.

The common denominator of V2 languages (in contrast to non-V2 or residual V2 languages) is the conflation of the A (argument) (=IP) and the A' (non-argument) (=CP) system. Thus, in a V2 language, subjects may surface in the same position as fronted non-subject constituents (e.g. objects and adverbial phrases). This conflation may be complete, as in German, showing root-/non-root asymmetries with respect to V2, or partial, as in Yiddish, showing no root-/non-root asymmetries with respect to V2. The special status of complementizers in German (functional elements associated with finiteness) could be conceived of as a subparameter of the global parameter +/-V2 (global parameter: "A- and A'-system conflate" vs. "A- and A'-system do not conflate"). In other words, there are V2 languages such as German, where the complementizer does not instantiate a separate functional category, and V2 languages such as Yiddish, where it does. We could hypothesize that there is no triggering data for this kind of subparameter and that the child therefore cannot simply look for a trigger in the input and subsequently be driven to the correct grammar. In this respect, it is interesting to note that all children have acquired German as a V2 language, including those children who make errors in subordinate clauses. Thus, they do not hesitate as to whether German is V2 or not (the global parameter). Some children, however, make incorrect choices with respect to the status of complementizers (the subparameter). It is not surprising that inductive learning is evidenced in the domain of subparameters: The children use the same complementizer with correct and incorrect word orders and the correct verb-final order is learned for each complementizer separately. More research will need to be conducted in order to determine whether the postulation of a subparameter without triggering data is plausible. If this turns out to be the case, we would be able to predict that transfer in bilingual individuals is restricted to subparameters.

The analysis presented here has to cope with another problem, namely parameter resetting. The children who initially make errors in subordinate clauses achieve a state where these errors have completely disappeared. Did they reset the parameter? Parameter resetting should be avoided as an analytical concept in the general case, since it may lead the

child to switching parameter values an infinite number of times and as a consequence to a situation where s/he may never settle on the correct value (see Clahsen, 1990; Müller, 1993; Randall, 1990; Valian, 1990). Since subparameters confront the language learner with the analysis of ambiguous input, we have to guarantee that once the learner chose the wrong value for a subparameter s/he should be able to revise this decision during the acquisition course. Again, more empirical work may help to clarify this issue (see Müller 1994, 1996). The most interesting observation with respect to this question is that learners who chose the wrong path cannot simply revise their decision within a short period of time. Revisions are relatively time-consuming, that is, we find evidence for inductive learning. Since it has been argued that the setting of a parameter is instantaneous, the possibility that the subparameter has been reset by the learners is excluded. What is the learning procedure then? It is evident that learners who chose the wrong value for the subparameter start to build up a list of exceptions to the setting of this special subparameter. Such a list has to be implemented anyway, since there are exceptions to many parametrized grammatical regularities. We may further speculate that once this list of exceptions is exceedingly large, the learner, due to economy principles, develops a new generalization which outranks the old generalization, the parameter. This leads us to the question as to whether a parameter is associated with particular values or whether it has to be conceived of as a method or a subroutine for language analysis (see Haider, 1993b). With respect to the preceding discussion, it is very plausible to think of parameters as subroutines.

A further problem is that there are also children who do not make visible mistakes. This indicates that individual characteristics of learners have to be considered as well. Although difficult at the current stage of theoretical grammatical research, the study of the individual learner is a desirable goal. Gawlitzek-Maiwald et al. (1992) describe as the two extremes of a continuum a conservative learner and a liberal learner. Benny is treated as an extremely liberal language learner. Ivar, the bilingual child studied in depth here, can also be characterized as a liberal learner; for example, he uses preconjunctional subordinate clauses, that is, a construction which is "incomplete" from the adult's perspective. The bilingual child Pascal represents the other extreme, a very conservative learner. Pascal has correct word orders in subordinate clauses from the beginning and he does not use preconjunctional subordinate clauses. It would be interesting to relate wrong paths in language acquisition to individual features of learners, such as liberal vs. conservative. Such a perspective is opened by Fodor's (1998) work. In sentence-processing research, there have been defined different strategies for dealing with ambiguity: (a) serial processing, that is, the learner selects one analysis and revises it later if necessary; (b) parallel processing, that is, the learner does not select one analysis but "works" with all analyses until more information is available on the basis of which only one analysis can be chosen; (c) delay or "wait-and-see", that is, the learner waits for more information before choosing between different analyses, and no grammar change takes place until unambiguous input becomes available. It is possible now to interpret these strategies as characteristics of individual learners. In other words, we do not have to decide between the different strategies and determine which is "the correct one", but we may assume that all three strategies coexist. The present analyses of Ivar's and Benny's intermediate German grammars could be interpreted as evidencing strategies (a) and perhaps (b). Ivar made a wrong choice with respect to a parameter value. It takes him more than one year to recognize that the grammatical representation which allows the usage of target-deviant clauses has to be revised. During this period (until the age of 4;4), target-like subordinate clauses amount to 4 per cent of all subordinate clauses. In terms of the strategies mentioned above, we may conclude that Ivar is a type (a) learner: He selects one analysis and revises it later. The learning algorithm presented in Gibson and Wexler (1994) is of type (a). Benny may be qualified as a type (b) learner. Fritzenschaft et al. (1990) and Gawlitzek-Maiwald et al. (1992) do not mention a stage comparable to that observed in Ivar, where Benny's data lack the target-like verb-final pattern in subordinate clauses. Benny thus seems to compute two alternatives for German sentence structure during the same developmental phase. Finally, there is also evidence of the type (c) learner in the longitudinal data presented here. Pascal may represent a conservative type (c) learner. He uses a wait-and-see device, namely he does not use subordinate clauses at all until unambiguous information is available. This is also the reason why his data do not evidence "mistakes". Type (c) learners are simply silent.

In the present paper I have tried to argue in favor of transfer in the bilingual individual as a function of ambiguous input. In comparing the children under investigation, I have tried to show that language dominance is not the most plausible reason for transfer. There is indeed more evidence against language dominance as an explanatory concept. Crysmann and Müller (1995, in press) show that for the phenomena related to the hierarchical versus "flat" structure of the VP, the French system represents the

problem space for the bilingual French/German children investigated in the present paper. It can be shown that the VP in adult French is best described in terms of a flat structure, in contrast to German, which involves a hierarchical VP. The French input does not unambiguously lead to the conclusion that French has a flat VP structure. Thus, the children assume a hierarchical VP for French for about two years of their language development, evidencing clitic placement and auxiliary selection errors (Müller & Crysmann, 1997). Again, monolingual French children also evidence these error types, but to a much lesser extent, that is, they revise their analysis of the French VP in terms of a hierarchical structure during a period of about three months, and "wrong paths" are less frequent. The "error" with respect to the French VP occurs during the same period when the children have "wrong" subordinate clauses in German. This observation excludes language dominance as an explanatory concept.

A further observation to be emphasized is that transfer only occurs to the extent that the language learner has evidence for the grammatical analysis resulting from transfer in the recipient language. In other words, "blind" transfer does not exist in the children studied here. A French/Italian/English property can be transferred into German because there is evidence for the property in adult German as well (subordinate clauses showing root word order). Furthermore, transfer has been viewed positively, as a strategy to cope with problematic input. In this sense, transfer can be viewed as a relief strategy. In discussing the monolingual child Benny, we hypothesized that he has been mislead by the ambiguous German input. In order to explain VSX patterns in subordinate clauses, it was suggested that the Hessian input contains examples for a doubly filled COMP position and that Benny's analysis of VSX patterns is an outcome of this dialectal property. The question which arises is whether Benny is a real monolingual German child. Dialectal variation may indeed be enormous, involving different parameter settings (see Roberge & Vinet, 1989, for example). Benny may be a bilingual child who has knowledge of two German dialects. Recently, Roeper (1997) has defended the position that "from a theoretical perspective, all speakers are bilingua ... In particular, ... children exhibit a form of bilingualism when they appear to be between Stages" (p. 2). Bilingualism with respect to first language acquisition means that the child has two grammars, one with agreement and the other without, for example. This view of first language acquisition opens interesting perspectives to a parallel treatment of "monolingual" and bilingual first language development. Interestingly, the problems Ivar and Benny are struggling with are also characteristic of adult second language learners of German (see Müller, 1998, to appear,b). Again, it would be interesting to compare "monolingual" and bilingual first language acquisition with adult second language development, a perspective that falls outside the scope of the present paper.

Another interesting result is that the variation found in the bilingual children who produce erroneous word orders in German subordinate clauses falls within the range of Universal Grammar. From a more general point, this means that UG theory may shed light not only on monolingual language development but also on the nature of bilingual language acquisition.

Summary

In the present paper, transfer has been argued to be a relief strategy, used in order to cope with ambiguous input. Once one of the languages leaves open the possibility for more than one grammatical analysis, the bilingual individual may, in compensation, use parts of the analysis of the second language, that is, s/he transfers parameter values or feature specifications of categories. The status of German complementizers is not easy to detect from the input the child receives. German subordinate clauses present the child with a variety of word orders and the verb-final pattern of subordinate clauses is used in main clauses as well. The grammatical representation resulting from transfer is compatible with parts of the target language: the children come up with a phrase structure where V2 is independent of whether the clause is introduced by a subordinating conjunction or not. This mirrors the possibilities of the adult system. In other words, there has to be positive evidence for the structure resulting from transfer. This explains why the verb-final property of German verb phrases is never transferred into French, Italian, or English, for example. Monolingual children also have problems with the language material in question. This suggests that the input contains evidence for more than only one grammatical analysis. The quantitative difference between monolingual and bilingual language acquisition is interpreted as evidence in favor of cross-linguistic influence in bilingual language development. Transfer as viewed in the present paper thus is a predictable factor in bilingual language acquisition.

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PEER COMMENTARIES

Comparing error frequencies in monolingual and bilingual acquisition

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Natascha Müller's article concerns the acquisition of word order in German subclauses by young bilingual children. Müller's basic argument as I understand it runs as follows:

(1) In the acquisition of word order in German sub clauses some children make errors and others do not;
(2) there are some monolingual and some bilingual children who do not make errors;
(3) there are some monolingual and some bilingual children who do make errors, and the errors are qualitatively similar for monolingual and bilingual children;
(4) when children do make errors, they occur more frequently in bilingual than in monolingual children;
(5) the errors in both monolingual and bilingual chil dren are due to the misprojection of a separate functional category;
(6) *in addition*, the errors in bilingual children (but not in monolingual children) are due to influence from the other language they are simultaneously ac quiring. The reason for positing this is that bilingual children's errors are more frequent than mono lingual children's errors.

Regarding point 3, it is obvious that the investigator must be absolutely certain that the subclause that is being analyzed is indeed non target like. This means that the child should not have heard similar constructions in the input (as Müller points out in her introduction, word order in adult German subclauses is highly variable; it is a pity that she presents no analysis of actual input to young language learning children). Furthermore, transcription and coding should be unambiguous (an utterance such as Ivar's "sagen wir mal dass das is ein baum", for instance, is not a clear example of a "target deviant subclause", as Müller suggests, but a possible case of juxtaposition of two co ordinate clauses, where what has been transcribed as "dass" is actually a rendition of "das", which is then repeated).

My more basic comments will focus on points 4 and 6. Since frequency of occurrence of errors is such a central issue in Müller's argumentation it is surprising that there is no quantification present except for the statement that up to the age of 4;4, the bilingual child Ivar produced seven out of 167 target like subordinate clauses. Without a strong empirical basis presenting appropriate quantitative analyses of different word orders in subclauses by both monolingual and bilingual children, the assumption that indeed bilingual children make more errors than monolingual children is premature. Such quantitative analyses will have to consider both the proportions of errors in function of the total number of subclauses as well as the absolute number of subclauses (there needs to be a sufficient "mass" for analyses to be viable). Furthermore, in comparing children to each other their overall levels of language development and ages must be taken into account, and similar size corpora should be taken as a basis for comparison.

In order for quantitative analyses to be possible, there must be quantifiable data. Unfortunately, there are few corpora available so far for either monolingual or bilingual children acquiring German that can function as a basis for analysis. Diary data cannot be used, since they suffer from severe sampling limitations and cannot capture the fre quency of occurrence of particular phenomena. A state ment such as that by Ronjat that his son Louis "dit très fréquemment wenn der Bubi ist lieb" (1913, p. 67) is uninterpretable in terms of just how frequently this utter ance occurred. (Incidentally, Müller interprets Ronjat here as stating that Louis produced "many erroneous word patterns ... of the type *wenn der Bubi ist lieb*". As the quote from Ronjat shows, Ronjat only claims that the actual utterance *wenn der Bubi ist lieb* occurred frequently.) In trying to explain Louis' errors in *wenn der Bubi ist lieb* and three other utterances, Ronjat notes: "Cette faute n'est pas rare chez des enfants allemands monoglottes" (1913, p. 67), and he refers to the Sterns (Stern & Stern, 1907) to support his claim (it is ironic, therefore, that Müller uses Ronjat's data to help support her claim of quantitative difference between monolingual and bilingual children). Of course, just as Ronjat's bilingual data are not appropriate for addressing issues of frequency, neither are the Sterns' diary data concerning monolingual children.

Ronjat's Louis is one of the ten bilingual children whose data are taken into account in Müller's Table 2 to outline bilingual children's use of word orders in German sub clauses. In order to address the frequency issue, Louis' data cannot be used since they are diary data. For the same reason, neither can Hildegard's (Leopold, 1970, c. 1939 49). Olivier and Jens (Kielhöfer and Jonekeit, 1983) are two more children who are listed in Müller's Table 2. As I have pointed out elsewhere (De Houwer 1990: 20), the book by Kielhöfer and Jonekeit gives no information on data collection, and since their book presents no quantita tive analyses, the examples of utterances mentioned in their book cannot be used for a quantitative comparison. For the six remaining children, transcribed recordings are avail able. The source for the data on the two Italian German girls Giulia and Lisa (Taeschner 1983, pp. 164 6) does not, however, give any quantitative information on subclause

word order use at all, and only seven (!) actual utterances from the two children are listed. Hence a quantitative comparison with other children is impossible. This leaves the four French German bilingual children, Ivar, Caroline, Pierre and Pascal, who were all studied in the DUFDE project (see, e.g., Meisel, 1990). However, Müller notes in her footnote 29 that "Caroline has only very few subordi nate clauses". I interpret this as meaning that there is insufficient data. This leaves Ivar, Pierre and Pascal a total of three bilingual children for whom there are suffi cient data available to allow a quantitative analysis of German word order use in subclauses (additional bilingual children acquiring German for whom there may be suffi cient data available are Hannah and Adam see Tracy 1994/5).

The empirical basis for comparisons with monolingual children concerning the extent to which bilingual children use target like word orders in German subclauses is quite small, then, given the current paucity of appropriate bilin gual data (there seem to be more data available for mono lingual acquisition; these include Miller's (1979) very extensive (30,000 utterances!) corpus spanning the child Simone's ages 1;9 to 4;0 that was further analyzed by Behrens (1993) but is not mentioned in Müller's article). It is inappropriate at this time, then, to claim, as Müller does, that "Whereas the error types presented here have been observed in bilingual language development to a very large extent, they seem to represent rather an exception in monolingual language acquisition".

Assuming, however, that Müller's empirical claim above can be substantiated by the evidence, there is still the question of how such a quantitative difference between bilingual and monolingual children should be interpreted. First of all there is the possibility of influence from the actual input that children hear (see De Houwer, 1997, for an analysis of input frequency factors in the acquisition of past time verb morphology in a bilingual child). Until the possible role of this influence has been satisfactorily dis counted, other explanations that are not in and of them selves testable, such as Müller's transfer explanation, will have to wait. Assuming that indeed some bilingual chil dren's significantly more frequent use of erroneous word order patterns in comparison with some monolingual chil dren is not relatable to specific input features, it needs to be explained why the frequency of a particular error should be influenced by transfer, that is, by knowledge of the other language, which is a qualitative phenomenon, rather than that the type of structure should be influenced. Also it should be clarified what type of frequency is deemed to be affected (relative or absolute). Furthermore, it should be explained why some bilingual children are influenced by the other language while other bilingual children growing up in similar circumstances are not.

In any learning system that has a strong memory component, results of previous learning may have an effect on subsequent learning. As such, a transfer explanation for some areas of bilingual first language acquisition is in principle quite plausible. Questions that can be raised in this regard are: to what extent can transfer override other factors such as regular input features? to what extent is behavior relatable to transfer susceptible to negative feed back? to what extent is the use of transfer related to individual learning styles? are there areas of language that are more susceptible to transfer than others? In order for such questions to be answerable, however, there has to be certainty that indeed particular observable phenomena are due to transfer. Müller's interpretation of specific bilingual processing hinges on a comparison to monolingual beha vior. As I have argued elsewhere (De Houwer, 1994), though, (qualitative) comparisons between bilingual and monolingual acquisition are only a secondary way of settling issues of separate development or transfer, and unfortunately there will always remain cases that are ambiguous and that can be interpreted either way.[1] It is to Natascha Müller's merit that she has explicitly introduced the notion of quantity in a discussion that has so far been more qualitatively focused. Perhaps indeed quantitative analyses can provide the missing links.

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[1] It is not the case that I have stated that separate development is only possible when there is separate exposure to two languages, as Muller claims in her second section. Rather, I have claimed that when there is regular separate exposure to two languages, separate development takes place (De Houwer 1990, p. 339). Since then, it has become clear that separate development is also possible without separate exposure (De Houwer 1995, p. 240).

Transfer and language mode

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Natascha Müller's proposal to view transfer as a relief strategy used by bilingual learners to cope with problematic input is very interesting and has far reaching consequences for theories of bilingual language acquisition. The author makes a strong case for the fact that bilingual children transfer parameter values from the language presenting unambiguous input to the other "puzzling language". In what follows, I will not question the main thrust of her argument. Rather I will return to the definitions that have been proposed for transfer in the literature and show that they are usually too broad. I will then propose that anyone interested in studying transfer must take into account the language mode the language learner or bilingual subject is in when being studied, and I will end by showing the consequences that this may have if it is not done. Natascha Müller's main argument is not affected by the language mode factor but the quantitative difference she finds between monolingual and bilingual children could be.

It is now accepted that the definitions of interference (transfer, transference) proposed by earlier researchers were too broad. For Weinreich, interferences correspond to instances of deviation from the norms of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language. Haugen refers to interference as the overlapping of two languages, Mackey talks of the use of features belonging to one language while speaking or writing another, and for Clyne transference is the adoption of any elements or features from the other language (see Grosjean, 1982 (p. 299), for exact references). This view has been maintained in recent years as can be seen by Beatens Beardsmore's (1986) definition of interference as the observable feature of one code used within the context of the other. A direct result of this broad view is that the interferences observed in studies correspond to interferences but also often to borrowings and even code switches.

It is my belief that we will never get to the bottom of this terminological problem, and that we will never isolate interferences from code switches and borrowings in bilingual speech, if we do not take into account (and do not control for) the language mode bilinguals and language learners are in when they are being studied (i.e. observed, recorded, tested, etc.). Bilinguals in their everyday lives find themselves in various language modes that correspond to points on a monolingual bilingual mode continuum (Grosjean, 1994, 1997). A mode is a state of activation of the bilingual's languages and language processing mechanisms. At one end of the continuum, bilinguals are in a totally monolingual language mode in that they are interacting only with (or listening only to) monolinguals of one or the other of the languages they know. One language is active and the other is deactivated. At the other end of the continuum, bilinguals find themselves in a bilingual language mode in that they are communicating with (or listening to) bilinguals who share their two (or more) languages and with whom language mixing may take place (i.e. code switching and borrowing). These are end points, but intermediary points exist and depend on such factors as interlocutor, situation, content of discourse and function of the interaction.

At the bilingual end of the continuum, both languages are active but at any one moment in time one language is usually less active than the other as it is not currently the language of communication. This is the kind of mode bilinguals find themselves in when they are interacting with other bilinguals who share their two (or more) languages and with whom they feel comfortable mixing languages (such as bilingual children among themselves or with their bilingual caretakers, etc.). They usually first adopt a base language to use together and the other language, the guest language, is available in case it is needed in the form of code switches and borrowings. A code switch is a complete shift to the other language for a word, a phrase or a sentence whereas a borrowing is a word or phrase taken from the less activated language and adapted into the base language. Idiosyncratic (nonce) borrowings can involve both the form and the content of a word (loanwords) or simply the content (loanshifts). It is important to note in relation to the topic at hand that Haugen (1969) distinguishes between two types of loanshifts: extensions (semantic loans) and creations. The latter involve rearranging words (or morphemes) in the base language so that they correspond to the pattern of the other language. Of course, a change of topic or of situation may lead to a change of base language but not necessarily of language mode. At the other end of the continuum, the monolingual language mode, one language is totally active whereas the other language is deactivated. This mode arises when the person being spoken to is monolingual and/or the topic, the situation or the purpose of interaction require that only one language be spoken to the exclusion of the other(s). (For example, when a bilingual child is speaking to a monolingual adult such as a grandparent, teacher, baby sitter, etc.). Evidence for the language mode continuum concept has been found with adults in experimental settings (Grosjean, 1997) and in naturalistic settings (Treffers Daller, 1998) as well as with children interacting with their parents (Lanza, 1992).

It is important to know the language mode bilinguals are in when we examine their interferences. These are speaker specific (an "individual process" as Müller writes) and they are either static or dynamic. Static interferences reflect permanent (or relatively permanent) traces of one

language on the other, whereas dynamic interferences are the ephemeral intrusions of the other deactivated language. Whereas in a bilingual language mode, all bilingual lan guage phenomena can occur (interferences, code switches, borrowings of various types, etc.) this is not the case in a monolingual language mode. Here code switches and bor rowings are either nonexistent or are usually kept to a strict minimum so as to ensure adequate communication. Thus, the interferences that are produced can stand out more clearly (a bit like the landscape emerging when the fog lifts) and they are not mistaken as easily for other bilingual phenomena that can be very similar in appearance. When interferences occur in the bilingual mode, which they also do, they are very difficult to separate from other forms of language mixing, especially borrowings. What might appear to be an interference could also be a guest element or structure produced by the speaker who is aware that his or her interlocutor knows the other language (to some extent at least). For example, although "baving" (from the French verb "baver" (to dribble)), produced in an English monolingual speech mode, is most probably the result of the deactivated language "intruding" into the language being spoken (an interference, therefore), in a bilingual speech mode it is either an interference or the result of normal access of a word in the less activated lexicon and its integration into the base language (a borrowing). At the phrase level, a constituent in the base language whose structure or meaning combination is a result of language contact may either be an interference or a loanshift creation in Haugen's terminology.

It is rare that researchers working on interferences (see Odlin, 1989, for a recent review) control the language mode bilingual subjects are in when they obtain language samples. This has two unfortunate consequences. The first is that what is classified as an interference may in fact be a borrowing of some kind (or even a code switch) produced in a bilingual language mode. Several researchers interested in language mixing in children (e.g. Meisel, 1989; Genesee, 1989; Goodz, 1989) have noted that when recordings are made, children are usually in a bilingual mode. The care takers (and researchers) are often bilingual themselves and hence set up the stage, however involuntarily, for mixed language. This is the case for many of the bilingual children mentioned by Müller (Louis, Ivar, Hildegard, Lisa, etc.) and it is therefore difficult to classify all their instances of language contact as interferences when they might be examples of normal language mixing. Admittedly, the kind of target deviant patterns discussed by Müller do look like interferences but some could perhaps also be loanshift creations triggered by the bilingual speaking mode the children were in. The second consequence relates to the quantitative issue Müller raises. She states that there is no qualitative difference between the error types produced by bilingual and monolingual children but that there is a quantitative difference. Bilingual children use these deviant patterns more often. The questions become: Could this quantitative difference be due to the bilingual language mode most of these children were in? Could it be that when two languages are activated, as they are in the bilingual mode, there is a greater tendency for the language not being used (the guest language) to influence the use of a particular structure in the base language? Would the quan titative difference be reduced, or sometimes even done away with, if subjects were put in a monolingual mode? The hypothesis I am proposing is that while, as Natascha Müller rightly explains, the quantitative difference between monolinguals and bilinguals is due to the second language which is in contact with German, it may also be due to the bilingual language mode children were in when being recorded. It would be interesting to test this hypothesis by studying interferences produced by the same kind of chil dren in a truly monolingual mode. This can be done if researchers working with bilingual children manipulate the language mode they are in more systematically (as in Lanza, 1992). For example, in addition to interacting in a bilingual language mode with the bilingual researcher, children could also interact at different times with research assistants who are truly monolingual, at least in the ma jority language (minority language monolinguals are prob ably harder to find). Any one of a number of different approaches could be used as long as they guarantee sponta neous speech in the children's various language modes. (For a discussion of language mode manipulation in various settings and with varying populations, see Gros jean, 1989, 1998.)

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Evidence for transfer in bilingual children?

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The paper by Natascha Müller follows the new way of studying bilingual first language acquisition which has been advocated in the last few years by several researchers (Döpke, 1996,1997; Gawlitzek Maiwald & Tracy, 1996; Hulk & Van der Linden, 1996; Hulk, 1997). In this new approach, while it is taken as an established fact that bilingual children are capable of early language differentiation, at the same time a lot of attention is given to cross linguistic influence as an important characteristic of bilingual first language acquisition. We will discuss the nature of differentiation and transfer here as presented by Müller's paper and the way we see it ourselves. We will illustrate our position with examples from the French Dutch bilingual child we have been studying for some time.

In the last decade most syntactic studies of bilingual language acquisition have stressed the fact that bilingual children are able to differentiate between their two languages from very early on. Investigations into large corpora of bilingual children's utterances such as the DUFDE project (contributions in Meisel 1990, 1994) have shown that children differentiate between their two languages both at the lexical and at the syntactic level. The same has been argued for by De Houwer (1990) for Dutch/English bilingual children. Lanza (1992) showed that formal aspects of language mixing by bilingual two year olds are not a sign of the child's lack of language differentiation, but indicate instead that the children do differentiate their language use in a contextually sensitive way. Most of these papers aim at denying the earlier hypothesis that children start off their language acquisition with one unitary language system for both languages (Taeschner, 1983; Vihman, 1985). However, in arguing convincingly against the idea that bilingual children first have a unitary language system, many of these linguists tend to overlook examples of cross linguistic influence. They sometimes even deny that there is any influence from one language on the other and state that bilingual language acquisition is the same as monolingual acquisition: in Müller et al. (1996), the *bilingual* child Ivar is taken to illustrate the *monolingual* acquisition of the French clitics system. Apparent counter evidence against this claim seems to be overlooked or not taken seriously by these authors. Schlyter and Hakansson (1994) claim that in their study of French/Swedish bilinguals they do not find any signs of transfer of word order from one language into the other and the same claims have been made by Meisel (1989) and Parodi (1990) for the reciprocal influence of French and German on children in the DUFDE project. Recently, Paradis and Genesee (1996) claimed that they did not find any influence of one language on the other in French/English bilingual children. They conclude that these children show no evidence at all of transfer. Interestingly, however, they do mention some puzzling data which at first sight look like transfer data, but which they qualify as follows: "these aberrant examples are most likely performance errors". Although it may be true that at least part of these data are performance errors, this does not mean that there is no need to explain them in a more satisfactory way. Why do these bilinguals make precisely these errors, that seem to reflect characteristics of their other language?

Some recent, partly unpublished studies of the syntactic development of bilingual children (Döpke, 1996,1997; Gawlitzek Maiwald and Tracy, 1996; Hulk & Van der Linden, 1996; Hulk, 1997) have revived the interest in such "mixed" utterances, which are attested for different language pairs. Having established the fact that bilingual children are able to differentiate between their two languages at a very early age, we are now at the point where we can address the question of cross linguistic influence in a more precise way. This is what Müller attempts to do in her paper. We will show that our position is different from hers in that we do no think that bilingual children are subject to *direct* transfer from one language into the other. But we do think that *indirect* influence from one language on the other plays a role, especially in those cases where the input in one language is ambiguous or presents conflicting evidence to the child.

Müller seems to equate the notion of transfer with that commonly used in studies in second language acquisition. However, in those studies the subjects have already instantiated a first language from which they can transfer elements or parameter settings into the second language. In bilingual first language acquisition, there is no "first language" to build on, so the nature of "transfer" is necessarily different. We prefer not to use the term transfer at all, but rather cross linguistic influence. Indeed, in studying bilingual language acquisition we witness the emergence of grammars of two languages at the moment of creation, when they are in close contact with each other. As suggested already by MacWhinney (1987), the bilingual child may attempt to make short cuts and allow strategies from one language to be used in the other one. Cues may be stronger in one language than the other, leading to facilitation of acquisition. The acquired language facts may then

be adopted in the other language as well. We especially expect such "short cuts" when the child has to cope with problematic input, which is ambiguous and contains evi dence for more than one grammatical analysis. Indeed, the bilingual child is exposed to a much wider range of syntactic possibilities than a monolingual child, and it is offered structural possibilities which monolinguals do not have. At the same time however, the input of each of the languages separately is probably smaller for the bilingual child than for the monolingual child, which makes the cues for each individual language less salient.

Müller raises the question "what is transferred"?, which we will reformulate as: "when does cross linguistic influ ence appear in the child's language development"? Müller adopts the hypothesis that there is transfer of parametric values or feature specifications. Although we agree with her that this is a plausible hypothesis, we have problems with the way in which she elaborates it. Müller observes that the bilingual children she has studied sometimes use both correct and incorrect word orders at the same point in their development. In other words these children seem to hesitate about the right value of a parameter. This is called the "pendulum effect" by Müller. We found a similar effect in the French Dutch bilingual girl Anouk (see Hulk & Van der Linden, 1996; Hulk, 1997): Anouk seems to have problems with the head parameter in French since she produces utterances with both V XP and XP V orders. The former corresponds to the French setting of the head parameter, the latter to the Dutch one.

(1) penche tête, non "bow head no"	An. 2.4.23	V_fONeg
(2) papa cheche Anouk "daddy get Anouk"	An. 2.6.11	SV_fO
(3) atejer parti "(to) studio left"	An 2.4.17	XPV_i
(4) Anouk papa dessine "Anouk daddy draws"	An 2.4.23	SOV_f

Müller advances the hypothesis that pendulum effects are the result of transfer and are restricted to phenomena involving the setting of what she calls **sub**parameters. The notion of subparameter however is not generally accepted in linguistic theory. It is not even clear what exactly a subparameter is. Müller does not give a general character ization, but just illustrates the notion by giving an example. She mentions that the special status of German comple mentizers (they are functional elements associated with finiteness) could be conceived of as a subparameter of the global +/ V2 parameter: in some V2 languages, such as German, complementizers do not instantiate a separate functional category, in others, such as French, they do. Müller hypothesizes that there is no triggering data for this kind of subparameter and therefore the (bilingual) children may hesitate as to the status of complementizers in German, whereas they do not hesitate as to whether German is V2 or not (the global parameter). Moreover, Müller makes an even stronger claim: transfer in bilingual individuals could be restricted to subparameters. However, if we look at the "pendulum effect" in Anouk's utterances given above, we do not know of any subparameter that could play a role. On the contrary, it seems to be the setting of the "global" head parameter that is causing problems for the child. Therefore it is unclear what Müller's explana tion of such cross linguistic influence could be. Moreover, before we can address the question whether Anouk's French OV utterances are an illustration of transfer from Dutch, we have to consider acquisition data of monolingual French children to find out if they ever produce XP V orders. Interestingly, as we have shown elsewhere, this is indeed the case (examples from Ferdinand, 1996):

(5) couteau met "knife put"	NAT 2.2.2
(6) un pomme de terre donne "a potato give"	GRE 2.1.25

These utterances have been analysed as involving fronting of a focalized constituent in the stage of language development when null subject (clitics) are still the rule. We have argued that the XP V orders produced by Anouk should also be analyzed as focalizations. Kail (1989), quoting McWhinney and Bates, observes in a completely different situation that young children in several languages place new information at the beginning of utterances, followed by old or less focal elements of meaning, contrary to adults who tend to start their sentences with old or topical information. Psycholinguistically speaking then, an analysis of the XP V orders as focalizations is not an implausible one.

The fact that these focalizations are more frequent in Anouk's French than in the French of monolingual chil dren reflects, we think, the *indirect* influence of Dutch. Not only do monolingual Dutch children use these same word orders, in adult Dutch too, as a consequence of the V2 property of the language, we find clauses with fronted objects:

(7) Zuurkool lust ik niet
"sauerkraut like I not"

Therefore, we have suggested that these XP V orders are not an example of transfer of basic Dutch OV orders nor of mis setting of a parametric value on the basis of the Dutch input. They represent an example of a general tendency in child language to start the sentence with new information a tendency which is also present in monolingual French children. Their frequency may be explained by the indirect input influence of adult Dutch, where fronting of XPs is a general syntactic phenomenon.

Interestingly, Müller also mentions that monolingual German children have problems with the acquisition of word order in subordinate clauses and produce (incorrect) utterances similar to the ones produced by the bilingual children. Müller relates this to the fact that the input is ambiguous and therefore presents conflicting evidence. Word order in the German subordinate clause does indeed present a lot of conflicting evidence to the child: the input offers utterances which lead to different possible analyses of these clauses. It is in this context that uncertainty is greatest in the child and that cross linguistic influence may

occur. This corresponds exactly to what we have found in the utterances of the French Dutch bilingual child Anouk, not only as far as XP V orders are concerned but also in the production of French object pronouns. Anouk's pro duction of object pronouns seems again to reflect the influence of Dutch (Hulk, 1997). At first, until 2.7.5, object clitics are rare, and always situated in front of an infinitive:

(8) faut **leur** donner de l'eau An 3.1.04
"must them give water"

At age 3.3.17 Anouk produces her first object clitics in preverbal position of a finite verb:

(9) si je **le** mets là An 3.3.17
"if I it put there"
(10) je **la** tiens An 3.3.17
"I it hold"

Strikingly, only one week later Anouk makes her first "placement error" with an object clitic:

(11) * je prends **la** An 3.3.23
"I take her"
(correct: je **la** prends)

The errors represent about 10 per cent of all the utterances with object clitics for the period of recordings; in other words it is not a very frequent phenomenon, but is certainly not negligible. Contrary to what we have seen in the section about V XP/XP V orders, the misplacement of object clitics has not been found in the data of monolingual French children. However, Jakubowicz et al. (1997) found that French speaking children with developmental dys phasia have problems with the acquisition of object pro nouns. Moreover, as we have shown elsewhere (Hulk 1997), these errors look very much like errors made by (adult) Dutch learners of L2 French. Is this a clear case of transfer then? Again we have to be careful, and ask ourselves what exactly these errors tell us. It is important to note that the (adult) French data are not always unambig uous as for the status of the object pronouns: some constructions allow both an analysis as clitics and as weak pronouns. This is true among other things for constructions involving a modal verb and an infinitive, where the object clitic in French figures in between the two verbs:

(12) Jean peut le faire
"Jean can it do"

Exactly the same (superficial) order is found in Dutch, which has weak object pronouns (and no clitics):

(13) Jan kan het doen
"Jan can it do"

As has been observed in the literature on the L2 acquisi tion of French (see e.g. Schwartz, 1996), the L2 learners are confronted with conflicting evidence as to the exact feature composition of such pronouns.

Let us consider the Dutch/French bilingual child again. The French evidence she gets is not unambiguous. However, we know from the acquisition of monolingual French children that this does not have to be a problem. But the bilingual child is in a different situation she gets input from her two languages, French and Dutch. Not only does the Dutch evidence clearly suggest a weak pronoun analysis, it also partly overlaps with the French evidence, thus creating more conflicts for the exact analysis of French. The bilingual child will be misled more easily than the monolingual child, because on the one hand, she gets less non ambiguous (only French) input and on the other hand she gets more ambiguous, conflicting evidence due to the input of her other language, Dutch. Again we do not want to go into the exact analysis of the Dutch and French pronoun system. We only want to suggest that in this case the child appears to be confronted with ambiguous input and therefore she uses what Müller calls a "relief strategy", which in this case is probably related to the acquisition of the exact feature composition of the elements in question.

We have argued that we agree with Müller that bilingual children may use a relief strategy in order to cope with ambiguous input. However we do not agree with her as she states that this relief strategy (always) takes the form of (pure) transfer and that this is expected (only) in the case of phenomena involving subparameters, for which she claims there are no triggers. We have shown two different cases of cross linguistic influence. In both cases it is the *indirect* influence of Dutch that makes the child overgeneralize a pattern that is already present in French. In the case of XP V orders we have argued that it is related with a focaliza tion strategy. In the case of object pronoun acquisition it is the feature composition of the pronouns in question which causes the problems. Although these two phenomena are very similar to the one discussed by Müller for Ivar, in these cases no clear subparameters are at stake. We do not think either that these are phenomena for which there are no triggers. On the contrary, we crucially assume that in these cases the children have too many triggers. Or in other words that the two languages present conflicting evidence and therefore conflicting cues or triggers for the acquisition of the phenomena involved.

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Cross-linguistic influence, input and the young bilingual child

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The field of bilingual first language acquisition has focused on several important and interrelated issues: whether or not the young child acquiring two languages simultaneously differentiates his or her two languages from the onset of acquisition, what role the input plays in the acquisition of two languages, and whether the path of acquisition is similar to that of monolingual peers (see De Houwer, 1990). As a member of the DUFDE team, Natascha Müller has in previous work argued forcefully and convincingly for the bilingual child's separate development of his or her two languages, and hence how language acquiring bilin guals behave like monolinguals. In her keynote article, Müller invokes the notion of transfer, a well known term from research into second language acquisition, and pro poses to consider transfer from the perspective of the input to which the young bilingual child is exposed. When this input is ambiguous, so that is there is variation in the input regarding one of the languages, the child will resort to transfer from the other language as a so called relief strategy. In the following, I address the issue of cross linguistic influence in language development and highlight the implications Müller's proposals may have for the field of bilingual first language acquisition. In conclusion I will relate these issues to the complexity of the notion of input in early bilingualism.

The incorporation of elements from a stronger or dominant language has been reported in the bilingual first language acquisition literature (e.g. Lanza, 1993; Schlyter, 1993; Gawlitzek Maiwald & Tracy, 1996). Transfer in the form of dominance, however, apparently does not capture all the regularities of transfer specifically within the domain of the acquisition of subordinate clauses in German, as Müller argues, when that language is acquired simulta neously with another language such as English, French, or Italian, which lacks equivalent ambiguity. Hence a child acquiring both German and English, with German as a dominant language, may nonetheless employ transfer from English as a relief strategy in German. The strategy, or resultant structures, employed by the bilingual children in Müller's study has also been documented in monolingual children acquiring German; however, the strategy is here construed as a bilingual strategy, a trouble shooter for ambiguous input.

It is important to stress, as Müller does, that despite the claim that there is bi directional or cross linguistic influence in the young child's language development, there is ample evidence that the child is on the whole proceeding along two language specific paths, similar to monolingual peers. Müller's proposal, however, highlights the issue that the two languages may potentially influence each other since they are in contact in acquisition. How much contact and influence there is will inevitably depend upon numerous factors, and hence there will be individual variation. In Müller's article, transfer is in fact argued to be an indivi dual process.

Attention to cross linguistic structures and individual variation is a welcome dimension to studies of bilingual first language acquisition which have in the past decade stressed how the bilingual child develops both languages separately. Such a stress on separate development has been important and understandable given the former influence of the fusion, or unitary language system, hypothesis (see Genesee, 1989). Now we can look at how young bilingual children actually do compare and contrast their two lan guages although they are developing them as two separate systems (see also Döpke, in press). The two systems need not be conceptualized as impermeable. That is, the overall theoretical framework of separate development is not threatened despite the unveiling of such cross linguistic language contact which is quite interesting theoretically albeit minimal in proportion. Although this strategy of transfer, or rather the resulting structures, used by bilingual children is also employed by monolinguals, Müller appeals to frequency of use as evidence for it as a bilingual strategy. Bilingual children are claimed ''to proceed more frequently along 'wrong paths' than monolingual children do and they take much more time to 'correct the error'" (p. 00). However, to substantiate the claim of greater frequency of use among bilingual children, more studies will be needed, since some bilingual children in fact do seem to proceed without difficulty with the structures in question. Although the frequency argument as given in Müller's paper is very weak, it is nonetheless important to pursue investigation of the theoretical claims made about cross linguistic influence.

Evidence for cross linguistic influence and structures has been demonstrated in older bilingual children (Lanza, forthcoming), in bilingual adults (Klein, 1980; Hernandez, Bates & Avila, 1994), as well as in language contact situations across time in bilingual communities, which result in language restructuring (Talmy, 1982; Grosjean & Py, 1992). For example, a Norwegian English bilingual child showed clear indications of dominance in Norwegian, yet she employed some strategies in her temporal and aspectual marking in Norwegian, which were more in line with her non dominant language English. Furthermore, the cross linguistic strategies employed by this bilingual child in the domain of aspectual marking were of the same type employed in the diachronic change of one language in contact with another (see Lanza, forthcoming, for a discus sion). Examining the cognitive and pragmatic motivations for these various types of language contact may help further our understanding of the cognitive and linguistic

processing of the bilingual individual, in both acquisition and use, and how this may affect language change and restructuring over time. There is a need to envisage bilingual first language acquisition in relation to other language contact situations.

Another important aspect of Müller's study is the incorporation of the notion of input in an explanation for the bilingual children's grammatical development. Input is, however, defined as purported variation existent in the target language. However, input can also be construed as the actual variable use of the available variation in the target language, and a focus on this would necessitate a study of the actual input the individual children receive in interaction. What exactly is the child's input? In the case of the bilingual child, this input has both methodological and theoretical implications for the child data collected and to be analyzed. There is reason to believe that many of the interactions in which the bilingual children in Müller's study were involved were actually bilingual in character (see Pujol Berché, 1993). Although adult interlocutors may only use one language with the child, an indication of comprehension of the other language may contribute to a bilingual context (Lanza, 1997), and a bilingual language mode (Grosjean, 1998). In such a situation either language could feasibly serve as the matrix language of an utterance, including the syntactic structure of that utterance. This only underscores the necessity of taking into account contextual parameters of data, that is, the extent to which an interaction is more monolingual or bilingual in nature, even when undertaking a purely grammatical analysis.

Ochs and Schieffelin (1995) propose a language socialization perspective to language acquisition which they hold renders a more enriched model of grammatical development in that it provides insights into the sociocultural parameters that influence children's use of grammatical forms. In the case of the bilingual child such a perspective pays attention to the variability of language use in the actual input, be it within a monolingual or bilingual context. A more contextualized notion of input may shed light on the frequency issue in regard to the individual bilingual child's use of the transfer strategy. In sum, Müller's keynote article highlights important dimensions and indicates new directions in the field of bilingual first language acquisition which it is to be hoped will be pursued in future studies of early bilingualism.

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Directionality in transfer?

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Natascha Müller discusses a question which in recent years after a period of focus on cross linguistic principles of language acquisition has regained its position as a current topic, namely transfer, and here in bilingual children. One of her points is that for transfer to take place, the trans ferred construction must have some correspondence in the target language, a position similar to the "transfer to some where" principle often advocated in the L2 acquisition literature (cf. Gass & Selinker, 1983). The specific structure studied is the lack of Verb End in the German of a bilingual German French child.

Müller discusses to what extent transfer from French can be responsible for this non use of Verb End word order in the child's German subordinate clauses. She makes some claims (see her Conclusion) for this child, the generality of which may be questioned.

1a. "Once one of the languages leaves open the possibi lity for more than one grammatical analysis, the bilingual individual may, as a relief strategy, use parts of the analysis of the second language . . . "

1b. " . . . there has to be positive evidence for the structure resulting from transfer."

2. What is transferred is neither the surface structure, nor the entire D structure, but a sub parameter which has as a result that "V2 is independent of whether the clause is introduced by a subordinating conjunction or not."

To what extent can these principles be taken as generally valid? I will discuss them partly with reference to a Swedish French corpus (see Schlyter & Håkansson, 1994).

Principle 1a. If one generalizes (1a), this would among other things predict some cases of VS inversion in French in a German French or Swedish French bilingual, since this is the standard interrogative structure in German/ Swedish, and also exists in French, even if rare and restricted to subject clitics. Such a transfer, however, is extremely rare: in Müller's corpus there is one occurrence. In the Swedish French corpus it never occurs, despite the large number of questions. The children always use non inverted questions, e.g.:

(1) où il est? où ils sont?

Principle 1b. If (1b) is to be generalized, then the frequent V3 constructions in Swedish French bilinguals are problematic (see Schlyter & Håkansson, 1994) since the structure does not exist in the target language. Structures of the type ADV S Vfin X, i.e. exact copies of the very typical French pattern, are very frequent in Swedish as the weaker language of these bilinguals (see Schlyter & Håkansson, 1994). For example:

(2) här den måste sitta (correct: "här måste den sitta")
"here it must sit"

Such structures do not exist in Swedish, but are comple tely excluded. In these cases, either transfer occurs without the existence of such structures in the input language, or it is not a question of transfer.

In both cases, a kind of directionality seems to play an important role, a fact which is not discussed by Müller. If there is transfer, it occurs in these cases from SV to SV, but not from VS to VS. In other words, a (X)SV(Y) seems to be dominant in many bilingual situations over a (X)VS(Y) structure. This is compatible with a number of works by Håkansson, and with the fact that the Swedish SLI children studied by Håkansson do not have VS but the incorrect SV word order to a great extent (see Håkansson & Nettelbladt, 1996). This means that theories of markedness of different kinds should probably also be exploited in order to account for transfer.

Principle 2. The proposal that neither the surface struc ture, nor the entire D structure, is transferred, but only a part of a parameter, seems to be a very interesting path for further research.

But here as well one may pose the question of direction ality. If the rule is formulated such that the child does not distinguish between +/ roots, couldn't the change a priori have been the other way around? The fact that the phenom enon occurs in subordinates resembles the difficulty in adult L2 acquisition of German (and Swedish) of canceling inversion once it has been acquired in main clauses. This difficulty is accounted for in Pienemann's Processability Theory (Pienemann, 1998) by processing difficulties. The phenomenon also resembles historical development, for instance in Yiddish, where V2 still exists in main clauses but Verb End has disappeared in subordinates. Does the bilingual child Ivar precede a coming development in German, that is, along lines similar to what has already happened in Swedish? As Müller shows, this lack of Verb End also exists in monolingual German children but to a lesser extent. A study of possible parallels would be inter esting.

Even the above cited case of the non transfer of V2 to French could be related to historical development. In medieval French, V2 (or something similar) was standard, but was gradually replaced by V3, etc., and is today a disappearing structure.

An alternative hypothesis of transfer (or cross linguistic influence) in bilingual situations could therefore be to say that transfer of a structure occurs only when the structure is in line with the general historical development of the target language, and not if it is a historically disappearing structure. Such a hypothesis would be compatible with many language historians' observations that historical changes occur most rapidly in regions where many people

and languages meet, and consequently there is a great deal of bilingualism.

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Transfer versus coexistent systems

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Compared with the wealth of investigations on monolin gual language acquisition, research on early bilingualism still has some catching up to do. Papers such as the one by Natascha Müller show us what may be gained if results from both areas are integrated within one theoretical framework, in this case current generative theory.

There can be no question that I am sympathetic to both the theoretical framework and the hypothesis of the paper that bilingual children pool their resources and may engage in some transfer of features of one language to the other in order to fill temporary lexical and structural gaps; after all, the notion of "bilingual bootstrapping", which we pro posed in Gawlitzek Maiwald and Tracy (1996), is of the same nature.

I would also agree that the problems shared by the bilingual Ivar and the monolingual Benny are due to what Müller calls "ambiguity" in the input. This is just a special case of the chronic underdetermination of the theory by the data which puzzles the linguist as well, hence our disagree ment about descriptively adequate target grammars (for German see the discussion in Fritzenschaft et al., 1990; Gawlitzek Maiwald et al., 1992; Tracy, 1995).

At the same time, however, it seems to me that the similarity between Ivar and Benny weakens the transfer hypothesis, a point which Müller stresses herself when she concedes that "transfer cannot be the whole story". Indeed, if monolinguals come up with the same range of structures as bilinguals, we should probably think of alternative explanations. I should think that one attractive option to which I will turn shortly is right there in Müller's paper as well.

In any case, the type of transfer the author has in mind needs clarification. She writes in the introduction that "grammars which result from transfer of grammatical features are compatible with natural languages to which the child has not been exposed". But does it actually make sense to talk about transfer if the outcome clearly goes beyond the supposed source? In the case at hand, the "other" language cannot very well be held responsible for the range of XVS and VSX patterns in subordinate clauses.

Do we need transfer, then? After all, should not the principles of Universal Grammar be sufficient to create the spectrum of structural formats observed? What is striking is that the children's sentence patterns can be traced back to a set of simple syntactic choices, apart from the problem of assigning ambiguous individual lexical items to word classes. They stay within what is possible "in principle", as is also stressed by the author.

All children are faced with the task of figuring out how many structural layers are needed and what evidence to rely on. While we have long accepted the idea that children may start with a subset of the adult tree, we have more problems accepting the idea that some children and Benny, as we have claimed in Fritzenschaft et al. (1990) and Gawlitzek Maiwald et al. (1992) would be one of them temporarily create layers of structure which they will eventually have to eliminate. This structural overgeneration could be due to the very procedure Natascha Müller envisions for Ivar's gradual mastery of the target like subordinate clause, where the child needs to figure out which head projects what type of complement.

Müller's contribution certainly encourages us to look for further opportunities to close the gap between different acquisition types and to explore which features are "robust" enough to manifest themselves in any acquisition process. What should definitely be explored, for instance, is the hypothesis alluded to in the paper that monolinguals may also rely on two grammars in transitional phases and should, hence, be considered bilingual (Roeper, 1997).

I believe that we could even go further than that: as I have argued (Tracy, 1991, 1995), so called monolinguals appear actually to start out with several coexisting systems. Thus they could be seen as behaving like "ideal" bilinguals, reluctant to "fuse" structures which they initially cannot integrate within one overall derivational system. For German children these systems typically consist of a re stricted set of V2 expressions on the one hand and VE formats on the other (see also Kaltenbacher, 1990). Initially these systems cannot be related by one single grammar, but they eventually converge.

In addition, we could attempt to relate what we know about specific language impairment to the same overall picture: here we encounter children who are indeed very "monolingual" in that they focus on a small set of syntactic formats (for instance the VE pattern typical for German speaking dysphasic children), thus avoiding the conflict which, in the case of unimpaired monolingual and bilingual acquisition, nudges the child along to explore new struc tural options.

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Ambiguity and transfer in bilingual first language acquisition?

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Natascha Müller presents a very interesting analysis of the structure of the German subordinate clause in bilingual first language acquisition. The main issue in this paper is to explain the fact that some bilingual children but not all of them display non target language structures in German subordinate clauses. That is, the finite verb does not appear in the final position of the subordinate clause. These non target structures can in part be explained by transfer, but this cannot be the whole story, because some monolingual children produce these structures as well. Bilingual chil dren, though, appear to have problems with the German subordinate clause more frequently than monolingual chil dren. Interestingly, acquiring the target structures is a slow process for children who produce non target structures. Ivar, the French German child Müller discusses in most detail, for example, needs two years to acquire the correct position of the finite verb in German subordinate clauses. Müller argues that the problems arise because the input children receive is ambiguous: the finite verb does not always appear in the finite position in German subordinate clauses in adult speech. The ambiguity of this situation opens the way to transfer. In their uncertainty, the children turn to their other language as a relief strategy.

Müller combines an in depth theoretical analysis with the concept of transfer, and shows under which circum stances transfer is likely to occur. As a matter of fact, there is growing evidence that transfer plays an important role as a discovery procedure in the acquisition of syntax. Gaw litzek Mailand and Tracy (1996, 903) have suggested that some sort of bilingual bootstrapping may take place in that "something that has been acquired in language A fulfills a booster function for language B". In the case studied by Gawlitzek Maiwald and Tracy, not only structures were transferred, but also the words filling those structures. Müller's article gives further support to a new perspective on transfer in which transfer is no longer seen as a negative factor, impeding the normal development of a language, but on the contrary, as a strategy which furthers language development (see also Hulk & Van der Linden, 1996).

The situation Müller describes is very interesting from a theoretical point of view for different reasons. In the first place, Müller shows how important (un)ambiguous input is in parameter setting. As the argumentation of the article relies heavily on the ambiguity of the input, it would have been important to take analyses of input to children into account, to corroborate the author's assumption that the input is actually ambiguous. In the present article the author does not give sufficiently convincing evidence that the structure of the German subordinate clause is ambig uous. As a matter of fact, there are many cues that the finite verb occurs in final position in the German subordi nate clause. In embedded clauses beginning with the com plementizer *daß* (that), for example, the finite verb always appears in final position (see (1)).

(1a) Ich weiß, daß die Nebensätze sehr kompliziert sind
I know that the subordinate clauses very komplex are
(1b) *Ich weiß, daß die Nebensätze sind sehr kompliziert
I know that the subordinate clauses are very complex

It is possible to omit the complementizer, and then the structure under (1b) becomes possible: (1c).

(1c) Ich weiß, die Nebensätze sind sehr kompliziert
I know the subordinate clauses are very complex

The author does not discuss the possibility that the two consecutive clauses in (1c) are two simple main clauses or that "ich weiß" (I know) is a kind of tag or discourse marker, such as "natürlich" (naturally), followed by a main clause. If we take as an example a sentence where the first clause cannot be considered as a tag or discourse marker, such as (2a) and (2b), it becomes very likely that we are dealing with two consecutive main clauses in (2b), because of the obligatory pause.

(2a) Das sind Kräuter, die in meinem Garten wachsen
These are herbs which in my garden grow
(2b) Das sind Kräuter, (pause) die wachsen in meinem Garten
These are herbs, which grow in my garden

Intonation patterns seem to support an analysis of sentence (2a) as forming one sentence, whereas (2b) repre sents a sequence of two main clauses. In (2b) there is a falling intonation contour at the end of the first clause, just as one would expect at the end of any sentence expressing a statement. In (2a) this falling intonation does not occur, and is not even possible, according to native speakers in my environment. This issue is important, because it means that monolingual and bilingual children have an unambiguous cue in the intonation pattern of the sentence: if there is *no* falling intonation contour at the end of the first clause, the next clause is a dependent clause, and thus the finite verb occurs at the end of the embedded clause.

The author does not refer to the literature about the

acquisition of German as a second language, which would have been interesting because the acquisition of verb placement and the likelihood of transfer as a source of errors has been studied intensively in the 1980s. It has been well known since the early studies of the acquisition of German as a second language (Klein and Dittmar 1979; Clahsen, Meisel & Pienemann 1983; Keim 1984) that the acquisition of the position of the verb in German subordinate clauses is particularly problematic. According to Clahsen, Meisel and Pienemann (1983) the acquisition of the position of the verb in subordinate clauses is the last step in the acquisition of a series of syntactic constructions in German as a second language. The problems with the subordinate clause are not only attested for speakers with a Romance background, but also for those with a Turkish background, who are familiar with verbs in final position in embeddings. This makes it perhaps less likely that transfer is the only factor in the problems encountered in bilingual first language acquisition. This is even more so because the author produces evidence that even monolingual children may have problems with word order in the subordinate clause. Clearly, transfer cannot play a role in monolingual acquisition.

The author takes the point of view that it has been "convincingly argued that the development of a bilingual child proceeds along two language specific paths." Although this position clearly does not exclude the possibility of transfer, it does become problematic when there is evidence for a lot of transfer: in that case the borderline between the two languages can become blurred. It is interesting in this respect to compare the tree structures given for adult German (Figure 1) and adult French (Figure 2) with that representing German phrase structure in Ivar (Figure 3). Clearly, Ivar's German phrase structure is almost the same as the *French* phrase structure tree (except for the OV versus VO order) and does not at all look like the adult German phrase structure. In my view it is not possible to postulate that Ivar follows language specific paths given Ivar's German phrase structure, which is so similar to French phrase structure. It is also not entirely clear to me how one wants to defend the strong continuity position in this situation, as there is quite a step from Ivar's phrase structure to Haider's (1993) conception of adult German phrase structure. In my view it is more convincing to assume that Ivar has some form of compromise grammar at this point. This does not necessarily mean that the *entire* grammars are fused. As a matter of fact, the discussion around fusion and separate development could get a new dimension if one abandons a monolithic view on this matter and allows for separateness in some areas of the grammar and fusion (or, perhaps better: compromise) in other areas. As a matter of fact, from a psycholinguistic point of view it would seem to be economical to assume that language structures both languages have in common are stored together. Obviously, it needs to be investigated what "storing together" means exactly.

A last point I would like to raise concerns the issue of parameter setting, as discussed by the author. Apparently, some bilingual children do not set the V2 parameter correctly from the start. It is well known that if we allow parameters to take the wrong value in the first place, we may end up with what is called the pendulum effect: setting and resetting parameters ad infinitum. This is very undesirable from a theoretical point of view, and may never lead to a stable and target like situation. Müller's solution to this problem looks very attractive at first sight. She suggests that in addition to the global V2 parameter, there is a subparameter relating to the status of the complementizer. In some V2 languages, such as German, complementizers do not instantiate a separate functional category, whereas they do in Yiddish. Some children may hesitate as to the status of complementizers, even though they have no problem with the global parameter. This is attractive because it explains that Ivar knows that German is V2, but does not know that this doesn't apply to non root structures. The solution is, however, not so attractive from a theoretical point of view, because it is entirely unclear how children manage to set the subparameter, especially because Müller assumes there is no triggering data for this subparameter. The author already points to this problem when she says that it needs to be investigated whether the postulation of subparameters without triggering data is plausible. In particular, the fact that the majority of the monolingual children as well as some bilingual children set this parameter without experiencing problems remains unexplained in this approach.

In summary, I would like to say that the author has made an important contribution to the syntactic analysis of bilingual first language acquisition, as well as to the discussion about the relationship between ambiguity in the input and the occurrence of transfer.

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AUTHOR'S RESPONSE

Really transfer?

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Research Strategies

From the beginning of this century fascinating work has been carried out on the simultaneous acquisition of two languages from birth in the form of diary studies for example, that by Ronjat (1913). Many aspects of mono lingual language acquisition have been studied in the same way, whereby researchers generally observed their own children, for example, Stern and Stern (1928). The modern research strategy is to audiotape or videotape the speech of young children at fixed intervals. Of course, a quantitative analysis can be carried out for both diary studies and more recent types of longitudinal study. However, researchers such as Ronjat (1913) do not provide us with exact quantitative results. Notwithstanding, these studies deserve to be taken seriously and I think it is possible to interpret some of the observations they contain as good and "reli able" evidence and compare these with results from modern longitudinal studies, where exact quantification is an important issue. I therefore think that the quantitative results of my review of existing studies on the acquisition of German subordinate clauses in bilingual children can be taken seriously, although I agree with François Grosjean and Elizabeth Lanza, who object that the quantitative differences between monolingual and bilingual children's errors are perhaps artefacts of the setting in which the children have been recorded. That I considered diary studies as well disappointed one commentator, Annick De Houwer, who would have preferred a comparison of modern studies only.

Writing this article for *Bilingualism* made me consult most of the literature mentioned in depth again. I studied for example Ronjat's (1913) book. It is not true, as De Houwer seems to believe, that Ronjat (1913) uses the subordinate clause *wenn der Bubi ist lieb* and three other examples to imply that the errors Louis made are restricted to these particular constructions: "Dès qu'il sait pratiquer la flexion verbale Louis peut se rendre compte de la place que dans des groupes comme 'wenn der Bubi lieb ist' sa mère attribue au mot 'ist' qu'il connaît déjà pour l'avoir entendu et employé lui même à une autre place dans 'der Bubi ist lieb'. Cependant il dit très fréquemment 'wenn der Bubi ist lieb' et je note encore au 39e mois 'wie der Papa war so klein', au 40e 'damit er kann auch machen', au 48e 'wenn du vormittags hast einen fürchterlichen Hunger, dann nimmst du dir eins' " (p. 67). The examples are very important for Ronjat and are treated as instances of a more general phenomenon, because he discusses them with respect to the influence of French, Louis' second language. Since Louis' French subordinate clauses are target like with respect to word order, that is, he never uses the German word order in a French subordinate clause, Ronjat (1913) concludes that "l'influence du français me paraît en résumé inutile pour expliquer la position incorrecte du verbe allemand en hypotaxe" (p. 67). Comparing these errors with those mentioned in Stern and Stern (1928) and Scupin and Scupin (1907, 1910) is very dangerous since these studies come to the conclusion that finite verbs are placed correctly in German subordinate clauses by their monolin gual children, unless a conditional clause is involved. The following erroneous subordinate clauses are mentioned in Stern and Stern (1928): *wenn de Mutter hätte dort sitzen, dann hätte ich mit Vater Prost machen können* "if the mother would have there to sit, . . . " (Hilde; 4;6), *weisst du warum? dass ich hab schlafen können, wenn ich hätte drinnen geblieben und Günther hätte weiter geschrieen, dann hätte ich ja bis früh nich geschlafen* " . . ., if I would have inside stayed and Günther would have further cried, . . . " (Hilde; 4;8), *wenn du's uns nicht würdest geben, dann würden wir's nicht essen* "if you it us not would to give, . . . " (Hilde; 5;1), *wenn ihr würdet immerfort in Berlin geblieben sein, so würdet ihr immerfort Berliner gewesen sein* "if you would always in Berlin stayed to be, . . . " (Hilde; 5;5). There is one example for Bubi as well, namely *wenn du mich hättest einen Pfennig in den Automaten stecken lassen* "if you me would have a penny into the machine to put to let" (Bubi; 4;7). Scupin and Scupin (1907, 1910) mention two other erroneous subordinate clauses, where the finite verb is placed in the position immediately preceding the infinitive/past parti ciple*: weil ich dir den Apfel hab (ge)geben* "because I you the apple have given" (Bubi; 2;5), *dass man nicht runter darf fallen* "that one not down may to fall" (Bubi; 4;6). These patterns are possible in adult German subordinate clauses which contain more than two verbal elements, for example, *weil ich dir den Apfel hab geben wollen* "since I you the apple have to give to want". Summarizing, the errors reported in the diary studies of monolingual German children are restricted to auxiliary verbs (modal/temporal auxiliaries) and to conditionals. Finally, I would like to add that I am aware of the Simone corpus and of the fact that researchers such as Weissenborn (1990a, 1990b) have come to the conclusion that Simone evidences very few placement errors of finite verbs in subordinate clauses (less than 2 per cent, Weissenborn, p.c). The survey of the literature on mono lingual German children was not meant to be exhaustive (and nowhere did I suggest that it is), unless the researchers have studied the acquisition of word order in German subordinate clauses; for an overview see Mills (1985).

One commentator, Jeanine Treffers Daller, criticizes me for not taking into consideration the literature on second language acquisition (see Clahsen, Meisel & Pienemann, 1983). I did so in another publication (see Müller, 1998). The comparison of bilingual first and second language acquisition is very important but not a trivial issue. In the target article my concerns have been more limited, dealing with the acquisition of a syntactic domain by monolingual and bilingual children. Consequently, I had nothing to say about how second language learners in Clahsen et al.'s (1983) study migrant workers acquire German subordinate clauses or come to use them in a target like way. Discussing this issue would have required presenting and discussing the "UG is dead/UG is active" issue; space limitations have made this interesting discussion impossible.

The question of transfer

The majority of commentators agree that bilingual children develop two separate grammars during early developmental phases. Likewise it is rational to reject the assumption that there is no crosslinguistic influence. The commentators all agree on this result. Their criticism mainly concerns the hypothesis that transfer is involved in the case of cross linguistic influence in bilinguals. Rosemarie Tracy questions the possibility that the outcome of transfer "goes beyond the supposed source". Certainly, if we think of transfer in terms of parts of tree structure for example, crosslinguistic influence could hardly entail that the recipient tree differs significantly from the source tree. However, my hypothesis is that parameter values are transferred by the children. Suppose, as I did, that the bilingual children have determined for German that it is a generalized V2 language (at the time when they produce target deviant word orders in subordinate clauses). In structural terms, this means that the A and A' systems conflate. One "subdecision" which has to be made by the children is whether this conflation is partial or complete. Complete conflation gives a V2 language like German, partial conflation results in a V2 language like Yiddish. In terms of finite verb movement, this means that the finite verb raises to COMP in German and to INFL in Yiddish. Romance languages such as French and Italian are residual V2 languages; V2 effects are triggered by some lexical element in SpecCP. In these languages, the finite verb regularly raises into INFL, and into COMP only in lexically triggered cases. In other words, there is no parametric difference between Yiddish on the one hand and French and Italian on the other hand with respect to finite verb movement (in the general case); it is the IP system which is being involved. A bilingual child who has determined that German is a generalized V2 language and who uses the French/Italian parameter value for finite verb raising (which corresponds to saying that the finiteness operator is located in INFL "[+F] in INFL" and not as required in adult German in COMP "[+F] in COMP') at the same time ends up with a Yiddish grammar. Put differently, the child makes a wrong decision with respect to the complete/partial conflation of the A and A' system, that is, s/he chooses the wrong value for the parameter which determines the functional head to which finite verbs move (in the general case).

In a parametrized UG, parameters are conceived of as switches. One outcome of the setting of a parameter is instantaneous learning; the learner selects a value and the grammar converges instantaneously with the adult system for that particluar language property. I actually used the term transfer to describe what the bilingual children under investigation are doing with this concept of parameters in mind. If we think of parameters as a method or a subroutine for language analysis, transfer is no longer necessary. We can simply say, then, that the bilingual child uses a subroutine of the system in both languages, which massively overgeneralizes in one of the languages (German). The bilingual child is tempted to pursue this way in cases where there is positive evidence for the application of the subroutine.

Two commentators, François Grosjean and Elizabeth Lanza, suggest that one has to control for the type of interactions in which the bilingual child is involved. The bilingual children under investigation have been observed in a bilingual setting: The children's parents knew both languages and also the interlocutors who were interacting with the children during the recording sessions were "bilingual" in that the German interlocutor, interacting with the child in German only, spoke French with the French speaking mother after the recording session, for example. This is a very important issue which has to be persued further. We could, then, think of what I defined as transfer in the bilingual children in terms of code switching. In my understanding of code switching, wouldn't we predict that overgeneralizations occur in both directions? Wouldn't the prediction be that the V final property of German is used in French/Italian/English as well? At least sometimes? These questions are on my research agenda and I have to admit that I haven't the faintest idea what the answers to the questions may look like and what the consequences are for parameter theory. Perhaps, the answer to the question of (uni)directionality has to be embedded into a markedness hierarchy, allowing a distinction between marked and unmarked language properties, as proposed by Suzanne Schlyter. I am actually conducting a research project on the simultaneous acquisition of German and Italian in bilingual children where I control for the language mode the bilingual children are in when they are recorded. One of the bilingual children, for example, has been recorded when interacting with her monolingual Italian grandmother. I hope to be able to present some of the results in the not too distant future.

Finally, I want to point out that the results by Aafke Hulk and Elizabeth van der Linden do not represent a challenge for my approach. The OV sequences they find in the utterances of a Dutch/French bilingual child may, of course, also be due to scrambling, an "outcome" of some properties of the Dutch grammar, and not to the wrong setting of the head parameter for the VP. This alternative analysis can be verified on the basis of an analysis of the

fronted XPs in terms of definiteness or specificity. I do not see any incompatibility with my hypothesis then that children use subparameters of language A in language B. Formulations such as "that the presence of OV patterns in the Dutch input of this bilingual child may very well be the factor that "pushes up" the production of [XP V] patterns in the child's French" or that "there is a form of interaction between the two languages: it is not mixing of the structure of one language into the other however, but rather "activa tion" of a possible, but rare pattern in one language by the input of a superficially similar, frequent pattern in the other" (Hulk & Van der Linden, 1996, p. 100) are very vague and compatible with what I proposed. They may suggest, however, that crosslinguistic influence is viewed by these authors as being performance driven, rather than competence driven.

Are monolinguals bilingual?

Some commentators find it contradictory to explain the errors in subordinate clauses in terms of crosslinguistic influence in bilinguals because the same type of errors are also evidenced in monolingual German children. I disagree with this objection because I think it is plausible to assume some kind of crosslinguistic influence in monolinguals as well. Within a theory of language where universal (and partly parametrized) principles are assumed to exist, all individuals, monolinguals and bilinguals, know about the "core" range of language (non)variability. Children may adopt intermediate analyses which do not match those of the adult models since they may analyze the linguistic environment in such a way as to set a parameter one way, but later, with greater maturity of the child's capacities to analyze the input, and with more parameters set, revise earlier decisions.

We may hypothesize then that there are degrees of "monolingualism" or "bilingualism". Ivar, one of the bilingual children studied, learns two different languages, French and German. Crosslinguistic influence is meant to be influence of one language on the other. Benny, the monolingual German child, is exposed to two German dialects. Is he a monolingual child? Here, crosslinguistic influence may be defined in terms of influence of one dialect on the other. Recently, Roeper (1997) has defended the view that "monolingual" speakers are also "bilingual". All researchers who have worked on child data know the phenomenon, namely that children evidence a form of "bilingualism" when they appear to be between stages of language development. A "stage B child" may still use constructions to a large extent characteristic of the previous stage A. Consequently, crosslinguistic influence could be defined in terms of influence of one (previous) grammar (grammar of stage A) on a more advanced grammar (grammar of stage B). In the target article I tried to show that monolingual German children have to acquire two different representations for a type of construction, sub ordinate clauses, one where the finite verb surfaces clause finally and another where the finite verb shows up in the structural position of root clauses. In this case, two dif ferent grammars are involved, where one grammar is not necessarily a grammar of previous stages of linguistic development. This view of first language acquisition opens interesting perspectives to a parallel treatment of "mono lingual" and bilingual first language development. Perhaps, it also reduces the special role of bilingualism defined in terms of two different languages attributed to language change in time (see the commentary by Suzanne Schlyter), since phonological distinctness of the varieties does not seem to be a condition for language change to take place: "... speakers learning a language in the course of a gradual change learn two sets of well formedness principles for certain grammatical subsystems and that over historic time pressures associated with usage (presumably processing or discourse function based) drive out one of the alternatives. We must then ask, however, what would cause learners of a superficially homogeneous dialect to postulate two mu tually exclusive grammars for it rather than one grammar which allowed for variation, especially as stable inherent variation is widespread in grammar. ... This same question, of course, arises with respect to bilingual and diglossic environments, since children in such environments learn the dialects they hear without mixing the rules. In these cases, phonological distinctness of the varieties may seem enough of a cue to prevent confusion, but it should be evident upon reflection that the appeal to phonology just poses the same learning question at a different level of language structure. In any case, where competing syntactic and morphological subsystems coexist without overt cues, the only answer to the learning question that is currently available is that the learners' innate dispositions, as speci fied by UG, force them to analyze the competing variants in the linguistic environment as evidence for two linguistic systems" (Kroch, 1989, p. 349).

Conclusion

I am deeply grateful to all the commentators. They have pointed out interesting questions with respect to my transfer approach. These issues involve both internal and external factors of bilingual language development. I tried to provide answers where possible to their criticism.

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Conceptual representation in bilingual memory: Effects of concreteness and cognate status in word association*

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A word association experiment examined conceptual representation in bilingual memory. Dutch English bilinguals associated twice to nouns and verbs that varied on concreteness and cognate status, once in the language of the stimuli (within language), and once in the other language (between language). Within and between language associations for concrete words and for cognates were more often translations of one another than those for abstract words and noncognates, and nouns evoked more translations than verbs. In both within and between language association, retrieving an associate was easier to concrete than to abstract words, to cognates than to noncognates, and to nouns than to verbs. These findings suggest that conceptual representation in bilingual memory depends on word type and grammatical class: concrete translations, cognates, and noun translations more often share, or share larger parts of, a conceptual representation than abstract translations, noncognates, and verb translations. The results are discussed within the framework of distributed memory representation.

How are the meanings of words in the two languages of a bilingual organized in memory? This question has elicited considerable debate in the literature and centers around two views. The language-independent, or common storage view, claims that the words of a translation pair share a common conceptual (i.e., semantic) representation. In contrast, the language-dependent, or separate storage view claims that the bilingual's two languages are stored in two separate, language-specific stores. Each of the words in a translation pair has its own conceptual representation. The viability of these views has been investigated using a variety of tasks (for a review, see e.g., Keatley, 1992). Studies employing tasks that involve the retrieval of word meanings typically show that conceptual representations are shared in bilingual memory (see Kroll & De Groot, 1997, for a review; but see, e.g., Kolers, 1963). For example, evidence from cross-language priming studies, in which a prime in one language is followed by a target in the other language, suggests that at least under certain circumstances bilinguals are able to access conceptual information that is shared between the two languages. This position has been the starting point of many studies in bilingual memory. However, as already pointed out by Diller (1970), more and more studies suggest that *the* bilingual memory may be a conceptual artifact. For instance, bilinguals differ in their fluency in the second language (e.g., Kroll & Curley, 1988), or in their history of learning that language (e.g., Lambert, Havelka & Crosby, 1958), which may bring about different memory representations for different (groups of) bilinguals.

Even within the memory of a single bilingual, the organization of conceptual memory may differ, depending on word type. In earlier studies, using only nouns as stimulus materials, we found that concrete words were translated faster than abstract words by fairly fluent bilinguals (De Groot, 1992a; De Groot, Dannenburg & Van Hell, 1994; Van Hell & De Groot, 1998) and by novice learners of a second or foreign language (Van Hell & Candia Mahn, 1997). In addition, cognates (i.e., translation pairs in which the words are similar in sound and spelling) were translated faster than noncognates both by fairly fluent bilinguals (e.g., De Groot, 1992a; De Groot et al., 1994; Kroll & Stewart, 1994) and by novice learners of a foreign language (Lotto & De Groot,

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1998). These word-type effects in translation performance suggest that words, here nouns, with different characteristics are represented differently in bilingual memory.

The word-type effects observed in translation are corroborated by other bilingual studies, all using tasks that are considered to involve conceptual access. In a cross-language semantic priming study, Jin (1990) obtained a reliable priming effect for concrete but not for abstract words. In a free recall experiment, Paivio, Clark and Lambert (1988) presented lists of concrete and abstract words, once in the first and once in the second language of bilinguals. They found that concrete words benefited more from cross-language repetition than abstract words. Under the assumption that free recall is a retrieval task in which conceptual information is tapped (e.g., Durgunoglu & Roediger, 1987), this suggests that bilingual memory representations may differ for concrete and abstract words. (Though Paivio et al. (1988) and Jin (1990) do not list their stimulus materials, the examples they present suggest that their materials consisted of nouns.)

Differences were also found in the processing of cognates and noncognates. In a cross-language semantic priming experiment, De Groot and Nas (1991) observed a semantic priming effect for cognate nouns, but not for noncognate nouns. In experiments employing a cross-language semantic categorization task, in which participants had to decide whether a target word (typically a noun, e.g., "banane") is a member of a particular category (e.g., "fruit"), cognates were processed faster and more accurately than noncognates (e.g., Dufour & Kroll, 1995).

Taken together, differences observed in the processing of concrete and abstract nouns and of cognate and noncognate nouns may signify that these words are represented differently within the memory of a single bilingual. More specifically, and according to a localist view (e.g., Collins & Loftus, 1975), the meanings of abstract translation pairs may relatively often be represented in separate stores, whereas those of concrete translation pairs may relatively often share a conceptual representation. Or, if one takes a distributed view which assumes that the meanings of words are represented over an entire network of interconnected units or features (e.g., Hinton, McClelland & Rumelhart, 1986; Kawamoto, 1993; Masson, 1991), abstract translation pairs may share fewer meaning elements than concrete translation pairs in conceptual memory (De Groot, 1992b; Taylor & Taylor, 1990). A possible reason why conceptual representations of abstract words differ from those of concrete words is that the meanings of an abstract word and its translation tend to be less similar than those of concrete translation pairs (e.g., Taylor, 1976). That is, the meanings of abstract words may be less consistent, and more dependent on the linguistic context in which they appear, than those of concrete words (e.g., Breedin, Saffran & Coslett, 1994; Hampton, 1981). Because of this higher dependency on linguistic context, abstract word meanings may be more language-specific than concrete word meanings (Van Hell, 1998a). Alternatively, abstract words may have fewer semantic features than concrete words (e.g., De Groot, 1989; Kieras, 1978; Plaut & Shallice, 1993), and, hence, have fewer semantic elements to share with their translations. In all, differences in the meanings of abstract and concrete words across languages may result in different conceptual representations in the memory of bilinguals: concrete translation pairs may more often share a conceptual representation than abstract translation pairs (localist view), or may share larger parts of the representation (distributed view).[1]

Like abstract versus concrete translation pairs, the conceptual representations of cognates may differ from those of noncognates. De Groot and Nas (1991) proposed that cognates share a conceptual representation, whereas noncognates are stored in language-specific conceptual nodes. Or, taking a distributed point of view, the representations of cognates may share more meaning elements than those of noncognates (De Groot, 1992b). Conceivably, conceptual representations of cognates may be more similar than those of noncognates because cognates look more alike than noncognates (Anthony, 1953; Carroll, 1992; De Groot, 1992b). Noticing the salient similarity of cognates, one may be inclined to think that words that look and sound alike are also similar in meaning. Hence, when learning a cognate in the second language, learners may simply map the to-be-learned L2 word onto the existing conceptual representation of its translation in the native language. When learning noncognates, on the other hand, the dissimilarity in spelling and sound may prevent L2 learners from automatically mapping these L2 words onto the conceptual representation of their respective translations in L1. Consequently, cognates may more often share a conceptual representation (localist view), or may share more meaning elements (distributed view) than noncognates.

Conceptual representation in bilingual memory may not only depend on word type, but also on grammatical class. Bilingual studies aimed at

[1] Theories discussed here all assume that word meanings are represented in amodal (sub)symbols in memory. An alternative framework, based on modal symbolic representations, is provided by dual coding theory (cf. Paivio et al., 1988).

studying conceptual representation have typically used (concrete) nouns as their stimulus materials. Monolingual and cross-linguistic studies, however, suggest that syntactic differences between verbs (often denoting relational concepts) and concrete nouns (typically denoting referential concepts) have implications for their conceptual representation in memory. More specifically, verbs have a greater breadth of meaning than concrete nouns (Gentner, 1978; Miller & Fellbaum, 1991; Reyna, 1987), and their meaning appears more dependent on their linguistic context than the meaning of concrete nouns (Gentner, 1981). These differences may ensue from less dense conceptual representations of verbs as compared to nouns (e.g., Gentner, 1978, 1981; Reyna, 1987). Additionally, cross-linguistic research suggests that the meanings of verbs are less similar across languages (Gentner, 1981), and are more constrained by the structure of a specific language than those of concrete nouns (Choi & Bowerman, 1991). For example, Gentner (1981) had a bilingual translate a text into another language, and subsequently asked a second bilingual to translate this text back into the original language. Next, the doubly translated text was compared with the original text. More of the original nouns than verbs appeared in the doubly translated text, and Gentner took these results to suggest that the meanings of verbs vary more across languages than the meanings of concrete nouns. Differences between nouns and verbs observed in monolingual and cross-linguistic studies may have implications for the representation of nouns and verbs in bilingual memory. In particular, verbs may more often be represented in language-specific conceptual stores, whereas nouns more often share a conceptual representation in the memory of bilinguals. Or, adopting a distributed point of view, conceptual representations of verbs may share fewer meaning elements in a bilingual's memory than those of nouns.

To recapitulate, the focus of this study is on the representation of the meanings of words with different characteristics in bilingual memory. In particular, we examined the conceptual representation of abstract vs. concrete translation pairs, of cognates vs. noncognates, and of nouns vs. verbs.[2]

The task we used is a bilingual variant of the traditional word association task (Gekoski, 1980; Kolers, 1963; Taylor, 1976). Two common versions of this task are discrete and continued word association. In the discrete version, participants come up with a single association to a stimulus word. In the continued version, they produce as many associates to a word as possible within a prespecified amount of time. The word association task is assumed to reflect conceptual processing (De Groot, 1989). More specifically, the retrieval of word meanings seems to be involved in word association, as (monolingual) performance on this task was found to be influenced by the concreteness of stimulus words (e.g., Brown, 1971; De Groot, 1989), as well as by their meaningfulness or affectivity/emotionality (e.g., Cramer, 1968). For example, using the discrete and continued word association task, De Groot (1989) found that concrete words elicited faster, and a higher number of, associative responses than abstract words. Moreover, examination of the actual associative responses given reveals that the vast majority of the associative responses are related in meaning to the presented stimulus words (cf. De Groot, 1989; Postman & Keppel, 1970). Surprisingly few associative responses of adults reflect lexical variation on the stimulus words, such as rime or morphological inflections (with the exception of adjectives; see, e.g., Deese, 1964).

In the bilingual version of the word association task, bilinguals associate to a series of words, once in the language of the stimulus words, and once in the other language. The within- and between-language associative responses to each stimulus word are subsequently compared to see whether they are translations or not (Kolers, 1963; Taylor, 1976). A large amount of translations (or "same" responses) is considered evidence for a common conceptual store. In contrast, a large amount of different responses is taken to indicate a language-specific storage of word meanings in bilingual memory.

In a seminal study, Kolers (1963) collected discrete within- and between-language associative responses on the same series of stimuli, all nouns. Kolers' participants were native speakers of German, Spanish, or Thai, and all had English as their second language. Each participant took part in all four association conditions: within-language responses on the words presented in the native and in the second language, and between-language responses on native and second language words. Subsequently, the within- and between-language responses were compared to see whether they were translations ("same") or not ("different"). Kolers' main finding was that about 55 per cent of these responses were not translations (i.e., were different), and concluded that word meanings are represented in language-specific stores in bilingual memory.

Kolers' conclusion may have been too strong,

[2] As will be seen below, we interpreted this research question in terms of two different views on the representational format in memory: local and distributed memory representations. Note that our study is *not* designed to test the viability of these two views.

however, as he himself later recognized (Kolers & Gonzalez, 1980). His data revealed that about 31 per cent of the within- and between-language associates to the same stimulus were translations (''king-queen'', ''king-reina''). Moreover, about 20 per cent of the within- and between-language associates were the same across all four association conditions (e.g., ''king-queen'', ''king-reina'', ''rey-queen'', ''rey-reina''). Hence, the responses reveal that at least a number of translation pairs share a conceptual representation in bilingual memory. Interestingly, Kolers (1963) found that the ten concrete words elicited more same responses within- and between-languages than the ten abstract words. A similar difference between concrete and abstract words was obtained by Taylor (1976) in a bilingual continued word association experiment. In addition, she found that cognates evoked more same responses than noncognates.

A basic question that can be raised about these early studies of Kolers (1963) and Taylor (1976) concerns the alleged consistency of associative responses. Kolers (1963) concluded that the high level of dissimilar associations within- and between-languages entailed that word meanings are stored separately in bilingual memory. Likewise, Taylor (1976) took the relatively low similarity of associations to noncognates and abstract words to indicate that these types of words were represented language-specifically. However, before valid conclusions can be drawn about the similarity and dissimilarity of the within- and between-language associative responses, one first has to know how often responses are similar when participants associate twice within the same language. Kolers (1963) and Taylor (1976) implicitly seemed to assume that participants' within-language associative responses are highly consistent.

Some monolingual word association studies cast doubt on this assumption, however (Fox, 1970; Gekoski & Riegel, 1966; Howell, 1970). Howell (1970) had participants associate to a set of stimuli, and asked them to repeat this task one month later. The mean probability of repeating a response on the second session was .46. Likewise, Gekoski and Riegel (1966) and Fox (1970) found that 43 per cent and 48 per cent of the associative responses were repeated after a one-week and a two-month interval, respectively. This inconsistency of within-language responses qualifies the dissimilarity of the within- and between-language associations as observed by Kolers (1963) and Taylor (1976), and puts their conclusions in a different light. Therefore, in our word association study, we tested the (in)consistency of associative responses by asking half the participants to perform the within-language association task a second time.

In the present study, whose aim is to examine the representation of the meanings of words with different characteristics in bilingual memory, Dutch-English bilinguals performed the discrete word association task on a series of either Dutch or English stimulus words. The stimulus words, nouns and verbs, were orthogonally varied on concreteness and cognate status. All participants associated to these words twice, once in the language of the stimuli (within-language) and once in the other language (between-language). As in Kolers' (1963) and Taylor's (1976) studies, the within- and between-language associations were compared to see whether they were translations or not. If within- and between-language associative responses on abstract words, noncognates, and verbs are less often translations than those on concrete words, cognates and nouns, it can be concluded that the meanings of abstract words, noncognates, and verbs are more often represented in language-specific stores (localist view), or share fewer meaning elements across languages (distributed view), than those of concrete words, cognates, and nouns. Half of the participants performed the within-language association task a second time. The similarity of these repeated within-language associations serves as a ''baseline'' measure of consistency against which the similarity of the within- and between-language associations can be interpreted. Finally, in order to obtain converging evidence for the associative responses (''what has been said''), we measured the time it took participants to come up with an association, and how often they did not succeed in doing so within a prespecified amount of time (i.e., omission). No reaction time and omission data had been collected in the studies of Kolers (1963) and Taylor (1976). In line with the hypothesized differences in conceptual representation of concrete and abstract translation pairs, of cognates and noncognates, and of nouns and verbs, longer association times and more omissions should be observed for abstract words, noncognates and verbs than for concrete words, cognates and nouns.

Experiment

Method

Participants. Eighty first-year psychology students from the University of Amsterdam participated in the experiment. They were randomly allocated to one of the four task conditions. All were unbalanced bilinguals, with Dutch as their native language and English as their second. All were fairly fluent in their second language: they had learned English at school for about three to four hours a week, starting around

the age of ten, until their enrollment in the university. Their training at the university required them to read mainly in English. After finishing the first session of the experiment they were asked to rate their comprehension and production abilities in English on a 7 point scale (1 = very low; 7 = same as in Dutch). The mean comprehension ratings ranged from 5.45 to 5.65. Mean production ratings ranged from 4.84 to 5.30. One factor ANOVAs revealed no significant differences in proficiency between the four groups of participants, either in comprehension, $F(3,76) = .30$, $p > .10$, or in production, $F(3,76) = 1.63$, $p > .10$. All participants received course credit for participation.

Materials. The critical test materials consisted of 90 Dutch words and their English translations: 60 nouns and 30 verbs (see Appendix A). We also included 30 adjectives as fillers; this was done to prevent a bias in participants to respond predominantly with nouns and verbs, which may occur if only nouns and verbs serve as stimulus words.[3] The ratio of nouns to verbs was 2:1; fewer verbs as compared to nouns is in accordance with differences in the distribution of these words in natural language.

The nouns, verbs and adjectives were orthogonally varied on concreteness and cognate status. The nouns were derived from a corpus of 440 Dutch words and their English translations, rated for imageability and cognate status (for more details, see De Groot et al., 1994). The verbs and adjectives were selected from a corpus of concreteness ratings of Dutch words, in which the same imageability instruction as in De Groot et al.'s corpus had been used (Van Loon-Vervoorn, 1985).[4] The cognate status of the verbs and adjectives was assessed in a new norming study, in which eighteen newly selected Dutch-English bilinguals, drawn from the same population as those participating in the actual experiment, took part. The instruction was the same as that used for De Groot et al.'s (1994) corpus.

Stimulus words were controlled for two characteristics known to influence monolingual and bilingual processing: log word frequency and length. The log frequencies of the Dutch words and their English translations were derived from the frequency counts of the Centre for Lexical Information (CELEX) in Nijmegen, Netherlands (Burnage, 1990). The length of the Dutch words and their English translations were determined simply by counting the letters of each word. Mean values and standard deviations of the properties of the critical stimulus materials are presented in Appendix B.

In addition to the test stimuli, 20 Dutch words and their English translations (10 nouns, 5 verbs, and 5 adjectives) were selected as practice stimuli, all different from any of the test stimuli. As for concreteness, cognate status, length and frequency, the practice words were comparable to the test stimuli.

Apparatus and Procedure. The experiment was run on an Apple Macintosh computer. All participants were tested individually. Stimuli were presented at the centre of the computer screen. A PASCAL-program controlled the stimulus presentation and the recording of the response times. Participants' responses were registered by a microphone that activated a voice-operated switch. The experimenter typed in the participant's responses on the computer keyboard (what was being typed in was not echoed on the screen), and monitored the workings of the voice switch. Failures of the voice-key to register the participant's response or triggering due to faltering of the participant's voice or ambient sounds were noted.

Table 1 (upper part) presents an overview of the test sessions and the experimental conditions.

In order to avoid possible repetition effects across association conditions, one month elapsed between the subsequent test sessions. In the first session, the eighty participants were randomly allocated to one of the four task conditions: stimulus presentation in Dutch and response in Dutch (DD), stimulus presentation in English and response in English (EE), stimulus presentation in Dutch and response in English (DE), and stimulus presentation in English and response in Dutch (ED). One month later, all participants took part in a second session. The language of the stimuli was the same as in the first session, but they had to respond in the other language. The 40 participants who performed the within-language association task in the first session took part in a third session, that took place one month after the second one. In the third session, they performed exactly the same task as in the first session; a comparison of first and third session responses serves as a baseline measure for the consistency of associative responses (see introduction).

In all sessions and task conditions, participants were instructed that on each trial a word would

[3] Adjectives were not considered critical in this study because many adjectives have an antonym (e.g., "cheap expensive", "happy unhappy"), which have been found to be the primary associate. The availability of an antonym may bias the results towards same responses within and between languages, above and beyond the manipulation of concreteness and cognate status, thereby interfering with the main purpose of our experiment. (See Cramer, 1968, and Deese, 1964, for more details on adjectives and word association performance.)

[4] In previous work, we found a correlation of .94 between the imageability of Dutch nouns and their English translations (De Groot et al., 1994). It is conceivable that the imageability of Dutch verbs also correlates strongly with that of their English translations. Therefore, we did not collect imageability ratings on the English verbs in a new norming study.

Table 1. *Overview of the experimental conditions, and hypothetical within- and between-language responses and their scorings (similar or dissimilar)*

	Session 1	Session 2	Session 3
Condition	Stimulus-Response	Stimulus-Response	Stimulus-Response
1	Dutch Dutch	Dutch English	Dutch Dutch
2	English English	English Dutch	English English
3	Dutch English	Dutch Dutch	
4	English Dutch	English English	
	Similar Responses		
	Session 1	Session 2	Session 3
Condition	Stimulus-Response	Stimulus-Response	Stimulus-Response
1	rok jurk	rok dress	rok jurk
2	skirt dress	skirt jurk	skirt dress
3	rok dress	rok jurk	
4	skirt jurk	skirt dress	
	Dissimilar Responses		
	Session 1	Session 2	Session 3
Condition	Stimulus-Response	Stimulus-Response	Stimulus-Response
1	rok jurk	rok woman	rok broek
2	skirt dress	skirt vrouw	skirt pants
3	rok dress	rok vrouw	
4	skirt jurk	skirt woman	

Note: "Rok" translates into "skirt"; "jurk" translates into "dress"; "vrouw" translates into "woman"; "broek" trans lates into "pants".

appear on the screen. They were asked to speak out loud, as quickly as possible, the first word that came into their mind upon reading the word on the screen. Participants were told that their response had to be a single word, either in Dutch if they had to respond in Dutch, or in English if they were to respond in English. Following Kolers (1963), they were told that their response should not be a repetition (in the within-language condition) or a translation (in the between-language condition) of the presented stimulus word.

The procedure for all trials was as follows. Prior to the stimulus word a fixation stimulus (an asterisk) appeared on the screen for one second. Then the word was presented and remained on the screen until the participant responded. The onset of the participant's response (or of any other sound) was registered by the voice-switch. Reaction time (RT) was measured from the onset of the stimulus. Then, the experimenter typed in the participant's response and hit the RETURN-key, initiating the presentation of the next stimulus one second afterwards. The maximum presentation duration for a stimulus was 8 seconds. Whenever this period expired, the experimenter typed the word "none" and the next trial was called by pressing the RETURN-key.

Each participant completed 20 practice and 120 test trials. Within the practice session and within the experimental session, all trials were presented in random order, with a different order for each participant and for each session. The test trials were divided in 6 blocks of 20 stimuli each. After each block, the participant was allowed a brief rest, after which the experimenter initiated the presentation of the first trial of the next block.

Results and discussion

Association analyses: similarity of within- and between-language associations. The similarity of the within- and between-language associations was determined as follows. Each participant had been presented with the *same* set of 120 stimulus words twice: In one session he or she had associated in Dutch, and in the other session in English (see Table 1, upper part). Dutch and English associates on each critical stimulus word were compared to see if they were similar (i.e., translations) or not. Table 1 (lower parts) presents the scoring of responses of hypothetical participants, whose within- and between-language associations were all similar, or all dissimilar.

For example, if the stimulus word "rok" (meaning "skirt") evoked "jurk" in Dutch and "dress" in English, these associative responses were considered similar, because "jurk" translates into "dress". However, if "rok" evoked "jurk" in Dutch and "woman" in English, the associates were regarded as dissimilar. Translation status was determined by the first author, who, if necessary, consulted a set of Dutch-English and English-Dutch dictionaries (Martin & Tops, 1984, 1986). The plural and the diminutive of a word (in Dutch the diminutive is an affix, e.g., "*little* skirt" is "rok*je*") were equated with its generic form (i.e., lemma). Omissions were not considered responses and were excluded. After all responses were scored, the entire procedure was repeated a second time to ensure the reliability of scoring. Subsequently, the scorings were compared with an (independent) scoring of the second author, who followed the same procedures. Cohen's kappa (Cohen, 1960) for the two scorings on the nouns and verbs was .98 in both cases. Hence, our scoring procedure was highly reliable.

For each participant, mean similarity scores were calculated for each of the four concreteness (concrete

Table 2. *Mean response equivalence (in percentages) of the within-language and between-language associations upper part) and the repeated within-language associations (lower part) for the nouns and verbs, itemized for association conditions, concreteness, and cognate status. Standard errors are in parentheses*

	Cognates		Noncognates	
	Concrete	Abstract	Concrete	Abstract
	Within and Between language associations			
Nouns				
DD DE	44.0 (2.0)	33.0 (3.1)	28.7 (3.0)	24.2 (4.0)
DE DD	46.2 (2.7)	24.8 (3.4)	28.2 (3.6)	21.2 (2.2)
EE ED	49.3 (2.9)	24.3 (2.8)	34.2 (3.3)	24.6 (2.8)
ED EE	43.7 (3.3)	19.8 (2.2)	25.6 (3.1)	22.4 (2.8)
Mean	45.8 (1.4)	25.5 (1.5)	29.2 (1.6)	23.1 (1.5)
Verbs				
DD DE	39.3 (3.8)	25.4 (5.0)	34.0 (3.4)	25.8 (5.9)
DE DD	41.1 (4.5)	23.3 (2.9)	38.2 (4.0)	23.3 (5.5)
EE ED	34.5 (5.5)	27.6 (4.0)	27.2 (3.6)	16.5 (4.8)
ED EE	28.9 (4.8)	23.4 (3.8)	25.9 (3.3)	14.0 (4.5)
Mean	36.0 (2.4)	24.9 (2.0)	31.3 (1.8)	19.9 (2.6)
	Repeated Within language associations			
Nouns				
DD DD	53.9 (2.2)	43.1 (2.4)	39.6 (2.7)	42.0 (4.2)
EE EE	52.0 (2.4)	30.2 (3.9)	42.0 (3.4)	30.8 (2.9)
Mean	53.0 (1.6)	36.6 (2.5)	40.8 (2.2)	36.4 (2.7)
Verbs				
DD DD	48.0 (4.2)	34.0 (5.1)	44.2 (4.4)	37.7 (3.8)
EE EE	39.2 (5.0)	31.6 (4.2)	33.7 (4.4)	26.7 (5.7)
Mean	43.6 (3.3)	32.8 (3.3)	39.0 (3.2)	32.2 (3.5)

Note: D Dutch; E English.

vs. abstract) by cognate status (cognates vs. noncognates) conditions; noun and verb data were treated separately. Furthermore, mean similarity scores for the items (nouns and verbs) within each concreteness by cognate status condition, collapsed across the participants within each of the four association conditions, were calculated. In calculating the mean similarity scores (both participants and items), we corrected for response omissions by subtracting these missing values from the total number of observations, N, in the denominator. A 2 (stimulus language) by 2 (response languages in first and second sessions) by 2 (grammatical class) by 2 (concreteness) by 2 (cognate status) ANOVA was performed on the mean participant similarity scores. In addition, the corresponding 2 x 2 x 2 x 2 x 2 ANOVA was performed on the mean item similarity scores.

The mean similarity scores are presented in the upper part of Table 2 (throughout this paper, all means presented are mean participant scores).

The analyses revealed that concrete words elicited 12.2 per cent more similar responses than abstract words (35.6 per cent and 23.4 per cent, respectively; $F_1(1,76) = 105.33$, $p < .0001$ and $F_2(1,328) = 54.47$, $p < .0001$). Likewise, cognates evoked 7.1 per cent more similar responses than noncognates (33.0 per cent and 25.9 per cent, respectively; $F_1(1,76) = 29.29$, $p < .0001$ and $F_2(1,328) = 15.61$, $p < .001$). The overall degree of similarity of associations was somewhat higher for nouns than for verbs (30.9 per cent and 28.0 per cent, respectively; $F_1(1,76) = 5.62$, $p < .05$ and $F_2(1,328) = 3.46$, $.05 < p < .10$). The main effect of stimulus language was marginally significant, $F_1(1,76) = 3.43$, $.05 < p < .10$ and $F_2(1,328) = 3.61$, $.05 < p < .10$; associative responses to Dutch words were slightly more similar than those to English words (31.3 per cent and 27.6 per cent, respectively). There was no significant main effect of the factor response languages.

Concreteness interacted with cognate status, $F_1(1,76) = 9.21$, $p < .01$, and $F_2(1,328) = 4.48$, $p < .05$. This interaction was qualified by a three-way interaction between grammatical class, concreteness, and cognate status, $F_1(1,76) = 9.24$, $p < .01$, and $F_2(1,328) = 4.24$, $p < .05$. The interaction between grammatical class and stimulus language was significant on the participant analysis, $F_1(1,76) = 5.65$, $p < .05$, and marginally so on the item analysis, $F_2(1,328) = 3.34$, $.05 < p < .10$. The three-way interaction between grammatical class, stimulus language, and concreteness reached significance on the analysis by participants, $F_1(1,76) = 4.42$, $p < .05$, but not on the analysis by items. None of the remaining interactions was significant.

In order to localize the source of the above three-way interaction between grammatical class, concreteness and cognate status, additional ANOVAs were performed on the noun and verb data separately. These analyses revealed that the interaction between concreteness and cognate status was only significant for the nouns, $F_1(1,76) = 29.34$, $p < .0001$, and $F_2(1,224) = 12.72$, $p < .001$, but not for the verbs. As can be seen in Table 2, the degree of equivalence of associations is particularly large for the concrete cognate nouns (45.8 per cent).

In sum, across all four association conditions, concrete nouns and verbs evoked a higher proportion of equivalent responses than abstract nouns and verbs. Likewise, the within- and between-language associations for cognate nouns and verbs were more

often translations than those for noncognate nouns and verbs. Concreteness was found to interact with cognate status in the nouns, but not in the verbs; this interaction was caused by the high proportion of similar responses to concrete cognate nouns. Finally, the overall degree of similarity of associations was somewhat higher for nouns than for verbs.

The overall pattern of results (i.e., irrespective of concreteness and cognate status) obtained in our study is similar to that of Kolers (1963) and Taylor (1976). Collapsed across all task conditions and word types, 31 per cent of the nouns and 28 per cent of the verbs evoked the same within- and between-language associations (see Table 2). Remarkably, the 31 per cent similarity of responses to the nouns is exactly the same degree of similarity as Kolers (1963) obtained in his study (using all nouns). This finding prompted Kolers to conclude that the meanings of words in the two languages of bilinguals are stored separately. However, as discussed in the introduction, before drawing any conclusions pertaining to the organization of conceptual representation in bilingual memory, one first has to know how consistent the associative responses are when participants perform the same task twice within the same language.

Association analyses: similarity of repeated within-language associations. In order to ascertain the consistency of associative responses, the responses of participants who had performed the within-language association task twice, in the first and in the third session, were compared. These participants had either associated twice from Dutch into Dutch, or twice from English into English. In judging the similarity of responses, the same procedure as described above was followed. Responses were considered similar if they were repetitions (e.g., "skirt" and "skirt"), or, as occasionally occurred, synonyms (e.g., "jail" and "prison"). Again, the plural and the diminutive of a word were equated with its generic form. Cohen's kappa for the scorings of the first and second author was .99 and .98 for the nouns and verbs, respectively, indicating that the scoring procedure was highly reliable.

For each participant, and separately so for the nouns and verbs, a mean similarity score was calculated for the four conditions formed by the two levels of the variables concreteness (concrete vs. abstract) and cognate status (cognates vs. noncognates). Furthermore, mean similarity scores for all stimuli within each condition, collapsed across participants, were calculated. In calculating these mean similarity scores, we corrected for response omissions as was done in the foregoing analysis.

In the lower part of Table 2 the mean similarity scores of the two association conditions are presented. The most important finding is that participants do not consistently produce the same associations when they have to perform the same task twice within the same language. It was found that, across all conditions, only 45 per cent of the associates to Dutch nouns and 39 per cent of the associates to English nouns were produced twice. In addition, 41 per cent and 33 per cent of the associations to the Dutch and English verbs were given twice. At best, 53.9 per cent of the associations are produced a second time (for Dutch concrete cognate nouns). Hence, our data do not support the implicit assumption of Kolers (1963) and Taylor (1976) that people typically come up with the same responses when they perform the within-language association task twice. The present within-language comparisons qualify our findings of the within- and between-language comparisons, as well as the results obtained by Kolers (1963) and Taylor (1976), and the concomitant conclusions on conceptual representation in bilingual memory. This point will be elaborated upon in the discussion.

Moreover, Table 2 suggests that the degree of similarity of the repeated within-language associations (lower part) is higher than that of the within- and between-language associations (upper part). To substantiate this we performed the following ANOVA on the mean participant similarity scores: 2 (comparison: within- and between-language associations versus repeated within-language associations) by 2 (stimulus language) by 2 (grammatical class) by 2 (concreteness) by 2 (cognate status). The corresponding 2 x 2 x 2 x 2 x 2 ANOVA was performed on the mean item similarity scores. (In these analyses only the data of participants who associated in all three sessions were used.)

The main effect of comparison was significant, $F_1(1,38) = 60.15$, $p < .0001$ and $F_2(1,328) = 21.74$, $p < .0001$, indicating that the overall similarity of the repeated within-language associations (39.3 per cent) was higher than that of the within- and between-language associations (30.8 per cent). In addition, the following main effects were found: concreteness, $F_1(1,38) = 44.26$, $p < .0001$ and $F_2(1,328) = 41.22$, $p < .0001$; cognate status, $F_1(1,38) = 22.32$, $p < .0001$ and $F_2(1,328) = 9.81$, $p < .01$; grammatical class, $F_1(1,38) = 9.52$, $p < .01$ and $F_2(1,328) = 6.04$, $p < .05$; and a weaker effect of stimulus language, $F_1(1,38) = 3.00$, $.05 < p < .10$ and $F_2(1,328) = 5.70$, $p < .05$.

Concreteness interacted with cognate status, $F_1(1,38) = 6.52$, $p < .05$ and $F_2(1,328) = 4.81$, $p < .05$; the similarity of the associative responses was particularly high on the concrete cognates (45 per cent). The interaction between comparison and stimulus language was significant on the participant analysis,

$F_1(1,38) = 5.20$, $p < .05$, but not on the item analysis. Likewise, the three-way interaction between stimulus language, concreteness, and grammatical class was significant on the participant analysis, $F_1(1,38) = 4.80$, $p < .05$, but not on the item analysis. None of the remaining interactions reached significance.

In conclusion, for each type of word, the similarity of the repeated within-language associations was higher than that of the within- and between-language associations.

Association analyses: dissimilar within- and between-language associations. In the foregoing analyses, we compared the within- and between-language associations to see whether they were the same or not. However, dissimilar responses, though not exact translations, may still reflect some degree of semantic resemblance. For example, the word "skirt" may elicit "dress" and "vrouw" (translation of "woman") as within- and between-language associations, respectively (see Table 1). Though these responses are dissimilar, they nevertheless are somewhat related in meaning, and possibly add to our understanding of the organization of bilingual conceptual memory representation.

Therefore, four fluent Dutch-English bilinguals scored all dissimilar within- and between-language responses on the degree of semantic relatedness. Judges were instructed to assign a 2 to clearly related, a 1 to somewhat related, and a 0 to unrelated response pairs. Some examples of related response pairs were given, in which the relations reflected (near) synonymy, hyponymy, membership of a common semantic category, antonymy, meronymy, attributes, functions, and entailment (see, e.g., Miller & Fellbaum, 1991, for more details; pilot testing had indicated the need to include some examples in the instructions, as semantic relatedness appeared to be a vague notion for lay persons). The reliability of the ratings of the four judges was high: intraclass correlations (for more details, see Guilford, 1954, pp. 395 7) for the responses on the nouns and verbs were .93 and .91, respectively. Next, mean ratings of all response pairs were calculated, averaged across the four judges. Following the procedures of the similarity analyses described above, mean semantic relatedness ratings of the dissimilar responses were then calculated for each of the cells of our design, for each participant and for each item. The data were subjected to ANOVAs that were identical in design to those of the foregoing similarity analyses. The mean semantic relatedness ratings are presented in Table 3. It should be mentioned that these data only provide a gross indication of semantic relatedness, as in some cells only a few dissimilar responses were observed, and could be scored.

Table 3. *Mean semantic relatedness ratings of the dissimilar within-language and between-language associations for the nouns and verbs. Standard errors are in parentheses*

	Cognates		Noncognates	
	Concrete	Abstract	Concrete	Abstract
Nouns				
DD DE	1.10 (.07)	.50 (.06)	1.16 (.08)	.67 (.10)
DE DD	1.03 (.08)	.51 (.06)	1.16 (.06)	.51 (.06)
EE ED	.87 (.08)	.40 (.04)	.97 (.08)	.42 (.06)
ED EE	.97 (.08)	.37 (.06)	1.09 (.06)	.50 (.05)
Mean	.99 (.04)	.45 (.03)	1.10 (.03)	.52 (.04)
Verbs				
DD DE	1.17 (.09)	.64 (.07)	1.02 (.06)	.36 (.05)
DE DD	1.08 (.09)	.44 (.07)	.84 (.09)	.49 (.08)
EE ED	1.08 (.10)	.54 (.07)	.66 (.08)	.31 (.06)
ED EE	.78 (.08)	.45 (.07)	.60 (.05)	.23 (.04)
Mean	1.03 (.05)	.52 (.04)	.78 (.04)	.35 (.03)

Note: D Dutch; E English.

The analyses revealed a large effect of concreteness, $F_1(1,76) = 472.60$, $p < .0001$, and $F_2(1,328) = 174.46$, $p < .0001$: semantic relatedness ratings of the dissimilar responses were higher for concrete words than for abstract words (.97 and .46, respectively). Cognates received somewhat higher ratings than noncognates, .75 and .69, respectively, $F_1(1,76) = 6.23$, $p < .05$, and $F_2(1,328) = 2.80$, $.05 < p < .10$. Semantic relatedness ratings were higher for nouns than for verbs, .77 and .67, respectively, $F_1(1,76) = 15.71$, $p < .001$, and $F_2(1,328) = 4.99$, $p < .05$. The main effect of stimulus language was significant, $F_1(1,76) = 20.07$, $p < .0001$, and $F_2(1,328) = 14.80$, $p < .001$; the semantic relatedness of the dissimilar responses to L1 (Dutch) stimulus words was higher than that to L2 (English) stimulus words, .79 and .64, respectively. There was no significant main effect of the factor response languages.

Cognate status interacted with grammatical class, $F_1(1,76) = 36.45$, $p < .0001$, and $F_2(1,328) = 11.08$, $p < .01$; the semantic relatedness of the dissimilar associations to cognates was higher than that to noncognates in the verbs, but not in the nouns. The three-way interaction between stimulus language, response languages, and grammatical class was significant on the participant analysis, $F_1(1,76) = 4.98$, $p < .05$, and marginally so in the item analysis, $F_2(1,328) = 2.85$, $.05 < p < .10$. The four-way interaction between response languages, grammatical class, concreteness, and cognate status reached significance

on the participant analysis, $F_1(1,76) = 9.92$, $p < .01$, but not on the item analysis. None of the remaining interactions reached significance.

In sum, semantic relatedness ratings of the dissimilar within- and between-language associations substantiate our main conclusion that association performance varies as a function of concreteness, cognate status, and grammatical class. Analogous to the analyses on the similar within- and between-language responses, the dissimilar responses to concrete words were more related in meaning than those to abstract words. Likewise, the dissimilar responses to cognate verbs (but not nouns) shared more meaning than those to noncognate verbs. Dissimilar responses to nouns were more alike in meaning than those to verbs.

Response Times and Omissions Analyses. The analyses of reaction times and omissions centered around two main questions. First, is it easier to associate to some types of words than to others? Second, is it more difficult to associate between languages than within languages? To answer these questions, RTs and omission data of the *first* session were analyzed. Responses measured in the first session were deemed a purer measure of word association performance, and provided a better comparison with earlier word association studies, than would responses in any of the subsequent sessions.

For each participant in the DD, EE, DE, and ED conditions, and separately so for the nouns and verbs, mean RTs were calculated for the four word types. Furthermore, mean RTs for all stimuli (nouns and verbs) within each of the four association conditions, collapsed across participants, were calculated. False registrations due to voice switch registration errors and voice catches were excluded in calculating the means. In addition, for each stimulus word an omission score was calculated, which was the number of times participants did not come up with an association within 8 seconds after stimulus onset.

A set of 2 (stimulus language) by 2 (response language) by 2 (grammatical class) by 2 (concreteness) by 2 (cognate status) ANOVAs was performed, one on the mean participant RTs and one on the omission scores. In addition, the corresponding 2 x 2 x 2 x 2 x 2 ANOVAs were performed on the mean item RTs and omission scores.

Response times. Mean RTs are presented in Table 4.

The analyses of the RT data yielded a significant effect of concreteness, $F_1(1,76) = 273.92$, $p < .0001$ and $F_2(1,328) = 228.80$, $p < .0001$: coming up with an associate to concrete words took 681 ms less than to abstract words (1934 ms and 2615 ms, respectively). Participants were 286 ms faster in retrieving an associate to cognates than to noncognates (2131 ms and 2417 ms, respectively); $F_1(1,76) = 88.42$, $p < .0001$ and $F_2(1,328) = 38.73$, $p < .0001$. The effect of grammatical class was marginally significant on the analysis by participants (2252 ms and 2296 ms for the nouns and verbs, respectively), $F_1(1,76) = 3.05$, $.05 < p < .10$, and was not significant on the analysis by items. The main effect of stimulus language was significant on the analysis by items, $F_2(1,328) = 5.77$, $p < .05$, but not on the analysis by participants. The effect of response language was significant, $F_1(1,76) = 9.24$, $p < .01$ and $F_2(1,328) = 43.36$, $p < .0001$.

The latter two main effects were qualified by an interaction between stimulus language and response language, $F_1(1,76) = 9.87$, $p < .01$ and $F_2(1,328) = 52.09$, $p < .0001$; mean RTs in the DD, EE, DE, and ED conditions were 1917, 2325, 2521, and 2335, respectively see Table 4. Post-hoc analyses showed that participants were fastest in associating from their native language into the native language (in the participant analysis, only the differences between DD and each of the three remaining conditions were significant; in addition to these differences, DE also differed from ED and EE in the item analysis).[5] The

Table 4. *Mean reaction times (in milliseconds) of the associations to nouns and verbs, itemized for association conditions, concreteness, and cognate status. Data are from the first session. Standard errors are in parentheses*

	Cognates		Noncognates	
	Concrete	Abstract	Concrete	Abstract
	Nouns			
Dutch Dutch	1471 (56)	1983 (127)	1661 (94)	2397 (135)
Dutch English	1925 (96)	2848 (143)	2330 (115)	3052 (130)
English English	1813 (87)	2571 (136)	2070 (105)	2730 (153)
English Dutch	1742 (119)	2569 (150)	2063 (100)	2815 (151)
Mean	1738 (49)	2492 (77)	2031 (58)	2749 (75)
	Verbs			
Dutch Dutch	1541 (77)	2077 (106)	1591 (65)	2615 (165)
Dutch English	2054 (118)	2732 (166)	2224 (141)	3002 (146)
English English	1958 (77)	2467 (150)	2301 (146)	2687 (152)
English Dutch	1915 (99)	2438 (126)	2284 (146)	2852 (172)
Mean	1867 (51)	2428 (73)	2100 (72)	2789 (80)

[5] This result points to potentially interesting differences between within language processing and cross language processing, and between cross language processing from L1 to L2 and vice versa. An elaborate discussion of this issue is beyond the scope of the present paper however; see Kroll and De Groot (1997) for more details on differences in cross language processing in the two directions.

Table 5. *Mean omission scores (in percentages) of the associations to nouns and verbs, itemized for association conditions, concreteness, and cognate status. Data are from the first session. Standard errors are in parentheses*

	Cognates		Noncognates	
	Concrete	Abstract	Concrete	Abstract
	Nouns			
Dutch Dutch	0.3 (0.3)	6.3 (2.3)	1.3 (0.8)	9.3 (2.6)
Dutch English	0.0 (0.0)	5.0 (1.6)	1.0 (0.5)	9.3 (2.3)
English English	1.7 (0.7)	8.0 (2.6)	1.7 (0.7)	6.3 (2.3)
English Dutch	1.0 (0.7)	4.0 (1.6)	1.3 (0.8)	8.3 (2.3)
Mean	0.8 (0.3)	5.8 (1.0)	1.3 (0.3)	8.3 (1.2)
	Verbs			
Dutch Dutch	0.7 (0.7)	3.8 (1.6)	0.0 (0.0)	8.6 (3.0)
Dutch English	2.2 (1.2)	5.0 (2.1)	1.2 (0.9)	10.7 (4.3)
English English	5.0 (2.6)	11.2 (3.6)	7.5 (2.9)	10.0 (2.9)
English Dutch	2.2 (1.6)	5.6 (2.3)	3.8 (2.0)	8.6 (2.8)
Mean	2.5 (0.8)	6.4 (1.3)	3.1 (1.0)	9.5 (1.6)

three-way interaction between stimulus language, grammatical class, and concreteness reached significance on the analysis by participants, $F_1(1,76) = 6.18$, $p < .05$, but not on the analysis by items. The three-way interaction between response language, concreteness, and cognate status was also significant on the analysis by participants, $F_1(1,76) = 4.20$, $p < .05$, but not on the analysis by items. None of the remaining interactions reached significance.

In brief, as in the similarity analyses, word-type effects were observed in the speed of associative responses. Across all four association conditions, retrieving an associate was faster to concrete words than to abstract words, to cognates than to noncognates, and it was marginally faster to nouns than to verbs in the participant analysis. Furthermore, participants who associated in Dutch to a Dutch stimulus word (the DD condition) were faster than participants in any of the other conditions; this result corroborates the findings of Gekoski (1980).

Omissions. Mean omission data are presented in Table 5.

The effect of concreteness was significant, $F_1(1,76) = 45.02$, $p < .0001$ and $F_2(1,328) = 82.81$, $p < .0001$: fewer omissions occurred on concrete words (1.9 per cent) than on abstract words (7.5 per cent). Likewise, participants less often failed in retrieving an associate on cognates than on noncognates, 3.9 per cent and 5.6 per cent, respectively, $F_1(1,76) = 8.68$, $p < .01$ and $F_2(1,328) = 7.60$, $p < .01$. They remained silent somewhat less often on nouns than on verbs, 4.1 per cent and 5.4 per cent, respectively, $F_1(1,76) = 3.63$, $.05 < p < .10$ and $F_2(1,328) = 4.57$, $p < .05$. The effect of stimulus language was significant on the item analysis, $F_2(1,328) = 4.74$, $p < .05$, but not on the participant analysis. Likewise, the effect of response language reached significance on the item analysis, $F_2(1,328) = 4.46$, $p < .05$, but not on the participant analysis.

Grammatical class interacted with stimulus language, $F_1(1,76) = 4.03$, $p < .05$ and $F_2(1,328) = 5.04$, $p < .05$; post hoc analyses revealed that participants remained silent relatively often on the English verbs. None of the remaining interactions reached significance.

In brief, the pattern of results of the omission analyses substantiates that of the RT analyses (and both analyses reveal a pattern similar to that obtained in the similarity analyses). Participants remained silent less often on concrete words than on abstract words, and fewer omissions were observed on cognates than on noncognates. Likewise, somewhat fewer omissions were observed for the nouns than for the verbs.

An interesting aspect of the omission and response times analyses concerns the influence of cognate status on within-language association performance, particularly in the native language. When participants associated in their native language on a stimulus presented in their native language, they were 302 ms and 294 ms faster in finding an associate to cognates than to noncognates in the case of nouns and verbs, respectively. Likewise, fewer omissions occurred on cognates compared with noncognates. Importantly, at this stage of the experiment (i.e., first session), participants presumably were not aware of the fact that they were participating in a bilingual experiment. That is, they were only presented with Dutch stimulus materials, they did not know they were being tested as bilinguals, and no mention had been made of the between-language association task in the second session (in which they had to associate in English). Furthermore, when participants were recruited for this experiment (via sign-up lists), no reference had been made to their bilingualism. Hence, neither the experimental task nor the conditions in the laboratory required explicit activation of their second language, yet cognates were responded to faster than noncognates. This suggests that when processing in the mother tongue, the second language remains nonetheless active. Moreover, at least in word association, this activation of the second language lexicon facilitates native language performance.

Recently, we replicated this advantage of cognates

over noncognates in associating in the native language, using a different group of bilinguals (in fact, trilinguals) and another set of stimuli. Moreover, we also obtained a facilitative effect of cognates in lexical decision in the native language (Van Hell, 1998b). The finding that performance in one language is affected by knowledge of another language is not an isolated effect and has been found, for example, in studies using interlexical homographs (e.g., Beauvillain & Grainger, 1987; Dijkstra, Van Jaarsveld & Ten Brinke, 1998; but see Grosjean, 1998), in studies manipulating the number of interlexical orthographic neighbors (e.g., Grainger & Dijkstra, 1992), as well as in Stroop interference paradigms (e.g., Chen & Ho, 1986). Furthermore, in natural discourse of bilingual speakers in one language, intrusions from the other language sometimes occur (e.g., Grosjean, 1995). Interestingly, these code-switches are more likely to occur after processing a cognate than after processing a noncognate (Clyne, 1980).

General discussion

The aim of this study was to gain insight into the organization of conceptual memory of bilinguals by comparing within- and between-language associations. We hypothesized that conceptual representations in bilingual memory are different for concrete versus abstract words, for cognates versus noncognates, and for verbs versus nouns, as would be demonstrated by different association patterns for these different types of words. Such differences were indeed obtained. It was found that the within- and between-language associative responses on concrete words were more often translations than those on abstract words. Cognates more often evoked equivalent responses than noncognates, and responses to nouns were similar more often than those to verbs. Moreover, concrete cognate nouns elicited relatively many similar within- and between-language associative responses. The observed effects were highly consistent, and were further bolstered by the semantic relatedness ratings on the dissimilar within- and between-language responses. The effects of concreteness, cognate status, and grammatical class obtained in the similarity analyses were corroborated by the RT and omission data. In all four within- and between-language association conditions, longer association times and more omissions were observed with abstract than with concrete words, with noncognates than with cognates, and with verbs than with nouns.

The pattern of associative responses obtained in this study replicates and extends the results of earlier bilingual word association studies (Kolers, 1963; Taylor, 1976). One of the new aspects of our study was the inclusion of a base-line consistency measure for repeated within-language associations. As Kolers (1963) we found that the overall similarity of within- and between-language responses on nouns was 31 per cent (and 28 per cent on verbs), a finding that prompted Kolers to conclude that the meanings of words in the two languages of a bilingual are represented in two separate stores. This result, however, was qualified by our finding that when bilinguals perform the within-language association task twice, also a relatively small percentage of the associations were repeated, namely 45 per cent, 41 per cent, 39 per cent, and 33 per cent on the Dutch nouns and verbs, and English nouns and verbs, respectively. So, even when meanings are retrieved from one and the same memory store, which is supposedly the case in the within-language association task, responses are more often not repeated than repeated. Hence, Kolers' (1963) conclusion has been too strong: conceptual representations in bilingual memory are not purely language-specific.

However, our data indicate that these conceptual representations are not purely shared either. Overall analyses revealed that the degree of similarity of within- and between-language associations is lower than that of repeated within-language associations (see Table 2). More importantly, the word-type effects we obtained suggest that conceptual representations in bilingual memory are different for concrete versus abstract words, for cognates versus noncognates, and for nouns versus verbs. We will explain these results in terms of two different views on the representation of word meanings in (bilingual) memory, one assuming local conceptual representations and the other assuming distributed conceptual representations. But first we will raise a critical note concerning the role of conceptual memory in between-language word association.

As discussed in the introduction, the word association task is assumed to involve conceptual memory. It might be argued, however, that the bilingual version of this task not only reflects conceptual processing, but lexical processing as well. In retrieving an associate in the other language, bilinguals may first associate within-language to the stimulus word and then translate the retrieved association, or they may first translate the stimulus and then associate to the translation. Under the assumption that translation occurs entirely at the lexical level in memory, between-language association thus at least partly involves lexical processing. However, the assumption that translation is an entirely lexical process is at variance with many findings in the word

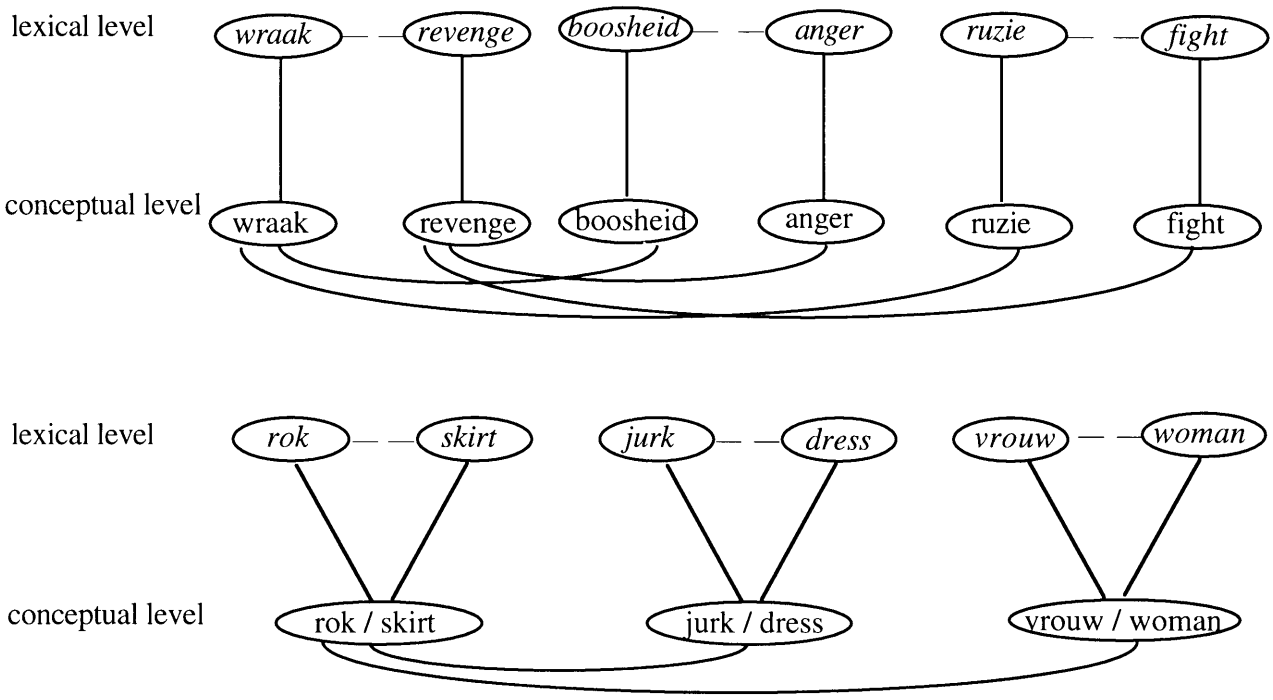

Figure 1. Local representations of related abstract noncognate translation pairs (upper part) and related concrete noncognate translation pairs (lower part).

translation literature (e.g., De Groot et al., 1994; La Heij, Hooglander, Kerling & Van der Velden, 1996; Potter, So, Von Eckardt & Feldman, 1984). These studies all converge on the conclusion that word translation involves conceptual processing, and particularly so in quite proficient bilinguals (such as our bilinguals). So, switching towards the other language (either before or after retrieving an associate) does not preclude the activation of meaning.

We will briefly outline how the localist view could explain the main results of our study, and will elaborate in more detail on the distributed view. Theories assuming local representations typically distinguish two representational systems in memory: a word's form is represented in a single node at the lexical level, and its meaning is represented in a single node at the conceptual level. (See, e.g., Collins & Loftus, 1975; Potter et al., 1984, for monolingual and bilingual memory representation, respectively). Upon activation of a node, activation spreads via links to connected nodes in the network. In bilingual memory, illustrated in Figure 1, the meanings of the two words in a translation pair are assumed to share a conceptual representation (that is, are connected to conceptual representations of associatively related words; see bottom part of figure), or they are represented in language-specific conceptual nodes (each being only connected to conceptual nodes of associatively related words in the same language; see top part of figure).

The localist view can explain the effects obtained in our study by assuming that the effects of word type reflect how many members of a particular group of words share a conceptual representation between languages: word types of which many members share a conceptual representation between languages (i.e., concrete noncognate nouns such as "rok skirt") will give rise to high degrees of within- and between-language associative similarity, whereas word types of which few members share a conceptual representation between languages will result in low degrees of within- and between-language associative similarity (e.g., abstract noncognate nouns such as "wraak revenge"). In a similar vein, the RT data can be explained by assuming that more links must be traversed in retrieving an associate to translations with language-specific conceptual representations than to translations with a shared conceptual node (most notably so in between-language association see Figure 1), bringing about longer association times in the former case than in the latter. In addition, assuming that activation decreases over links (see, e.g., Collins & Loftus, 1975), the number of omissions will increase with the distance between the critical nodes in the network. Indeed, as translations are more likely to share a conceptual node (as

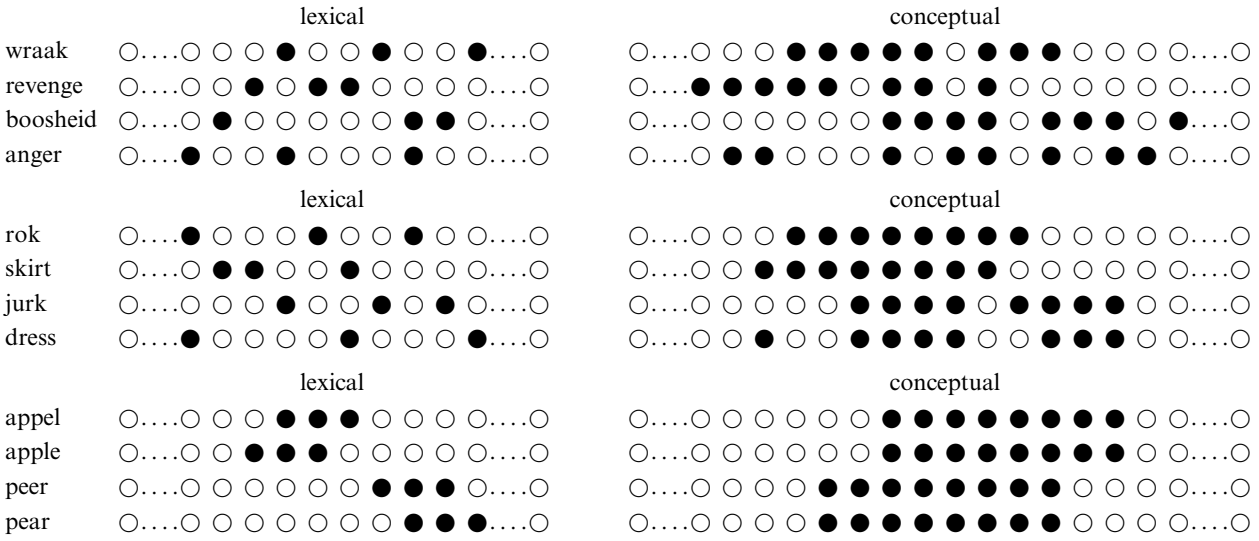

Figure 2. Distributed representations of two related abstract noncognate translation pairs (upper part), two related concrete noncognate translation pairs (middle part), and two related concrete cognate translation pairs (lower part). Units are interconnected within and between subsets.

suggested by the similarity data), association times and the number of omissions were found to decrease.

A different account which we will discuss in more detail is provided by theories based on distributed representations (e.g., Hinton et al., 1986; Kawamoto, 1993; Masson, 1991; Van Orden, Pennington & Stone, 1990). In general, these models assume that a word is not represented by a single node, but as a pattern of activation across an entire network of interconnected units or features. One unit can be involved in the representation of different words. Knowledge is encoded by the weights on connections between units. In Figure 2 some examples of distributed representations are presented, in which the orthography/phonology and the meaning of a word correspond to a pattern of activation across the lexical and conceptual units, respectively.[6] Different patterns of activation denote different words. Typically, distributed memory models assume that units are completely interconnected, hence, they assume full connectivity within each subset of units (here: lexical units and conceptual units) as well as between different subsets of units (see, e.g., Kawamoto, 1993). A key property of distributed memory models is that when a fragment of a (previously learned) activation pattern is presented, the activation in the network gradually changes (via recurrent connections between the units) until the whole pattern is reproduced and the system has reached a stable state (i.e., reached the minimum of a basin of attraction). So, presentation of a word (e.g., "skirt") activates the corresponding pattern of lexical units, after which the entire pattern of activation of this word, including the conceptual units, is re-created (indicating that the pattern is "recognized").

Important for our present purpose is the notion that activation patterns of different words can partially overlap (see Figure 2). Words related in meaning (e.g., "skirt" and "dress") are assumed to share conceptual features. Similarly, words related in spelling and/or pronunciation (e.g., homophones such as "dear" and "deer") can share orthographic and/or phonological features. The overlap in activation patterns of words is not restricted to the native language memory system, but may extend to that of the second language. For example, to the extent that translation pairs have similar meanings, the conceptual features of a word and its translation may (partially) overlap. When the system proceeds from one state to another, it will most likely be attracted to the activation pattern that has most overlap with the initial pattern. As activation patterns share more features (hence, the lexical distance between the patterns is smaller), this movement from one pattern to another will take less time, and will be more often successful (for more details, see, e.g., the simulation studies of Kawamoto, 1993; Masson, 1991).

[6] Some models based on distributed memory representation do not specify the precise information entailed by each of the lexical (i.e., phonological and orthographic) or conceptual features (e.g., Kawamoto, 1993; Masson, 1991), whereas in other models each feature is assigned to capture a specific piece of information. For example, in some models a set of labeled conceptual features (e.g., "has legs", "pleasant", "container") is employed, denoting empirically derived (McRae, De Sa, & Seidenberg, 1997) or intuitive (Plaut & Shallice, 1993) semantic distinctions.

Within this theoretical framework, how may word association come about? Presentation of the stimulus word (e.g., "skirt") activates lexical features, after which the entire activation pattern (entailing lexical and conceptual features) is re-created. Activation in memory then moves further towards partially overlapping patterns, representing related words (e.g., its translation "rok", the semantically related word "dress", and the latter's translation "jurk" see Figure 2). These related words are all potential associative responses, though, in this experiment, participants were instructed not to give the translation of a word as associative response (see Method, above). The more features an activation pattern of a word shares with that of the stimulus, the more likely it is that this word will be the ultimate associative response given by the participant (conceptual features conceivably play a stronger role in determining the response than do lexical features, as adults' word associations are typically related in meaning to the stimulus). Furthermore, the more the activation pattern of the stimulus resembles that of the (potential) associative response, the less time will be needed to move towards this pattern (bringing about shorter latencies), and the more frequently the association process will be successful within a particular amount of time (bringing about fewer omissions; see, e.g., Sharkey & Sharkey (1992) for a more detailed explanation of effects of lexical distance between related words).

The word-type effects obtained in the present study may stem from differences in overlap of conceptual features. (In the introduction we discussed why such differences may exist.) This is depicted in Figure 2, in which activation patterns of abstract words share fewer conceptual elements with semantically related words and with the latter's translations than those of concrete words. As a result, with abstract words such as "revenge" chances are higher that in within-language association the system is attracted towards a pattern that is different from that of between-language association. In addition, more time will be needed to move from the activated pattern of an abstract stimulus word towards that of an associative response, and chances are higher that no such pattern will be reached eventually. On the other hand, because a concrete word such as "skirt" shares many elements with the related word "dress" and the latter's translation "jurk", it is fairly likely that both these words will be produced as within- and between-language associations, respectively. Due to the close resemblance in activation patterns, the speed and success with which these associations are produced will be relatively high.[7] Likewise, if activation patterns of concrete words share more conceptual units with semantically related words in the same language than the patterns of abstract words do, chances are higher that when the within-language association task is repeated, the system will move towards the same pattern as before. Indeed, we observed a higher number of repeated within-language associations for concrete than for abstract words.[8] This notion may also imply that if the system is attracted towards a different pattern upon repetition of the association task (now in the other language), the activation patterns of dissimilar associations will share fewer conceptual features in the case of abstract stimulus words than with concrete words. We indeed observed that the semantic relatedness ratings of the dissimilar within- and between-language associations for abstract words were less similar in meaning than those for concrete words.

Differences obtained between cognates and noncognates and between nouns and verbs may originate from similar differences in conceptual overlap: cognates may share more conceptual units than noncognates, and nouns may share more conceptual units than verbs.[9] Moreover, we observed that concrete

[7] One could argue that if concrete words share more conceptual features with semantically related words and with their translations than abstract words do, the former may lead to *less* consistent associations: words with many closely related concepts may generate less consistent associations due to competition among potential associates. Previous word association studies contradict this view (e.g., De Groot, 1989; Taylor, 1976). De Groot (1989) found that concrete words elicited a greater number of associations in a continued association task than did abstract words. In a recent study, these results were replicated, and extended to continued word association in the second language in bilinguals (Van Hell, 1998a). Because of the higher number of associations, the alleged competition among potential associates should be higher for concrete than for abstract words. Nevertheless, the present study showed that the former evoked more consistent (and faster) responses. Hence, the lexical distance from a word to a potential associate appears to determine the consistency of associations above and beyond a role that the competition among potential associates may play.

[8] This proposal implicitly assumes that associative responses to words with a high (low) overlap of conceptual features, such as concrete (abstract) translation pairs, evoke associative responses with a relatively high (low) overlap of conceptual features. To see whether our data fit these assumptions, we looked in more detail at the nature of the associations produced to nouns. For each association condition (i.e., DD, EE, DE, and ED), we combined the associations given in the first and second session, and, for each of the 60 nouns, took the most frequently produced association. It appeared that, across all four conditions, *all* associations to concrete nouns were concrete themselves. Furthermore, of the associations to abstract nouns, 70 per cent, 72 per cent, 57 per cent, and 69 per cent were abstract themselves in the DD, EE, DE, and ED conditions, respectively.

[9] Relatively few studies on bilingual memory have studied effects of grammatical class, and more research is needed to test this notion.

cognate nouns such as "appel apple" evoked a particularly high degree of similar within- and between-language associations. Within the framework of distributed memory representations, this is to be expected due to the joint effects of concreteness, cognate status, and grammatical class: conceptual features of concrete cognate noun translations overlap more than either concrete, cognate, or noun translations alone. In fact, the activation patterns of the two words in a concrete cognate noun translation pair may be nearly identical due to the high overlap in conceptual, as well as orthographic and phonological elements (see lower part of Figure 2). This near identity of activation patterns conceivably benefits concrete cognate noun translations such as "appel apple" over and above the summed effect of being concrete, cognate, and noun.

Finally, the finding of shorter association times and fewer omissions for cognates than for noncognates in the within-language association task fits within the above framework. One asset of this framework is that it allows for high interaction between the two language systems. Conceivably, of the patterns sharing features with the pattern of the stimulus word, the pattern of its translation overlaps most, and this will be the pattern to which the system is first attracted after stimulus recognition.[10] Because cognate translation pairs such as "appel apple" share more features than those of noncognates such as "rok skirt" (see Figure 2), a cognate translation will become activated sooner than a noncognate translation. Because of the earlier convergence of activation of an L1 cognate and its L2 translation, the ultimate associative response will be reached earlier for cognates than for noncognates, resulting in shorter association times and fewer omissions for cognates than for noncognates.

In brief, explanations based on local and distributed memory representations can both explain the data of this study. One merit of an account based on distributed memory representations is that we no longer need a notion of bilingual memory comprising qualitatively different representations, depending on word-type. Word-type effects in bilingual, and, for that matter, in monolingual processing may stem from differences in the amount of conceptual, and/or orthographic, and/or phonological features shared. As such, the distributed memory view is more parsimonious than views based on local representations (see Van Hell, 1998a, for a discussion on how the above attractor model may describe other findings in the bilingual literature).

In conclusion, the present study revealed different patterns of association performance for concrete vs. abstract words, for cognates vs. noncognates, and for nouns vs. verbs. The framework of distributed memory representation seems to provide a parsimonious account of these results by attributing these differences to one and the same underlying cause: effects of word type and word class originate from differences in the amount of conceptual features shared between languages.

[10] This is supported by translation data we recently collected for the 60 nouns of the present study: translation times for the four groups of nouns were shorter than the corresponding association times (see Table 4). Mean forward translation times (from L1 to L2) for the concrete and abstract cognates, and concrete and abstract noncognates were 864 ms, 996 ms, 1030 ms, and 1523 ms, respectively. Mean backward translation times were, in the above order, 844 ms, 993 ms, 1032 ms, and 1354 ms.

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Appendix A: Critical Stimuli of the Experiment

Abstract nouns

Noncognates		Cognates	
Dutch	English	Dutch	English
plicht	duty	inzicht	insight
gelegenheid	opportunity	schaamte	shame
gunst	favour	plan	plan
poging	attempt	motief	motive
voordeel	advantage	kwaliteit	quality
gemak	ease	hel	hell
wraak	revenge	blok	block
waarheid	truth	methode	method
geweten	conscience	kans	chance
oorzaak	cause	principe	principle
geheugen	memory	informatie	information
eis	demand	metaal	metal
zorg	care	cirkel	circle
geloof	faith	paniek	panic
bezit	property	figuur	figure

Concrete nouns

Noncognates		Cognates	
Dutch	English	Dutch	English
winkel	shop	schouder	shoulder
spiegel	mirror	seizoen	season
geweer	gun	vinger	finger
aardappel	potato	kapitein	captain
mes	knife	dochter	daughter
fles	bottle	peper	pepper
rok	skirt	slaaf	slave
bloem	flower	appel	apple
boom	tree	sneeuw	snow
ziekenhuis	hospital	winter	winter
broek	trousers	koffie	coffee
boerderij	farm	roos	rose
vogel	bird	politie	police
fiets	bike	trein	train
gevangenis	jail	dokter	doctor

Abstract verbs

Noncognates		Cognates	
Dutch	English	Dutch	English
weigeren	refuse	vergeten	forget
toegeven	admit	buigen	bend
storen	disturb	durven	dare
slagen	succeed	arresteren	arrest
raden	guess	haten	hate
beloven	promise	hopen	hope
begrijpen	understand	spreiden	spread
		irriteren	irritate

Concrete verbs

Noncognates		Cognates	
Dutch	English	Dutch	English
beven	tremble	niezen	sneeze
bewegen	move	klimmen	climb
dopen	baptize	fronsen	frown
gooien	throw	zwemmen	swim
rekenen	calculate	luisteren	listen
trouwen	marry	stelen	steal
huilen	cry	zingen	sing
schilderen	paint		

Appendix B: Mean Values (and Standard Deviations) of the Properties of the Critical Stimuli

	Cognates		Noncognates	
	Concrete	Abstract	Concrete	Abstract
	Nouns			
Word property				
Concreteness D	6.09 (.63)	3.44 (1.44)	6.44 (.26)	2.46 (.49)
Concreteness E	6.43 (.49)	3.95 (1.42)	6.58 (.47)	2.92 (.39)
Cognate Status	5.89 (.52)	5.89 (.73)	1.23 (.08)	1.23 (.09)
Log Frequency D	3.43 (.35)	3.38 (.36)	3.39 (.21)	3.40 (.27)
Log Frequency E	3.50 (.34)	3.53 (.34)	3.39 (.36)	3.56 (.42)
Length D	6.07 (1.16)	6.27 (1.98)	6.07 (2.40)	6.27 (1.98)
Length E	5.87 (1.19)	6.13 (1.85)	5.27 (1.39)	6.60 (2.35)
	Verbs			
Concreteness D	6.29 (.41)	4.23 (.89)	6.26 (.41)	4.01 (.60)
Cognate Status	4.58 (.61)	5.04 (1.02)	1.56 (.39)	1.62 (.49)
Log Frequency D	3.18 (.58)	3.34 (.39)	3.43 (.37)	3.48 (.40)
Log Frequency E	3.21 (.58)	3.46 (.35)	3.41 (.62)	3.57 (.26)
Length D	6.86 (1.07)	7.12 (1.89)	6.62 (1.60)	7.00 (1.41)
Length E	5.00 (.82)	5.25 (1.49)	5.62 (1.92)	6.71 (1.70)

Note: D Dutch. E English. Concreteness ratings in English for the verbs are not available (see text for further details).

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Producing words in a foreign language: Can speakers prevent interference from their first language?*

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Two picture word interference experiments were conducted to investigate whether or not words from a first and more dominant language are activated during lexical access in a foreign and less dominant language. Native speakers of Dutch were instructed to name pictures in their foreign language English. Our experiments show that the Dutch name of a picture is activated during initial stages of the process of lexical in English as a foreign language. We conclude that bilingual speakers cannot suppress activation from their first language while naming pictures in a foreign language. The implications for bilingual speech production theories are discussed.

It is a well-known fact that people can produce words in their first and more dominant language at a faster rate than in a foreign language.[1] Picture naming studies have shown that the production of a word in a foreign language requires considerably more time than in a first language (e.g., Chen & Leung, 1989; Kroll & Curley, 1988; Potter, So, von Eckardt, & Feldman, 1984). However, it is still unclear why a speaker needs more time to retrieve words in a foreign language. Is it more difficult to produce words in a foreign language merely because we do not use them on a daily basis? Or do we need more time because there is interference from the first language? In this study we will focus on the second question. We will report two picture-word interference experiments in which we investigated whether or not words from the first language Dutch are activated during lexical access in English as a foreign language, in an experimental setting in which participants are discouraged from accessing lexical representations in their first language Dutch.

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[1] From now on, we will also use the phrase "the first language" when we actually mean "the first and more dominant language", and the phrase "the foreign language" when we mean "the foreign and less dominant language". Thus, in this study the first language Dutch is always more dominant than the foreign language English.

By studying the involvement of the first language during lexical access in a foreign language, we address one of the most remarkable abilities of bilinguals. During the production of speech, bilinguals are able to produce words only in the language in which they intend to express their thoughts. Some bilingual speech production models account for this ability by assuming that elements (rules and representations) that belong to a language system form a subset which can be activated or deactivated in its entirety (e.g., De Bot & Schreuder, 1993; Green, 1986, 1993, 1998; but see also Poulisse & Bongaerts, 1994). Green (1986, 1993), for instance, proposes that an external control device called "the Specifier" regulates the activation level of lexical representations in each of a bilingual's languages. When a language is chosen for production, the activation level of lexical representations in that language is increased, while the activation level of lexical representations in a bilingual's other languages is decreased. We will further discuss these bilingual speech production models in relation to our results in the general discussion.

In this study we investigate whether interference from a first and more dominant language occurs during the process of lexical access in a foreign language. During the process of lexical access, conceptual structures are mapped onto lexical representations. Most speech production theories assume that the process of lexical access comprises two steps:

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lemma selection and phonological encoding (e.g., Butterworth, 1989; Dell, 1986; Garrett, 1988; Kempen & Huybers, 1983; Levelt, 1989, 1992; Levelt, Roelofs & Meyer, in press). During the lemma selection process, semantically and syntactically appropriate lexical items are selected from the mental lexicon. The phonological word forms are accessed during the stage of lexeme retrieval, which is part of the process of phonological encoding. Phonological encoding also involves subsequent computations on these word forms that are necessary for the production of words in connected speech (see Levelt & Wheeldon, 1994). Although most speech production theories agree upon the existence of the lemma selection and lexeme retrieval processes, there still is much debate about the relationship between lemma selection and lexeme retrieval (Dell, 1986; Dell & O'Seaghdha, 1991, 1992; Levelt, 1989; Levelt et al., in press; Schriefers, Meyer & Levelt, 1990). Discrete two-stage models of lexical access hold the view that the process of lemma selection strictly precedes the process of lexeme retrieval, without feedback (Levelt, 1989; Levelt et al., in press; Levelt et al., 1991; Schriefers et al., 1990; Van Turennout, Hagoort, & Brown, 1997). In contrast, interactive models of lexical access assume that the process of lexeme retrieval starts before the lemma selection process has been completed, and that the lexeme retrieval process can affect the lemma selection process (Dell, 1986; Dell & O'Seaghdha, 1992; Harley, 1993; O'Seaghdha & Marin, 1997). The primary aim of this study is to investigate whether lexical representations from a first language are activated during lexical access in a foreign language, and not whether lexical access proceeds in discrete non-interactive stages or in temporally overlapping and interactive stages. To simplify matters, we will initially present and discuss our experiments within a discrete two-stage model of lexical access. However, we will discuss our results within alternative models of lexical access in the general discussion.

To investigate whether or not words from a first language are activated during lexical access in a foreign language, we conducted two picture-word interference experiments. In picture-word interference tasks, participants are instructed to name pictures that are presented on a computer screen, usually with a prespecified name in a given language. Participants are instructed to *name* the pictures as quickly and accurately as possible, and to *ignore* a visually or auditorily presented interfering stimulus (IS). This IS may be phonologically (*doll*) or semantically (*cat*) related to the name of the picture (*dog*), or there may be no relationship at all (*bed*). Naming latencies for pictures accompanied by related ISs are compared to naming latencies for pictures accompanied by unrelated ISs.

Semantically related ISs are assumed to affect only the lemma selection part of the naming response preparation (e.g., Levelt et al., 1991; Roelofs, 1992; Schriefers et al., 1990, but see also Starreveld & La Heij, 1995, 1996). The presentation of a semantically related IS has been found to slow down the initiation of the naming response relative to the presentation of an unrelated IS. Semantic interference effects of auditory ISs are only observed when the auditory ISs are presented prior to the presentation of the pictures (e.g., Schriefers et al., 1990). For a detailed account of how a semantically related IS may slow down the initiation of the naming response in picture-word interference tasks, see Roelofs (1992).

The presentation of a phonologically related IS has been found to speed up the initiation of the naming response relative to an unrelated IS. Phonological facilitation effects of auditory ISs are usually only observed when the auditory IS is presented simultaneously with or shortly after the presentation of the picture (e.g., Schriefers et al., 1990). Until recently, phonologically related ISs were assumed to facilitate the lexeme retrieval process only (e.g., Lupker & Katz, 1981; Lupker & Williams, 1989; Meyer & Schriefers, 1991; Schriefers et al., 1990; Starreveld & La Heij, 1995, 1996). However, that assumption has now been challenged by Jescheniak and Schriefers (submitted), who claim that a phonologically related IS cannot only facilitate the lexeme retrieval process, but the lemma selection process as well.

In a recent study (Hermans, Bongaerts, De Bot & Schreuder, submitted) we obtained evidence which supports the claim that phonologically related ISs can facilitate the lemma selection process. In three picture-word interference experiments we tracked the time-course of identical facilitation, phonological facilitation, and semantic interference in the first and more dominant language Dutch and in English as a foreign and less dominant language. In one experiment, native speakers of Dutch were instructed to name pictures in their foreign language English. Pictures of objects, for example, *plate*, were accompanied by identical ISs, by phonologically related ISs such as *place*, by semantically related ISs such as *dish*, or by unrelated ISs such as *chest*. The time interval between the onset of the auditory IS and the presentation of the picture, the stimulus onset asynchrony (SOA), was varied. The onset of the auditory IS preceded the presentation of the picture by 300 ms (SOA −300 ms), by 150 ms (SOA −150 ms), coincided with the presentation of the picture (SOA 0 ms), or followed the presentation of the picture by

150 ms (SOA +150 ms). We found that identical ISs facilitated the initiation of the naming response at every SOA, and that semantically related ISs slowed down the initiation of the naming response at SOA's −300, −150, and 0 ms. More importantly, phonological facilitation was observed at every SOA. Thus, we did not only observe phonological facilitation at late SOAs, but at early SOAs as well.

In a further experiment, we replicated these results with third-year students of English, whose lexical proficiency in English as a foreign language was significantly higher than those of the participants in the previous experiment. We claimed that the early phonological facilitation effects in English as a foreign language can only be accounted for within a discrete two-stage model of lexical access if we assume that phonologically related ISs facilitate the lemma selection process of the English name of the picture at early SOAs. Like Jescheniak and Schriefers (submitted), we proposed that an IS such as *place* does not only activate the lexeme and the lemma of *place*, but also the lexeme and the lemma of the phonological competitor *plate*. A phonologically related IS such as *place* can therefore facilitate both the lemma selection and lexeme retrieval parts of the naming response preparation of a picture of a *plate*. Additionally, we proposed two possible explanations why phonologically related ISs facilitate the lemma selection process in English as a foreign language (and not in the first and more dominant language Dutch).

First, we argued that a phonologically related IS facilitates the lemma selection process in English as a foreign language because the frequencies of English lemmas are, for native speakers of Dutch, generally low in comparison with the frequencies of Dutch lemmas. We suggested that a phonologically related IS facilitates the lemma selection process when the to-be-selected lemma has a low frequency, and is, therefore, difficult to select. A phonologically related IS may reduce this difficulty by activating the to-be-selected lemma.

An alternative interpretation is that a phonologically related IS facilitates the lemma selection process in a foreign language because it helps to overcome the selection bias for the more frequent semantically close not-to-be-selected translation equivalent from the first and more dominant language. This interpretation presupposes that lemmas from the first language and the foreign language are both activated during the lemma selection process in a foreign language. Thus, for native speakers of Dutch, the Dutch lemma *bord* (plate) and the English lemma *plate* are both activated when naming a picture of a *plate* in the foreign language English. Because the Dutch lemma *bord* has a high frequency in comparison with the English lemma *plate*, the Dutch lemma will start out with a higher activation level than the English lemma. A phonologically related English IS may facilitate the lemma selection process of the English name of a picture because it helps to overcome the higher activation level for the Dutch name of the picture (see Jescheniak & Schriefers (submitted) for a similar interpretation of early phonological facilitation in picture-word interference tasks). Thus, early phonological facilitation in a foreign language may reflect the activation of the more frequent not-to-be-selected semantically close lemma from the first and more dominant language.

Therefore, in the present study we investigated in two picture-word interference experiments whether, for native speakers of Dutch, the Dutch name of a picture is activated during the process of lexical access in the foreign language English. Thus we are interested in finding out whether the not-to-be-selected Dutch lemma *berg* (mountain) is activated during the lemma selection process of its English translation equivalent *mountain*, just as semantically related English lemmas such as *valley* are (Hermans et al., submitted).

We also investigated whether the Dutch name of a picture is activated during the lexeme retrieval process in English as a foreign language. Recent evidence suggests that in cases of strong competition during the lemma selection process, as is the case during the production of a word which has a near-synonym, both the to-be-selected lemma and its not-to-be-selected near-synonym are phonologically encoded (Jescheniak & Schriefers, 1997, submitted; Peterson & Savoy, 1998). Translation equivalents can be viewed as near-synonyms that belong to different languages: translation equivalents are semantically at least as closely related as near-synonyms. If the competition between the to-be-selected English lemma and the not-to-be-selected Dutch translation equivalent is as strong as the competition between near-synonyms, both lemmas may be phonologically encoded during picture naming in English as a foreign language.

To investigate whether there is interference from the first and more dominant language Dutch during the lemma selection and lexeme retrieval parts of the naming response preparation in English as a foreign language, pictures of, for example, a *mountain,* were paired with English ISs such as *bench* (Experiment 1) and with Dutch ISs such as *berm* (Experiment 2), which are phonologically related to the Dutch name of the picture (*berg* (mountain)). Like Jescheniak and Schriefers, we assumed that ISs such as *bench* and *berm* (from now on also referred to as Phono-Dutch

Table 1. *Example of the experimental conditions in Experiments 1 and 2 (participants are instructed to produce the L2 name "mountain" in response to a picture of a mountain)*

Condition	Experiment 1: English (L2) ISs	Experiment 2: Dutch (L1) ISs
Phonological	mouth	mouw (sleeve)
Phono Dutch	bench	berm (verge)
Semantic	valley	dal (valley)
Unrelated	present	kaars (candle)

ISs) do not only activate the lexemes and the lemmas of, respectively, *bench* and *berm*, but also the lexeme and the lemma of the phonological competitor *berg* (mountain). We therefore assumed that Phono-Dutch ISs can interfere with both the lemma selection and lexeme retrieval parts of the naming response preparation. Phono-Dutch ISs such as *bench* and *berm* may interfere with the lemma selection process by activating the not-to-be-selected Dutch lemma *berg,* which would make it harder to select the English lemma *mountain*. However, Phono-Dutch ISs may also interfere with the lexeme retrieval process. In the latter case, strong competition between the Dutch and the English lemma may result in the activation of both the Dutch lexeme *berg* and the English lexeme *mountain*. Additional activation of the not-to-be-produced Dutch lexeme makes it even harder to suppress it in order to produce the English name of the picture.

To determine at which level Phono-Dutch ISs interfere, pictures were also paired with semantically related ISs such as *valley*, phonologically related ISs such as *mouth*, and unrelated ISs such as *present*. The rationale is the following: if Phono-Dutch ISs slow down the initiation of the naming response at SOAs at which phonological facilitation but no semantic interference is observed, the interference from Phono-Dutch ISs is likely to be localized at the lexeme level. If a semantically related IS cannot interfere with the lemma selection process because participants are already at the phonological stage of the naming response preparation when the IS activates its semantic information, the interference from a Phono-Dutch IS can only be localized at the lexeme level. Similarly, if Phono-Dutch ISs interfere at SOAs at which semantic interference is observed, the interference is likely to be localized at the lemma level. Thus, our claim is that interference from Phono-Dutch ISs at SOAs at which semantic interference is also observed can be interpreted as interference at the lemma level, and that interference from Phono-Dutch ISs at SOAs at which no semantic interference is observed can be interpreted as interference at the lexeme level.

In sum, in Experiments 1 and 2 we investigated whether the Dutch name of a picture is activated during the lemma selection and lexeme retrieval processes of its English translation equivalent. In Experiment 1, native speakers of Dutch were instructed to name pictures in their foreign language English. Pictures were paired with auditorily presented English ISs which are phonologically related (*mouth*), semantically related (*valley*), or unrelated (*present*) to the English name of the picture (*mountain*), or by English ISs (*bench*) which are phonologically related to the Dutch name of the picture (*berg*). The ISs were tested at SOAs −300, −150, 0, and +150 ms. On the basis of the results obtained in the study described earlier (Hermans et al., submitted), we predicted semantic interference effects at SOAs −300, −150, and 0 ms, and phonological facilitation effects at every SOA. Furthermore, if the Dutch name of the picture is activated during the lemma selection process, we should observe interference from Phono-Dutch ISs at the same SOAs at which semantic interference is observed. Finally, if the Dutch name of the picture is not only activated during the lemma selection process, but is also phonologically encoded, we should observe interference from Phono-Dutch ISs at SOAs at which no semantic interference is observed.

Experiment 1

Method

Participants. Sixty-four undergraduates of the University of Nijmegen participated in Experiment 1. Their ages varied between eighteen and thirty years with a mean of twenty-three. All participants were native speakers of Dutch, and were paid for their participation. All participants had received at least five years of education in English as a foreign language at high school.

Materials. The target stimuli were twenty-four line drawings of common objects which were selected from the picture pool available at the Max Planck Institute for Psycholinguistics in Nijmegen. In addition, eight line drawings were selected from the same pool as practice items. An off-line study had shown that the intended name of the picture corresponded to the name which was spontaneously given most frequently to the picture.[2] For each of the line draw-

[2] In an off line study we had verified that the intended name of the picture corresponded to the name which was spontaneously

ings (e.g., of a mountain), four English words were selected to serve as ISs in the following test conditions: (1) Phono-Dutch (*bench*) (2) Phonological (*mouth*) (3) Semantic (*valley*) (4) Unrelated (*present*). ISs in the four test conditions were matched on number of letters, number of phonemes, number of syllables and log frequency per million as much as possible. Frequency counts were taken from the COBUILD written corpus using the CELEX database (Baayen, Piepenbrock & Van Rijn, 1993). The mean log lexeme frequencies in the Phono-Dutch, Phonological, Semantic, and Unrelated conditions were 1.3, 1.4, 1.4, 1.4 respectively, and the mean log lemma frequencies 1.4, 1.6, 1.6, and 1.5.

Care was taken that semantically related ISs were neither strongly associatively related to the name of the picture (for the need to control for the associative relationship of a semantically related IS and the name of the picture see La Heij, Dirkx & Kramer, 1990), nor phonologically related to the English or the Dutch name of the picture. The strength of the associative relationship between the semantically related ISs and the English names of the picture was relatively low: 0.03 (Kiss, Armstrong, Milroy & Piper, 1973).The materials are listed in Appendix A.

The English stimuli were spoken by a female native speaker of Dutch, who lived in England for many years and went to school there, and was designated as an excellent, native-like, speaker of English by various experts in English as a Foreign Language. The stimuli were digitally recorded in a sound studio at the Department of Language and Speech of the University of Nijmegen.

Design. The experimental design included one between-participant factor, SOA, with four levels: −300, −150, 0, and +150 ms, and one within-participant factor, Interfering Stimulus (IS), with four levels: Phono-Dutch, Phonological, Semantic, and Unrelated. SOA was varied between participants to keep the number of repetitions for each picture restricted to four. Each picture was presented four times to each participant, accompanied by four ISs which were presented auditorily. The twenty-four pictures were divided into four sets of six pictures each. The order in which ISs in the four test conditions were paired to the first, second, third and fourth presentation of the picture was different for each set of pictures. For example, pictures in the first set were first accompanied by an identical IS, then by a phonologically related IS, next by a semantically related IS, and finally by an unrelated IS. By counterbalancing the order of appearance of these conditions for the four sets, each condition appeared six times in combination with a first, second, third or fourth presentation of a set of pictures. Prime-target pairs were presented to the participants by means of lists in which the order of the items was fixed, with the restriction of a minimum of 10 trials between two presentations of the same picture. Half the participants at each SOA received a list in one order, the remaining participants in the reverse order.

Procedure. Participants were seated in front of a computer screen at a distance of about 60 cm. Stimulus presentation and recording of the naming latencies was computer controlled. Pictures, with a display size of approximately 90 mm * 90 mm, were presented in the center of a computer screen. The auditory stimuli were presented through a headphone. Naming latencies were measured from picture onset by a voicekey. The responses of the participants were digitally recorded.

Each participant was tested individually in a dimly illuminated room. The experiment consisted of three parts. In the first part of the experiment a booklet with thirty-two pictures was presented. Under each picture, the name of the picture was printed. Participants were instructed to use only these names to refer to the pictures. After participants had indicated that they had seen all drawings, they received another booklet with the same pictures, but now without the printed word, and were instructed to name these pictures. Next, a practice block was administered. Participants were allowed to ask questions after completing the practice block. Then, the experimental block was administered. A single trial looked as follows: an asterisk was presented as a fixation point for 500 ms at the position where the picture was to be presented with a delay of 500 ms. The picture was presented for 2000 ms. The onset of the auditory IS preceded the presentation of the picture by 300 ms (SOA = −300) or 150 ms (SOA = −150), coincided with the picture onset (SOA = 0) or followed the onset of the picture by 150 ms (SOA = +150). Time-out was set at 2000 ms. In addition, a pause of 1 second was inserted at the end of each trial. Each trial lasted 4 seconds.

In the second part of the experiment, the so-called Llex vocabulary test (Meara, 1994) was administered. This test has been found to be a good predictor of how proficient people are in listening, reading, and

given most frequently to the picture. In the off line study, a set of twenty four printed pictures was presented to twenty under graduates from various disciplines of the University of Nijmegen. Participants were asked to write the names of the pictures in a space reserved for this purpose. The mean error percentage was only 6.4 per cent, indicating that the intended name of the picture was generally preferred by the participants. These results show that the name which was spontaneously given most fre quently corresponded to the intended name, and that there was no more dominant semantically close competitor of the name of the picture.

Table 2. *Experiment 1: mean response latencies (M in ms), standard deviations (SD in ms), and error percentages (E) in the Phonological, Phono-Dutch, Semantic, and Unrelated conditions, and the difference (Dif) for the Phonological, Phono-Dutch, and Semantic conditions relative to the Unrelated condition at each SOA (target English, interfering stimuli English)*

	SOA 300 ms			SOA 150 ms			SOA 0 ms			SOA +150 ms		
IS	M (SD)	E	Dif	M (SD)	E	Dif	M (SD)	E	Dif	M (SD)	E	Dif
Phonological	732 (130)	3.6	19	750 (159)	6.5	24	709 (140)	1.6	31	645 (121)	1.3	64
Phono Dutch	765 (137)	4.2	14	779 (154)	6.0	5	768 (143)	4.2	28	714 (132)	2.3	5
Semantic	795 (171)	4.2	44	793 (171)	6.2	19	771 (169)	6.0	31	699 (147)	5.2	10
Unrelated	751 (113)	5.5		774 (156)	5.7		740 (124)	1.3		709 (151)	1.6	

writing in a given language. The vocabulary test consisted of 300 lexical decision trials. English words and nonwords were randomly selected from a lexicon which consisted of a sample of 1000 words from the Threshold Level Vocabulary in English and 500 nonwords. Each participant received a unique subset from the lexicon. Participants were instructed to press the "yes" button if they knew the meaning of the printed word and the "no" button if they did not. The experiment was individually paced; immediately after participants had made a decision, the next printed string was presented on the screen. The aim of administering the Llex vocabulary test was to determine whether the level of lexical proficiency was similar for the groups of participants at each SOA.

In the third part of the experiment, participants had to fill in a questionnaire. This questionnaire was based on a questionnaire developed by Grosjean (personal communication), and adapted to the Dutch situation. The aim of administering the questionnaire was to get more information about the language history of our participants, and their proficiency in English as a foreign language. Some results of this questionnaire are shown in appendix B. The experiment lasted about 30 minutes.

Results and discussion

The mean score on the Llex vocabulary test was 83.8. Participants with a score higher than 80 on the vocabulary test perform within the range of native speakers of English, and can thus be characterized as having a high level of lexical proficiency in English. Mean scores on SOA −300, −150, 0, and +150 ms were 84.8, 81.5, 83.3, and 85.5 respectively. Unpaired t-tests showed that the mean scores at each SOA did not differ from the scores at other SOAs (all p's > .1). Thus, the participants of Experiment 1 were highly proficient in English as a foreign language, and more importantly, the level of lexical proficiency of the participants at each SOA did not differ significantly from the level of lexical proficiency of participants at other SOAs.

Trials on which participants produced mouth clicks, stuttered, hesitated during the production of the response, gave an incorrect response, or produced no response within the time limit of 2000 ms were marked as errors. The same held for responses from trials in which a technical error had occurred. In all, 5.5 per cent of the data were classified as errors. 4.1 per cent of the data (74 per cent of the errors) were considered to be true errors: hesitations, stuttering, incorrect responses and no responses. Naming latencies which deviated more than two standard deviations from the item and participant mean in the relevant condition and errors were replaced by estimates, following Winer (1971). Substitutions of incorrect responses amounted to 5.5 per cent of the data, estimate substitutions of extreme naming latencies to 2.1 per cent. In total, 7.6 per cent of the data were replaced by estimates. Table 2 lists the mean naming latencies, the standard deviations, and the true error percentages (without technical errors and mouth clicks).

Analyses of the naming latencies

Analyses of variance were conducted on the naming latencies with Participants and Items as random factors and IS as within-participant and within-item

factor, and SOA as between-participant and within-item factor. The main effects of SOA (F_1 (3,60) = 4.69, MSE = 17893, $p < .01$, F_2 (3,69) = 50.39, MSE = 2497, $p < .001$) and IS (F_1 (3,180) = 53.13, MSE = 728, $p < .001$, F_2 (3,69) = 14.55, MSE = 3987, $p < .001$), and the interaction between SOA and IS (F_1 (9,180) = 3.46, MSE = 728, $p < .005$, F_2 (9,207) = 3.14, MSE = 1203, $p < .005$) reached significance in the by-participant and by-item analyses. Subsequent analyses testing the effect of IS at each SOA separately showed that IS was significant at SOA −300 ms (F_1 (3,45) = 18.73, MSE = 617, $p < .001$, F_2 (3,69) = 10.30, MSE = 1684, $p < .001$), at SOA −150 ms ((F_1 (3,45) = 10.32, MSE = 486, $p < .001$, F_2 (3,69) = 3.79, MSE = 1987, $p < .05$), at SOA 0 ms (F_1 (3,45) = 14.49, MSE = 943, $p < .001$, F_2 (3,69) = 8.61, MSE = 2381, $p < .001$), and at SOA +150 ms (F_1 (3,45) = 18.46, MSE = 866, $p < .001$, F_2 (3,69) = 15.52, MSE = 1546, $p < .001$).

Post-hoc analyses applying Duncan tests (alpha = .05) to the item and participant means of each level of IS for each SOA separately showed that for SOA −300 ms, the Semantic condition differed from the Phonological, Phono-Dutch, and Unrelated condition in the by-participant and by-item analyses. Furthermore, the Phonological condition differed from the Phono-Dutch condition in the by-participant and by-item analyses, and from the Unrelated condition in the by-participant analysis. No significant differences were found for the Phono-Dutch and the Unrelated conditions. For SOA −150 ms, the Semantic condition differed from the Phonological condition in the by-participant and by-item analyses, and from the Unrelated condition in the by-participant analysis. The Phonological condition also differed from the Phono-Dutch condition in the by-participant and by-item analyses, and from the Unrelated condition in the by-participant analysis. Again, no significant differences were found for the Phono-Dutch and the Unrelated conditions. For SOA 0 ms, the Semantic condition differed from the Phonological and the Unrelated conditions in the by-participant and by-item analyses. Furthermore, the Phonological condition differed from the Unrelated and Phono-Dutch conditions in the by-participant and by-item analyses. More importantly, the Phono-Dutch condition differed from the Unrelated condition in the by-participant analysis. For SOA +150 ms, the Phonological condition differed from the Phono-Dutch, Semantic, and Unrelated conditions in the by-participant and by-item analyses. No differences were found between the Phono-Dutch, the Semantic, and the Unrelated condition.

Analysis of repetition effects

In Experiment 1, pictures were presented four times to each participant, accompanied by four different auditory ISs. To investigate whether and how the repetition of pictures affected the magnitude of the effects that occurred at each SOA, several additional analyses of variance were conducted. We defined the factor BLOCK with two levels: BLOCK-1 (first and second presentation of a picture) and BLOCK-2 (third and fourth presentation of a picture). We were interested in finding out whether there were any interactions between the factor BLOCK and the phonological facilitation effect, the phono-Dutch interference effect, or the semantic interference effect at each SOA. Any significant interaction would reveal that the repetition of pictures affected our experimental results.

The phonological facilitation effect did not interact with the factor BLOCK at SOA −300, −150, and 0 ms (all p's > .1), but there was a significant interaction between the phonological facilitation effect and the factor BLOCK at SOA +150 ms in the by-participant analysis ($p_1 < .05$, $p_2 > .1$). Analyses for each BLOCK separately at SOA +150 ms showed that the phonological facilitation effect was significant for BLOCK-1 (p_1 and $p_2 < .05$) and for BLOCK-2 and (p_1 and $p_2 < .05$). The magnitude of the phonological facilitation effect was significantly larger in BLOCK-1 (86 ms) than in BLOCK-2 (43 ms). Neither the phono-Dutch interference effect nor the semantic interference effect interacted with BLOCK at any SOA (all p's > .1). The repetition of pictures only affected the magnitude of the phonological facilitation effect at SOA +150 ms. We can conclude therefore that our main results were not affected by the repetition of pictures.

Analyses of list composition effects

The stimuli in Experiment 1 were presented to the participants by means of two lists in which the order of the items was fixed. To investigate whether there were any list composition effects, analyses of variance were conducted with IS as within-participant and within-item factor, and SOA and LIST as between-participant and within-item factor. These analysis revealed that the main effect of LIST showed a trend towards significance in the by-item analysis only (F_1 (1,56) < 1, F_2 (1,23) = 2.96, MSE = 6359, $p < .1$). The interaction between SOA and LIST reached significance in the by-item analysis (F_1 (3,56) < 1, F_2 (3,69) = 3.20, MSE = 2348, $p < .05$), reflecting the fact that LIST was significant at SOA −300 in the by-item analysis (F_1 (1,59) < 1, F_2 (1,23) = 9.04, MSE = 2325,

$p < .01$), showed a trend towards significance in the by-item analysis at SOA −150 ms (F_1 (1,59) < 1, F_2 (1,23) = 3.60, MSE = 2824, $p < .1$), but failed to reach significance at SOAs 0 ms (F_1 (1,59) < 1, F_2 (1,23) < 1) and +150 ms (F_1 (1,59) < 1, F_2 (1,23) = 2.34, MSE = 3020, $p > .1$) More importantly, neither the two-way interaction between LIST and IS (F_1 (3,168) = 1.13, MSE = 1204, $p > .1$, F_2 (3,69) < 1) nor the three-way interaction between LIST, IS, and SOA (F_1 (9,168) < 1, F_2 (9, 207) < 1) reached significance in the by-participant or by-item analyses.

Analyses of the error percentages

Analyses of variance were also conducted for the error percentages (only true error percentages), with IS as within-participant and within-item factor, and SOA as between-participant and within-item factor. The main effects of SOA reached significance in the by-item analysis only (F_1 (3,60) = 1.61, MSE = 63.5, $p > .1$, F_2 (3,69) = 6.18, MSE = 24.9, $p < .005$). Furthermore, the main effect of IS (F_1 (3,180) = 4.42, MSE = 14.86, $p < .01$, F_2 (3,69) = 2.67, MSE = 36.90, $p < .1$) and the interaction between SOA and IS (F_1 (9,180) = 2.21, MSE = 14.86, $p < .05$, F_2 (9,207) = 2.22, MSE = 22.24,p <.05) reached significance in the by-participant and by-item analyses. Subsequent analyses showed that IS failed to reach significance at SOA −300 ms (F_1 (3,45) < .1, F_2 (3,69) < .1) and SOA −150 ms (F_1 (3,45) < .1, F_2 (3,69) < .1), but reached significance in the by-participant and by-item analyses at SOA 0 ms (F_1 (3,45) = 5.08, MSE = 15.75, $p < .005$, F_2 (3,69) = 5.58, MSE = 21.49, $p < .005$), and at SOA +150 ms (F_1 (3,45) = 4.36, MSE = 11.69, $p < .01$, F_2 (3,69) = 3.57, MSE = 21.35, $p < .05$).

Post-hoc analyses applying Duncan tests (alpha = .05) to the item and participant means of each level of IS for SOAs 0 and +150 ms showed that for SOA 0 ms, the Semantic condition differed from the Phono-Dutch and Unrelated conditions in the by-participant and by-item analyses. Furthermore, the Phonological condition differed from the Unrelated condition in the by-item analysis. At SOA +150 ms, the Semantic condition differed from the Phonological, Phono-Dutch, and Unrelated conditions in the by-participant and by-item analyses.[3]

[3] Because distractors hardly ever induce systematic speech errors in picture word interference experiments (Levelt et al., in press), we do not wish to report extensively on the type of errors participants made in the various conditions in experiments 1 and 2. Nevertheless, sometimes (in 9 per cent of the true errors) participants incorrectly produced either the Dutch name (e.g., berg) of a picture (e.g., mountain) or the first phoneme(s) of the Dutch name of a picture (e.g., be ...). More interestingly, these errors were usually produced in the Phono Dutch condition.

Discussion

Four important results were obtained in Experiment 1. First, the presentation of a phonologically related IS facilitated the initiation of the naming response at every SOA. Second, reliable semantic interference effects were obtained at SOAs −300, −150, and 0 ms. Both these findings are replications of an earlier study in which we also found phonological facilitation at SOAs −300, −150, 0, and +150 ms, and semantic interference at SOAs −300, −150, and 0 ms (Hermans et al., submitted). Third, no evidence was found for the claim that the Dutch name of the picture is phonologically encoded, as indicated by the absence of significant interference in the Phono-Dutch condition at SOA +150 ms. Fourth, significant interference in the Phono-Dutch condition was obtained at SOA 0 m, but not at SOAs −300 and −150 ms. Thus we found some support for the claim that the more frequent Dutch name of the picture is activated during the lemma selection process, and no support for the claim that its phonological form is activated during the lexeme retrieval process.

Our claim that an *English* Phono-Dutch IS such as *bench* can activate the *Dutch* name of the picture (*berg* (mountain)) is based upon the assumption that there is a sufficient overlap between the phonetic realizations of the initial phonemes of the English Phono-Dutch IS and the Dutch name of the picture. However, this may not be the case. One possible explanation for the absence of reliable interference effects in the Phono-Dutch condition is that the mismatch between the phonetic realizations of the English Phono-Dutch ISs and the Dutch name of the picture is large enough to prevent the Dutch name of the picture from being strongly activated by the English Phono-Dutch IS.

This alternative interpretation was explored in Experiment 2, in which native speakers of Dutch were again instructed to name pictures in their foreign language English. Unlike Experiment 1, pictures were paired with *Dutch* ISs which were either phonologically related (*mouw* (sleeve)), semantically related (*dal* (valley)), or unrelated (*kaars* (candle)) to the English name of the picture (*mountain*), or phonologically related (*berm* (verge)) to the Dutch name of the picture (*berg*). The ISs were tested at SOAs −300, −150, 0, and +150 ms. The rationale was the same as in Experiment 1: we claimed that interference in the Phono-Dutch condition at SOAs at which semantic interference is also observed can be interpreted as interference at the lemma level, and that interference in the Phono-Dutch condition at SOAs at which no semantic interference is observed can be interpreted as interference at the lexeme level.

On the basis of the results obtained in Experiment 1, we assumed that there is a relatively small overlap between the phonetic realizations of the initial phonemes of the *English* name of a picture of a *mountain* and a phonologically related *Dutch* IS such as *mouw*, whereas there is an almost complete overlap between the phonetic realizations of the initial phonemes of the *Dutch* name of a picture of a mountain (*berg*) and a *Dutch* Phono-Dutch IS such as *berm*. We therefore predicted that a phonologically related Dutch IS should not or only slightly speed up the initiation of the naming response in English because of the mismatch between the phonetic realizations of a phonologically related *Dutch* IS and the *English* name of the picture. In contrast to Experiment 1, phonological facilitation effects should therefore be small or even absent in Experiment 2. Furthermore, if the Dutch lemma is activated during the lemma selection process of the English name of the picture, we should observe strong and reliable interference effects from Dutch Phono-Dutch ISs at SOAs −300, −150, and 0 ms in Experiment 2. Finally, if the Dutch name of the picture is activated during the lexeme retrieval process, interference effects should be observed in the Phono-Dutch condition at SOA +150 ms.

Experiment 2

Method

Participants. Sixty-four undergraduates of the University of Nijmegen participated in Experiment 2. Their ages varied between eighteen and thirty-three years with a mean of twenty-three. All participants were native speakers of Dutch, and were paid for their participation. All participants had received at least five years of education in English as a foreign language at high school. None of the participants had participated in Experiment 1.

Materials. The same thirty-two line drawings were used as in Experiment 1. Pictures were accompanied by Dutch words which were either phonologically related (*mouw* (sleeve)), semantically related (*dal* (valley)), or unrelated (*kaars* (candle)) to the English name of the picture (*mountain*), or phonologically related (*berm* (verge)) to the Dutch name of the picture (*berg*). ISs in the four test conditions were matched on number of letters, number of phonemes, and number of syllables, and on log frequency per million as much as possible. Frequency counts were taken from the INL corpus using the CELEX database (Baayen et al., 1993). The mean log lexeme frequencies in the different test conditions were 1.0, 1.2, 1.2, and 1.2 respectively, and the mean log lemma frequencies 1.0, 1.3, 1.4, and 1.4. The semantically related words were the Dutch translation equivalents of the semantically related English words that were used in Experiment 1. The materials are listed in Appendix C.

The Dutch stimuli were spoken by the same female native speaker of Dutch as in Experiment 1. The stimuli were digitally recorded in a sound studio at the Department of Language and Speech of the University of Nijmegen.

Design. The design was identical to the one used in Experiment 1.

Procedure. The procedure was identical to the one used in Experiment 1.

Results and discussion

The mean score on the Llex Vocabulary test was 83.4. Mean scores on SOA −300, −150, 0, and +150 ms were 82.5, 81.9, 82.9, and 86.2 respectively. Unpaired t-tests showed that these scores of the groups of participants did not differ from the scores at other SOAs (all p's > .1). In addition, the scores obtained in Experiment 2 did not differ from the scores obtained in Experiment 1 (t (126) = .33, p > .1). As in Experiment 1, the group of participants can, on the basis of their scores on the vocabulary test, be characterized as having a high level of lexical proficiency in English.

Application of the same criteria as in Experiment 1 led to the replacement of 5.8 per cent errors and 2.1 per cent outliers. 4.8 per cent of the data (83 per cent of the errors) were classified as true errors (cf. Experiment 1). Table 3 lists the mean naming latencies and standard deviations, and the true error percentages in each condition.

Analyses of the naming latencies

Analyses of variance were conducted on the naming latencies with Participants and Items as random factors and IS as within-participant and within-item factor, and SOA as between-participant and within-item factor. The main effects of SOA (F_1 (3,60) = 3.49, MSE = 27974, p < .05, F_2 (3,69) = 104.65, MSE = 1401, p < .001) and IS (F_1 (3,180) = 14.34, MSE = 1022, p < .001, F_2 (3,69) = 4.84, MSE = 4545, p < .005) were significant in the by-participant and by-item analyses. Most importantly, the interaction between SOA and IS reached significance in the by-item analysis and showed a trend towards significance in the by-participant analysis (F_1 (9,180) = 1.79, MSE = 1022, p < .1, F_2 (9,207) = 2.59, MSE = 1055, p < .01). Subsequent analyses testing the effect of IS at each SOA separately showed that IS was significant at SOA −300 ms (F_1 (3,45) = 3.33, MSE = 755, p < .05, F_2 (3,69) = 1.73, MSE = 2180, p =

Table 3. *Experiment 2: mean response latencies (M in ms), standard deviations (SD in ms), and error percentages (E) in the Phonological, Phono-Dutch, Semantic, and Unrelated conditions, and the difference (Dif) for the Phonological, Phono-Dutch, and Semantic conditions relative to the Unrelated condition at each SOA (target English, interfering stimuli Dutch)*

	SOA 300 ms			SOA 150 ms			SOA 0 ms			SOA +150 ms		
IS	M (SD)	E	Dif	M (SD)	E	Dif	M (SD)	E	Dif	M (SD)	E	Dif
Phonological	763 (152)	4.1	8	738 (149)	4.4	5	759 (197)	4.1	10	654 (117)	2.0	35
Phono Dutch	785 (154)	6.5	30	771 (151)	5.7	38	784 (191)	5.7	35	696 (126)	5.2	7
Semantic	772 (151)	4.6	17	770 (162)	6.2	37	768 (168)	3.9	19	702 (139)	4.1	13
Unrelated	755 (145)	5.7		733 (131)	5.7		749 (161)	5.0		689 (120)	3.6	

.17), at SOA −150 ms (F_1 (3,45) = 6.65, MSE = 978, $p < .005$, F_2 (3,69) = 4.54, MSE = 2148, $p < .01$), and at SOA +150 ms (F_1 (3,45) = 13.32, MSE = 571, $p < .001$, F_2 (3,69) = 9.19, MSE = 1442, $p < .001$), and showed a trend towards significance in the by-item analyses at SOA 0 ms (F_1 (3,45) = 1.96, MSE = 1784, $p = .13$, F_2 (3,69) = 2.45, MSE = 2140, $p < .1$).

Post-hoc analyses applying Duncan tests (alpha = .05) to the item and participant means of each level of IS for each SOA separately showed that for SOA −300 ms, the Phono-Dutch condition differed from the Unrelated condition in the by-participant and by-item analyses, and from the Phonological condition in the by-participant analysis. No significant differences were found for the Phonological, Semantic, and Unrelated conditions. For SOA −150 ms, the Phono-Dutch condition differed from the Unrelated and Phonological conditions in the by-participant and by-item analyses. The Semantic condition also differed from the Phonological and Unrelated conditions in the by-participant and by-item analyses. For SOA 0 ms, the Phono-Dutch condition differed from the Unrelated condition in the by-participant and by-item analyses. No differences were found for the Semantic, Phonological, and Unrelated conditions. For SOA +150 ms, the Phonological condition differed from the Phono-Dutch, Semantic, and Unrelated conditions in the by-participant and by-item analyses. No differences were found for the Phono-Dutch, Semantic, and Unrelated conditions.

Analyses of repetition effects

In Experiment 2, pictures were presented four times to each participant, accompanied by four different auditory ISs. We conducted several additional analyses of variance to determine whether and how the repetition of pictures affected our results. We defined the factor BLOCK with two levels: BLOCK-1 (first and second presentation of a picture) and BLOCK-2 (third and fourth presentation of a picture). As in Experiment 1, we were interested in finding out whether there were any interactions between the factor BLOCK and the phonological facilitation effect, the phono-Dutch interference effect, or the semantic interference effect at each SOA.

The factor BLOCK did not interact with the phonological facilitation effect at any SOA (all p's > .1). The phono-Dutch interference effect interacted with the factor BLOCK only at SOA 0 ms and only in the by-participant analysis ($p_1 < .05$, $p_2 > .1$). Separate analyses revealed that the phono-Dutch interference effect was significant in BLOCK-1 (p_1 and $p_2 < .05$), but not in BLOCK-2 (p_1 and $p_2 > .1$). The semantic interference effect also interacted with BLOCK only at SOA 0 ms in the by-participant analyses ($p_1 < .05$, $p_2 > .1$) Separate analyses revealed that the semantic interference effect was significant in BLOCK-1 (p_1 and $p_2 < .05$), but not in BLOCK-2 (p_1 and $p_2 > .1$). We can therefore conclude that our main results were not affected by the repetition of pictures.

Analyses of list composition effects

The stimuli in Experiment 2 were presented to the participants by means of two lists. To investigate whether there were any list composition effects, analyses of variance were conducted with IS as within-participant and within-item factor, and SOA

and LIST as between-participant and within-item factor. These analysis revealed that the main effect of LIST failed to reach significance (F_1 (1,56) < 1, F_2 (1,23) = 1.67, MSE = 3914, p > .1). The interaction between SOA and LIST reached significance in the by-item analysis (F_1 (3,56) < 1, F_2 (3,69) = 47.44, MSE = 1674, p < .001), reflecting the fact that LIST was significant in the by-item analysis at SOA −300 (F_1 (1,59) < 1, F_2 (1,23) = 70.93, MSE = 1632, p < .001), at SOA 0 ms (F_1 (1,59) < 1, F_2 (1,23) = 21.76, MSE = 4260, p < .001), and at SOA +150 ms (F_1 (1,59) < 1, F_2 (1,23) = 29.48, MSE = 1233, p < .001), but failed to reach significance at SOA's −150 ms (F_1 (1,59) < 1, F_2 (1,23) < 1). More importantly, neither the two-way interaction between LIST and IS (F_1 (3,168) = 1.24, MSE = 940, p > .1, F_2 (3,69) < 1) nor the three-way interaction between LIST, IS, and SOA (F_1 (9,168) < 1, F_2 (9, 207) = 1.04, MSE = 1598, p > .1) reached significance in the by-participant or by-item analyses.

Analyses of the error percentages

Analyses of variance were also conducted for the error percentages (only true error percentages), with IS as within-participant and within-item factor, and SOA as between-participant and within-item factor. The main effects of SOA reached significance in the by-item analysis only (F_1 (3,60) = 1.33, MSE = 46.03, p >.1, F_2 (3,69) = 4.46, MSE = 20.54, p < .01). Furthermore, the main effect of IS was significant in the by-participant analysis (F_1 (3,180) = 3.67, MSE = 16.32, p < .05, F_2 (3,69) < 1). The interaction between SOA and IS (F_1 (9,180) < 1, F_2 (9,207) < 1) failed to reach significance in the by-participant and by-item analyses.

Post-hoc analyses applying Duncan tests (alpha = .05) to the participant means of each level of IS collapsed over SOA showed that the Phonological condition differed from the Phono-Dutch, Semantic, and Unrelated conditions.

Discussion

The results obtained in Experiment 2 can be summarized as follows: First, phonological facilitation was found at SOA +150 ms only. Thus, a phonologically related Dutch IS did not speed up the initiation of the naming response at SOAs −300, −150, and 0 ms. More importantly, significant interference effects in the Phono-Dutch condition were observed at SOAs −300, −150, and 0 ms, but not at SOA +150 ms. These results demonstrate that the not-to-be-selected Dutch lemma is activated during the lemma selection process of its English translation equivalent, but that the Dutch lemma is not phonologically encoded. Third, a semantically related Dutch IS slowed down the initiation of the naming response significantly at SOA −150 ms. This finding suggests that even semantically related Dutch lemmas are activated during the lemma selection process of English words.

General discussion

Can we suppress activation of lexical candidates in our first language when we have to name pictures in a foreign language? We investigated this question in two picture-word interference experiments, in which native speakers of Dutch were instructed to name pictures in their foreign language English. More specifically, we investigated whether lexical representations from the first and more dominant language Dutch are activated during the lemma selection and/or lexeme retrieval parts of the naming response preparation in English as a foreign language.

In Experiment 1, pictures were paired with English ISs which were either phonologically related (*mouth*), semantically related (*valley*), or unrelated (*present*) to the English name of a picture of a *mountain*, or phonologically related (*bench*) to the Dutch name of a picture of a mountain (*berg*). Like Jescheniak and Schriefers (submitted), we assumed that an IS such as *bench* not only activates the lexeme and the lemma of *bench*, but also the lexeme and the lemma of the phonological competitor *berg*. We thus assumed that Phono-Dutch ISs such as *bench* can interfere with both the lemma selection and lexeme retrieval parts of the naming response preparation of the English name of a picture of a mountain. A Phono-Dutch IS such as *bench* may interfere with the lemma selection process by activating the not-to-be-selected semantically close Dutch lemma *berg*, which would make it harder to select the English lemma *mountain*. However, Phono-Dutch ISs may also interfere with the lexeme retrieval process. In the latter case, strong competition between the Dutch and the English lemma may result in the activation of both the Dutch lexeme *berg* and the English lexeme *mountain*. Activation of the not-to-be-pronounced Dutch lexeme makes it harder to suppress it in order to produce the English name of the picture. We claimed that interference in the Phono-Dutch condition at SOAs at which semantic interference is also observed can be interpreted as interference localized at the lemma level, and that interference in the Phono-Dutch condition at SOAs at which no semantic interference is observed can be interpreted as interference localized at the lexeme level.

In Experiment 1, some support was found for the

claim that the Dutch name of a picture is activated during the lemma selection process of its translation equivalent in the foreign language English: an English Phono-Dutch IS significantly slowed down the initiation of the naming response at SOA 0 ms. Furthermore, we obtained no evidence that the not-to-be-selected Dutch name of a picture is phonologically encoded: an English Phono-Dutch IS did not slow down the initiation of the naming response at SOA +150, the only SOA at which no semantic interference was observed. To account for the absence of reliable interference effects in the Phono-Dutch condition, we suggested that there is a relatively small overlap between the phonetic realizations of the initial phonemes of the *English* Phono-Dutch ISs and the *Dutch* names of the pictures. This relatively small overlap is insufficient to activate the lemma and the lexeme of the Dutch name of a picture.

This interpretation was investigated in Experiment 2, in which native speakers of Dutch were again instructed to name pictures in their foreign language English. However, this time, pictures were paired with *Dutch* ISs which were either phonologically related (*mouw* (sleeve)), semantically related (*dal* (valley)), or unrelated (*kaars* (candle)) to the English name of a picture of a *mountain*, or phonologically related (*berm* (verge)) to the Dutch name of a picture of a mountain (*berg*). As in Experiment 1, we claimed that interference in the Phono-Dutch condition at SOAs at which semantic interference is also observed can be interpreted as interference at the lemma level, and that interference in the Phono-Dutch condition at SOAs at which no semantic interference is observed can be interpreted as interference at the lexeme level.

We assumed that the overlap between the phonetic realizations of the initial phonemes of the *English* name of a picture of a *mountain* and a phonologically related *Dutch* IS such as *mouw* is small in comparison with the almost complete overlap between the phonetic realizations of the initial phonemes of the *Dutch* name of a picture of a mountain (*berg*) and a *Dutch* Phono-Dutch ISs such as *berm*. On the basis of these assumptions, we predicted that a phonologically related Dutch IS should not or only slightly speed up the initiation of the naming response in the foreign language English. Furthermore, we claimed that, if the Dutch name of a picture is activated during the lemma selection process in English as a foreign language, we should observe strong and reliable interference effects from Dutch Phono-Dutch ISs at SOAs −300, −150, and 0 ms in Experiment 2. Finally, if the Dutch name of a picture is activated during the lexeme retrieval process in the foreign language English, interference effects should be observed at SOA +150 ms.

Unlike the results of Experiment 1, phonological facilitation was found at SOA +150 ms only. More importantly, we found reliable interference effects in the Phono-Dutch condition at every SOA at which semantic interference was observed in Experiment 1. Experiment 2 demonstrates that the Dutch name of a picture is activated during the lemma selection process of its English translation equivalent, but that the Dutch name of a picture is not phonologically encoded. Interestingly, we also obtained some evidence which suggests that even semantically related Dutch words are activated during the lemma selection process of English words.

On the basis of the results obtained in Experiments 1 and 2, we argued that the absence of reliable interference effects in the Phono-Dutch condition in Experiment 1 was caused by the relatively small overlap between phonetic realizations of the initial phonemes of an *English* Phono-Dutch IS such as *bench* and the Dutch name of a picture of a mountain (*berg*). However, there is an alternative interpretation for the results obtained in Experiments 1 and 2. Grosjean (1982, 1997, 1998) has argued that bilinguals are always situated at some point on the so-called "bilingual continuum". When bilinguals are at the monolingual end of this continuum, only one of a bilingual's languages is activated. In contrast, both a bilingual's languages are activated when bilinguals are at the bilingual end of the continuum. More importantly, Grosjean has argued that the position at which a bilingual is situated on the continuum depends upon background variables such as the subject of conversation, information about the listener, and the (experimental) setting in which the conversation takes place. Thus, following Grosjean's line of argument, it could be argued that the position at which participants were situated on the bilingual continuum in Experiments 1 and 2 was affected by the experimental settings. Participants named pictures in their foreign language English while trying to ignore auditory English ISs in Experiment 1, and while trying to ignore auditory Dutch ISs in Experiment 2. One might therefore claim that the participants of Experiment 2 were more in a bilingual mode than the participants of Experiment 1. We might have observed unreliable interference effects in the Phono-Dutch condition in Experiment 1 and reliable interference effects in the Phono-Dutch condition in Experiment 2, because the first language Dutch was more strongly activated in Experiment 2 than in Experiment 1. However, we did not only observe different interference effects in the Phono-Dutch condition in Experiments 1 and 2, but also different

facilitation effects in the Phonological condition. We found that phonologically related English ISs facilitate the initiation of the naming response at every SOA, while phonologically related Dutch ISs facilitate the initiation of the naming response at SOA +150 ms only. It is unclear how an interpretation in terms of the position of participants on the bilingual continuum can account for these asymmetrical phonological facilitation effects.

In the introduction we briefly discussed how current bilingual speech production models account for the ability of bilingual speakers to produce words only in the language in which they intend to express their thoughts (e.g., De Bot & Schreuder, 1993; Green, 1986, 1993; Poulisse & Bongaerts, 1994; Poulisse, 1997). Some bilingual speech production models assume that lexical representations from a language form a subset which can be activated or deactivated in its entirety (e.g., De Bot & Schreuder, 1993; Green, 1986, 1993). The activation level of lexical representations in a language is increased when that language is chosen for production, and decreased when another language is selected for production. Furthermore, the extent to which a language can be deactivated depends upon how frequently that language is used. Languages that are frequently used cannot be completely deactivated, while languages that are infrequently used can be completely deactivated. Green (1986, 1993) and de Bot and Schreuder (1993) assume that a bilingual can produce words only in the language in which he or she intends to speak because the activation level of lexical representations in that language is higher than the activation level of languages not chosen for production (see Poulisse & Bongaerts (1994) for a slightly different proposal).

In our experiments, we obtained evidence to support this assumption. First, the semantic interference effects of English ISs in Experiment 1 were more reliable than the semantic interference effects of Dutch ISs in Experiment 2. Second, and more importantly, research has shown that during the production of a word which has a near-synonym, the not-to-be-produced word is activated during the later stages of the naming response preparation of the to-be-produced word (Jescheniak & Schriefers, 1997, submitted; Peterson & Savoy, 1998). Jescheniak and Schriefers suggested that both word forms are phonologically encoded because there is extreme competition at the lemma level. Although translation equivalents are semantically at least as closely related as near-synonyms, the Dutch name of a picture is only activated during the initial stages of the process of lexical access in English as a foreign language. Thus, the competition between near-synonyms that belong to different languages (translation equivalents) is less extreme than the competition between near-synonyms that belong to the same language. Thus, our experiments suggest that lemmas from the language chosen for production are more strongly activated than lemmas from other languages, even though the language not chosen for production is a first and more dominant language.

At the same time, our experiments show that the Dutch name of a picture is activated during the lemma selection process of its translation equivalent in English as a foreign language. This finding is consistent with Green's (1986, 1993) and de Bot and Schreuder's (1993) claim that lexical representations from the first and more dominant language cannot be completely deactivated during the production of speech in a foreign language. Therefore, semantically close lemmas from the first language will be activated to some degree during the lemma selection process in a foreign language.

Until now, we have discussed and interpreted our results within a discrete two-stage model of lexical access. Thus we have assumed that the process of lexeme retrieval only starts when the lemma selection process has been completed. However, that assumption is neither shared by alternative models of lexical access, such as interactive models (Dell, 1986; Harley, 1993) or cascaded models (Peterson & Savoy, 1998), nor consistent with some results obtained in picture naming studies (Jescheniak & Schriefers, submitted; O'Seaghdha & Marin, 1997; Peterson & Savoy, 1998). In contrast to discrete two-stage models of lexical access, interactive and cascaded models hold the view that the process of lexeme retrieval is initiated before the lemma selection process has been completed. Thus, cascaded and interactive models of lexical access assume that there is a temporal overlap between the lemma selection and lexeme retrieval processes. Furthermore, interactive models of speech production assume that the lexeme retrieval process can affect the lemma selection process. According to interactive activation models, lexical access proceeds as follows: lexical access starts when conceptual representations become activated (for instance, as the result of the presentation of a picture), and spread their activation to lemmas which match these conceptual representations. These lemmas, in turn, spread their activation to corresponding word forms as soon as they become activated. Therefore, not only the word form of the eventually produced lemma (e.g., cat) becomes activated, but also the word forms of semantically related lemmas (e.g., dog). Subsequently, these activated word forms (e.g., cat) spread their activation back, not only to the corresponding lemma (e.g.,

cat), but also to lemmas of phonologically related word forms (e.g., rat, cap).

Because interactive models of lexical access assume that the process of lexeme retrieval is initiated immediately when lemmas become activated, interactive models of lexical access can account for early phonological facilitation in picture-word interference tasks in the following way: during the early stages of the process of lexical access of a picture of a *mountain*, lemmas that (partially) match the conceptual representations become activated (e.g., mountain, valley), and immediately spread their activation to the corresponding lexemes (mountain, valley). The presentation of a phonologically related ISs such as *mouth* will facilitate the retrieval of the word form *mountain*. Thus, according to interactive models of lexical access, early phonological facilitation may be localized at the word form level.

However, interactive models of lexical access also assume that a word form such as *cat* spreads its activation backward to the lemma level, not only to the lemma *cat*, but also to lemmas of phonologically related word forms such as *rat* and *cap* (Dell & O'Seaghdha, 1992). Thus, interactive models of lexical access explicitly assume that an activated word form also spreads its activation to lemmas of phonologically related words. For instance, a word form such as *mouth* not only spreads its activation to the lemma *mouth,* but also the word forms and the lemmas of *mouse* and *mountain*. Therefore, phonologically related ISs such as *mouth* can facilitate the lemma selection part of the naming response preparation of *mountain*. In other words, according to interactive models of lexical access, early phonological facilitation effects can be localized at the word form level, at the lemma level, or at both levels.

Interactive models of lexical access can account for the early phono-Dutch interference effects in a very similar way. First, the interference effects of Phono-Dutch ISs at early SOAs may be localized at the word form level. During the initial stages of the naming response preparation in a foreign language, lemmas that (partially) match the conceptual specification become activated, and spread their activation to corresponding word forms. Thus, during the initial stages of the naming response preparation of a picture of a *mountain* in English as a foreign language, both the English lemma *mountain* and the Dutch lemma *berg* become activated, and spread their activation the word forms *mountain* and *berg*. The presentation of the Dutch IS *berm* or the English IS *bench* will activate the Dutch word form *berg* more strongly, which makes it harder to produce the English name of a picture. Second, the interference effects of Phono-Dutch ISs at early SOAs may be localized at the lemma level. The presentation of Phono-Dutch ISs such as *berm* and *bench* leads to the activation of the lemma of the Dutch name of the picture, which is also activated as a consequence of the presentation of the picture. Preactivation of the Dutch lemma *berg* by the IS *bench* or *berg* will make it harder to select to English name of the picture.

Thus, according to interactive models of lexical access, early phonological facilitation and early phono-Dutch interference can either be localized at the word form level, at the lemma level, or at both levels. More importantly, while early semantic interference may be localized the lemma level, early phono-Dutch interference may be localized at the word form level within an interactive model of lexical access. Thus, only within a discrete two-stage model on lexical access, we can compare performance in the semantic condition to the performance in the Phono-Dutch condition to determine the locus of the phono-Dutch interference effect. Although it is unclear within an interactive view on lexical access whether or not the early phono-Dutch interference effect itself is localized at the lemma level, our results still show that Dutch name of a picture is activated during the initial stages of the naming response preparation of its translation equivalent in English as a foreign language. Thus, although the early interference effect of Phono-Dutch ISs such as *berm* and *bench* itself may be localized at the word form level, the interference effect is observed because the Dutch lemma *berg* is activated as consequence of the presentation of a picture of a *berg*, and spreads its activation to the word form *berg*. In other words, we claim that our conclusion that Experiments 1 and 2 show that the Dutch lemma is activated during the lemma selection part of the naming response preparation of the English name of the picture is valid both within a discrete two-stage and within an interactive model of lexical access. However, within an interactive model of lexical access, the results of our experiments could also be interpreted as showing that not only the Dutch lemma, but also the Dutch word form is activated during the initial stages of the naming response preparation of the English name of the picture.

In short, in two picture-word interference tasks we demonstrated that the Dutch name of a picture is activated during the initial stages of the process of lexical access of its translation equivalent in the foreign language English. Apparently, speakers cannot prevent their first language from interfering with the production of speech in a foreign language. In a task in which the speaker is explicitly discouraged from accessing representations in his or her first and more dominant language, a bilingual speaker

will indeed behave like a monolingual during the later stages of the process of lexical access. However, during the initial stages of the process of lexical access in a foreign language, a bilingual speaker cannot prevent interference from the first language.

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Appendix A

Stimulus materials used in Experiment 1

Picture's name	Phonological	Phono Dutch	Semantic	Unrelated
fence	fellow	health	gate	knife
doll	dock	pox	bear	flag
skirt	skill	rocket	coat	punch
mountain	mouth	bench	valley	present
leaf	league	black	branch	chain
plate	place	box	dish	chest
glasses	glider	bridge	lens	chapter
bottle	bottom	flesh	cup	vessel
witch	wing	hedge	dwarf	globe
dog	dot	holiday	goat	nail
peacock	people	power	chicken	blanket
ferry	feather	pocket	ship	salad
belt	belly	reef	leather	jaw
snail	snare	slack	beetle	bag
cloud	clock	watch	sky	lion
flower	flavor	blues	garden	curtain
letter	lettuce	breeze	stamp	fairy
trousers	trout	bruise	shirt	falcon
snake	snow	slab	worm	cross
pin	pig	span	button	bill
frog	front	kitchen	lizard	hole
brush	brother	body	cloth	church
key	keel	slaughter	door	train
square	squad	veal	triangle	paint

Appendix B

The mean self estimations of language use and age of acquisition of the participants of Experiment 1 and 2 for reading, writing, speaking, and listening in the foreign language English. The mean self estimations of Ability in each skill is the mean score language on a 5 point scale (1 equally good as in the first language Dutch, 5 much worse than in the first language Dutch). The mean self estimations of Study (hours a week using the foreign language English for study ends) and Hobby (hours a week using the foreign language English for purposes other than study ends) is the mean score on a 5 point scale (1 less than one hour a week, 5 more than 10 hours a week). The mean self estimation of Age of Acquisition (AOA) for each skill is the mean estimated age at which participants began to acquire this skill.

	Use						Acquisition	
	Ability		Study		Hobby		AOA	
Skill	Exp 1	Exp 2	Exp 1	Exp 2	Exp 1	Exp 2	Exp 1	Exp 2
Reading	2.7	2.6	2.3	2.3	1.3	1.6	11.7	11.1
Writing	3.6	3.3	1.3	1.2	1.3	1.2	12.1	11.3
Speaking	3.4	3.1	1.4	1.2			11.4	9.7
Listening	2.6	2.7	2.5	2.7	3.0	3.0		

Appendix C

Stimulus materials used in Experiment 2

Picture's name	Phonological	Phono Dutch	Semantic	Unrelated
fence	fan (fan)	held (hero)	poort gate)	pijp (pipe)
doll	dolk (dagger)	pols (wrist)	beer (bear)	tand (tooth)
skirt	scalp (scalp)	rots (rock)	jas (coat)	druif (grape)
mountain	mouw (sleeve)	berm (verge)	dal (valley)	kaars (candle)
leaf	lied (song)	blik (tin)	tak (branch)	hoed (hat)
plate	plan (plan)	borst (chest)	schaal (dish)	trap (stairs)
glasses	gletscher (glacier)	bron (well)	lens (lens)	eend (duck)
bottle	botsing (collision)	fluit (flute)	kopje (cup)	klink (handle)
witch	wind (wind)	hert (deer)	dwerg (dwarf)	rits (zip)
dog	dorp (village)	horst (hurst)	geit (goat)	mes (knife)
peacock	piste (ring)	paus (pope)	kip (chicken)	verf (paint)
ferry	festijn (feast)	post (mail)	schip (ship)	stip (dot)
belt	berk (birch)	riet (reed)	leer (leather)	park (park)
snail	sneeuw (snow)	slag (blow)	kever (beetle)	kroon (crown)
cloud	klauw (claw)	wolf (wulf)	hemel (sky)	fiets (bycycle)
flower	flauwte (faint)	bloed (blood)	tuin (garden)	stok (stick)
letter	lente (spring)	brood (bread)	postzegel (stamp)	kruis (cross)
trousers	trauma (trauma)	broer (brother)	hemd (shirt)	leeuw (lion)
snake	snee (incision)	slaaf (slave)	worm (wurm)	trein (train)
pin	pint (pint)	spek (bacon)	knoop (button)	koek (biscuit)
frog	front (front)	kinkel (lout)	hagedis (lizard)	spiegel (mirror)
brush	brug (bridge)	borrel (drink)	doek (cloth)	varken (pig)
key	kier (chink)	sluier (veil)	deur (door)	tempel (temple)
square	score (score)	virus (virus)	driehoek(triangle)	deken (blanket)

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One vs. two systems in early bilingual syntax: Two versions of the question*

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This paper identifies two versions of the question as to whether there is a single initial system in the syntax of developing bilinguals. Version 1 asks whether there are early mixed utterances, and if so, attributes this to a single initial system. Version 2 asks whether the utterances containing words from one of the child's languages exhibit the same syntax as the utterances containing words from the child's other language. We argue with reference to our own data (from an English Spanish bilingual from ages 1;7 to 1;9) that Version 1 is not tenable because of the paucity of lexical resources when the child begins to produce two word utterances. However, we argue that the early two word utterances in our data do *seem to exhibit a single rudimentary syntax, based on a predicate argument structure found in all utterance types, mixed and non mixed. We then argue in relation to Version 2 of the question, that it can only be answered once the child's utterances can be identified as language specific in the two languages, and that this is not possible before the emergence of morphological marking. This is illustrated by an analysis of our data from ages 1;8 to 2;3. We argue that language specific morphology allows us to identify the language of the utterances in our data and to see evidence for the appearance of two differentiated morphosyntactic systems.*

Research on bilingual acquisition has been dominated by the question of whether the child has one or two systems from the very beginning of speech. This question has been raised in relation to phonology, to the lexicon and to syntax. In this paper we shall be concerned with syntax.

The question of whether there is a single initial system in the syntax of developing bilinguals has meant different things to different researchers. For some it has meant asking whether the child's early two-word utterances all consist of words taken from the same language, that is, are all utterances in language A or language B? The existence of mixed utterances (where one word comes from each language) has then been interpreted as indicating a single, ''mixed'' syntax. This is the position taken by Redlinger and Park (1980), for example. On the other hand, some investigators have considered the question of one vs. two initial syntactic systems to be a question about whether the utterances containing words from language A exhibit the same syntax as the utterances containing words from language B. These researchers (e.g. Volterra & Taeschner, 1978) often acknowledge the existence of mixed utterances but do not include them in their analysis.

In this paper we shall attempt to address both versions of the question about one vs. two initial systems. We shall argue with reference to our own data that the version which attributes mixed utterances to a single initial system (Version 1) is not tenable because these mixed utterances are often due to a paucity of lexical resources, which prevents the child from producing the word belonging to the appropriate language for the context. We shall argue that the early two-word utterances in our data *do* seem to exhibit a single rudimentary syntax, based on a predicate-argument structure found in all utterance types, mixed and non-mixed. We shall then go on to address the second version (Version 2) of the question, and argue that it can only be answered once the child's utterances can be identified as language-specific in the two languages, and that this is not possible before the emergence of morphological marking. This argument will also be illustrated in relation to our own data.

Version 1

Redlinger and Park (1980, p. 351) argued for a single initial system on the basis of finding ''high mixing rates'' in German-English and German-Spanish data

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from children around two years old. Several arguments against this conclusion were put forward by other researchers. For example, Meisel (1989) notes that there is considerable individual variation between the four subjects and considers that sociolinguistic factors may account for the differences. Genesee (1989) points out that studies such as this one and that by Volterra and Taeschner (1978) which argue for the "unitary-system hypothesis" did not collect their data in separate language contexts. Others, such as Bergman (1976), argue that the occurrence of mixed utterances do not necessarily provide evidence for a single initial system, since there may have been mixed utterances in the input. We shall argue, as indicated, that mixed utterances can be attributed to the limited lexical resources of a developing bilingual, and thus should not be used as evidence for a single initial system.

Version 2

Volterra and Taeschner (1978) acknowledged the existence of mixed utterances in their data, but their argument for a single initial syntactic system was based on analysing only non-mixed utterances. On the basis of multiword utterances consisting of combinations of either German or Italian utterances, they argued that the bilingual German/Italian children they studied (from ages 1;2 and 1;5) went through an initial stage where they applied the same syntactic rules to both of their languages. However, Meisel (1989) finds that their data do not support this claim, and argues, for example, that "the commonalities in the use of the two languages may be the result of transfer from the dominant language" (Meisel, 1989, p. 19). We would argue that it is unclear that the child was "speaking German," in the case of the German-only utterances, versus Italian in the case of the Italian-only utterances, given the possibility that the children's possibilities for lexical choice may have been limited.

Criticisms of the studies arguing for one single system did not always make it clear whether they were assuming Version 1 of the question, or Version 2. In practice, however, most recent researchers have taken up the question in its Version 2 form, and a number of studies have appeared arguing *for* the separate development of syntactic systems in the child's two languages. The data they draw on come mostly from children over two years of age, at a stage where the investigators could apparently distinguish between utterances in each of the two languages fairly clearly, and so conduct syntactic analyses for each set. Examples of such studies are Meisel (1989), De Houwer (1990), Meisel (1994), Gawlitzek-Maiwald and Tracy (1996), and Paradis and Genesee (1996). Meisel (1989) considered data from French German bilinguals with an MLU of 1.75 2.25 and concluded that the data show language-specific word-order patterns in each of their languages. De Houwer (1990) studied the morphology and syntax of a child acquiring Dutch and English (focusing on an eight-month period when the child was between 2;7 and 3;4) and reported that her data were compatible with "the separate development hypothesis," according to which "a bilingual child's morphosyntactic development proceeds along separate, non-intersecting lines for each language" (De Houwer, 1990, p. 338). Meisel (1994) focused on the development of finiteness in French German bilinguals, arguing that once the functional category IP had been acquired, French and German grammatical structures were different, the French structure being relatively adult-like while the German structure would have to be reanalysed to approximate adult grammar. Gawlitzek-Maiwald and Tracy (1996, p. 920) found in a case study of a German English bilingual aged two that "there was structural evidence for the separation of English and German" from the beginning of data collection at age 2;1. At the same time, the child's mixed utterances could be accounted for in terms of the pooling of resources from both languages. Paradis and Genesee (1996, p. 2) assumed on the basis of previous studies that "by two years of age bilingual children have differentiated linguistic systems," but they sought to determine whether the grammars of French English bilingual children develop independently between the ages of two and three. Following an analysis of the data from three children, in which they focused on finiteness, negation, and pronominal subjects, they concluded that their results "support the hypothesis that bilingual children acquire their languages autonomously, following the same patterns as monolinguals" (Paradis & Genesee, 1996, p. 22).

While studies such as those mentioned above represent a clear consensus that there is evidence for dual syntactic systems in bilingual children aged two and above, little progress has been made on the nature of syntactic systems in developing bilinguals *under* age two. In the case study presented here, however, we shall consider the very earliest two-word utterances, where it is not so easy to identify the language of each utterance as later on.

When does syntax begin?

There are various views on when syntax begins. Some consider that it can be found in holophrastic or single-word utterances but Atkinson (1985, p. 294),

reviewing arguments addressing the linguistic status of the one-word stage from a syntactic, semantic and phonological perspective, concludes that, for syntax, he does not believe that any case "can be made for the one-word child having access to a system of syntactic representation". Regarding two-word utterances, Meisel (1994, p. 93), working on German French bilingual data, considers that "early two-word combinations do not exhibit syntactic properties". He suggests that the child may not have access to grammar at all at an early stage, and that hierarchical syntactic structures are not in evidence in "concatenations of predicates and nominal arguments" (Meisel, 1994, p. 95). However, Radford (1988), who views early two-word utterances as exemplifying small clauses, and therefore syntactic structure, takes a different position which will be further described below. In this paper we adopt one of the definitions of *syntax*, given by Crystal, as "the inter-relationships between elements of sentence structure, and of the rules governing the arrangement of sentences in sequences" (1980, p. 346). We argue that the earliest possible signs of syntax occur when two-word utterances are produced, on the grounds that there is at least juxtaposition of two words (as one of the possible relationships between words) in predicate-argument structures and sometimes hierarchical structure in some noun phrases containing two nouns. At this stage it can be argued that there is a rudimentary grammar, as we shall also explain in more detail below.

The Case Study

The subject of the case study is the first author's daughter, to be referred to hereafter as M. Data were collected as part of a funded project (ESRC ref. no. C00232393) (Deuchar, 1989). Some of the data have been deposited with CHILDES, the international child language archive which can be accessed at http://childes.psy.cmu.edu (see MacWhinney, 1995). M was exposed to English and Spanish from birth. She and her family were living in southern England at the time of the study; her mother was a native speaker of British English and her father of Latin American Spanish. Both spoke the other's language fluently. Spanish was the language used at home by both parents, whether addressing one another or the child. However, English was used when monolingual English-speaking visitors were present. The child was addressed in English outside the home, particularly on the university campus where she attended a crèche and also spent some time with her mother, who worked there. Thus the child's input was differentiated mainly according to location. It was estimated that about half of her total language input was in Spanish, the other half in English.

The data

The data came from two main sources: diary records of M kept from age six months by the mother, and audiovideo recordings made twice weekly from age 1;3. Diary records were from conversations between the mother and child, and included a note of the utterance in orthographic form, its phonetic transcription, and contextual information. These records were kept both in the English-speaking context outside the home and the Spanish-speaking context within the home, but were more extensive in the Spanish-speaking context, since the mother spent more time with her daughter at home than outside it. At first it was possible to keep an almost exhaustive list of the child's utterances, but this became more difficult later as her utterances became more frequent. This had happened by the time of the appearance of two-word utterances, and priority was then given to noting down new utterances. As for the audiovideo recordings, one was made each week of the child conversing with the maternal grandmother who spoke English, and the other with the father who spoke Spanish. The mother operated the camera, but also sometimes appeared in the recordings alongside the other adult: on those occasions she would speak English in the sessions with the grandmother, Spanish in the sessions with the father.

Both the diary and the audiovideo data were used to establish a cumulative lexicon of all words known to the child, and to collect the set of two-word utterances used in the analysis reported on below. All of the one-word and two-word utterances in the recordings used were transcribed by the authors. Two-word utterances consisted of two words sharing the same intonational contour, without a substantial pause between them. The two-word utterances analysed in this paper come mostly from the diary data (see Tables 1 and 2 below for specific information), because they occurred in larger numbers there, doubtless because the time spent collecting diary data was longer than that spent video-recording.

Analyses of our data: addressing Version 1

We shall present two analyses of our data in this section. The first will be of early mixed two-word utterances recorded between the ages of 1;7 and 1;9, and will be used to demonstrate that mixed utterances can be attributed largely to limited lexical resources rather than to an initial syntactic system.

We shall show that when lexical resources allow, the appropriate word for the language context is in general selected. This provides some evidence for lexical, but not syntactic differentiation. The second analysis will demonstrate that the child uses a similar rudimentary syntax for most two-word utterances recorded between the ages of 1;7 and 1;9, regardless of the language source of the words contained in them.

In what follows we shall use the term *mixed utterance* for convenience to refer to a two-word utterance consisting of one word from one language being acquired by the child, juxtaposed with a word from the other language. The term *mixed* is not intended to presuppose that the child is actually mixing languages or being confused or mistaken in any way.

Analysis of mixed utterances

The child began to produce two-word utterances around the age of 1;7, when she had an MLU of 1.06. At this time her vocabulary consisted of 126 words, of which 53 were unambiguously Spanish and 53 were unambiguously English. We shall focus on those two-word utterances which consisted of one word in English and one word in Spanish in order to evaluate the claim that mixed utterances indicate a single initial system. (We excluded all two-word utterances containing a word which was ambiguous between English and Spanish, like *train* or ***tren***, which was pronounced similarly in the two languages. Note that *banana* was counted as an English-source word, since the Spanish word for this item in the input was ***guineo***.) We shall investigate whether the child could have produced two words from the same language, and where she had a choice, how this may have been affected by the English or Spanish language context. The mixed (Spanish/English and English/Spanish) utterances are listed in Tables 1 and 2 below (N = 70). Those utterances recorded in a Spanish language context are listed in Table 1, while those recorded in an English language context are listed in Table 2. Although the utterances listed in Tables 1 and 2 are types for each day, there is only one utterance where more than one token that day was recorded (no. 15, ***more*** *pasa*, which is recorded twice in the diary in the same situation, where the child was requesting more raisins). In the final column of Tables 1 and 2, information is given as to whether the words used in the mixed utterances had translation equivalents. If the child had an "equivalent" for a word produced, there was a translation equivalent in the other language that was part of the child's productive vocabulary. A word was a "translation equivalent" of another if the two words came from different languages but were used by the child with the same meaning in similar situations.

We can see from Table 1 that seventeen of those 61 mixed utterances recorded in the Spanish context (nos. 1, 2, 10, 11, 14, 16, 21, 22, 25, 26, 31, 42, 43, 45, 47, 51, 60) were made up of words which had no equivalent in the child's lexicon at the stage at which they were produced. So in these utterances the child was using the only words available to her: it just happened that one word was English, the other Spanish. In utterances 21 and 22, for example, ***babero*** *off* ("bib off") and *off* ***babero*** ("off bib"), the child used the Spanish word ***babero*** in the Spanish context because the only word she had in her productive lexicon for "bib" just happened to be Spanish. For the same reason, she juxtaposed this word with the English word *off* because she knew only one word for the concept, and it happened to be English, so she produced it despite the Spanish context. There are other utterances in Table 1, however, where we can see that for one or both of the words used, the child did have an equivalent or equivalents in her vocabulary. In utterance 54, *juice* ***manzana*** ("juice apple"), for example, we see that she had no Spanish equivalent for the English word *juice*, but that she did have an English equivalent (*apple*) in her lexicon for the Spanish word ***manzana***. It is interesting to note that she "chose" to use the Spanish word, perhaps because of the Spanish language context. If we look at the right-hand column of Table 1, which indicates which words the child had in her lexicon, but did not use in specific utterances in the Spanish context, we see that the majority of the words in that list are English (looking at types rather than tokens). This suggests that where she had a pair of equivalents in English and Spanish, she tended to choose the Spanish item in the Spanish language context. This generalization applies to the following pairs of equivalents:

taza, *cup*
zapato, *shoe*
agua, *water*
papá, *daddy*
manzana, *apple*
sí, *yes*
crema, *cream*
cuchara, *spoon*.

Exceptions to this generalization are the following pairs:

piso, *floor*
bola, *ball*
mamá, *mummy*
más, *more*

Table 1. *All mixed two-word utterances (types) occurring in the Spanish context between the ages of 1;7 and 1;9 (all utterances marked with an asterisk are from the audiovideo data; all others are from the diary data)*

No.	Age	Utterance	Gloss	Equivalents?
1	1;7.0	***pasa*** *gone*	raisin gone	,
2	1;7.0	*gone* ***pasa***	gone raisin	,
3	1;7.1	***más*** *juice*	more juice	*more*,
4	1;7.1	*juice* ***más***	juice more	,*more*
5	1;7.2	***mamá*** *hat*	mummy hat	*mummy*,
6	1;7.3	***más*** *juice*	more juice	*more*,
7	1;7.4	*gone* ***taza***	gone cup	,*cup*
8	1;7.4	***mamá*** *down*	mummy down	*mummy*,*silla*
9	1;7.5	***zapato*** *gone*	shoe gone	*shoe*,
10	1;7.5	***tapa*** *gone*	lid gone	,
11	1;7.5	*gone* ***tapa***	gone lid	,
12	1;7.6	*more* ***agua***	more water	*más*,*water*
13	1;7.7	*mummy* ***silla***	mummy chair	*mamá*,
14	1;7.7	***pasa*** *gone*	raisin gone	,
15	1;7.7	*more* ***pasa***	more raisin	*más*,
16	1;7.7	*sit down* ***galleta***	sit down biscuit	,
17	1;7.10	***mamá*** *gone*	mummy gone	*mummy*,
18	1;7.14	***papá*** *book*	daddy book	*daddy*,
19	1;7.14	***mamá*** *book*	mummy book	*mummy*,
20	1;7.15	*more* ***agua***	more water	*más*,*water*
21	1;7.15	***babero*** *off*	bib off	,
22	1;7.15	*off* ***babero***	off bib	,
23	1;7.16	*more* ***manzana***	more apple	*más*,*apple*
24	1;7.16	*banana* ***sí***	banana yes	,*yes*
25	1;7.16	***media*** *off*	sock off	,
26	1;7.16	*off* ***media***	off sock	,
27	1;7.19	***mamá*** *down*	mummy down	*mummy*,*silla*
28	1;7.22	*more* ***pasas***	more raisins	*más*,
29	1;7.22	*more* ***pasa***	more raisin	*más*,
30	1;7.23	*more* ***crema***	more cream	*más*,
31	1;7.23	***ropa*** *off*	clothes off	,
32	1;7.24	***mamá*** *clock*	mummy clock	*mummy*,
33	1;7.24	*banana* ***más***	banana more	,*more*
34	1;7.25	*more* ***crema***	more cream	*más*,
35	1;7.25	***crema*** *more*	cream more	,*más*
36	1;7.27	*more* ***fruta****	more fruit	*más*,
37	1;7.28	*more* ***leche***	more milk	*más*,
38	1;7.28	***leche*** *more*	milk more	,*más*
39	1;7.28	*oh dear* ***mamá***	oh dear mummy	,*mummy*
40	1:7.29	***leche*** *floor*	milk floor	,*piso*
41	1;7.29	***sí*** *woof*	yes dog	*yes*,
42	1;7.29	*oh dear* ***cama****	oh dear bed	,
43	1;7.30	*gone* ***pan***	gone bread	,
44	1;7.30	*more* ***pan***	more bread	*más*,
45	1;8.0	***dos*** *clock*	two clock	,
46	1;8.2	*more* ***manzana***	more apple	*más*,*apple*
47	1;8.2	*off* ***ropa***	off clothes	,
48	1;8.2	*more* ***pasa***	more raisin	*más*,
49	1;8.2	***pasa*** *more*	raisin more	,*más*
50	1;8.2	***mamá*** *book*	mummy book	*mummy*,
51	1;8.4	*hat* ***dos***	hat two	,
52	1;8.6	*more* ***crema***	more cream	*más*,*cream*
53	1;8.6	***galleta*** *more*	biscuit more	,*más*
54	1;8.7	*juice* ***manzana***	juice apple	,*apple*
55	1;8.11	***pan*** *more*	bread more	,*más*
56	1;8.11	*more* ***pan***	more bread	*más*,
57	1;8.12	***dos*** *ball**	two ball	,*bola*
58	1;8.13	***cuchara*** *floor*	spoon floor	*spoon*,*piso*
59	1;8.13	*mummy* ***ropa****	mummy clothes	*mamá*,
60	1;8.15	*oh dear* ***dos***	oh dear two	,
61	1;8.22	*ball* ***dos***	ball two	*bola*,

Table 2. *All mixed two-word utterances occurring in the English context between the ages of 1;7 and 1;9 (all utterances marked with an asterisk are from the audiovideo data; all others are from the diary data)*

No.	Age	Utterance	Gloss	Equivalents?
1	1;7.26	***más*** *banana**	more banana	*more*,
2	1;7.26	*more* ***galleta****	more biscuit	*más*,
3	1;8.10	***dos*** *frog*	two frog	,*sapo*
4	1;8.10	***dos*** *snow*	two snow	,*nieve*
5	1;8.16	*daddy* ***dos****	daddy two	*papá*,
6	1;8.16	***más*** *paper**	more paper	*more*,
7	1;8.23	*table* ***sí****	table yes	*mesa*, *yes*
8	1;8.23	***otros*** *tables**	other tables	*other*,*mesa*
9	1;8.24	***dos*** *clock*	two clock	,

The occurrence of *floor* in utterances 40 and 58 in Table 1 rather than the expected Spanish ***piso*** may be explained by the fact that whereas the English word *floor* had entered the lexicon at age 1;7.4, its equivalent ***piso*** had not entered until age 1;7.29. So for the child, ***piso*** may not have been so well-established in the lexicon as *floor* at age 1;7.29 when utterance 40 is produced, nor by age 1;8.13 when utterance 58 is produced. The occurrence of *ball* ([bɔ]) in utterance 57 at age 1;8.12 and utterance 61 at age 1;8.22 may be explained by the fact that whereas a word that was phonetically ambiguous between *ball* and ***bola*** had been established at age 1;3.9, a word recognizable as ***bola*** as opposed to *ball* had only appeared recently, at age 1;7.29. As for ***mamá***/*mummy,* there are ten examples in Table 1, of which eight are ***mamá*** and so match the Spanish context.

The clearest exception to the generalization that the child uses words which match the language context, however, is the pair: ***más***, *more*. In Table 1 we can see that ***más*** occurs in utterances 3, 4, 6 and 33, but *more*, which is the "wrong" word for the language context, occurs in many utterances: 12, 15, 20, 23, 28, 29, 30, 34, 35, 36, 37, 38, 44, 46, 48, 49, 52, 53, 55 and 56. It seems as if ***más*** and *more* are being used somewhat indiscriminately, despite the language context. Below we refer to such items as "acategorial" predicates. It may be that, unlike words belonging to lexical categories, these predicates have a non-language-specific status for the child.

We now turn to discussion of the mixed utterances produced by M in the English language context. These are given in Table 2. As we can see from the right-hand column of Table 2, the presence of the Spanish words in most of the mixed utterances can be accounted for by the fact that there was no English equivalent in the child's lexicon. This is true of the Spanish words ***galleta*** ("biscuit"), ***dos*** ("two") and ***sí*** ("yes"). The exception to this pattern is ***más***, which has already been discussed above. The words which do appear in the right-hand column of Table 2 are mainly Spanish (with the exception of *more*). We can thus make a generalization complementary to that made in relation to Table 1, that where the child had a pair of equivalents in English and Spanish, she tended to choose the English item in the English language context. The relevant pairs of equivalents are the following:

sapo, *frog*
nieve, *snow*
papá, *daddy*
mesa, *table*

As before, the exception to this pattern is the pair ***más***/*more*, since both appear in the English language context just as they did in the Spanish language context.

Overall, then, we have seen that mixed utterances in both the English and the Spanish context can mostly be attributed to the lack of a contextually appropriate lexical item in the child's vocabulary. (This generalization is supported by a quantitative analysis performed on two-word utterances in the audiovideo data only, and reported in Deuchar & Quay, to appear.) What the child seemed to be doing was selecting a contextually appropriate item where she could, and where it was not available, using what lexical resources she had available. Thus the existence of mixed utterances as such cannot be taken as evidence for a single initial syntactic system. The nature of the combinations in early two-word utterances, however, can be considered in both mixed and non-mixed utterances.

The syntax of early two-word utterances

In this section we shall attempt to describe the syntax of all two-word utterances used by the child, regardless of the source language of the words contained in the utterances. (The analysis is based on a total of just under 300 two-word utterances recorded in audiovideo and diary form, and listed in Appendix III of Deuchar & Quay, in preparation.) We start by using the framework proposed by Radford

(1988,1990), which was designed to account for two-word utterances in early child English. Radford argued that early two-word utterances could be analysed as "small clauses" made up of a subject and a predicate, or an NP and an XP, where XP can be NP, VP, AP or PP (these four being identified as "lexical categories"). This allows for early two-word utterances to be assigned the following possible structures: [NP NP], [NP VP], [NP AP] and [NP PP]. If we try to apply Radford's scheme to our data, the following examples of utterances between the ages of 1;7 and 1;9 appear to conform (the predicates are underlined):

hat off	[NP PP]	
tummy gone	[NP VP]	
woof car	[NP NP]	("dog car")
mamá ***bajar***	[NP VP]	("mummy down")
cuchara *floor*	[NP NP]	("spoon floor")
zapato *gone*	[NP VP]	("shoe gone")
media *off*	[NP PP]	("sock off")

In all of the above utterances both words can be assigned lexical categories. (We may note that *off* would be categorized as a preposition in Radford's schema, although Quirk, Greenbaum, Leech & Svartvik (1980, p. 1151) would classify it as a "prepositional adverb". In some ways its behaviour is more akin to that of the acategorial predicates to be discussed below than to other lexical categories.) However, we also found examples in our data which do not conform to Radford's schema. Some clauses have acategorial predicates or words which cannot be assigned a lexical category (NP, VP, AP or PP). Acategorial predicates are indicated with an X in the examples below:

more juice	[X NP]	(wanting more juice)
oh-dear book	[X NP]	(after dropping a book)
más ***pasa***	[X NP]	(wanting more raisins)
fruta sí	[NP X]	(liking fruit)
no spoon	[X NP]	(not wanting spoon in egg)
more ***galleta***	[X NP]	(wanting another biscuit)
more ***leche***	[X NP]	(requesting more milk)
leche *more*	[NP X]	(requesting more milk)

The Xs in the above correspond to words which appear to function as predicates in a predicate-argument structure. So *more* seems to mean something like "I want". *Oh-dear* indicates something having gone wrong, ***sí*** indicates approval and *no* here indicates not wanting something. (In other utterances *no* is also used to indicate non-existence.) Word order at this point is quite variable as in *more* ***leche*** ("more milk") and ***leche*** *more* ("milk more"), the latter order being different from that in both English and Spanish. Variation in order did not seem to correspond to a variation in meaning of any kind, as far as one can tell from the situation.

Radford (1990, pp. 70 1) finds *more* in his data juxtaposed with verbs, as in the examples *more read*, *more sing* and *more walk,* and suggests that *more* may be analysed as a verbal adjunct. However, in our data it appears in the early utterances juxtaposed with nouns rather than with verbs. Interestingly, Radford suggests that *more* might alternatively be analysed as a verb like *want.* This suggestion is presumably made on semantic grounds, and seems compatible with our analysis of *more* as a predicate. However, we would not classify *more* as a verb because we do not expect it to develop verb morphology, and for that reason consider it to be acategorial rather than belonging to a lexical category. Radford's approach to *no* (another acategorial predicate in our analysis) is similar in that he suggests analysing it either as a verbal adjunct or as a verb.

The examples of *no* in his data show it as appearing before verbs (as in *Kathryn no fix this*), but in longer utterances than our two-word ones where *no* appears juxtaposed with nouns. Our argument against *no* as a verbal adjunct or verb in the earliest two-word utterances would be the same as that against *more* as a verbal adjunct or verb. (More and no are of course quantifiers in adult English, but we assume that they are reanalysed as such once the child ceases to use them as acategorial predicates and has developed functional categories.) The differences between Radford's analyses and our own may possibly be due to the fact that his data do not necessarily include the very first two-word utterances produced by the children observed.

Thus early-two word utterances in our data can be described as having a rudimentary syntax consisting of the juxtaposition of two words, an argument and a predicate. Although an argument-predicate analysis applies to the majority of our early two-word utterances, there are also some utterances consisting of just a noun phrase made up of two nouns, such as for example, ***fruta lata*** ("fruit tin"), a phrase used by the child to refer to tinned fruit purée. While one of the nouns may in some utterances be considered to be a predicate as in the example ***cuchara*** *floor* ("spoon floor") cited earlier (utterance 58 in Table 1), where *floor* can be considered to be a locative, this is not always the case. In an utterance like ***fruta lata***, where one noun modifies the other, this noun phrase might best be treated as an argument without a predicate, or at any rate be considered to be equivalent in function to a one-word utterance consisting of a noun.

The argument-predicate analysis outlined above applies to early two-word utterances of all types: those made up of two Spanish words, of two English

words, and of one word from each language. Assuming that the earliest signs of syntax appear when there is word juxtaposition, we can say that these utterances show a single rudimentary syntax consisting of the juxtaposition of two words, an argument and a predicate. However, this is not the same as saying that the same syntactic system applies to "English" and "Spanish" utterances. First we must identify language-specific utterances.

Analysis of our data: addressing Version 2

In this section we shall report on our third analysis, of the emergence of morphological marking in multiword utterances from ages 1;8 to 2;3. We shall illustrate how language-specific utterances can be identified as morphological marking appears. This process of identification is a prerequisite for considering whether the syntax of Spanish and the syntax of English utterances is the same or different. In the case of the early two-word utterances, we did not consider it possible to identify the "language" of the utterance, given that lexical choices were limited. In these utterances there was also no evidence of language-specific co-occurrence restrictions. However, we suggest that this will appear in the form of language-specific morphology. As the child gets beyond the earliest two-word utterances, we can anticipate the appearance of morphological marking (or category-appropriate inflections) on nouns, verbs and adjectives. If English inflections are attached to English stems, and Spanish inflections to Spanish stems, then we can identify language-specific morphology. Only when this has been done can we investigate syntactic differentiation.

The criterion of word order is not helpful in our case, since not only is word order variable, as we have seen, but also, because English and Spanish are both SVO languages, the adult languages are fairly similar in word order. It is interesting to note that Köppe (1996) does find word order differences in the bilingual acquisition of French and German from about the age of 1;10; though the examples of utterances given do not seem to be from among the very earliest two-word utterances. However, the criterion of word order could clearly be used alongside that of morphological marking in studies of the bilingual acquisition of two languages with different basic word orders.

We can of course expect morphological marking to emerge gradually, and to be variable at the beginning. To identify an instance of morphological marking, we also need an instance of the "bare" form in our data. So for example, if *cows* were to appear only in this form, with an apparent plural marker, but not as the singular form *cow*, identification of the plural marker for this word could not be claimed.

The emergence of morphological marking from 1;8 to 2;3

In our data, the following combinations of stems and inflections are possible:

1) English stems with English inflections;
2) English stems with Spanish inflections;
3) English stems with Spanish *and* English inflections;
4) Spanish stems with Spanish inflections;
5) Spanish stems with English inflections;
6) Spanish stems with Spanish *and* English inflections.

If we find 1 and 4, we can establish that we have language-specific morphology and if the utterances are also non-mixed, we can then go on to consider the syntax of English and Spanish utterances. Patterns 1 and 4 are in fact what we find in our data, as we shall demonstrate below. The implications of the other patterns, if they had been found, will be discussed later.

Table 3 lists examples illustrating the gradual appearance of language-specific morphology from ages 1;8 to 2;3. At age 1;8, plural marking has begun to appear in utterance 1, ***dos patos*** ("two duck [plural]") and utterance 4, ***dos niños*** ("two child [plural]"). However, this is not yet uniformly produced when required, as utterances 2 and 3 were also found in the data: ***dos pato*** ("two duck") and ***dos niño*** ("two child"). Moreover, since plural marking is phonetically rather similar in English and Spanish, this cannot really tell us anything about the language-specificity (or otherwise) of morphological marking. The same argument applies to utterance 5, ***otros*** *tables* ("other[plural] tables"), which anyway as a mixed utterance cannot be used to establish language-specific morphology, as we suggested in the previous paragraph.

At age 1;9, the situation regarding plurals is similar except that plural marking is now appearing with numerals as in the following examples from Table 3:

6) *two tables*
7) *pictures* ***dos*** ("pictures two")
8) *two pictures*
9) ***dos bolas*** ("two ball[plural]")
10) ***seis gatos*** ("six cat[plural]")
12) *two arms*
16) ***dos caballos*** ("two horse[plural]")

There is also one example (no. 21 in Table 3) of the use of the singular numeral ***uno caballo*** ("one

Table 3. *Examples illustrating the gradual appearance of language-specific morphology*

Occurrence	Age	Utterance	Gloss
1	1:8.4	***dos patos***	two duck[plural]
2	1;8.4	***dos pato***	two duck
3	1;8.8	***dos niño***	two child
4	1;8.13	***dos niños***	two child[plural]
5	1:8.23	***otros*** *tables*	other[plural] tables
6	1;9.2	*two tables*	
7	1;9.2	*pictures* ***dos***	pictures two
8	1;9.2	*two pictures*	
9	1;9.5	***dos bolas***	two ball[plural]
10	1;9.5	***seis gatos***	six cat[plural]
11	1;9.6	*oh dear* ***zapatos***	oh dear shoe[plural]
12	1;9.7	*two arms*	
13	1;9.7	***dos*** *arm*	two arm
14	1;9.10	***no quiero***	no want[first person singular]
15	1;9.21	***mamá vamos***	mummy go[first person plural]
16	1;9.22	***dos caballos***	two horse[plural]
17	1;9.22	*off* ***zapato***	off shoe
18	1;9.25	M[child's name] ***cargar***	M carry[infinitive]
19	1;9.25	***más caballo***	more horse
20	1;9.25	***caballo más***	horse more
21	1;9.27	***uno caballo***	one masculine horse
22	1;10.1	M[child's name] ***toco***	M knock[first person singular]
23	1;10.2	*grandpa come*	
24	1;10.10	*grandpa doing*	
25	1;10.10	*granny doing*	
26	1;10.10	M[child's name] *do it*	
27	1;10.11	*mummy working*	
28	1;10.23	*Peter coming*	
29	1;10.24	***mamá come***	mummy eat[third person singular]
30	1;10.25	***zapato pone***	shoe put on[third person singular]
31	1;10.28	***papá come***	daddy eat[third person singular]
32	1;10.28	***panda come fruta***	panda eat[third person singular] fruit
33	1;10.29	***acabó gato***	finish[past third person singular] cat
34	1;11.3	M[child's name] ***camina***	M walk[third person singular]
35	1;11.3	M[child's name] *walk*	
36	1;11.5	M[child's name] *read it*	
37	1;11.7	M[child's name]'s *book*	
38	1;11.7	***aquí pasa***	here raisin
39	1;11.7	*off* ***zapato***	off shoe
40	1;11.12	*mummy reading book*	
41	1;11.12	***zapato rojo***	shoe red[masculine]
42	1;11.25	*daddy's key*	
43	1;11.25	M[child's name]'s *bath*	
44	1;11.25	M[child's name] ***sienta***	M sit[third person singular]
45	1;11.25	***mamá cansada***	mummy tired[feminine]
46	1;11.29	***muchas cosas***	much[feminine plural] thing[plural]
47	1;11.29	***mamá busca niña***	mummy look for[third person singular] girl
48	2;0.26	***una vela***	a[feminine] candle
49	2;0.26	***un papel***	a[masculine] paper
50	2;0.26	***en la baño***	in the[feminine] bath
51	2;0.26	***qué es eso?***	what is[third person singular] that?
52	2;0.26	***donde está mi libro?***	where is[third person singular] my book?
53	2;1.2	*find the other one*	
54	2;1.2	*that's* M[child's name]'s *bath*	
55	2;1.2	*that is water shower*	
56	2;1.29	*no want lie down*	
57	2;2.5	***perro no quiere***	dog no want
58	2;2.17	*more una torre arriba*	more a[feminine] tower up

[masculine] horse''). Again, however, such markings are not uniformly produced when required as both example 12, *two arms,* and example 13, ***dos** arm,* were uttered on the same day at 1;9.7. The production of ***no quiero*** (''no want[first-person-singular]'') (utterance 14) and ***mamá vamos*** (''mummy go[first-person-plural]'') (utterance 15) shows the possibility that language-specific verbal morphology is appearing, but the status of ***no quiero*** and ***mamá vamos*** is unclear as there are no other instances of these verbs recorded before this date. At 1;9.25, the use of the infinitive form of the verb indicates again the non-marking of morphology on the verb in utterance 18: M[child's name] ***cargar*** (''M carry [infinitive]'').

Note that at 1;9 we still find utterances of a similar type to those found among the earliest two-word utterances, such as the following, which consist of an acategorial predicate (underlined) and an argument:

11)	*oh-dear* ***zapatos***	(''oh-dear shoe[plural]'')	[X NP]
19)	***más caballo***	(''more horse'')	[X NP]
20)	***caballo más***	(''horse more'')	[NP X]

Utterances of this kind, however, are less numerous than between ages 1;7 and 1;9, but it is normal in child language for older structures to be only gradually replaced by newer structures.

At age 1;10, more examples can be found of morphological marking beginning to appear on verbs in both languages. The English ''-ing'' suffix is found, for instance, at 1;10.23 in example 28, *Peter coming*, in contrast with *grandpa come* in example 23 at 1;10.2. We may note that *coming* was in fact the earliest form of this word, recorded initially at age 1;7.10. Utterance 27, *mummy working,* is produced at 1;10.11, but no strong conclusions about the productive nature of this marking can be reached because there is no previously recorded occurrence of ''work'' in its bare form. The same argument applies to *doing* used in utterance 24, *grandpa doing,* and in utterance 25, *granny doing,* as we do not have a previously recorded occurrence of bare ''do''. However, *do-it* is produced on the same day in the same context in utterance 26: M[child's name] *do-it*. In spite of our uncertainty about the productive nature of the above morphological markings, the fact that several verbs with ''-ing'' suffixes are appearing this month suggests that this English morphological marker is beginning to emerge. More importantly, with regard to language-specific morphology, ''-ing'' does not appear as a suffix to any Spanish verbs in our data. At this point we can see the emergence of language-specific co-occurrence restrictions, such that morphological markers match the language of the stems to which they are attached and, in most cases, the language of the other word(s) in the utterance.

The Spanish verbs which *do* appear in our data seem to have appropriate Spanish morphological marking but it is not yet clear that verb morphology is productive since we do not have alternative forms of the verbs which occur, for example, in the following utterances from Table 3 at 1;10:

22)	M[child's name] ***toco***	(''M knock[first-person-singular]'')
29)	***mamá come***	(''mummy eat[third-person-singular]'')
30)	***zapato pone***	(''shoe put-on[third-person-singular]'')
32)	***papá come***	(''daddy eat[third-person-singular]'')
32)	***panda come fruta***	(''panda eat[third-person-singular] fruit'')
33)	***acabó gato***	(''finish[past-third-person-singular] cat'')

At age 1;11, we find a contrast between *read* and *reading* in utterance 36, M[child's name] *read it,* and in utterance 40, *mummy reading book,* but English verbs do not yet seem to have third person singular marking. As at age 1;10, there are some examples which show appropriate morphological marking for Spanish but there is no evidence of alternative forms in the examples below:

34)	M[child's name] ***camina***	(''M walk[third-person-singular]'')
44)	M[child's name] ***sienta***	(''M sit[third-person-singular]'')
47)	***mamá busca niña***	(''mummy look-for[third-person-singular] girl'')

Although there are no examples of third-person marking on English verbs, we do find the first examples at 1;11 of the possessive marking on nouns. The examples are:

37) M[child's name]'s *book*
42) *daddy's key*
43) M[child's name]'s *bath*

No such possessive marking appears on Spanish nouns recorded at 1;11, which suggests that this marking is specific to English words but a Spanish-specific process which we do find this month is adjective agreement:

41)	***zapato rojo***	(''shoe [masculine] red-[masculine]'')
45)	***mamá cansada***	(''mummy [feminine] tired-[feminine]'')
46)	***muchas cosas***	(''much[feminine-plural] thing[plural feminine]'')

In the utterances above, the plural marking on the adjective as well as on the noun occurs only in Spanish; plural marking of English adjectives is not found in any of the child's utterances.

By the time the child is aged two we have clear evidence of language-specific morphology. In addition, after the age of 1;10 we have noted only two examples with lexical items from the two languages: 39 (*off* ***zapato***) and 58 (*more* ***una torre arriba***). Both of these are similar to the predicate-argument constructions found predominantly between the ages of 1;7 and 1;9, but as mentioned earlier, it is common for older constructions to survive after newer ones have emerged in child language. Overall, however, utterances produced after the age of 1;10 are lexically and morphologically language-specific. We have thus identified a set of English and a set of Spanish utterances, and can go on to consider the evidence for language-specific syntax.

As indicated near the beginning of this paper, under the heading "When does syntax begin?" we use Crystal's (1980, p. 346) definition of syntax as "the inter-relationships between elements of sentence structure, and of the rules governing the arrangement of sentences in sequences". This definition is equivalent to what others call *morphosyntax,* defined for example by Peters (1995, p. 462) as "the totality of those devices which can be used to express grammatical relations". As we have already seen, the child in our case-study exhibits language-specific morphology by age 1;11, and we also have examples of appropriate word order in utterances 41 (***zapato rojo***) and 45 (***mamá cansada***) considered above, where the adjective follows the noun it modifies as in adult Spanish, rather than preceding it as it would in English.

If we look now at utterances which appear from age two onwards, we can see that almost all can be clearly identified as English or Spanish, and there are many clear instances of language-specific syntax. For example, the child appropriately produces the feminine indefinite article in Spanish in utterance 48, ***una vela*** ("a[feminine] candle"), and the masculine indefinite article in utterance 49, ***un papel*** ("a[masculine] paper"), and the definite article "la" in utterance 50, ***en la baño*** ("in the[feminine] bath [masculine]"), at the same age, albeit with the feminine instead of the masculine definite article. The English definite article "the" is also used at 2;1.2 in utterance 53, *find the other one*.

In English, the contracted and uncontracted versions of the verb "to be" can be found at age 2;1.2 in utterance 54, *that*'s M[child's name]'s *bath,* and in utterance 55, *that is water shower*. In Spanish, both verbs meaning "to be" ***estar*** and ***ser*** appear at 2;0.26 in utterance 51, ***qué es eso?*** ("what is[third-person-singular] that?"), and in utterance 52, ***donde está mi libro?*** ("where is[third-person-singular] my book?"). Contractions of the verb translated as "to be" do not occur in Spanish and are also not found in the child's data. This shows that the use of the verb *to be* in English and its equivalents in Spanish follows language-specific processes.

Thus we have seen that, in our data, utterances can be classified as either English or Spanish by the age of about age 1;11, on the basis of language-specific morphology. We were then able to go on and identify language-specific syntax, or two systems, in the utterances we analysed from ages 1;11 to 2;3.

However, what if our data had been different, and the morphology had turned out not necessarily to be language specific? Could we have addressed the question of one or two systems in the syntax? We shall consider this question by referring to other case studies.

Klausen, Subritzky and Hayashi (1993) reported on the cases of two Danish English developing bilinguals, Natasha and Gitte. Recordings began when the children were under one year old, and ended when they were about two years old. Gitte was found to use both Danish and English plural suffixes interchangeably on stems from both languages, leading the authors to suggest "that her inflectional system for plural marking is a compound system which consists of suffixes derived from both target languages" (Klausen et al. 1993, p. 77*)*. For those utterances which show "mixed" inflections, it would not be possible to identify the language of the utterance and so would not allow one to raise the question of one vs. two systems *for those utterances*. However, they may make up only a minority of the utterances in the data. Their exact extent is difficult to determine from the article, since only three examples of morphological "mixing" are given.

The second case reported on by Klausen et al. is that of Natasha, who was found to use Danish inflections on English stems as well as English inflections on English stems and Danish inflections on Danish stems, but not English inflections on Danish stems. Klausen et al. argue that, unlike Gitte, Natasha did not have a "compound syntax system" because the Danish and English inflections were not used in an interchangeable way. Again, we do not have quantitative information on the proportion of utterances with "mixed" inflections in the data, but it would certainly have been possible to identify the language of those utterances with nonmixed inflections. As for the mixed utterances, one would not want to argue for a mixed morphological system, since the Danish and English inflections were not

being used interchangeably by the child, but in two distinct ways.

Klausen et al. also reported on two Danish Japanese cases: Adam and Genki. Adam produced only language-specific inflections as in our case, so that identifying the language of the utterances and investigating the nature of the syntactic system(s) would not have been a problem. The data from Genki included only Danish inflections including just one "mixed" one, and so is difficult to interpret. It would not at this stage be possible to identify the language of his utterances using morphological criteria as we did in our case, but it is possible that word order criteria could have been applied. However, Klausen et al.'s focus is on morphology, so that this possibility is not explored.

Just as Klausen et al. found various patterns of stem-inflection combinations in the children they studied, Lanza (1997) also found different approaches by the two Norwegian English developing bilinguals she studied from just under age two. One of these, Tomas, did not "mix" inflections and stems, but the other, Siri, did. Siri's pattern of mixing seems to have been similar to that reported by Klausen et al. for Natasha, in that Norwegian inflections were found to combine with both Norwegian and English stems, whereas English inflections only combined with English stems. As in the case of Natasha, it would not have been possible to identify the language of Siri's mixed utterances using the criteria adopted in our study (cf., however, the criteria used by Myers-Scotton (1993, p. 3) for identifying the "matrix" language in adult code-switched utterances). However, it would be possible to say that English and Norwegian inflections in Siri's data were not interchangeable. Siri's corpus in any case contained a large number of non-mixed utterances, including language-specific morphology.

Thus if the patterns in our data had been similar to those of children who did produce morphologically mixed utterances, we would not have been able to identify the language of those utterances. However, if the child had also produced non-morphologically mixed utterances, the language of these could have been identified and the question of one or two syntactic systems raised.

Conclusion

In this paper we have pointed out that there are two versions of the question as to whether the developing bilingual has a single initial syntactic system. Taking Version 1, the question of whether early mixed utterances occur, we find that they do, but that their appearance can be attributed to limited lexical resources rather than to a single initial system. Without attempting to differentiate between "English", "Spanish" and "mixed utterances", we have then argued that a single rudimentary predicate-argument syntax was found for two-word utterances of all kinds. Then addressing Version 2, the question of whether the syntax of the set of utterances in one language is the same as the set of utterances in the other language, we have argued that the question can only be raised once language-specific morphology appears; after this point we find evidence for two syntactic systems in our data.

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