



The Prosody of Questions in Brazilian Portuguese Infant Directed Speech

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Abstract

This paper investigates the prosody of questions addressed to Brazilian Portuguese pre-verbal infants in Infant Directed Speech (IDS). We analysed yes/no and wh-questions, measuring register, pitch range, tempo, breathiness and tonal variation.

Our data consist of 285 questions, of which 89 were yes/no and 196 wh-. This amounts to 32.7% of all the utterances produced by caregivers during 68 minutes of audio recordings. The subjects were the caregivers, all speakers of standard Brazilian Portuguese, in natural interaction with the babies at home. The addressees were one male and three female infants, between four-and-a half and eleven months of age.

We distinguished three types of questions in terms of the expected response, as produced by adults: i) Information-seeking questions; ii) Rhetorical questions; and iii) Semi-rhetorical questions. Most questions asked to babies do not expect an answer so they would be non-genuine questions.

Our results show that most yes/no questions were information-seeking (60.7%) whereas most wh-questions were rhetorical (51.5%). The great majority of questions were 'marked' for IDS (74.1%), by pitch, register, tempo or breathiness, although not all caregivers used the same features. We also noted that the older the infant becomes more information seeking questions are addressed to them.

Index Terms: Infant-Direct Speech, prosody of questions, Brazilian Portuguese

1. Introduction

Infant Direct Speech (IDS) has been shown to be used in all kinds of language communities as adults and older children modify their speech when interacting with babies [1, 2]. Compared with adult-directed speech, IDS has been reported to display higher pitch, greater pitch variations, longer pauses between utterances, slower speed, vowel and syllable stretching and hyper-articulation; it is also characterized by a higher number of repetitions, fewer words per utterance, simpler structures, lower number of subordinates and, importantly for this research, a high amount of interrogation [3-6].

This paper discusses the use and prosody of questions addressed to pre-verbal infants in the interaction between the caregiver (mostly but not exclusively the mother) and the infant, in a Brazilian Portuguese (BP) context. We distinguish the two main types of questions, yes/no questions and wh-questions. The purpose of this exploratory study is to verify to what extent the features of IDS mentioned above are used in this language.

Those questions used by adults in the interaction with babies are of great interest since in principle the infants would evidently be unable to answer them. For this we suggest that a great number of questions directed to them would be somehow rhetorical in nature, as no answer would be expected and would therefore not be qualified as genuine questions. They would not fulfill the Felicity Conditions [7] since the speaker may or may not know the answer, may not want to know the answer, and the hearer (the baby) likely will not be able to supply the information requested about some state of affairs implied by the question. Clearly the majority of questions employed in IDS do not fulfill these requirements.

Some studies [5, 6] have been conducted on the nature of IDS in Brazilian Portuguese, but they lack detailed descriptions of the prosody and none as far as we know has focused on the nature of the questions which according to the literature are abundant.

Here we classified the interrogatives into three categories according to their communicative function, distinguishing: a) Information-seeking question (ISQ), those that seek information or an explicit answer; b) Rhetorical questions (RQ), those formulated not to be answered [8], but rather would aim to seek the commitment or engagement of the interlocutor to the question [9, 10]; and c) Semi-rhetorical questions (SRQ), following [8] that present a third classification option, in which the speaker himself formulates and answers the question. So, a main research question is: What would be the communicative function(s) of the many questions addressed to the child when he/she does not yet produce language statements? Will be they all rhetorical, since the speaker does not expect an answer from the baby?

2. Intonation of questions in BP

BP interrogative intonation has configurations and uses that differ from other languages, i.e., yes/no questions tend to be rising/falling with the peak on the final stressed syllable ('circumflex' contour). The distinctive feature between statements and yes/no questions is the nuclear accent, which shows a rise through the final stressed syllable with a late alignment of the F0 peak [11], as seen in Figure 1. The nucleus of yes/no questions ends with an accentual rise (L+H) and a L% boundary; the accentual rise has been analysed as a L+H* accent [11, 12].

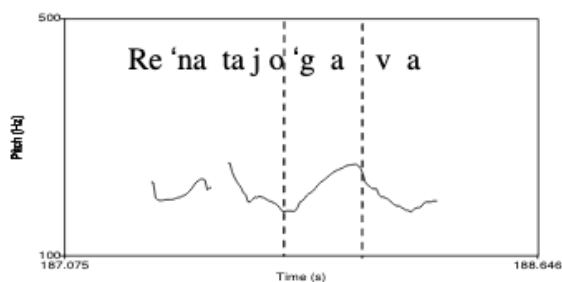


Figure 1: Contour of neutral yes/no question “Renata jogava?” [11].

Wh-questions in BP tend to be, as reported for a number of languages [13, 14], falling throughout the utterance; it begins with high pitch in the wh-word with gradual fall over the following syllables, until the last stressed syllable with a H+L*L% nuclear contour, as seen in Figure 2. Rising wh-questions are also possible, as well as rising-falling, which are used for specific contexts: rising for echo-questions, or rising-falling to convey emphasis, exclamation [14].

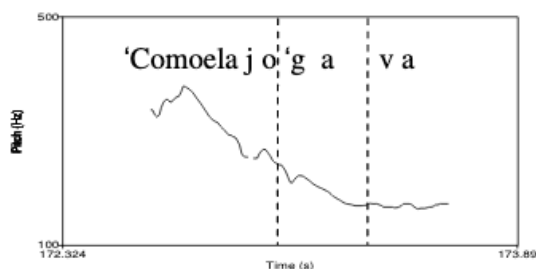


Figure 2: Contour of canonical wh-question [11].

In our data we found all different kinds of contours (see below): falls, rises, rise-falls and plateau contours, which occurred for both types of questions. They were interpreted differently according to whether or not they display the canonical pitch trajectory.

3. Methods

3.1. Participants and data

The data were collected through real-life interactions between the caregivers – mostly but not exclusively the mother – and four babies. These were: Ju, four-and-a half month-old female infant; Ben, six-and-a half months male infant; Bee, from 6 to 10 months-old female; and Tu, 11-and-a half female infant. The caregivers were five females and two males, university educated in their early thirties, except for Ben’s great grandmother who was 88 years old. The recordings were made by the caregivers themselves in real-life interactions with the babies at home.

A tape recorder was used for Ju and Tu; a cellular phone for the interactions with Ben; and a video recording for Bee. Although different devices were used in a natural setting, the quality of the recordings was appropriate for us to analyse the relevant acoustic elements with PRAAT [15].

All the participants involved gave us permission to use the recordings which were handed to us, aware of the purpose of

our study; the researchers did not participate in the data collection process. They were all speakers of Standard Brazilian Portuguese.

Our corpus consisted of 68 minutes of recordings of the speech directed to our four infants. The total of utterances was 871, which included declaratives, imperatives, exclamations, interjections, calls. There were silences, singing, funny vocal noises and some talk to other adults, which we ignored.

In those data we found 285 questions which were 32.7% of all utterances, a slightly lower proportion than reported in [16]. Of those, 89 or 31.2% were yes/no questions, and 196 or 68.8% were wh-questions. PRAAT was used for the analyses and figures. The acoustic analysis and prosodic marking were done by the second author.

3.2. Identification in the data

In interacting with the baby, we identified three intentions in the questions produced by adults:

- Search for information through full question (ISQ), even knowing that there will be no verbal response from the baby. Eg. “*Quer chupeta?*” (“Do you want a pacifier?”, Ben’s uncle);
- Search for engagement through rhetorical question (RQ). Eg. “*Cadê a neném?*” (“Where’s the baby?”, Ju’s mother);
- Check the understanding of the baby through semi-rhetorical question (SRQ), in order to verify if the baby “knows” the answer. Eg. “*Quem mijou?*” (“Who pissed?”, Ben’s uncle).

These categories, information-seeking question, rhetorical question and semi-rhetorical question, were used for the labelling of each item by the first author, native speaker of the variety under study.

3.3. Prosodic features of the questions

The first defining factor in the distinction between types of question was the shape of the pitch contour: it could be: i) Falling; ii) Rising; iii) Rising-Falling; or iv) Plateau (flat).

The other prosodic features used in classifying the questions were: i) Register, where we checked whether the pitch of the whole utterance was uttered as ‘normal’ or ‘high’ range; that is, whether the lower and upper limits of the pitch movement (in Hz) was within what we considered to be the expected adult-like range, or if on the other hand the whole utterance was produced in a raised fashion, affecting both the tonal baseline and the upper limit. We considered ‘high’ those questions with a baseline above 130 Hz for males and 250 Hz for females; ii) Pitch excursion size [17], the quantitative difference between peaks and valleys measured in semitones and octaves [18]; iii) Voice quality, where we distinguished whether a question or part of a question was perceptually ‘breathy’ or not; iv) Tempo, whether the utterance showed a substantial increase in duration, as opposed to normal speed. Previous studies on BP speech rate and rhythm were used as references [19, 20].

4. Results

Table 1 shows the total number of 285 questions, of which 89 (31.2%) were yes/no and 196 (68.8%) were wh- questions. Concerning intention types of questions, 106 were

Information-seeking questions (ISQ, 37.2%), 128 were Rhetorical questions (RQ, 44.9%) and 51 were Semi-rhetorical questions (SRQ, 17.9%).

Table 1: Number of questions by intention types and interrogative structure.

	Wh-	Y/N	Total
ISQ	52	54	106
RQ	101	27	128
SRQ	43	8	51
Total	196	89	285

We found that of the total, 212 were marked in some way as characteristic of IDS, by one or more of the prosodic features we described in 3.3. This amounts to 74% of all questions. In terms of contour, 55% of all wh-questions were falling; on the other hand, 67% of yes/no questions were rising-falling, as expected for Brazilian Portuguese.

There is a tendency in IDS to use repetitions [1, 3], to utter the same question several times in a row to elicit some response, and we found this to be the case in our BP data. An example, “*Cadê a Bia, cadê a Bia?*” (“*Where’s Bia, where’s Bia?*”), spoken by Bee’s mother, is shown in Figure 3. Both instances end with high-rising intonation; notice how extremely high the pitch rises, in this case as much as almost 900 Hz. This seems to be more a feature of rhetorical questions addressed to very young infants, rather than information-seeking questions which seem to increase in number as the baby grows.

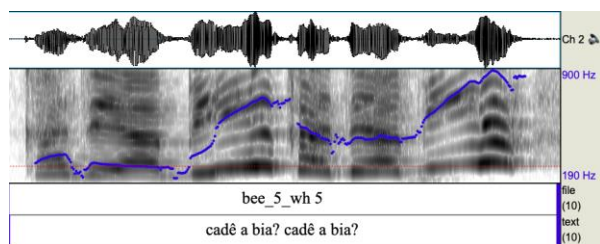


Figure 3: Wh-question (repeated) with extremely high pitch range and peaks.

An example of the very extensive pitch excursion in IDS is shown in Figure 4, in the falling wh-question “*Que que você vai fazer com a estrela filha?*” (“*What are you going to do with the star daughter?*”), also spoken by Bee’s mother. In this case the fall spans 21 semitones, an octave and 9 semitones, from the wh-word to the final low boundary tone. We used semitones rather than Hz in this case to illustrate the extent of the pitch movement.

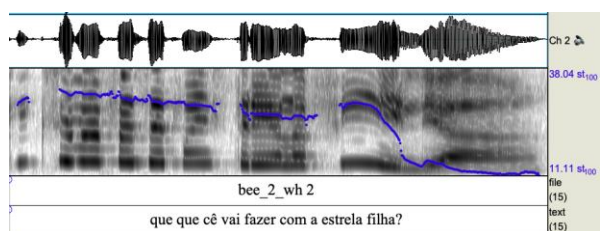


Figure 4: Wh-question with extremely pronounced fall (21 semi-tones).

Figure 5 shows a plateau intonation, that begins with a rise that is very high, fluctuating around 600 Hz. This question is almost sing-songy; and it is also fairly long, almost two seconds in duration (“*Cadê o lanchinho do Benjamin?*”, “*Where is Benjamin’s little lunch?*”), spoken by Ben’s great grandmother.

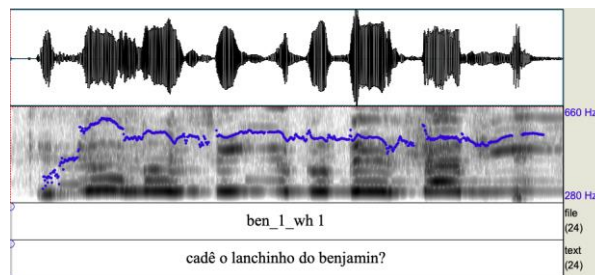


Figure 5: Plateau intonation of a wh-question in very high register (around 600 Hz).

5. Discussion

The majority of yes/no questions were ISQ, 54 out of 89 or 60.7%. This suggests that the baby is far more able to understand and express agreement/disagreement with such stimuli, rather than responding to open-ended wh-questions with inquisitive value. Of these yes/no questions, 36 had the canonical rise-fall contour of the standard questions, 66.6%; 25 of these 36 or 69.4% were directed to the baby that was older, eleven-and-a-half months.

Percentage of use of semi-rhetorical questions also seems to increase with age, at least they were more abundant when directed to the eleven-and-a-half baby Tu. We also noticed a difference in the input to the same baby, Bee, as she ages: between 8 and ten-and-a-half months there were less RQ and more SRQ and ISQ. However, our data are insufficient to provide solid statistical evidence for our claim, as a longitudinal study was not our aim.

Indeed, there is a departure from purely rhetorical, interactional questions toward content questions, as infants are perceived as engaging in some semblance of true conversations providing answers. This is an interesting finding in spite of our limited evidence.

This suggests that between the age of 4 and 11 months, the apparent cognitive understanding of the babies, at least from what can be derived from the caregivers’ types of questions, has come closer to an adult-like response. Of course, the higher percentage of information-seeking questions in our data does not directly indicate the baby’s understandings or reactions nor do we not claim age-dependent factors; in order to address this question different research hypothesis – outside the scope of the current study – will be implemented.

6. Conclusions

As far as we know, our study is the first to analyse the prosody of questions addressed to Brazilian Portuguese pre-verbal infants in Infant Directed Speech (IDS). An interesting finding is that most of the questions in our corpus are particular one way or another and diverge to what would be produced in adult speech. That is, they seem to be somehow ‘marked’

with one or more features which typifies it as IDS: either they are quite high in register, have some degree of breathiness, are slower in tempo, and the differences between peaks and falls are very pronounced, frequently reaching an octave or more either up or down. Brazilian Portuguese question intonation when directed for infants has indeed a particular prosody that is characteristic and distinctive; in our data, 212 out of 285 (74.4%) of all questions are 'marked' as distinctive of IDS, by one or more of the features described above, and 73 (25.6%) could be considered non-IDS, 'normal' or classified as similar to adult speech. However, not all caregivers used the same strategies and features when talking/interacting with the babies: for instance, Bee's mother preferred extremely high peaks and wide pitch range, whereas Ju's parents used a lot of breathiness and slower, more deliberate tempo. In the case of Ben's family, no slower speed or breathiness was noted, only wide pitch range and increased register was recorded.

High register and ampler pitch range was the most common feature for all adults, using IDS, as repeatedly reported in the literature. As noted above, as the infants pass the eight-month mark, there is a reduction in frequency and attenuation in the intensity of these baby talk feature – as well as increased use of genuine question as opposed to rhetorical ones. Between the age of 6 months and 11 months, there seems to be a dramatical increase in the communicative content of the dialogue, at least from the caregiver's behavior.

When the baby is younger, more marked questions are addressed to them. As the months go by, there is an increase of information-seeking questions and a reduction of purely interactive and affective acts of speech, more concerned with engaging the baby without expecting verbal responses. We begin to see the development of something like a true dialogue between the caregiver and the infant.

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