HOW DO GERMAN-SPANISH BILINGUAL CHILDREN ASK *WH*-QUESTIONS IN THEIR TWO LANGUAGES?

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ABSTRACT

This paper analyzes the production of *wh*-questions by German-Spanish bilingual children, and compares it to the monolingual production of the same question type. Both monolinguals and bilinguals have acquired the intonation targets at the age of 3;0, but the bilinguals' scaling and alignment of the first peak show non-target-like results. Moreover, whereas the target languages present a final falling boundary tone, bilinguals and German monolinguals prefer a rising boundary tone.

Keywords: L1 acquisition, bilinguals, f0, intonation targets, *wh*-questions, *yes/no*-questions

1. INTRODUCTION

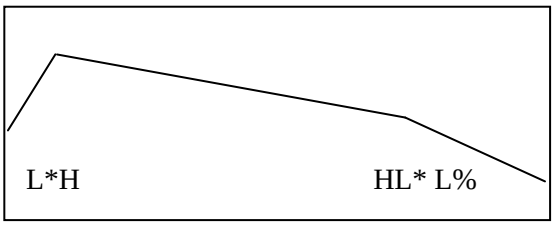
In recent years the AM-model of intonation has established itself as a reliable means for describing the intonation of many languages, among them, German (see e.g. [4]) and Spanish (see e.g. [15]). The theoretical foundation for the analysis are pitch accents and boundary tones (BT), which are formalized by the ToBI system, already available for many languages (see the German ToBI in [5], and the Spanish ToBI in [2]).

The AM-model has also been applied to L1 and L2 acquisition. In this article we are concerned with L1 acquisition. The focus of the study will be the acquisition of *wh*-questions (i.e. partial questions) in German and Spanish by children exposed to both languages from birth. There have been some studies on the acquisition of intonation in monolingual and bilingual children (see section 1.4 below), but to our knowledge no publications on partial questions are yet available. By comparing the intonation of bilinguals' *wh*-questions with that of monolinguals', and with the target language, we will be able to determine the degree of prosodic autonomy of the two languages of the bilingual child.

1.1. The intonation of *wh*-questions: German

Wh-questions are preceded by a w-word in German: *wer* 'who', *was* 'what', *wann* 'when', *wo* 'where', *wie* 'how', *warum* 'why'. These words are generally aligned with the first peak of the utterance, which is higher than in declaratives. Because most question words are monosyllabic, the peak occurs very early in the utterance. After that, f0 falls down to the nuclear stressed syllable, which is aligned with a low tone. From that point to the end of the utterance, f0 continues falling. This contour, generally interpreted as the neutral one, is expressed by means of the pitch accents and boundary tones schematized in Fig. 1 (see [5]). According to some descriptions (see [6, 7]), *wh*-questions in German can also end with a rising slope; these are interpreted as not being neutral, but as introducing some pragmatic meaning, like e.g. surprise.

Figure 1: Schematized representation of (neutral) *wh*-question intonation in German.

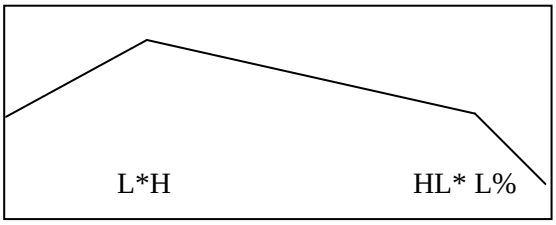


1.2. The intonation of *wh*-questions: Spanish

Partial questions are preceded by a *qu*-word in Spanish: *quién* 'who', *qué* 'what', *cuál* 'which one', *cuándo* 'when', *cómo* 'how', *por qué* 'why', as well as *dónde* 'where'. The intonation targets are similar to the German ones. After the first peak on the *qu*-word, f0 falls. Most of the interrogative words are disyllabic, in which case the peak is aligned with the second syllable, occurring thus later than in German. The nuclear pitch accent is low. From there on, f0 keeps on falling down to the end. The nuclear stress generally appears later in Spanish than in German, because the complement, which is the bearer of stress, follows

the verb in Spanish (VO). In German, the complement precedes the verb (OV), and the final slope begins earlier. This contour, generally interpreted as the neutral one in Spanish, is expressed by means of the pitch accents and boundary tones schematized in Fig. 2. According to most descriptions (see e.g. [11, 16]), *wh*-questions in Spanish can also have a rising slope at the end; in this case, the question involves kindness, surprise, or other non-neutral pragmatic nuances.

Figure 2: Schematized representation of (neutral) *wh*-question intonation in Spanish.



1.3. German vs. Spanish *wh*-questions

The intonation of *wh*-questions has much in common in the two languages. The initial and medial pitch accents can be represented in the same way, and so can the final BT. However, there are differences of scaling and alignment: the first H is higher and later in Spanish than in German, which means that the initial slope is shorter and shallower in German than in Spanish, whereas the final slope is shorter and steeper in Spanish than in German.

1.4. Research on L1 acquisition of intonation

The last decade has witnessed much work on the acquisition of intonation in L1, especially on declaratives and *yes/no*-questions, as well as on very early stages of speech production. Some authors consider intonation already acquired, when the child begins to produce his/her first words (see [12], and an overview in [14]). Other authors are more cautious, and assume that the child must be able to combine words, before intonation is on place. For instance, Chen, Fikkert [1], as well as Lleó, Rakow [8] have found that at about age 2;0 children still have difficulties with pre-nuclear pitch accents.

Some of the studies carried out on L1 intonation have focused on the comparison of the two languages of bilingual children. Lleó, Kehoe, Rakow [10] deal with the simultaneous acquisition of German and Spanish; they found that at 3;0 monolinguals have already acquired the pre-nuclear delayed peak of Spanish, but bilinguals have not yet. Regarding the acquisition of interrogative intonation, *yes/no*-questions have been dealt with e.g. in [9]. (See [3], as well, for *yes/no*-questions in target Spanish.) Results on bilingual acquisition show a certain delay in some areas, and a tendency to extend some aspects of one language into the other language, too.

The acquisition of *wh*-questions has rather been analyzed from a syntactic point of view, whereas their intonation has not been dealt with. For instance, Serrat, Capdevila [13] have observed that in Spanish the first *wh*-questions to be produced at about 2;0 years of age are those headed by *qué* and *dónde*. In the following months, *quién* and *cómo* appear, and at about 2;6 *por qué* and *cuándo*. They also note that the first *wh*-questions to appear are *qué es?* and *dónde está?*. At the age of 3;0 here studied, all *wh*-questions should already have been acquired. In our data we have found that the most frequent questions in Spanish are: *¿(en) dónde está X?, ¿qué es X?*, and in German: *was ist X?*, and *wo ist X?*.

1.5. Research questions

Given the similarities and differences between the intonation of *wh*-questions in German and Spanish, we set out to answer the following research questions: a) Are the three main targets—first pre-nuclear peak, nuclear low, and final fall—produced at 3;0? b) Is a final rise produced in pragmatically marked contexts? c) Do bilinguals differentiate their two languages at the left edge, i.e. do they produce the first peak later and higher in Spanish than in German? d) Do bilinguals differentiate their two languages on the right edge, i.e. is the final slope steeper in Spanish than in German? e) Are the bilingual productions different from the monolingual productions in the corresponding language?

Answers to (a) and (b) will illustrate the stage of acquisition of a given child, whereas answers to (c), (d) and (e) refer to bilingual acquisition, i.e. they will provide information on the degree of prosodic autonomy of the two languages of the bilingual child.

2. METHOD

2.1. Subjects

All *wh*-questions spontaneously produced at the age of 3;0 by three German-Spanish bilinguals (Jens, Manuel and Simon) growing up in Hamburg

were selected for analysis. With the purpose of comparing bilingual to monolingual production, the *wh*- questions produced at the same age by three German monolingual children (Britta, Marion, Thomas) and by two Spanish monolingual children (María, Miguel) were selected, too. The duration of each utterance was normalized to one second. A total of 136 utterances were acoustically analyzed. Table 1 summarizes the sets of utterances considered for analysis.

Table 1: Numbers of analyzed utterances (tokens).

German bilingual	Spanish bilingual	German monolingual	Spanish monolingual
31	30	55	20

2.2. Data analysis

The data were measured acoustically at the following points (see tables 2 to 4 for reference): a) F0 in semitones (ST) at the beginning of the utterance, at the initial H, at the nuclear L, and at the end of the utterance. b) The initial slope was measured with regard to length (1st slope in sec) and number of ST (1st slope in ST). c) In the final slope the proportion of ST pro second (2nd slope: ST/sec) was measured.

3. RESULTS

3.1. Bilingual results

Tables 2 and 3 show the results of the measurements for the three bilingual children of the study, in German and Spanish, respectively. Unfortunately, one child, Jens, did not produce any analyzable *wh*-questions in German. With regard to the initial slope, there is a difference between the two languages: Manuel and Simon produce the 1st slope steeper in German than in Spanish, Simon's initial H rising 3.5 ST in German, and only 2.2 ST in Spanish. These results are non-target-like.

With regard to the final slope, the tables show a falling slope, with negative values (indicated by an arrow looking down) and a rising slope, with positive values (indicated by an arrow looking up). Children produce both, a falling and a rising slope, but the numbers underneath the arrows indicate that unexpectedly there are more utterances with rising slope than with falling slope. Manuel's falling slope is much steeper in Spanish than in German, whereas Simon's slope is much steeper in German than in Spanish. Jens' falling slope in Spanish is like Manuel's. Both Manuel's and Simon's rising slopes are steeper in Spanish than in German. Jens' rising slope in Spanish is extremely steep, but this is only based on 2 tokens, and no German data are available for comparison.

Table 2: Results of measurements in German for the three bilingual children at age 3;0.

GE	1st slope in sec	1st slope in ST	2nd slope: ST/sec	↓	2nd slope: ST/sec	↑
Jens	--	--	--	--	--	--
Manuel	**0.101**	**1.5**	**-11.8**	5	**17.1**	15
Simon	**0.103**	**3.5**	**-23.9**	5	**14.5**	6

Table 3: Results of measurements in Spanish for the three bilingual children at age 3;0.

SP	1st slope in sec	1st slope in ST	2nd slope: ST/sec	↓	2nd slope: ST/sec	↑
Jens	**0.058**	**1.06**	**-21.5**	5	**45.3**	2
Manuel	**0.096**	**0.88**	**-21.7**	5	**20.7**	8
Simon	**0.140**	**2.21**	**-14.3**	2	**25.4**	8

3.2. Comparing bilinguals vs. monolinguals

In order to find out whether the tendencies of the bilinguals' results coincide with those of the monolinguals', the measurements of spontaneous *wh*-questions produced by three German monolingual children and two Spanish monolingual children are shown in table 4.

Table 4: Results of measurements for three monolingual German and two monolingual Spanish children at age 3;0.

GE	1st slope in sec	1st slope in ST	2nd slope: ST/sec	↓	2nd slope: ST/sec	↑
Britta	**0.060**	**0.42**	**-8.5**	3	**20.8**	15
Marion	**0.116**	**1.98**	**-13.6**	5	**18.3**	17
Thomas	**0.115**	**1.78**	**-8.3**	1	**17.2**	14
SP						
María	**0.125**	**0.88**	**-7.2**	5	--	--
Miguel	**0.258**	**3.3**	**-15.8**	13	**3.8**	2

The results for the initial H show that the Spanish child Miguel has the largest difference in ST and the largest distance in sec, from begin of the utterance to H. Miguel's final slope is preferably falling, and it is the steepest of all. Thus, Miguel's data are target-like, and so are the monolingual German data: The initial slope is not steep, and the final slope is not as steep as Miguel's for Spanish. However, there is an unexpected result: The rising slope is clearly preferred in German. María's data are very scarce, and exhibit a very reduced pitch range. Thus, it seems reasonable to limit the Spanish data to

Miguel's values. The comparison between bilinguals and monolinguals (in Spanish only one monolingual) leads to the observation that whereas the monolinguals show target-like tendencies, bilinguals show non-target-like values and much individual variation.

3.3. Discussion

The data analyzed in this study has shown that at age 3;0 both bilingual and monolingual children have already acquired the intonation targets of *wh*-questions, as they produce the initial H, the nuclear L and the final BT. However, whereas the Spanish monolinguals, and the bilingual child Jens in his Spanish, mainly produce the L% BT, the majority of the children, bilinguals as well as German monolinguals, prefer the rising slope. We had predicted that the BT most frequently used would be the falling one, and that the rising slope would be associated to non-neutral meanings. An inspection of the utterances produced by the children leads to the conclusion that most of the questions, in spite of ending with a rising BT, are neutral, in the sense that they just seek information from the interlocutor, and do not seem to be associated to kindness or surprise. We suspect that the children hear and produce *yes/no*-questions more frequently than *wh*-questions, and build the latter on the model of the former. That is, they are plausibly marking the utterance as clearly being a question, and typical questions end in a H%. This finding leads us to question certain claims about intonation being already acquired at the one-word period (see [12]), as these 3-year-olds do not seem to have a good command of the BT of *wh*-questions.

As for the issues related to bilingual acquisition, bilinguals do not render scaling target-like, as shown by their initial slopes, and also reported in [9] and [12]. Moreover, they do not differentiate their two languages in a consistent way, and their data involve much individual variation.

4. CONCLUSIONS

This paper has shown that German and Spanish monolingual as well as German-Spanish bilingual children at age 3;0 have already acquired the intonation targets of *wh*-questions, but bilinguals' scaling and alignment appear to be non-target-like. Although *wh*-questions in the target languages most frequently end with a falling BT, bilinguals in both languages and German monolinguals prefer a rising boundary tone, which can be explained by the higher frequency of *yes/no*-questions in their input.

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