Relation between mother-child interaction upon the development of oral language of the preterm newborn

A relação entre a interação mãe-criança no desenvolvimento da linguagem oral de recém-nascidos prematuros

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ABSTRACT

Purpose: To verify relations between the oral language development of preterm children and the quality of mother-child interaction.

Methods: The subjects of this research were 20 mother and child dyads. An interview was conducted with the mother to obtain data about birth and life conditions. The development of oral language of the children was assessed using a test that evaluates phonology, fluency, vocabulary and pragmatics. Results: It was observed that the most part of mothers considered themselves the main caretaker and behavior’s control and care are more important the stimulus in dyadic relation. All children scored below the expected for their age in the tests performed.

Conclusion: Besides the contribution of biological factors associated to prematurity, these results can be attributed to the quantity and quality of mother-child interaction, since mothers informed to prioritize obedience and good behavior more than stimulation of the development.

Keywords: Language; Mother-child interactions; Infant, Premature; Psychology; Speech, Language and Hearing Sciences

RESUMO

Objetivo: Verificar o impacto da interação mãe-criança no desenvolvimento da linguagem oral de crianças pré-termo, visto que a prematuridade pode prejudicar esse processo. Métodos: Participaram da pesquisa 20 diades de mães e filhos de 5 a 6 anos de idade, com diagnóstico de prematuridade ao nascimento. Realizou-se anamnese com as mães e avaliação da linguagem oral das crianças. Resultados: As mães, em sua maioria, se consideraram como as principais cuidadoras de seus filhos e referiram ser mais importante controlar o comportamento e cuidar, do que estimulá-los. As crianças, por sua vez, apresentaram desempenho abaixo do esperado para todos os testes realizados. Conclusão: Além da contribuição dos fatores biológicos associados à prematuridade, esses resultados podem ser atribuídos à quantidade e à qualidade da interação materno-infantil, visto que as mães informaram priorizar a obediência e o bom comportamento mais que o estímulo ao desenvolvimento, na educação dos filhos.

Descritores: Linguagem; Relações Mãe-Filho; Prematuro; Psicologia; Fonoaudiologia
INTRODUCTION

The importance of creative practices for the psychological development of children, in what pertains to their intellect, sociability or affectivity has been well established\(^\text{11}\). Likewise, the relationship between the quality of the child-family bonding - especially the mother-child bonding - and development has also been established\(^\text{2}\). However, a systematic literature review\(^\text{3}\) has found that research on regarding the influence of such practices over the development of some aspects of language that are important for future schooling of premature babies, especially when they reach school age, is still rare.

The concept of ‘preterm newborn’ refers to babies that are born before 37 full weeks of gestational age\(^\text{4}\). The incidence of premature births in the world varies from 6% to 10%, and the highest rates are verified in developing countries. In Brazil, the incidence is currently between 5% and 15%. The causes have not been fully determined, although some predisposing factors have been isolated, such as primiparity, socioeconomic status, maternal nourishment, mothers’ age, interval between gestations, maternal illnesses, previous fetal death history, low-weight and low-height mothers, fetal malformations, use of tobacco, etc\(^\text{4}\).

Premature births are permeated by urgency and, therefore, might involve serious negative consequences, for both mother and baby, if skin-to-skin restrictions occur due to the immaturity and instability of the baby. The mother, after the abrupt interruption of the birth, needs to cope with a great deal of conflicts, such as: birth-imposed separation; diminished responsiveness of the newborn due to the immaturity and precariousness of his general conditions; sharing the baby with health professionals and the possibility of the baby’s loss. This situation might generate feelings on the mother such as guilt, frustration, incompetence and negative expectations, like anxiety, and these might influence the quality of the interactions that established with the baby\(^\text{5}\). Many other feelings might appear alongside the scenario of babies’ prematurity, such as the fear that the child will not survive, that he will get sick easily or suffer long-term side effects\(^\text{6-8}\). Thus, during hospitalization, the relationships are configured in a peculiar way between the baby, the hospital staff and the parents.

Preterm babies present a few peculiarities. The majority of these infants present, for instance, good neuropsychomotor evolution, but can, nevertheless, show some delay in such development\(^\text{9}\). They will perform similar tasks as full-term babies, even if a bit later. This delay will depend on the complications and the environment’s stimuli received by the baby, that might reduce or augment the resulting effects of prematurity.\(^\text{\textsuperscript{13,5,9,10}}\)

Prematurity and development

Regarding the influence that the mother-child interaction exerts on development, as assessed in preschool and school age children, a positive relationship between the following aspects has been verified: maternal responsiveness in the interactions with the child and receptive, expressive language on the part of the child, as well as adequate maternal conduction and social and cognitive skills, mainly child autonomy.\(^\text{31}\)

There is evidence that mothers of premature children that present normal language development have manifested more sensitivity to their children’s clues and have more thoroughly stimulated their social and cognitive development than mothers whose children showed language issues. It was verified, thus, that maternal responsiveness in the first four years of the child’s life has a positive impact over the receptive and expressive language that the child displays at the age of four.\(^\text{4}\)

Age-appropriate linguistic development was also correlated with less punishment, less restriction and mother making available materials needed for playing. It is important to remember that preterm newborns tend to be delayed when it comes to behavioral organization, which, in turn, might lead to less social responsiveness, an important factor for the establishment of the relationship with their mothers and other caretakers.\(^\text{11}\)

It is possible that, by virtue also of a lowered responsiveness, that the language development of preterm babies is below average, with behaviors of different complexity coexisting, as well as marked leaps in evolution. Environmental factors such as employment (which leads to more positive and safer surroundings), intellectual level and family income (higher income families tend to favor higher quality stimuli in the household) are considered important factors for the development of language of preterm babies.\(^\text{3,10,12}\)

Although the mother is considered to be the conducting element of stimulation, when it comes to social ability in communicative exchanges, the infant’s responsiveness contributes to the maintenance and increased complexity of the social interaction.\(^\text{11}\) The child’s reduced adaptability to maternal intention may be related to attention problems once school age is reached.\(^\text{3}\)

As a result of the scenario described above it can be observed that the development of language, in all its aspects (vocabulary, phonology, fluency, pragmatics, speech) is intrinsically related to the social exchanges of the child with his/her environment, mostly with his/her mother figure, which presents as both model and link between the child and the environment in which he/she lives. The interaction between the dyad becomes even more important if involving premature children who need accompaniment and stimuli so that their development is adequate to their chronological age, since they represent a risk group for impairments in several aspects, such as linguistic skills. Thus the importance of orientating the mother regarding the baby’s stimulation, because the richer and more varied it is, the higher the probability of a positive effect on the child’s development.

Considering the results of the literature review this research had the objective of characterizing the development of the oral...
language of preschool age children who were preterm babies, and verify the influence of the mother-child interaction on the language development of these infants.

**METHODS**

**Subjects**

Twenty dyads were included in this study (ten boys and ten girls), with ages ranging from 5 to 6 years old (mean age 5 years and 5 months), and their respective mothers. They have all been admitted to a neonatal intensive care unit (NICU) at birth and were selected from exams and records registered in the High Risk Ambulatory from the Hospital e Maternidade Celso Pierro, where they were studied and followed since birth. From the identifying set of data regarding mother and child, researchers invited the mothers to participate in the study along with their children.

**Inclusion criteria were:**

1. Premature birth occurred at the same hospital in which the study was developed;
2. Agreement, on the part of the mother, to participate in the research and sign the Term of Consent;
3. The child needed to have received a prematurity diagnosis at birth, meaning a gestational age less than 37 weeks of corrected age and a birthweight lower than 2,000 grams. Age was corrected using the Capurro method and the New Ballard score (for cases in which children had a gestational age of 25 weeks);
4. Hospitalization in the NICU;
5. The child had been followed at the High Risk ambulatory from the same hospital, since discharge;
6. Regularly attended a school from its local educational district.

Children with central nervous system (CNS) alterations were excluded from the research, as well as those with syndromes; those hearing or eye impaired; children that were born at other hospitals; and children whose mothers, when invited, have not agreed to participate in the research. The evaluation of the preschoolers was undertaken out of project’s approval by the Ethics Committee of the Pontificia Universidade Católica de Campinas (PUCCamp) (parecer nº 973/07).

**Material**

In order to contemplate questions related to maternal-infant health and maternal-child interaction, an anamnesis – containing open questions with answers that were filled by the interviewer – was elaborated. The anamnesis approached aspects which were relative to identification data, family constitution, maternal records and child records at birth. Regarding the hospitalization, some questions were made about the maternal feeling during her interaction with the child, daily routines followed, availability for the child, type of activities undertaken, frequency at the daycare, what were her priorities regarding her child’s education and the mother’s expectations regarding the child (Appendix 1). The anamnesis was formulated so as to contemplate all aspects that involve the matter of prematurity and the dyadic relationship since birth, for example, maternal directivity and development. A pilot test was conducted with two mothers, in order to adjust the guide for the population studied.

In order to evaluate all aspects of children’s language, the child was submitted to a speech test called ABFW\(^{11}\), which aims at the evaluation of language’s four aspects: phonology, vocabulary, pragmatics and fluency. For the first two aspects, it was used an arrangement of figures from the same book, which contained images with blank lines to be filled with the correspondent names of animals, foods, furniture and utensils, transports, colors, shapes and toys. There are, also, phonetically balanced pictures, whose objective is to evaluate the phonologic development of children. For the pragmatics and fluency tests a free, playful activity was proposed using various toys, such as a ball, dolls, fitting pieces etc.

Regarding the evaluation of the oral speech, the following materials were used:

- A book called “Tuca, Vovó e Guto”\(^{14}\), as a tool for story retelling;
- Action figure as a tool for the elaboration of an original story after the observation of the figure;
- Four figure logical sequence for the assortment and elaboration of a story out of the observed scenery (taken from the game *Seqüências Lógicas – Brinquedos Inteligentes*).

**Procedures**

The evaluation was conducted in a therapy room from the Speech-Language Pathology Clinic of PUCCamp, according to what was described in the project that was approved by the Ethics Committee from the same institution, in a threefold session: the first involved only the mother, in order to have the Term of Consent signed, and, also, to realize the anamnesis. In the second session the following aspects of the child’s language were evaluated: vocabulary, phonology and speech. The last session was dedicated solely to the child’s play, so it could have a free and spare time to engage in playful situations, in which fluency and pragmatics were being evaluated.

All of the responses and participants’ behaviors, as observed by the evaluator, were filmed and later on transcribed on the protocols.

**Analysis**

The responses that were obtained in the anamnesis were grouped according to the questions that were made to the mothers (Chart 1).
Chart 1. Response analysis that were obtained according to queries to the mother

<table>
<thead>
<tr>
<th>Participants</th>
<th>Family Income</th>
<th>Household size</th>
<th>Marital status</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>R$1,000,00</td>
<td>4</td>
<td>Married</td>
</tr>
<tr>
<td>S2</td>
<td>R$1,200,00</td>
<td>5</td>
<td>Single</td>
</tr>
<tr>
<td>S20</td>
<td>R$ 800,00</td>
<td>4</td>
<td>Married</td>
</tr>
</tbody>
</table>

For the analysis of the speech’s structuring elements that were used by the children, it was considered: characters, topic preservation, plot/main event and upshot, according to the following classifications:

1. Maintenance of the main character:
   - C1: Undefined main character, with several characters appearing through the story so that it isn’t possible to determine the main character;
   - C2: Defined main character, but one that vanishes along the story, however it may return just to disappear again or, yet, be replaced by another.
   - C3: Defined main character that’s kept all through the narrative. It’s never replaced until the end of the story.

2. Maintenance of the theme/topic along the narrative:
   - T1: Undefined topic, it is present in the beginning of the story, but it is replaced along the narrative.
   - T2: There is a topic in the beginning of the story that is replaced by another along the narrative, just to be brought back at the end of the story.
   - T3: The topic remains the same all through the story.

3. Main event/plot:
   - E1: It is possible to observe the outline of an event, or the presence of multiple ones, without the existence of a main one. These are sequels of episodes or actions that aren’t correlated.
   - E2: Several events, although it is hard to define which is the main one, even if there’s some relationship among them.
   - E3: Presence of a main event, plot or problem situation which is central and defined, one that rules the entire story and the character’s actions.

4. Upshot that finishes and concludes the story:
   - U1: Lack of an upshot. The story is abruptly concluded.
   - U2: There is an upshot that, however, doesn’t hold any link with the main event.
   - U3: Defined upshot and close linkage with the main event.

5. Production, Level:
   - L1: C1, C2 or C3; T1, E1, U1
   - L2: C1, C2 or C3; T2; E1 or E2; U1 or U2
   - L3: C2 or C3; T3; E2 or E3; U2;
   - L4: C3; E3; T3; U3

   The Level 1 classification is characterized by stories in which there is a change of topics and of events that are succeeded in a disconnected manner, which compromises the text comprehensibility. Nevertheless, Level 2 is different from its predecessor once there is a tendency to maintain the topic all along the narrative, even if it doesn’t hold a precise relationship with the development of the story. Level 3 is characterized by the maintenance of the topic and of the event all along the narrative. However, since here the upshot holds no relation with the events that were narrated, comprehension is jeopardized. Level 4 is characterized by presenting a cohesive narrative chain that is centered on a defined topic, and there is a strong connection between events, characters and plot. It presents a straight relationship with the events that were narrated as the story unfolded.

According to the authors, the levels are differentiated according to the level of schooling in which the children are. This way, levels 1 and 2 refer to the initial years of school, corresponding to ages 6 and 7, respectively.

The oral language analysis was separated in four parts, according to the exams applied. In the phonology exam, the focus of observation was to whether or not the child had performed any phonological change. In the occurrence of any phonological changes, the phonologic processes that were realized by the child during the test were analyzed, with the objective of verifying it those were somewhat expected for the child’s age. In the vocabulary test, it was verified, in each of the semantics’ field that were evaluated, the usual designations, the non-designations and the replacement processes. Later on, there was an analysis of the outcomes, in terms of what was expected and what was obtained, regarding the chronological age of the child, according to the following classification:

- Usual vocable designation (UVD): correct naming of the presented vocable;
- Non designation (ND);
- Substitution processes (SP).

Pragmatics was analyzed according to the communicative acts realized by the subject, the communicative medium and the communicative functions that were utilized:

- Communicate acts: the ones that start as soon as the interaction adult-child, child-adult or child-object starts, and finish when the attention focus of child is shifted, or when there is a change of turn.
- Communicative medium: the communicative acts are divided in three kinds: verbal (VE) – involve at least 75% of the language’s phonemes – vocals (VO) – all others emissions and gestures – (G) – involve body and facial movements.
- Communicative functions: For this test, it is observed that, since 15 months of age, there is a balance between gestural communication and the sum of vocalizations and verbalizations. Moreover, the number of communicative acts expressed in a minute varies a lot between different individuals, in diverse situations and with different interlocutors. However, the communicative acts of the studied strip were of approximately eight per minute.

The last analysis concerned fluency. The typology of the disfluencies (normal and stuttering) was verified as well as
speech speed (word and syllables flow per minute) and rupture frequency (percentage of speech discontinuity and stuttering disfluencies). The disfluencies’ typologies are divided in two aspects\(^{(13)}\) (Chart 2).

<table>
<thead>
<tr>
<th>Normal disfluencies</th>
<th>Stuttering disfluencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hesitation</td>
<td>Syllable repetition</td>
</tr>
<tr>
<td>Interjection</td>
<td>Repetition of sounds</td>
</tr>
<tr>
<td>Revision</td>
<td>Elongation</td>
</tr>
<tr>
<td>Non finished Word</td>
<td>Blockade</td>
</tr>
<tr>
<td>Word and/or sentence repetition</td>
<td>Pause</td>
</tr>
<tr>
<td>Segment repetition</td>
<td>Sounds’ or segments’ intrusion</td>
</tr>
</tbody>
</table>

According to the author, repetition of syllables, words, segments and phrases are expected in younger children (usually two, maximum three repetitions). Up to two seconds’ pauses are also expected. Generally, the normal disfluencies exceed the stuttering disfluencies. The frequency of words is of approximately 160 words per minute in adults, and this tax is slightly inferior in preschoolers, and those are expected to reach this limit in its school years. Regarding the syllable, the tax for the adults is of, approximately, 212 syllables per minute and in preschoolers the articulatory speed remains around 170 syllables per minute. Also in this aspect, the school subjects are close to the results achieved by the adults, in school stage. Regarding rupture frequency, the maximum discontinuity percentage is of 15%, and the ruptures that are considered to be stuttering cannot surpass 3%.

The results of each of these tests were analyzed separately, according to what was expected for the age, once their associations with the data resultant to the anamnesis were verified. For such, Spearman’s rank correlation coefficient tests were used (in case that both variables were continuous) or Chi-squared tests of contingency (for two categorical variables). Furthermore, means tests were used to verify the difference between two (t test) or more than two (ANOVA) groups, according to one or more dependent continuous variables. A 5% significance level was adopted.

**RESULTS**

Regarding the anamnesis data, it was observed that the mother’s age range was between 26 and 47 years old, and the father’s age range was between 25 and 45 years old. Out of the surveyed mothers, 45% (nine) have attended elementary school, but dropped out of it. Only 25% (five) have completed this educational level and 30% of the mothers (six) have graduated from high school.

The family income ranged from R$450 to R$3,800, and the average number of residents in each household was around four people.

Out of the subjects, 85% have stated to be married, 10% (two) were divorced and one of them was single. More than half of them (70%) have attested that their pregnancies weren’t planned. However, almost all (93%) have accepted it willingly.

Almost all mothers have, as well, suffered some sort of intercurrence along the pregnancy period, whence the premature delivery they have had. Of those, 13 (65%) have had high blood pressure, from which seven have presented pre-eclampsia. Two mothers (10%) have related loss of amniotic fluid, two have regularly smoked along the pregnancy period, only one (5%) have presented bleeding and another, (5%) has worked strenuously all along the gestation period. None of the mothers knew that they would have premature deliveries.

It was observed that most of the deliveries (80%) occurred through caesarian section, while only four of the mothers (20%) have had vaginal deliveries.

Regarding the neonates, most were born with a birth weight of less than 1,500 grams and, more than half with gestational age (GA) between 27 and 30 weeks, which characterized them as extremely premature babies with low birth weight (LBW). In spite of their prematurity and LBW, most part of the children has had Apgar scores over five in their first minute of life and in their fifth minute. Almost half (45%) of the babies have presented intercurrences, such as infections and surgeries, during their hospitalization period that lasted, in average, 39 days.

<table>
<thead>
<tr>
<th>Weight, gestational age and Apgar score</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn weighing up to 1.500 g</td>
<td>13</td>
<td>65</td>
</tr>
<tr>
<td>Newborn weighing between 1.500g and 2.570 g</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>Newborn 27 to 30 weeks old</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>Newborn 31 to 37 weeks old</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td>1st minute of life, higher than 5</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>1st minute of life, lower than 5</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>5th minute of life, higher than 5</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>5th minute of life, lower than 5</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

A positive correlation was found between hospitalization time and the Apgar scores in the first minute of life (rho=0.681, p=0.002) and in the fifth minute (rho=0.607, p=0.005). Moreover, a negative correlation was found between hospitalization time and gestational age (GA) (rho= -0.768, p=0.001). This has led to the finding that the smaller the Apgar score and GA are, the longer is the child’s hospitalization time.

Most of the mothers (75%) have said to have experimented feelings of sadness, fear and despair, during their babies’ period at the Neonatal Intensive Care Unit (NICU). The remaining mothers have reported feeling confidence and trust during their hospitalization periods.

More than half of the mothers (60%) have informed that they were the main caretaker of the baby, while 40% have told
that they shared the nursing with others such as the grandmother (15%), the caretaker (10%), the school (10%) or the father (5%) of the child.

Among the interviewed mothers that have informed they were the main caretakers, it was verified that more than half of them (60%) have disposed one or two periods to stay with the child. The remaining ones have stated that they would take care of their children during the entire day (20%), or only on weekends and holidays (20%).

Most mothers have mentioned that they performed some type of playful activity with the child, such as playtime (85%), taking for a walk (90%) and talking (70%). A small minority (3%) reads children stories for their infants.

Although more than half of the mothers have reported to not having received any type of orientation regarding the child’s care, approximately the same proportion of them consider that rule abiding, obeying, playing and talking is what matters most in the education of a child. About half of the surveyed mothers consider that what is more important in the education of their children is the incitement to obedience or to follow the rules. The remaining ones have attributed a higher importance to the development’s adequacy to their ages. The results have pointed out that, for most part of the participants, the knowledge on “how to behave” is the fundamental aspect to be aimed at regarding children’s education.

Table 2. What mothers consider to be most important in the interaction with the child

<table>
<thead>
<tr>
<th>What’s most important in the child’s upbringing</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow rules</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Be obedient</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Play, talk</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Follow rules, be obedient, play and talk</td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td>Knowing how to behave properly</td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td>Be well developed for its age</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Behave properly and be well developed for its age</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>To talk after it has done something wrong</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>To punish when it has done something wrong</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Talks and punishes after something wrong was done</td>
<td>6</td>
<td>30</td>
</tr>
</tbody>
</table>

Children's performance on the oral speech evaluation

It was found that almost half of the participants has worded a story from the action figures (a baby holding a ball). In the logical sequence test (which consists of temporally ordinate three figures that were put disorderly in front of the child, so that it composes a coherent story), all of them have incorrectly placed the figures and half of the participants have managed to compose the story, even if the figures were out of order. Only six children have properly retold the story of “Tuca, Vovó and Guto”.

When the time of interaction between the mother and the child was compared with the oral speech of the latter, some differences were observed among the conducted tests. In the retelling test, the value of r = 0.16 is significant to the level of p<0.05, which indicates that, the longer the time that the mother has spent with the child, the better was the child’s performance in the retelling of stories. Unlike the retelling, the action figure and logical sequence tests have presented significant ratings, however their correlations were negative (the comparison between interaction time and action figure - r = -0.15 and r = -0.13 – between interaction time and successful attempt at the logical sequence), which means that the interaction time between the child and the mother doesn’t determine the performance of the participants in the production from the action figure and the logical sequence.

It was observed from the data described above that approximately half of the children have realized the oral production out of the required tests and that the interaction time has exerted some influence over the children’s performance. Thus, the more time the mother spends with the child, the better is the performance of the child in the tests that were proposed to evaluate speech.

Children's performance on the phonology test

The participants’ performance in this test has evidenced that more than half (60%) has not presented phoneme changes in their speeches. The remaining ones (40%) have presented some type of change that was expected for their age, like a simplification of consonant clusters (prato-pato) or that wasn’t expected for their age and/or development, like syllable reduction (elefante-ejante).

On the other hand, a significant relationship between gestational age (t=2.340, p=0.032) and phoneme changes on the part of the child was verified, which means that children that were born with a higher average gestational age (average = 33 weeks) have not presented changes, as well as the ones that were born with a GA of – or around – 30 weeks. When we compare the performance in phonology and the time of interaction between mother and child, a positive correlation of r = 0.16 was observed, in the level of p<0.05. Thus, more than

Table 3. Oral production realized by the child

<table>
<thead>
<tr>
<th>Oral production</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has realized out of an action figure</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Has not realized out of an action figure</td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td>Has realized out of a logical sequence</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Has not realized out of a logical sequence</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Has realized the sequence correctly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Has not realized the sequence correctly</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Retold the story</td>
<td>6</td>
<td>30</td>
</tr>
</tbody>
</table>
half of the children studied have presented normal phonological development, have not presented unexpected changes for their age, a result that can be attributed to factors such as gestational age and interaction time, that, the longer they are, the more they favor the development of the child’s speech.

**Children’s performance on the vocabulary test**

No participant has obtained the expected outcome for its age in one or more aspects of the vocabulary test, like designations by usual vocable (UVD), non designations (ND) or substitution processes (SP).

The comparison between the vocabulary results, time that the mother allocates to activity with her children has shown positive associations, which means that the more time spent by the mother with her children, the better her offspring’s vocabulary development will be.

When the vocabulary was compared with the oral speech of the children, some positive associations were observed, to the level of p<0.05. In the retelling test, a positive correlation was also found (r=0.00094). In the other two tests, regarding action figures and logical sequence, the correlation was negative (action figure r=-0.249 and logical sequence r=-0.42). Thus, the greater the vocabulary, the better was the performance of the participants in the retelling test. However, vocabulary size was not a sufficient enough aspect to guarantee a good performance in the action figures and logical sequence tests.

**Children’s performance on the pragmatics test**

In the pragmatics test, the total communicative acts (ACT) (the sum of the child’s communicative acts and the evaluator’s) were evaluated, as well as the communicative acts that were performed by the child alone (ACC), and how many communicative acts were performed in a minute – AC min.

An average of 164.3 total communicative acts was verified during the interaction between the child and the evaluator, and the average acts performed by the child alone was 71.3. One quart of the participants (25%) has performed half or more than half of the total communicative acts and most of them (75%) have performed even less communicative acts. Out of the presented indices, it was possible to obtain an average of 3.3 communicative acts per minute that were performed by the children. According to the test’s developer, this index is well below what was expected for the children’s chronological age, which would be 8 acts per minute. The average AC min. index obtained by the children that were studied equals the performance normally verified on three-year-olds(13).

**Children’s performance on the fluency test**

Regarding fluency, it was observed that there was a predominance of normal disfluencies (interjections, word repetitions) as compared to stuttering disfluencies (syllable repetitions, sound repetitions). The average number of the first type was 6.8, and the latter was 0.35. The average ratio of speech discontinuity (DF) was of 3.57% and of stuttering disfluencies (DG) was of 0.125%. The ratio of speech discontinuity cannot surmount 15%, while the ratio of stuttering disfluencies cannot surmount 3%(13). According to the described results, it was found that all children have obtained a performance that was expected for their age and speech developmental stage.

In regards to the speech speed (frequency of words per minute and frequency of syllables per minute) an average of 17.55 words per minute was verified, while the number of syllables per minute was of 28.96, in average. The performance of the participants group regarding this aspect was below what was expected for their age group, once the average of syllables per minute for preschoolers is of approximately 170, a number that is much higher than the one verified by the studied children. A positive correlation was observed between the interaction time and speech speed of r = -0.096, for p<0.05. This leads to the conclusion that the bigger the amount of time the mother spent interacting with her child, the more fluent is the child’s speech.

It was also possible to determine the association between fluency and pragmatics, once r=0.648 is quite significant, on the level of p>0.01, which indicates that the larger the communicative space that the child occupies in a given interactional situation, and the bigger the quantity of communicative resources it uses, the more fluent will be its speech. The same association was verified when the vocabulary test was used as a comparison parameter, in which r=0.045 was significant on the level of p<0.05, which leads to the conclusion that the more sizeable the vocabulary and pragmatics of the child is, the more fluent is the child’s speech. In these three studied aspects, it was observed that the mother plays an effective influence once that the more time she dedicated to her child, the better is her infant’s lexical and discursive development and, consequentially, the better the infant’s fluency will be during the interactional moments.

**DISCUSSION**

The results that regards the negative feelings experienced by the mothers during their child’s stay at the NICU, like fear of loss, despair, suffering and anxiety, concur with the findings of several authors (7,16,17) who highlight that, when the focus is shifted towards the premature delivery which is permeated by urgency, the family – especially the mother – becomes a mere spectator of the situation, making it impossible the skin-to-skin contact since the very first moments of life of the child, just passively observing all the procedures realized with her baby but not being able to act and do something for her infant directly. However, all parents of this study have managed to overcome these feelings by being in contact with the child, and by following its progress and, at the same time creating a bond.
with the child, even if it is a late one. This bond will affect, effectively, the communicative and linguistic development of the child and its disruption – well in the first minutes of life – might bring about consequences that will affect the child’s future development.

Most part of the studied children has presented low birth weight and almost half of them were extremely premature babies that spent between eight to 80 days hospitalized. Because of the intercurrences that occurred at birth, the children are considered to be at risk, all of them being more prone to present future disturbances and variations in their development. These factors, added to other social and environmental risks, might potentize the effects of such variations.

This fact was proven through the conducted tests, in which all the children performed below what was expected for their age, exception made to the test of oral speech verification. In the phonology test, almost half of the subjects have presented phonological deviations, and most of these deviations were not expected for their present development. The phonological deviation, characterized by spontaneous speech which was unintelligible at ages four or older, might occur for various reasons, encompassing biological, psychosocial, environmental and genetic reasons. In agreement with the authors aforementioned, the biological factors (prematurity and low birth weight) have influenced effectively the phonological performance of children, once most part of those that presented changes were diagnosed as extremely premature and with very low birth weight (LBW). Moreover, the data that were found suggest that the interaction between the dyad mother-baby was always an important factor, considering the significant correlation between both biological factors and mother-child interaction.

Out of the data that were collected in the interviews, it was observed that, although the mothers consider that what is most important for their children is to talk and play – and they did this with their kids, independently to the quantity of time they spent together – the mothers have prioritized the behavior. According to them, the adequate behavior favors a better living in the school, with the family and friends. The mother-child playtime, as discussed by several authors is an important stimulus for the socio-cognitive and linguistic development factors of the child, once the mother offers emotional security so that the child can explore and represent, rather independently, the environment, while offering emotional security and transmitting a range of information to the child so as to aid in problem solving as well.

This fact is directly related to all the tests that the children have been submitted to in the present study. Regarding the oral speech development, most part of the participants have not realized all the proposed oral compositions, either because it did not accept the activity (right in the moment of the evaluation, the child was embarrassed or didn’t want to perform the activity), or because it simply described what it had seen or heard, and not properly characterizing a story.

Even though some authors have reported, in their studies, that Levels 1 and 2 correspond to 6 and 7 years-old children (the same age group as this study), a mere four participants have presented Level 2 in one of the two conducted compositions. Two of these children have as their main caretakers their own mothers – and the remaining two are taken care by their grandmothers – that play with them and encourage them to the reading, chiefly of fables, what has became, thus, one of their favored activities. Besides that, it has been found a direct link between the oral speech and both interactional time and socioeconomic level of the studied mothers. In the analysis that was conducted, it has been observed that the higher the amount of time the mother spent with her children, and the higher the socioeconomic level of the family, the better it was the child’s performance in the proposed speech tests.

The findings of some authors justify this study’s own findings with relation to the vocabulary test, in which no participant has presented the expected performance for their chronological age, which attests the importance of reading for the acquisition and development of vocabulary and, consequentially, for the development of language itself, once that the reading time is a potentially rich opportunity for its increment. Not only does the stories contain contextual clues that help to decipher the meaning of unknown words, they also play a sociocultural role by helping children to organize the experiences that they’ve had and by stimulating their creativity by means of imaginary stories. Through these reports, the positive association between vocabulary and oral speech can be better understood, as presented in the data of this study, once that a correlation between greater vocabulary and better children speech was shown. In the verbal interaction adult-child, the mother is a model for the child’s verbal development that adapts her verbalizations according to her infant’s verbal capacity. The syntactic competence depends on the level of the environment’s stimulation and on the presentation of activities that might increment the grammatical organization capacity of these children. The adults’ participation in the activities of children until age six promotes social interaction, which leads to a satisfactory linguistic development, something that can be proven by the positive association found between the mother’s schooling and the vocabulary development level of her child, which means that the more years the mother has spent in school, the greater her child’s vocabulary will be.

The lexical acquisition and development are also strongly influenced by the interactional process, since language occurs in the context in which one’s exposed to. The socio-pragmatical aspects and the cognitive abilities are also fundamental to the child’s lexical development. These aspects have also influenc ed the performance that was verified in the pragmatics test, in which all children have presented scores that were well above what was expected for their age.

The fact that the number of communicative acts was short
of what was expected for their age have influenced their fluency test scores as well, in which the subjects have presented a word per minute and syllable per minute flow that was also lower than what was expected for their age group. Children speak slower than adults, and a faster pace of speech is expected after their teenage years. This is due to the immaturity of their neuromotor system, which is associated to the production of speech and to cognitive development. However, the disfluencies that were observed were mostly normal typed; the stuttering disfluencies’ ratio was something expected for the fluent speaker, and stuttering cases were not found among the study’s participants. The participants have presented themselves as fluent speakers, with short or no periods of disfluency, characterized mainly by hesitations, interjections and word and sentence repetitions.

The findings that show the influence of pragmatics and vocabulary over the fluency test performance, with the positive correlation between tests that was presented, means that fluency will be better once the child’s vocabulary got greater and the more communicative acts she produces. The greater the vocabulary, the more wide is the child’s speech, and, thus, the child’s fluency. Since the studied children have presented a performance that was short to that which was expected in those two tests, the development of the speech’s fluency was also jeopardized.

The findings of this research concur with the authors that have identified a delay in the linguistic development of the premature child in comparison to the child that was born on term, mainly regarding the meaning language. Besides biological factors resultant of the prematurity, the environmental ones that were related to this aspect have great importance, being able to contribute to the surmounting or preservation of the resultant difficulties.

Once this is known, it is this study’s suggestion that, early on in pregnancy, the mothers receive support and orientation from a multiprofessional team regarding the development that is expected from a child and the possible stimulations that are able to being put forth during hospitalization, in order to increment the maternal bond and the positive feelings towards the child. This very same professionals might also suggest a number of activities to be done at home, so as to propitiate the premature baby’s development. It is paramount to highlight the importance of the proximity of the mother to the child, in such a context that she appears as a linguistic and behavioral model for the child and, through her stimuli, she can mitigate possible consequences from the prematurity.

Reading and playing habits are important aspects to be reinforced, once they can be not only a positive influence in the development of all linguistic aspects that were evaluated (vocabulary, pragmatics, phonology, fluency and speech) but also a strengthening factor of the dyadic bond. The incentive for reading, either from the parents’ part or from the school’s part, is essential for the formulation of coherent speeches, containing syntactic structures and adequate vocabulary, which might lead to better learning of reading and writing in the future.

Rules of behavior and obedience are an important part of the child’s education, but cannot be seen as a priority. The mother, as both provider of knowledge and a safe harbor for her child during the activities and interactions, allows her child to develop socially, linguistically and behaviorally, and also provides her child with more autonomy and security during these activities.

The research described in these pages has focused on a group of children that were diagnosed as prematures at birth and that had a low socioeconomic level. The impossibility of the extension of the data reported here for other subjects from the same population that was studied, either because it was not possible to contact them for the convocation, or because they just did not showed up on evaluation day, was one shortcoming of this study.

The results reported here establish courses of action for future researches whose objective is to describe and compare the complexity of the language in different populations of children, which will allow (or not) the confirmation of the relationship between the participants’ performance, prematurity and mother-child interaction.

CONCLUSION

The participants of this study have presented a performance which was below what was expected for their chronological age for almost the entirety of the conducted tests. Three factors, together or associated, might justify the subjects’ performance: biological factors such as prematurity, low birth weight and prenatal, perinatal or postnatal intercurrences; sociocultural factors, such as instruction level, socioeconomic level and family culture; and mother-child interaction, in which the mother, as the sociolinguistic model of her child, might attenuate the consequences of the aforementioned factors, provided that she establishes a stimulating interaction with the child.

REFERENCES

Appendix 1. Anamnesis

1. Identification
Child's name:  
Date of birth:  
School:  
grade:  

Father's name:  
Date of birth:  
Age:  
Natural of:  
Education level attained:  
Employment:  

Mother's name:  
Date of birth:  
Age:  
Natural of:  
Education level attained:  
Employment:  

Address:  
Phone number:  
Household residents:  
Family income:  
Preferred Health Center:  

2. Maternal records
a) Marital status:  
b) Number of children:  
c) Quantity of abortions has suffered:  
d) Your pregnancy was planned? How have you responded to the fact that you were pregnant? How was the father responded?  
e) Any health problems/ any other problems (besides physical ones) during gestation?  
f) Do you currently use any of the following: medicines/alcohol/tobacco/ drugs/remedies?  
g) Do you know of any disability or deficiency in your family? Any type of chemical dependence?  
h) Were you hospitalized during gestation?  
i) Type of delivery  
j) Prenatal Intercurrences  
k) Postnatal Intercurrences
3. Child's records
a) Hospitalization date:
b) APGAR score:
c) Birth weight
d) Capurro
e) Diagnosis
f) Intercurrences
g) Medications
h) Surgeries
i) Hospitalization time
j) Feeding after hospitalization?
k) There was any accompaniment after the hospitalization? Where?
Which professionals were involved?
l) Motor development?
m) Speech and language development?
n) Is undergoing any type of treatment?
o) Hospitalizations?

4. Mother-child hospitalization
a) When did you know your baby was going to be born preterm?
b) What did you expect to happen when you knew your baby was going to be premature?
c) Did you receive any orientation and/or information regarding the prematurity and how would a premature baby be?
d) How did you feel during the baby's hospitalization period?
e) What did you expect to happen during the hospitalization?
f) Did you receive any orientation during the hospitalization period? From which professionals?
g) Have you talked to any other premature babies' mothers?
h) Have you observed or observes any difference from your child in relation to other children?
i) Have you received orientations regarding how it is the development of a child that was born on term?
j) Did you breastfeed your child? For how long?
k) Did the child do or does anything differently than you expected?
l) The motor development (rolling, sitting, crawling, walking) of your child is like you expected it to be?
m) When did your child start to babble (first sounds?)
n) When did your child speak its first words?
o) Around which age has your child started to speak more words and form two words-sentences?
p) Was your child always comprehended by peoples?
q) Did your child express more through gestures or words?
r) When did your child smile? When did your child start your child to differentiate you from other people?
s) How would you describe the child as it is nowadays? (If participant doesn’t understand: Did your child do anything that is different than what you expected?)
t) Is the child able to express itself with clarity? Do you think people understand her?
u) Does your child change sounds in her speech?
v) Does your child tells, invents and reports stories and facts?
w) Who's the main caretaker of the child?
x) Does the child stay with other people for some time?
y) How would you describe your care with your child nowadays?
z) You and the child's father participate on na equal basis regarding the care of the child?

5. Daily activities and mother-child interaction
aa) Do you talk with your child? What about?
bb) What do you do when your child decides to do something without your help?
c) How much time to you dispose for the child?
dd) What are the activities that you mostly do with your child?
e) With whom the child talks to the most?
ff) To which places do you usually take your child?
gg) How would you describe your child's personality?
hh) During pregnancy, did you receive mostly orientations regarding baby care, baby stimulation or what to do to ensure that your child had a good behavior?
i) Who was responsible for orientating you regarding these aspects during pregnancy?
j) What is more important to you in a child's upbringing: teaching to follow the rules, teaching how to be obedient or talking and playing? Why?
k) What do you think is most important for a child: knowing how to behave properly (with the family, in school) or being well developed for its age and having a good performance in school?
l) Do you forbid any type of activity because of the child's health?
m) How is it the behavior of your child when it is with you? And among others?
n) (If it stays with a caretaker) What does this person that takes care of the child values the most? Talking/playing, taking care of the cleanliness/ feeding or the child's behavior?
o) The fact that you work makes you to dedicate more to one activity than to others when you are taking care of your child? If so, which one of these: Healthcare/hygiene/ talking/ playing or education/upbringing/ obedience?
p) Have you observed any difference in your way of educating after your child was born?
qq) What do you do when your child does something that is wrong? (E.g.: Hits, talks, yells, punishes, ignores)
r) Since when is the child in school?
s) How is the child's performance at school?
t) What do you think it might be the reason for your child's school performance?
u) How does the child feels regarding school?
v) What does the school reports regarding your child?
w) How’s the child's behavior in school? And in the household? Does the child have any friends?
x) What are the child's favorite pastimes and plays? With whom does your child plays?
y) The child prefers to play alone or in group?
z) Your child prefers to play with younger, older or same aged children?
a) Do you play with your child? How's playtime? Do you tell stories? Which ones?
bb) Does your child watches TV? For how long each day? What does your child like to watch?
ccc) How does your child sleep? At what time? With whom?