The size and composition of the productive holophrastic lexicon: German–Italian bilingual acquisition vs. Italian monolingual acquisition

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In the present study, the natural and simultaneous first language acquisition of a German–Italian bilingual boy and an Italian monolingual girl from 1;8 to 2;1 are analyzed and compared. The investigation focuses on the rate of acquisition and the size and composition of the productive lexicons. At the end of the observation period, the bilingual boy has acquired twice as many words as the monolingual child. The rate of acquisition of both children markedly increases (vocabulary spurt) after their lexicons have reached the size of 50 words. The data reveal a noun preference (noun bias) in the lexicons of the bilingual and the monolingual child. The comparison of the Italian lexicons of the bilingual child and of the monolingual child do not show striking differences regarding word categories. In both lexicons, common nouns, proper nouns, and onomatopoeic words are the most important word categories, whereas verbs play a marginal role.

Keywords: bilingual acquisition; simultaneous bilingualism; monolinguals; childhood bilingualism; early bilingualism

1. Introduction

Parents, teachers, but also child language researchers often ask how bilingual children compare with monolingual ones, especially with regards to lexical development. Starting with Pearson, Fernández, and Oller (1993), several studies have analyzed early word comprehension in bilinguals and monolinguals. According to these studies, there is no significant difference in the number of word meanings understood, whereas there is a difference in the number of words understood. In this respect, bilingual children have a considerable advantage: bilingual children know more words for the same number of meanings (De Houwer 2009, 206–9).

Comparative analyses of early bilingual and monolingual word production are scarcer, especially studies not involving English. This paper, which reports on the findings from a longitudinal study of a German–Italian bilingual boy and an Italian monolingual girl from 1;8 to 2;1 (Klammler 2006), has two principal aims. It examines the development of the German–Italian bilingual productive lexicon and the Italian monolingual productive lexicon during the one-word-stage and asks in particular whether there are signs of a sudden lexicon growth (vocabulary spurt) and a predominance of nouns (noun bias). Secondly, it compares the bilingual lexicon with the monolingual lexicon, focusing especially on the total numbers of

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productive words, the rate of monthly acquired words, and the composition of the two lexicons.

2. The early lexicon: quantitative issues

During the initial stage of monolingual lexical development, words are acquired as relatively constant and invariable units (Rothweiler and Meibauer 1999, 13). This first stage, which is characterized by a comparatively slow growth of the lexicon, is usually concluded at the end of the second year of life. English and German monolinguals normally produce at least 50 different words by the age of 2;0 (Junker and Stockman 2002, 383). In several monolinguals, this stage is followed by a period with a rapid growth of the lexicon, which has been called *vocabulary spurt* (Goldfield and Reznick 1990).

The vocabulary spurt is not a general property of early first language acquisition but should be regarded as a possible individual stage during lexicon acquisition.[1] According to Kauschke (1999, 132), it is characterized by a growth rate of at least 12 words per month and starts when the active lexicon reaches approximately 50 words. Goldfield and Reznick (1990, 181) note that the start of the vocabulary spurt may be stimulated by a better understanding of the relation between an object and its name. Other factors that are often cited as triggers for a sudden lexicon growth are an increase in nouns (Goldfield and Reznick 1990, 179–81), the child's improved ability to segment sound chains (Plunkett 1993, 57), and the development of phonological competence (Clark 1993, 28; Elsen 1999, 97–8).

A vocabulary spurt has also been observed in several cases of bilingual first language acquisition (De Houwer 2009, 223ff.), but we cannot yet affirm with certainty that the triggering factors cited above are also valid in bilingual first language acquisition. Porsché (1983, 90–91) observed a sudden word increase when his son reached the age of 1;11 and had a combined vocabulary of 66 words. We can make the assumption that a bilingual vocabulary spurt is possible when the combined lexicons reach the total amount of 50 words, thus leading to a mental reorganization of the lexical entries. Some of the factors cited above in connection with the monolingual vocabulary spurt could, however, delay a bilingual vocabulary spurt (Zangl 1998). For example, lexicon development would have to be postponed until the sound chains of both languages are successfully segmented and the competence in both phonological systems is sufficiently developed. The bilingual vocabulary spurt is therefore possible if several conditions are simultaneously satisfied at a given developmental stage.

The considerations above lead to the following research questions:

(1) Is there a quantitative difference between the bilingual and the monolingual productive lexicons?
(2) Do vocabulary spurts (= increases of at least 12 words per month) take place during the development of the bilingual lexicon and the monolingual lexicon (Kauschke 1999, 132)?
(3) If the answer to (2) is yes, do the vocabulary spurts start when the respective total lexicons have reached 50 productive words (Kauschke 1999, 132; compare also Marchman and Bates 1994)?

3. The early lexicon: word categories

Researchers are still unsure how children acquire knowledge about word classes. Rothweiler and Meibauer (1999, 15–9) assume that grammatical development is a fundamental precondition. A correct differentiation of word classes in the grammatical sense seems to be possible only after 2;0. Prior to this stage, the child's word classes are primarily based on semantic features (Bloom 2000, 208–12; De Houwer 2009, 215–6). As a consequence, it is more appropriate to speak of semantic word categories than of grammatical word classes in the first stages of lexicon acquisition (Clark 1993, 38; Kauschke 1999, 139).

Bloom, Tinker, and Margulis (1993, 445) propose the following six semantic word categories: person names, object names, relational words, social words, event words, and other words. Based on these categories and her own research, Kauschke (1999, 140) assigns the words of the early German monolingual lexicon to the following main categories:

- Nouns
- Verbs
- Adjectives
- Personal–social words
- Relational words
- Pronouns
- Function words
- Onomatopoeic words
- Other words

The word categories adopted in the present study are basically the same as those in Kauschke (1999, 140), with the exception of the category of nouns, which is further subdivided into common nouns and proper nouns. The latter category comprises names for persons and objects that can be assigned to both German and Italian (Nicoladis 1998, 108).

The first words mostly refer to objects, actions, or qualities that are observable in the immediate surroundings of the child (Bloom 2000, 191). Words for relations appear later than words for entities because they are less fundamental in early utterances and their meanings are more difficult to individuate and label. From a psychological viewpoint this seems plausible: relations require the presence of the entities they link; hence, entities have to be cognitively available before the relations between them (Gentner and Boroditsky 2009, 5). According to Apeltauer (1997, 49), action words are more complex to acquire than object words for a child under 2 years of age. Due to their permanence and stability, concepts of objects can be analyzed and understood earlier than concepts of changes of states and actions, which presuppose the cognitive ability to deal with the temporal dimension.

Notwithstanding the plausibility of the above-mentioned developmental pattern, the question of what category is acquired first, either nouns or verbs, has caused much debate. Studies that focus on the acquisition of English generally favor the view of a 'noun bias' in early child speech. Bates, Bretherton, and Snyder (1988, 110) affirm that early lexicon development moves from 'nouniness' to 'verbiness': during the first 6 or 7 months the child acquires mostly nouns, whereas afterwards the acquisition of other word categories starts to accelerate, especially that of verbs.

Marchman and Bates (1994, 350) also observe a preference for nouns, particularly with reference to the early English lexicon. Gleitman and Gleitman (2001, 81) confirm the tendency toward nouns in early lexicon acquisition, saying that initial nouniness is 'robust across individuals and across languages, and of great magnitude'. Interestingly, English-speaking children with language impairments have been found to use even more nouns (and less verbs) than mean length of utterance (MLU) or age-matched normally developing peers (Watkins, Rice, and Moltz 1993).

A noun bias has also been observed in languages other than English. Caselli et al. (1995) compare the early lexicons of Italian and English monolingual children. Italian and English assign different syntactic importance to the function of the verb: Italian is a pro-drop language whereas English is not. Nevertheless, the acquisition of the first 50–100 words follows similar patterns in both languages. Verbs begin to appear only when nouns represent stable components of the developing lexicons (Caselli et al. 1995, 180). Hence Caselli et al. (1995) argue that the noun bias must be due to a universal predisposition, rather than to the children's input, because the linguistic structure of Italian emphasizes verbs more than nouns.

However, several studies focusing on languages other than English shed doubts on this view. Camaioni and Longobardi (1995, 216–7) analyze individual lexical differences between monolingual Italian-speaking children and note that nouns play a less significant role in the active vocabulary than in the acquisition of English or German at comparable stages. Data from Korean (Choi and Gopnik 1995) and Mandarin (Tardif 1996) seem to indicate that many children learning these languages use more verbs than nouns in their early spontaneous speech.[2] According to Bassano, Maillochon, and Eme (1998), French children have acquired a remarkable number of function words at the age of two years, a strategy which meets the demands of an analytic language, such as French. Although Zangl (1998) observes that nouns in English and German are acquired before verbs, she explicitly emphasizes that this cannot be considered to be a universal tendency. Kauschke (1999, 152) also disproves the general assumption about a noun bias in the early lexicon. According to her results, the most frequently occurring word categories are relational words and personal–social words.

According to Tardif, Shatz, and Naigles (1997), input must be a crucial variable in the development of a noun bias or a verb bias. They compare English, Italian, and Mandarin child speech and adult-to-child speech. English and Italian children produce more nouns than verbs, and Mandarin children produce more verbs than nouns (Tardif, Shatz, and Naigles 1997, 550). English adult-to-child speech emphasizes nouns, whereas Mandarin adult-to-child speech emphasizes verbs; Italian adult-to-child speech falls between these two extremes (Tardif, Shatz, and Naigles 1997, 560).

Assuming that the early bilingual lexicon is in principle comparable to the early monolingual one (Romaine 1999, 251), we hypothesize that the word categories in the two lexicons develop as in monolingual speakers of the respective languages. However, as we said above, there is no complete agreement among researchers regarding the existence of a noun bias in the monolingual lexicon. Studies of bilingual children that address this issue are rare. At the age of 1;11, the English–German bilingual child observed by Porsché (1983, 99) had acquired more noun-like words than other words. Schwab (1999) analyzes the lexicons of an English–German bilingual child between 1;8 and 2;7 and observes a clear tendency toward nouns.

According to her findings, nouns represent the predominant word category in both languages (Schwab 1999, 96ff.).

Although the present study cannot give a definite answer to the question outlined above, it will provide new data that might lead to a better understanding of the issue. Therefore, we formulate two additional research questions:

(4) Do nouns constitute the predominant word category in both the bilingual and the monolingual productive lexicons?
(5) Do the Italian lexicon of the bilingual child and the Italian lexicon of the monolingual child display remarkable differences regarding word category proportions?

4. The study

The study examines the developing productive vocabulary of a German–Italian bilingual boy (MAN) from 1;8 to 2;1. His Italian data are compared with those of an Italian monolingual girl (DEL). The two children are of almost identical age (with the difference of one day) and live in families with very similar socioeconomic backgrounds. MAN and DEL are the only children of their respective parents.

MAN lives with his Austrian mother and his Italian father in Naples and from birth has been exposed to German and Italian in accordance with the *one-person-one-language* practice. Once a year, the family travels to Austria and stays with the Austrian grandparents for two–three weeks. The five-month observation period includes one of these stays in Austria. Figure 1 gives an overview of the distribution of MAN's average weekly input.

The lexical development of the two children is documented by two separate data collections: parental lexicon diaries and regular recordings of spontaneous speech.
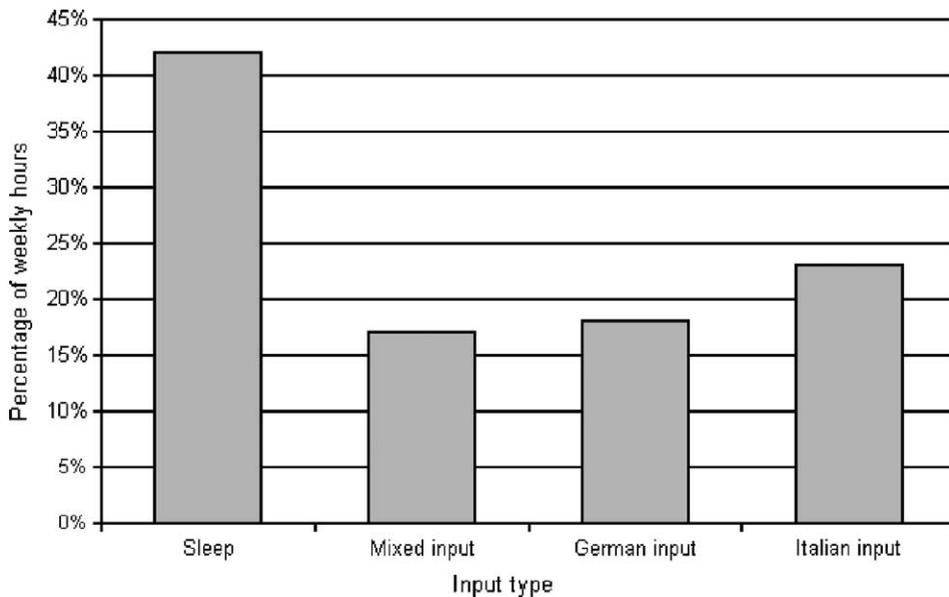

Figure 1.   MAN's average weekly input.

During the observation period, the parents registered the new words produced and other relevant observations in a lexicon diary. In addition, the children were recorded throughout the observation period for 15–20 minutes at home in an informal play setting – MAN twice a month (one recording per language) and DEL once a month. One of the parents and a researcher were present at the recordings. In the case of the bilingual child, the recordings were conducted as monolingually as possible, i.e. either only with the German-speaking mother or only with the Italian-speaking father. The 15 recordings were transcribed according to the CHAT-format developed by the *Child Language Data Exchange System* (CHILDES; MacWhinney 2000) and analyzed with the CLAN-program. The audio files and the transcripts can be downloaded from the CHILDES database (http://childes.psy.cmu.edu/). The parental lexicon diaries combined with the regular recordings ensure a documentation of the progressing vocabularies without major gaps. During the recordings, new words were added to the diaries and the consistency of those already registered was checked. The parents of both children were extremely collaborative and willing to go into great detail in conducting the data collections.

MLU in words of the recordings was calculated with the CLAN-program. In MAN's German recordings, it varies between a minimum of 1.016 in the first month of observation and a maximum of 1.266 in the fourth month. In MAN's Italian recordings, it varies between a minimum of 1.000 in the first two months of observation and a maximum of 1.127 in the fourth month. In DEL's recordings, the MLU starts from 1.000 in the first two months and reaches a maximum of 1.062 in the fourth month. All recordings of the fifth month of observation display lower MLUs. This may be due to the fact that these recordings took place after a pause of 4 weeks in which both children had not seen the researcher, and they had to regain their usual confidence. However, even the highest MLUs reached by the two children (MAN German 1.266; MAN Italian 1.127; and DEL 1.062) are comparatively low. The monolingual Italian children studied by Camaioni and Longobardi (1995, 209) reached an average MLU of 1.26 at the age of 1;8.

Vocabulary checklists, such as the *MacArthur communicative development inventories* (CDI; Fenson et al. 1993, 2006) or the *Language Development Survey* (LDS; Rescorla 1989) are used in monolingual and also in bilingual child language acquisition research. However, discordant opinions regarding their reliability deterred us from using vocabulary checklists as exclusive data collection tools, although with hindsight we acknowledge that it would have been advantageous to have used one of them in addition to the other two data collection methods. In some respect, the LDS is superior to the CDI because it does not restrict the words to a predefined list (Junker and Stockman 2002, 383), but the LDS is less comprehensively normed (Pearson 1998, 353). Despite being called *inventory*, even the long form of the vocabulary checklist on the CDI does not represent an exhaustive inventory, but only a sample. There are many everyday words that are not included (Pearson 1998, 354). This actually means that the CDI cannot show the precise number of words a child knows (De Houwer 2009, 73; De Houwer, Bornstein, and De Coster 2006, 343; Lanvers 1999, 48). Gentner and Boroditsky (2009, 24) observe that the checklist method may inhibit the registration of proper nouns unless parents are encouraged to provide them. An additional disadvantage of vocabulary checklists is the fact that neither the frequency of words and word categories nor the actual context of words can be determined (Kauschke 1999, 136). Being intended as screening tools, these checklists are more appropriate for large-scale cross-sectional

studies than single-case-studies (Kauschke 1999, 136; Lanvers 1999, 48). Vocabulary checklists (and parental records in general) need to be combined with direct observation of speech production (Junker and Stockman 2002, 392). In fact, in our case, it was often only possible through the recordings to find the correct interpretations of the children's words. Furthermore, it is problematic to compare CDI percentile scores obtained from a bilingual sample with those obtained from a monolingual sample (De Houwer 2009, 74). Pearson (1998, 367–8) recommends not to use monolingual norms for bilingual children and even expresses doubts that valid norming for bilingual children can ever be achieved.

   The words registered in the diaries and during the recordings are listed in a lexicon database. In order to be included, the entries have to satisfy the word definition criteria proposed by Kauschke (1999, 138–9), that is, they have to exhibit phonetic consistency, have a meaning, and be used in a plausible context. An adult-like phonological level of production is not a necessary criterion as long as the word has phonetic stability and a constant referential relation (Junker and Stockman 2002, 387). Onomatopoeic words and proper names are counted as words (Junker and Stockman 2002, 387). In connection with onomatopoeic words, we noted several cases of overextension. For instance, at the age of 2;1, MAN used *brrm* both in German and Italian for 'helicopter', 'train', and 'truck', which were registered as three different words. Words with completely distinct meanings (homonyms), e.g. *bi* for 'penguin' and for the personal name *Gabi*, also count as separate entries. As in Deuchar and Quay (2000, 53), direct imitations of adult language words are not listed in the lexicon database.

   For the identification of translation equivalents (or cross-linguistic synonyms), we draw upon the definition proposed in De Houwer (1990, 42):

> [...] if a child used form A with interlocutor X in situation H1 and used form B with interlocutor Y in situation H2, with form A unequivocally belonging to language A and form B to language B, and situation H1 being the same as situation H2, except for the time at which each takes place, then the child could be credited with an 'equivalent' pair.

Basically, the same approach is taken in De Houwer (2009, 193, 231). Lanvers (1999, 39) adopts a similar definition. Deuchar and Quay (2000, 53) and Quay (1995, 378) also affirm that equivalents are interchangeable words from two different languages that refer to the same object, event, or process; however, they observe that total cross-linguistic synonymy does not exist.

5. Quantitative analysis

5.1. MAN's bilingual lexicon

MAN acquires an average of 25.25 words per month. The total size of his vocabulary develops in the following way:

1;9	81 words
1;10	110 words
1;11	138 words
2;0	63 words
2;1	182 words

For the analysis, MAN's bilingual lexicon was divided into the following groups: German words, interlingual words, Italian words, and onomatopoeic words. The group of interlingual words comprises proper nouns and words that have the same phonological form in both adult languages or words that the child produces identically in both languages (e.g. German *na* and Italian *na* for 'banana'). Figure 2 shows how the proportions of the four groups change throughout the development of the lexicon and also contains the monthly numbers of the four groups.

Although the absolute values of interlingual words and onomatopoeic words continue to increase throughout the observation period, their proportions of the entire lexicon actually decrease, as MAN improves his articulatory and phonetic competences and starts to distinguish between the two languages. The percentage of German words increases considerably, almost doubling its proportion to 30% at the end of the period of observation. The Italian lexicon, on the other hand, develops slowly and reaches only 12% of the entire vocabulary at 2;1. This is surprising insofar as the proportion of Italian in MAN's language exposure time is considerably higher than 12%: on average, MAN is exposed to Italian 23% of his weekly time and to German only 18% of his weekly time (see Figure 1). Hence, a more balanced rate of German words vs. Italian words could be expected. David and Wei's (2008, 611) longitudinal study of 13 English–French bilingual children reports a significant correlation between the amount of time of language exposure and vocabulary size.

Figure 3 summarizes the growth of the entire lexicon and of the four groups of German words, interlingual words, Italian words, and onomatopoeic words. The continuous line, representing the growth of the entire bilingual lexicon, rises steadily, displaying only a slight flattening toward the end of the observation period.
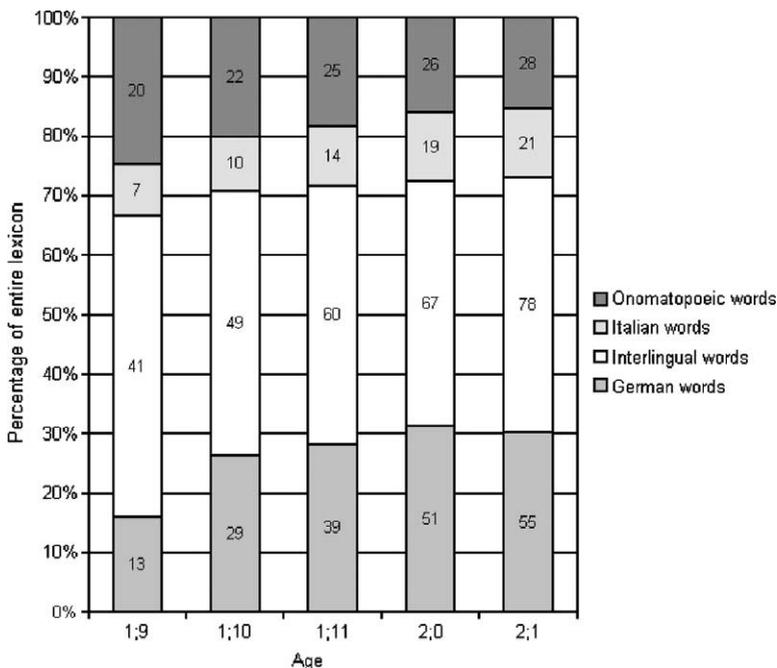

Figure 2.   The development of MAN's lexicon.

As we said before, Kauschke (1999, 132) defines 'vocabulary spurt' as a growth rate that reaches at least 12 words per month. According to Kauschke's definition, MAN's vocabulary growth actually constitutes a spurt, which is not apparent in Figure 3 because there are no data available for the periods before 1;8 and after 2;1. We can assume that the slight bend at the end of the observation period indicates the conclusion of the vocabulary spurt.

MAN's lexical development satisfies Kauschke's (1999, 132) criteria for the bilingual vocabulary spurt. The combined vocabulary surpasses the critical amount of 50 words at the start of the observation period. The child shows his developed language awareness by recognizing that his mother and his father use different words for the same concepts and by using translation equivalents (Junker and Stockman 2002, 391). MAN compensates for his still low level of phonological competence by using predominantly monosyllabic words. As we will see below, the monthly profiles of the composition of his lexicon point to a clear preference for common nouns and proper nouns. This result is in line with the noun bias reported by Goldfield and Reznick (1990, 179) regarding monolingual children with a vocabulary spurt.

Between 1;8 and 2;1 MAN acquires the following nine pairs of translation equivalents (= 18 words), whose members can unambiguously be assigned to either German or Italian:

(1) M.Germ.[3] *cht* (1;9), M.Ital. *otto* (1;9) 'eight'
(2) M.Germ. *füf* (1;9), M.Ital. *sci* (1;9) 'five'
(3) M.Germ. *aa* (1;10), M.Ital. *api* (1;10) 'to open, open'
(4) M.Germ. *nu* (1;10), M.Ital. *pa* (1;9) 'pasta'
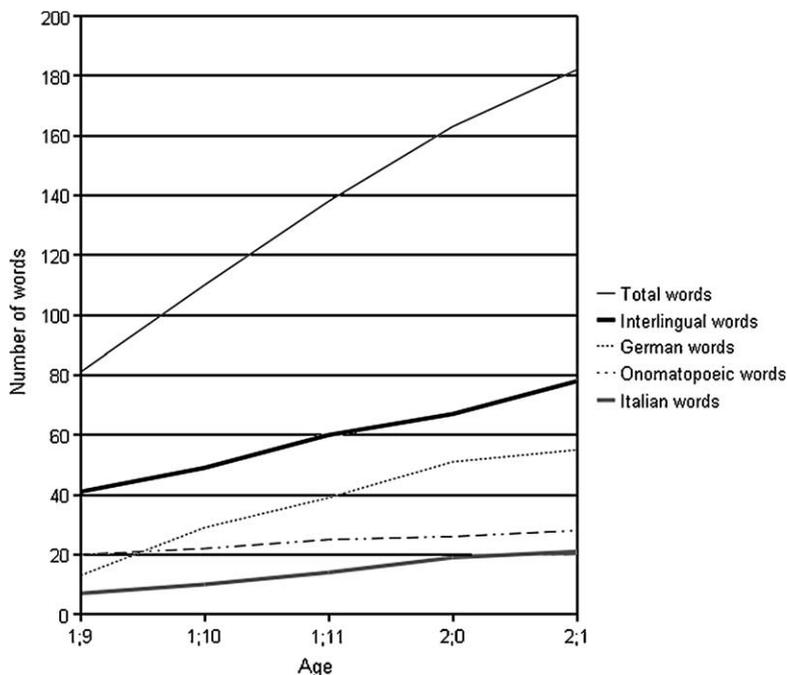

Figure 3.   The growth of MAN's lexicon.

    (5) M.Germ. *tschu* (1;11), M.Ital. *papa* (1;9) 'shoe'
    (6) M.Germ. *ja* (1;9), M.Ital. *sì* (1;11) 'yes'
    (7) M.Germ. *da* (1;10), M.Ital. *wua* (2;0) 'here, there'
    (8) M.Germ. *mea* (2;0), M.Ital. *ma* (2;0) 'sea'
    (9) M.Germ. *udu* (2;0), M.Ital. *tschu* (2;0) 'below, down'

Words with the same phonological form in both adult languages or words that the child produces (almost) identically in both languages (e.g. M.Germ. *na* and M.Ital. *na* for 'banana') are not classified as translation equivalents (cf. De Houwer, Bornstein, and De Coster 2006, 337; Lanvers 1999, 38–9), but as interlingual words. They may become equivalents later on after a process of phonological differentiation. According to his mother's account, MAN produced the first words at the age of 0;10. Hence, 11 months passed before the child learned the first cross-linguistic synonyms. Moreover, the child's vocabulary surpasses 50 words before the first equivalents start to appear.

5.2. DEL's monolingual lexicon

DEL's lexicon contains 23 words at 1;9 and reaches 81 words at 2;1. She thus acquires an average of 14.5 words per month. The word totals develop in the following way:

1;9   23 words
1;10   34 words
1;11   45 words
2;0   59 words
2;1   81 words

Between 1;9 and 1;11, DEL's vocabulary grows rather slowly. DEL frequently uses *agiu* or *giu*, a word invented by herself, for all objects whose names are yet unknown to her. At the age of 2;0, this placeholder disappears and lexical growth starts to accelerate. Starting from this point in time, DEL acquires twice as many words as in the period before. As can be seen in Figure 4, the size of the lexicon increases rather slowly until 2;0, when the growth line bends upwards, showing an acceleration. This is probably due to the fact that at the age of 2;0 DEL passes the 50-word limit, which triggers a vocabulary spurt.

    Between 1;9 and 1;11, the child learns 11 words per month, which is slightly below the value of at least 12 words per month that Kauschke (1999, 132) considers necessary for a vocabulary spurt. In the following two months DEL increases her lexicon by 14 and 22 words, respectively. These values indicate the beginning of a vocabulary spurt. After passing the 50-word limit, DEL begins to expand the proportion of nouns, that is, the acceleration in DEL's lexical growth toward the end of the observation period is related to the acquisition of nouns, as reported by Goldfield and Reznick (1990, 179) for monolingual children.

    Summing up, at the age of 2;0 DEL satisfies the conditions for a vocabulary spurt. She masters more than 50 words and acquires more than 12 words per month. This process is accompanied by remarkable progress in her articulatory competences; e.g. she no longer avoids *s + consonant* or *consonant + s* and uses words, such as D.Ital. *scola* 'school' (Ital. *scuola*) or D.Ital. *alsiza* 'sausage' (Ital. *salsiccia*).
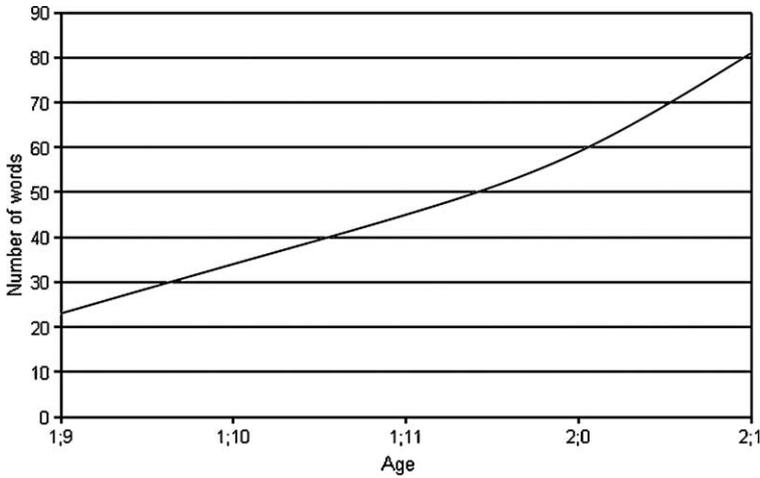
Figure 4.   The growth of DEL's lexicon.

5.3. Comparison of MAN's bilingual and DEL's monolingual lexicons

Figure 5 compares the monthly sizes of MAN's and DEL's lexicons. The comparison is based on MAN's bilingual lexicon, that is, including both languages as well as translation equivalents.

   During the entire observation period DEL's lexicon amounts to less than half the size of MAN's lexicon. Hence, our data do not confirm Taeschner's (1983, 56) hypothesis that a bilingual lexicon without translation equivalents is smaller than a comparable monolingual lexicon. Even without the nine pairs of equivalents ($=18$ words), MAN's lexicon would be considerably larger than DEL's.
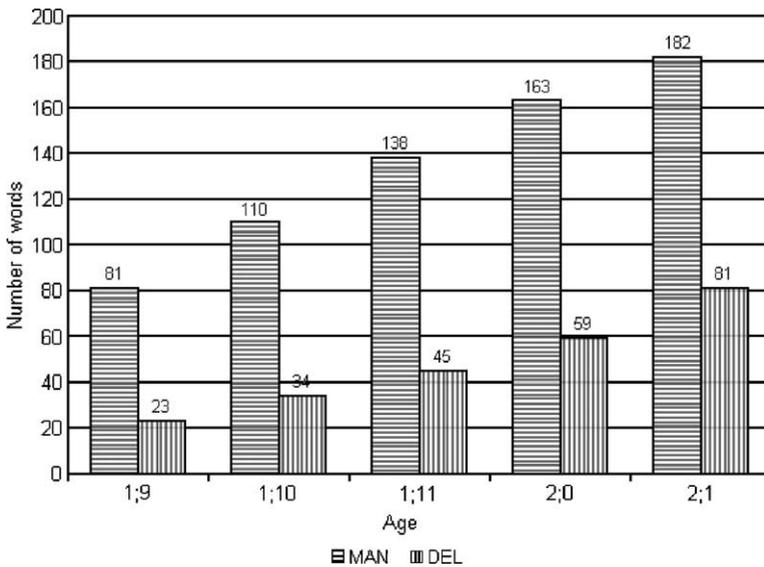

Figure 5.   Comparison of MAN's and DEL's lexicon sizes.

MAN passes the 50-word limit before 1;9, whereas DEL does not reach this important developmental point until 2;0. At 2;1 DEL masters 81 words. Now the monolingual child's lexicon is exactly the size of the bilingual child's lexicon at the beginning of the observation period. At that time, MAN's lexicon is 101 words larger than DEL's.

6. Analysis of the word categories

Based on Kauschke's (1999, 140) word categories, we now examine the proportions of the different categories in MAN's and DEL's early lexicons throughout the observation period.

6.1. MAN's bilingual lexicon

Figure 6, representing the proportions of common nouns and proper nouns compared to all other word categories, evidences the predominant position of nouns throughout the entire observation period. In the monthly profiles, no other category reaches the proportions attained by the combined categories of common nouns and proper nouns. Hence, there can be no doubt about a predominance of nouns in MAN's bilingual lexicon. Note that, as suggested by Gentner and Boroditsky (2009, 24), proper nouns and common nouns are both included within the category of nouns.

Table 1 gives the word numbers for each category and age. The 95 common nouns that MAN masters at the age of 2;1 comprise 46 interlingual words, 35 German, and
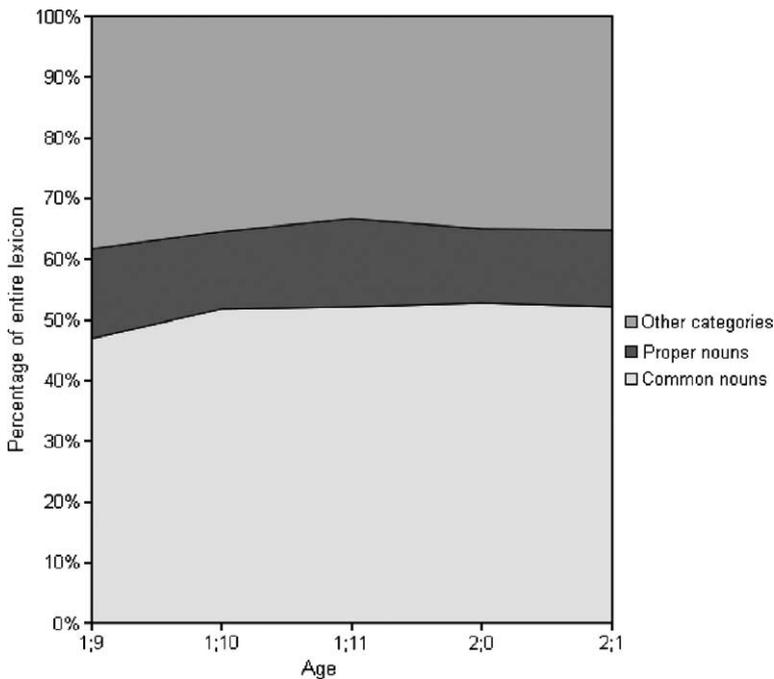

Figure 6.   Proportion of nouns in MAN's lexicon.

Table 1. Word categories in MAN's lexicon.

	Age				
Word categories	1;9	1;10	1;11	2;0	2;1
Common nouns	38	57	72	86	95
Proper nouns	12	14	20	20	23
Verbs		2	2	3	3
Adjectives	7	7	8	10	14
Personal–social words	1	1	4	7	8
Relational words	1	5	5	8	8
Pronouns				1	1
Function words	1	1	1	1	1
Onomatopoeic words	20	22	25	26	28
Other words	1	1	1	1	1
Total words	81	110	138	163	182

14 Italian ones. At the end of the observation time, the child has mastered only three verbs (two German and one Italian).

6.2. DEL's monolingual lexicon

Figure 7 shows the proportions of common nouns and proper nouns compared to all other word categories in DEL's lexicon. The girl's monolingual lexicon is also characterized by the predominance of nouns throughout the entire observation period. The proportion of nouns, however, is not as overwhelming as in MAN's lexicon; especially common nouns play a minor role. Until the age of 2;0, the
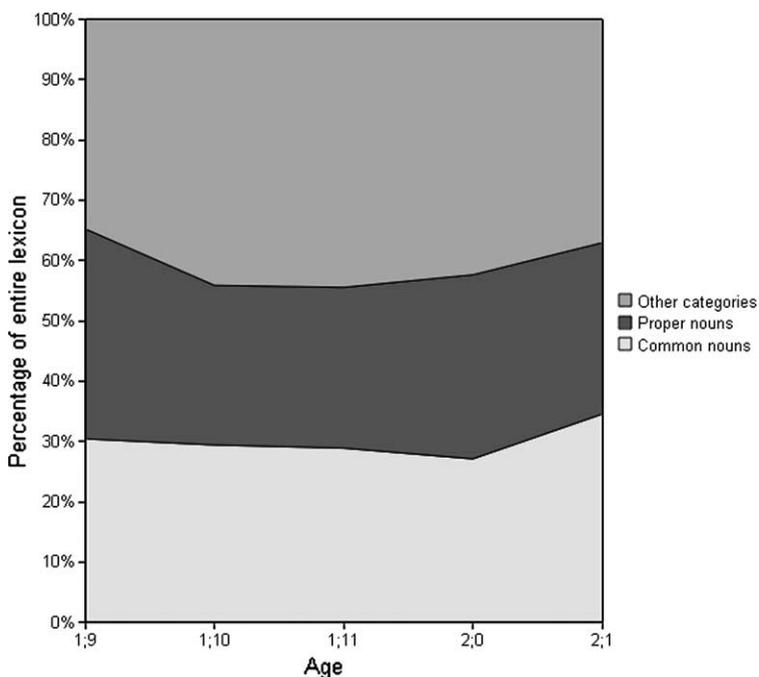

Figure 7. Proportion of nouns in DEL's lexicon.

Table 2. Word categories in DEL's lexicon.

Word categories			Age		
	1;9	1;10	1;11	2;0	2;1
Common nouns	7	10	13	16	28
Proper nouns	8	9	12	18	23
Verbs	1	1	1	2	2
Adjectives	1	1	3	4	6
Personal–social words	2	3	4	5	5
Relational words		1	1	1	3
Pronouns				1	1
Function words			1	1	1
Onomatopoeic words	4	9	10	11	12
Other words					
Total words	23	34	45	59	81

percentage of common nouns never exceeds 30% of the entire lexicon. After DEL passes the 50-word limit, the percentage of common nouns rises to approximately 36%. DEL's noun bias is not as pronounced as MAN's, but we should not forget that DEL's vocabulary growth is slightly slower than MAN's. In quantitative terms, MAN's vocabulary is ahead of DEL's by about four months.

Table 2 gives the word numbers for each category and age. At the age of 2;1, DEL uses as many proper nouns as MAN. The verbal category remains relatively marginal in DEL's lexicon. At the end of the observation time, the child has mastered only two verbs.

6.3. Comparison of MAN's and DEL's Italian lexicons

Table 3 basically has the same structure as Table 1 but leaves aside all German words from MAN's vocabulary. The comparative analysis of Tables 3 (MAN's Italian lexicon) and 2 (DEL's lexicon) shows a substantial similarity. In both lexicons, common nouns, proper nouns, and onomatopoeic words are the most important word categories, whereas verbs play a marginal role. Figure 8 shows the percentages of common nouns, proper nouns, and onomatopoeic words compared to the other

Table 3. Word categories in MAN's Italian lexicon.

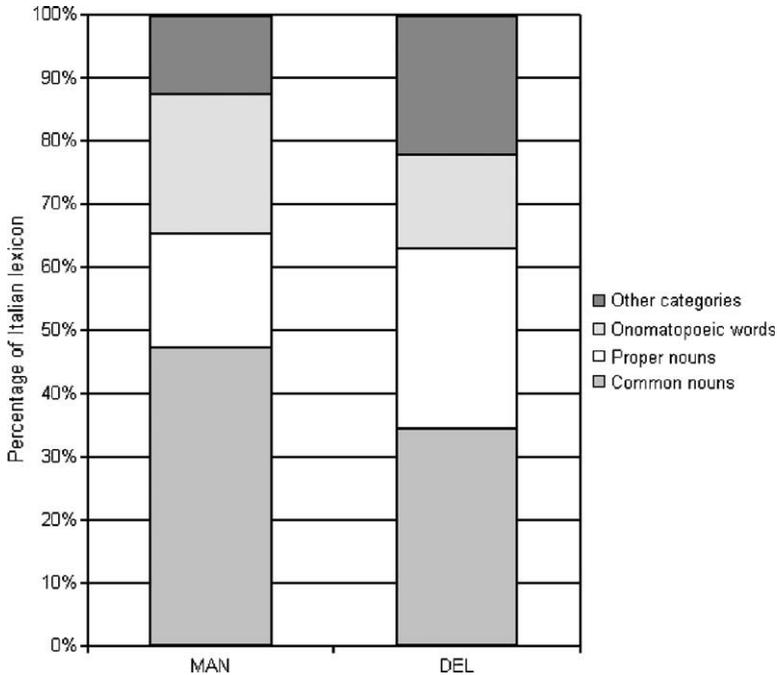| Word categories			Age		
	1;9	1;10	1;11	2;0	2;1
Common nouns	31	38	44	52	60
Proper nouns	12	14	20	20	23
Verbs		1	1	1	1
Adjectives	2	2	3	3	5
Personal–social words			2	3	3
Relational words	1	2	2	4	4
Pronouns				1	1
Function words	1	1	1	1	1
Onomatopoeic words	20	22	25	26	28
Other words	1	1	1	1	1
Total words	68	81	99	112	127

Figure 8.   Proportion of nouns in MAN's and DEL's Italian lexicons.

word categories in MAN's and DEL's Italian lexicons at the age of 2;1 (the end of the observation period).

In both lexicons, the combined percentages of common nouns and proper nouns at the age of 2;1 are over 60%, thus indicating a clear preference for nouns in general. However, in MAN's Italian lexicon the proportion of common nouns is considerably higher, reaching almost 50%, whereas in DEL's lexicon the proportion of common nouns is under 40% and in general the relation between the categories is slightly more balanced.

7. Results

Now we are in a position to answer the research questions formulated in Sections 2 and 3:

(1) At the age of 2;1, the bilingual child's (MAN) productive vocabulary comprises 182 words (55 German, 78 interlingual, 21 Italian, and 28 onomatopoeic words). Eighteen of these words are translation equivalents. Throughout the 5 months of the study, MAN adds 101 words to his vocabulary. DEL, the Italian monolingual child, increases her productive vocabulary from 23 words at the age of 1;9 to 81 words at 2;1 (with 12 onomatopoeic words). Hence, in relation to the first research question, we can affirm that there is a quantitative difference between the bilingual and the monolingual lexicons. As we will explain in Section 8, we attribute this difference to the distinct acquisition strategies of the two children.

(2) MAN adds 25.25 words per month on average to his lexicon, the lowest increase being 19 words during the last month of observation. According to Kauschke's (1999, 132) criteria, an increase of 12 words or more per month is to be considered as a vocabulary spurt. Until the age of 1;11, DEL's lexicon grows slowly, at a rate of 11 words per month. In the following 2 months, DEL increases her lexicon by 14 and 22 words, respectively. Starting from this point in time, we can speak of a vocabulary spurt.

(3) At the age of 1;9, MAN already knows 81 words, whereas DEL's lexicon passes the 50-word limit between 1;11 and 2;0. In both children, the vocabulary spurts take place when the respective total lexicons have reached 50 productive words.

(4) The proportion of nouns in MAN's lexicon is always over 60%. Even without proper nouns this proportion remains very high. At the age of 1;9, the percentage of common nouns in MAN's vocabulary is 47% and at 2;1 it reaches 51%. The percentage of verbs never surpasses 2%. The proportion of nouns in DEL's lexicon varies between 56% and 65%. During the first 4 months of the observation period, the percentage of common nouns in DEL's Italian monolingual lexicon remains at approximately 30%. In the last month, the percentage of common nouns rises to 36%. At the end of the observation time, the child has mastered only two verbs. Hence, in DEL's lexicon a noun bias can also be recognized; however, it is less pronounced, especially if we take only common nouns into account.

(5) Finally, we asked if the early Italian lexicons of the bilingual child and of the monolingual child displayed remarkable differences regarding word category proportions. The comparison of MAN's Italian lexicon with DEL's shows a considerable similarity. In both lexicons, common nouns, proper nouns, and onomatopoeic words are the most important word categories, whereas verbs play a marginal role.

8. Discussion

On the face of it and without a detailed qualitative analysis, it could be concluded that DEL's language competence is underdeveloped. Moreover, according to several studies, girls develop their lexicon faster and earlier than boys under the age of two (David and Wei 2008, 600, 609–10; De Houwer 2009, 224). However, as emphasized by many authors (e.g. Camaioni and Longobardi 1995; David and Wei 2008, 607; De Houwer 2009, 226; Romaine 1999, 259–60), huge individual differences in vocabulary size are normal, in early monolinguals as well as in early bilinguals. It seems that the two children have adopted different strategies during their lexicon acquisition: MAN could be called a quantitative learner and DEL a qualitative learner. MAN increases his vocabulary faster than DEL, but more than 40% of his words are monosyllabic, as, e.g. M.Ital. *pa* 'pasta' (Ital. *pasta*) or M.Germ. *to* 'potato' (Germ. *Kartoffel*). Only approximately 7% of DEL's vocabulary, on the other hand, contains monosyllabic words. The monolingual girl commands a smaller amount of words, but these are phonologically more complex, as, e.g. D.Ital. *fricio* 'tooth paste' (Ital. *dentifricio*) acquired at 1;9. Moreover, whereas MAN's vocabulary growth slows down at the end of the observation period, this is the time when DEL starts to accelerate the acquisition of new words.

We want to underline that the lexicon growths of MAN and DEL are only partly in line with the data given in Bloom (2000). According to Bloom (2000, 44), the lexicon increases as follows in monolingual language acquisition at the ages relevant for our study:

1;0–1;4	0.3 words per day
1;4–1;11	0.8 words per day
1;11–2;6	1.6 words per day

Between 1;9 and 1;11 MAN's lexicon grows by 57 words, i.e. by an average of 0.93 words per day. Between 1;11 and 2;1 MAN's lexicon grows more slowly, adding 44 words, i.e. an average of 0.72 words per day. Between 1;9 and 1;11 the monolingual girl adds only 22 words to her lexicon, i.e. an average of 0.36 words per day, whereas lexicon growth accelerates in the following 2 months, adding 36 words, i.e. an average of 0.59 words per day. The form of DEL's lexicon growth – slow until 1;11, fast afterwards – is as predicted by Bloom (2000, 44), though its values are not.

In this paper, we adopt Kauschke's (1999, 132) definition regarding the vocabulary spurt of monolingual German children. A growth of 12 words per month (Kauschke 1999, 132) means a growth of approximately 0.4 words per day. Bloom's (2000, 44) data suggest a much faster lexicon growth, which starting from 1;4 would be a vocabulary spurt in Kauschke's (1999) terms.

The proportions of nouns, i.e. common nouns and proper nouns, in MAN's and DEL's lexicons are always over 50%; both lexicons are characterized by a clear noun bias. In our analysis, we considered the entire lexicons of MAN and DEL at different ages. Another approach to the noun vs. verb issue could be to measure only the newly acquired words (Gentner and Boroditsky 2009, 24). However, in our case the noun preference would be even stronger: 67% of the words that MAN acquires between 1;9 and 2;1 are nouns; 62% of the words that DEL acquires between 1;9 and 2;1 are nouns.

Although the presence or absence of translation equivalents is not at stake in the present study, we have to make a comment on the low percentage of equivalents in MAN's lexicon. According to the literature overview in Lanvers (1999, 34), most bilingual children have more words with equivalents than without on their second birthday. Similarly, the English–German child observed by Lanvers (1999, 43), from the age of 1;8 onwards, knows more words with equivalents than without. In our data these values are never attained since MAN's entire bilingual lexicon comprises only nine pairs of cross-linguistic synonyms (=18 words), which amount to approximately 10% of the lexicon.

Besides individual variation (David and Wei 2008, 608ff.), a reason for this difference could be the substantial phonological and lexical distance between German and Italian. According to Schelletter (2002, 96), form-similar nouns make up 38% of all the noun types in English and German. Schelletter's (2002) study of the lexical development of an English–German bilingual child revealed that form-similar nouns are more likely to have translation equivalents. Junker and Stockman (2002, 392) also suggest that similarity between languages might facilitate the retention and recall of cross-linguistic synonyms. However, in her longitudinal study of two German–Italian bilingual children, Taeschner (1983, 33) registers a proportion of translation equivalents (a relation of 1;2 between equivalents and newly acquired words) which is much higher than the proportion reached by MAN.

According to Pearson, Fernández, and Oller (1995, 355), the proportion of translation equivalents possibly depends on overall lexicon size: children with vocabulary sizes of over 500 words in their sample were reported to produce almost twice as many translation equivalents as the children with smaller vocabularies. In Junker and Stockman's (2002) study, the child with the largest total vocabulary produced the largest proportion of equivalents. All children, however, had translation equivalents in their vocabularies.

MAN's low proportion of translation equivalents also contradicts David and Wei's (2008, 612) findings in their longitudinal study of 13 English–French bilingual children aged between 1;0 and 3;0. They conclude that the more balanced a child's language exposure is, the more likely the child is to have translation equivalents in its lexicon. We have seen, however, that MAN's language exposure is balanced (see Figure 1), but not the proportions of German words and Italian words in his lexicon (see Figures 2 and 3).

Notes

1. Bloom (2000, 35, 39–43) denies the existence of a vocabulary spurt altogether and calls it a 'myth'.
2. For studies on Korean and Mandarin arriving at very different conclusions see Gentner and Boroditsky (2009, 21–2).
3. Throughout the article the following language abbreviations are used: M.Germ., MAN's German; M.Ital., MAN's Italian; D.Ital., DEL's Italian; Germ., Standard German; and Ital., Standard Italian.

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