Bilingual Children's Lexical Development: Factors Affecting the Acquisition of Nouns and Verbs and Their Translation Equivalents

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1. Introduction

Bilingual children's early lexical development so far has been part of the ongoing debate whether children start out with one system (Volterra & Taeschner 1978) or whether they develop two separate systems from early on (De Houwer 1990, Meisel 1994). In relation to bilingual children's lexical development, the debate has centred on the occurrence of cross-language synonyms or translation equivalents. According to Clark's (1987) principle of contrast, each word in the lexicon of the monolingual child must have a distinct meaning and accordingly, synonyms of the same item are not accepted. If this principle also holds for bilingual acquisition, bilingual children should not accept translation equivalents. However, both Pearson et al. (1995) and Quay (1995) show that translation equivalents occur from very early on and in some cases, in close succession.

This finding is more in line with the separate system hypothesis, however, it raises wider issues on how bilingual children represent words in different language contexts to build up concepts of the words that they learn, whether they are able to link translation equivalents from early on and whether particular cross-language features facilitate early word learning.

Research on adult bilinguals has shown that particular groups of words and their translation equivalents have a closer relationship and are translated faster as a result. In particular, Kroll & Stewart (1994), Kroll & de Groot (1997) and van Hell & de Groot (1998) have shown that there is an effect of form similarity, such that nouns that are similar in sound and spelling are translated faster in both translation directions. This effect has been explained by the conceptual feature model (Kroll & De Groot 1997) which suggests that form similar words have a feature overlap in their conceptual representations in the two languages.

These findings have been found to be significant for bilingual children's developing representations. Schelletter (2002) reported on the early lexical development of nouns in a German/English bilingual child and also conducted a translation study with a group of school-age German/English bilingual children. Form similar nouns were found to be translated faster by the children and were also found to be more frequent among noun tokens used with a translation equivalent in the case study.

The present study addresses the question whether the previous findings on form similar nouns can be also be extended to the class of verbs. For verbs, form similarity should also result in a conceptual feature overlap between verbs and their translation equivalents, on the other hand, verbs have been found to be tied in more with grammar (Schelletter et al. 2001). This could affect the speed of translation of verbs, as well as the acquisition of early verbs.

2. Bilingual Case Study

2.1. Method

One female German/English bilingual child was observed from the age of 1;11 to 2;8 in German and 2;2 to 2;9 in English. Three sub-periods were identified: period 1 from 1;11 to 2;3, period 2 from 2;4 to 2;6 and period 3 from 2;7 to 2;9. Her language developed relatively late: at the beginning of the observation period, she was starting to put two words together. Spontaneous language samples were recorded fortnightly for about 45 minutes per session. No English samples were recorded at 2;4 and 2;5. The parents followed the 'one person one language principle' (Ronjat 1913). The father is a native English speaker and provided the English input, the mother is a native German speaker. The child has an older sister who is fluent in both languages. Input in both languages was judged to be about equal. An investigation of her early language development shows that she was ahead in German as far as her morphosyntactic development was concerned (Sinka & Schelletter 1998).

2.2. Results

The child's early use of lexical nouns and verbs in both languages is investigated in the observation period. The items are divided into those that are identical in form across the two languages (such as anglicisms in German), form-similar items, and non-similar items. In order for a noun or verb to be classed as form-similar, a criterion is adopted that requires 50 % or more of the phonemes making up the word and its translation equivalent to be similar. Form similarity implies that consonants share at least two of the three way label (place of articulation, manner of articulation, voiced/voiceless) and vowels differ minimally within the vowel classification. The order of phonemes within the word is also taken into consideration. For nouns, only count nouns are considered in the analysis. Figure 1 gives an overview of the noun and verb tokens used across the observation period for each language context. For the German context, the analysis includes 509 count nouns in the German context and 243 count nouns in the English context.

Figure 1: Distribution of nouns of different form similarity

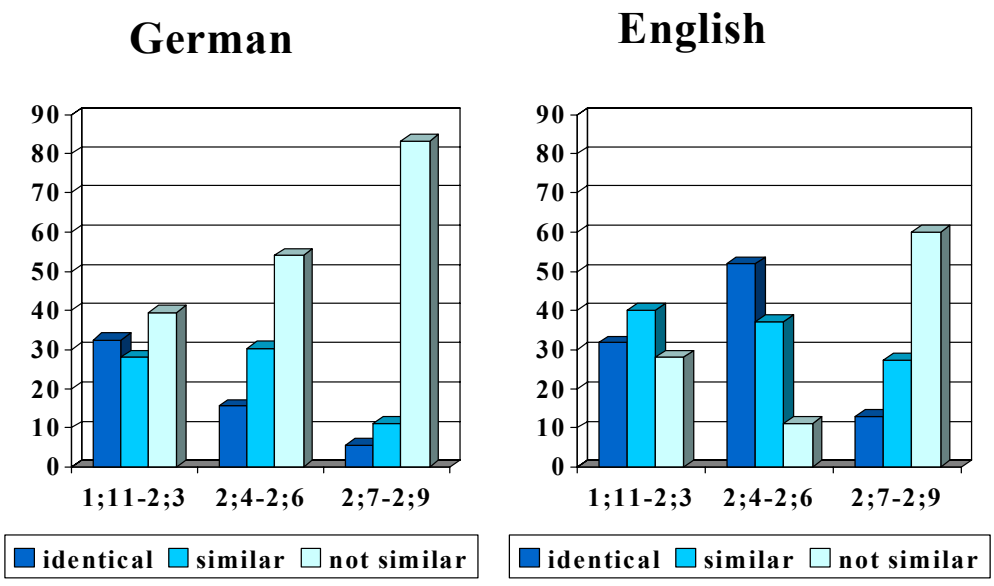


Figure 1 shows that nouns classed as identical occur as frequently as the other noun types in the first observation period, although there are few tokens. This changes for the German context for the remainder of the observation period where nouns that are not similar become the most frequent noun type. In the English context, identical and form-similar nouns are more frequent than not similar nouns in the second observation period but the picture becomes more similar to the German context for the last observation period. Figure 2 gives the distribution of verbs types in the same observation period. The analysis includes 781 verbs in the German context and 550 verbs in the English context, however, a large proportion of verbs used was the be verb (300 instances in German, 227 in English).

Figure 2: Distribution of verbs of different form similarity

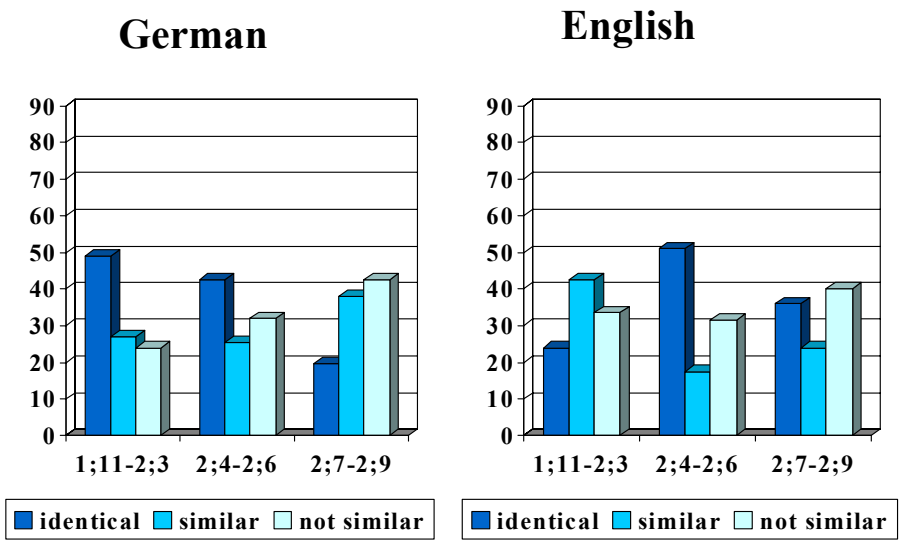


Figure 2 shows that the distribution of identical, form similar and not similar verbs remains similar during the observation period and for both language contexts. The high proportion of identical verbs was only due to the frequent occurrence of the be verb in both language contexts.

If form similarity is a strategy that the bilingual child utilises from early on to link a lexical item with its translation equivalent, then the effect should be seen in the distribution of translation equivalents for similar and not similar lexical items. Figures 3 and 4 give the percentage of similar and not similar noun and verb tokens with observed translation equivalents in both language contexts.

Figure 3: Percentage of similar and not similar nouns with and without observed translation equivalents

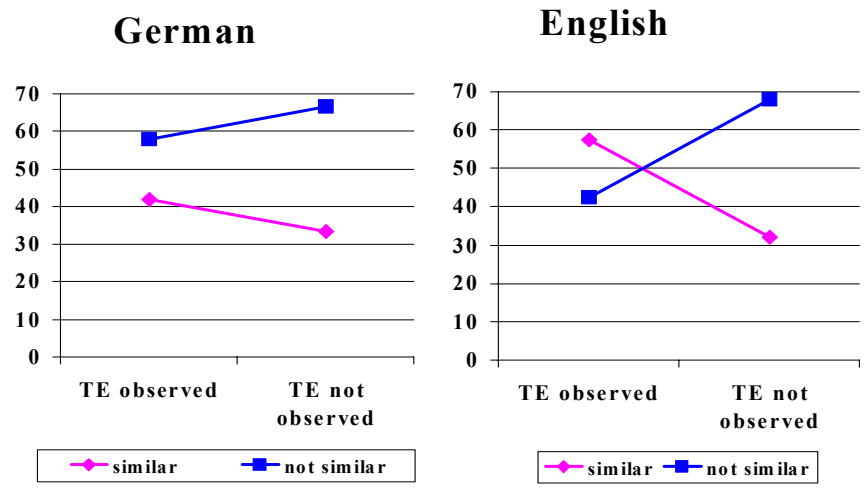
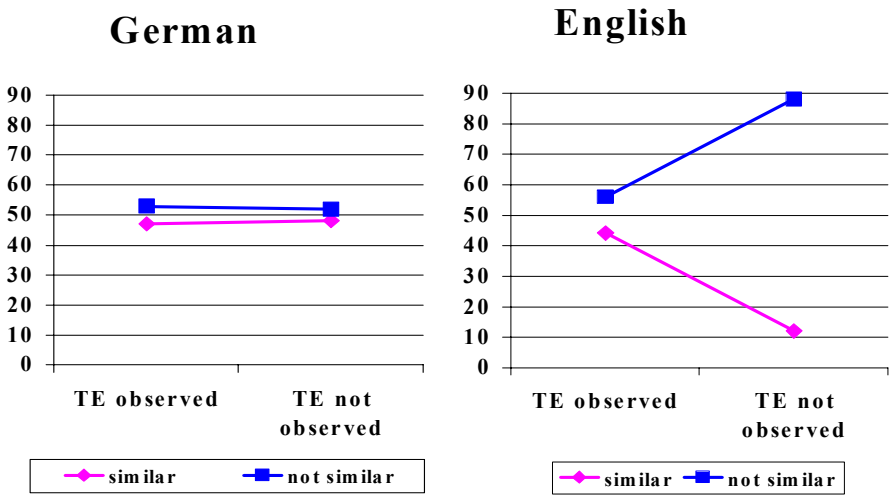


Figure 4: Percentage of similar and not similar verbs with and without observed translation equivalents



Figures 3 and 4 show that in the German context overall, there are more nouns and slightly more verbs that are not similar. While for verbs the tokens are distributed equally between items with observed translation equivalents and no observed translation equivalents (around 50 %), there is an effect for nouns whereby a lower percentage of similar nouns do not have observed translation equivalents (34 %) as opposed to observed translation equivalents (42 %), and vice versa for not similar nouns (67 % and 58 %). For the English context, this effect is much stronger and holds for both, nouns and verbs. For nouns, more similar nouns have observed translation equivalents (58 % versus 43 % for not similar nouns), whereas few similar nouns do not have observed translation equivalents (32 % versus 68 % for not similar nouns). For verbs, the percentage of similar and not

similar verbs with translation equivalents is quite similar (44 % and 56 %), however, there is quite a difference between the two categories for items where no translation equivalent is observed (12 % for similar nouns and 88 % for non-similar nouns).

From the results above it seems that form similarity does play in early lexical acquisition where the child acquires a language combination where this is available. In this case, it is more pronounced in the child's English as opposed to her German, and it affects noun acquisition more than verb acquisition. In order to assess bilingual children's developing lexicon further, a second study is described, involving German/English bilingual children of school-age.

3. Bilingual Translation Task

3.1. Method

The study includes 22 children aged 7 - 10 who all attended the primary section of the German school in Richmond in the UK (year 2 - 4). All children were judged by the teacher to be bilingual and have regular contact with both languages. There were 10 males and 12 females. The lexical level of the children was tested for both languages, using a productive vocabulary test for each language context. For English, the Renfrew Word Finding Vocabulary Test (Renfrew 1995) was used, for German, the Aktiver Wortschatztest (AWST, Kiese & Kozielski 1996) was employed. On the basis of the vocabulary test, the children were divided into a 'German dominant' group and an 'English dominant' group, depending on the language in which they achieved a higher percentage.

It was found that 13 children had a higher vocabulary level in German, and were therefore classed as German dominant (6 boys and 7 girls). On the other hand, 8 children had a higher English vocabulary level and were classed as English dominant (4 boys and 4 girls). One female child was able to name the same proportion of English and German vocabulary items and was excluded from the present analysis.

All subjects were presented with 18 spoken nouns and verbs for both language contexts. The items were presented on a MacIntosh Laptop using the Psyscope software (Cohen et al. 1993) and reaction times were measured in milliseconds on the basis of children's verbal responses via a button box. The nouns and verbs represented items that were commonly used and included 6 identical items, 6 similar items and 6 dissimilar items. Regarding form similarity, the same criterion was used as for study one.

3.2. Results

Children's translation latencies were measured for both, nouns and verbs, in both translation directions. Reaction times were only considered for correctly translated items and for values below 4000 ms. Figure 5 gives the results for nouns for the German dominant and English dominant groups.

Figure 5: Reaction times for similar and not similar nouns by language

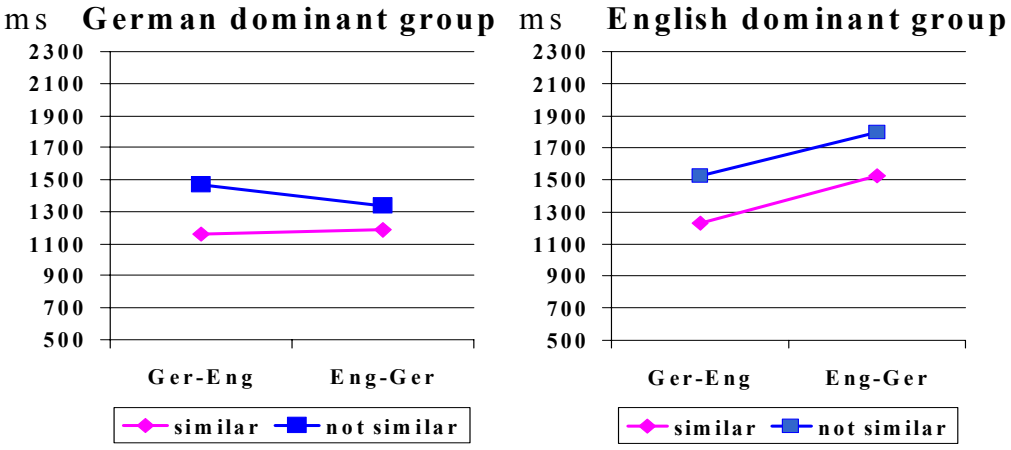


Figure 5 shows that for both groups, translation times for form similar nouns were lower than those for not similar nouns. A Wilcoxon signed ranks test comparing the two noun types and including both translation directions, shows that $Z = -3.36$, $p < 0.001$. The difference in reaction times between similar and non-similar nouns is therefore significant. In addition, figure 5 also shows an effect of language direction. The group of children classed as 'English dominant' were slower translating nouns into German than into English. A Wilcoxon signed ranks test comparing all nouns for both translation directions for the English dominant group shows that $Z = -2.15$, $p < 0.05$.

The finding that form similar nouns were translated faster is in line with previous findings on bilingual children (Schelletter 2002) and similar findings on adults (Kroll & Stewart 1994). The question to be addressed in this context was whether the findings for nouns also holds for verbs. Figure 6 gives the reaction times for verbs for both groups and in both translation directions.

Figure 6: Reaction times for similar and not similar verbs by language

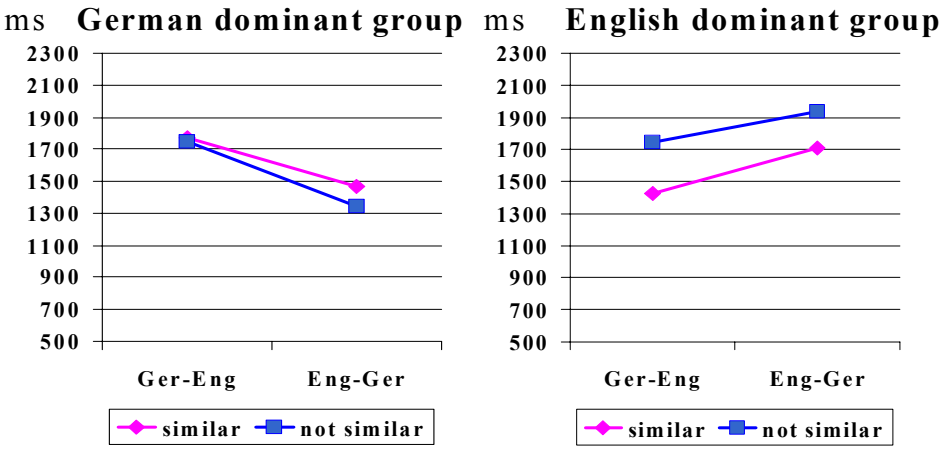


Figure 6 shows a difference in the pattern found for the two groups. For the German dominant group, there was no effect of form similarity for verbs. There was a slight but non-significant effect of translation direction, such that verbs were translated faster into German than into English. For the English dominant group, on the other hand, there was an effect of form similarity. A Wilcoxon signed ranks test comparing the two noun types for this group and including both translation directions, shows that $Z = -1.7$, $p < 0.05$. There was also an effect of translation direction, though this was not significant.

Comparing the translation of nouns and verbs for both groups, there was an effect whereby nouns were generally translated faster than verbs by both groups. The mean reaction time for both groups was 1359 ms for nouns and 1608 ms for verbs. A Wilcoxon singed ranks test comparing nouns and verbs for both groups together shows that $Z = -4.9$, $p < 0.001$. The difference in reaction times between nouns and verbs is therefore significant. On average, the children took 250 ms more to translate a verb.

Summarising, the analysis of the reaction time study shows a strong effect of form similarity for nouns for both groups included here, yet for verbs, the effect was weaker and only occurred in the English dominant group.

4. Discussion

The present study was conducted to investigate the lexical development of nouns and verbs in bilingual children in relation to their developing bilingual lexicon and in particular, to what extent bilingual children make use of strategies, such as form similarity, where this is available. The results presented here confirm the importance of form similarity in nouns, yet do not give a clear picture of the same pattern for verbs.

One reason for this finding could be due to the fact that verbs are tied more into the language-specific grammar. In this way, any feature overlap in the conceptual representation of form similar verbs, which would give a processing advantage, could be counterbalanced by the retrieval of the verb's argument structure. While this could explain the difference in reaction times between the translation of nouns and verbs in general, it would be necessary to compare form similar and non-similar verbs with the same argument structure to see whether this explanation is plausible.

Another factor to be taken into consideration here is not just the similarity of form, but also the similarity of meaning. Concrete count nouns by their very nature refer to perceptible objects. Given the language combination German/English, differences in the meanings between the concrete nouns used here and their translation equivalents are minimal. However, this is not the case for all verbs. The list of verbs used in the translation experiments is given in Appendix 1. This list includes, for example the verb 'make'. This verb has a form similar equivalent in German, 'machen'. However, there are discrepancies between the contexts where the two equivalents are used. For this reason, there is only a partial overlap in the meaning of 'make' and its German translation equivalent. These factors clearly play a role in the retrieval of a translation equivalent and need to be tightly controlled in order to determine to what extent effects of form similarity also exist for other word class types.

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Appendix 1

Nouns and verbs used in the translation study

	Nouns German - English	*Nouns English - German*
identical		
	grass	wind
	ship	house
	hamster	mouse
	shoe	bed
	tiger	bear
	ball	ring
similar		

	frog	lion
	paper	door
	sheep	cat
	bread	book
	foot	water
	soap	card
dissimilar		
	bag	chair
	dog	leg
	spoon	book
	head	cloud
	plate	cup
	leaf	duck

	Verbs German - English	*Verbs English - German*
identical		
	hear	drink
	fall	shine
	ride	sing
	sink	come
	find	wash
	jog	stink
similar		
	make	cook
	sweat	live
	build	blow
	dream	stand
	bake	eat
	lie	bleed
dissimilar		
	cough	talk
	catch	draw
	float	dive
	drive	play
	kneel	roar
	take	fetch