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The Language of Educators and Preschool Children in Different Classroom Situations

El lenguaje de las educadoras y de los(as) niños(as) en distintas situaciones de aula

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Abstract

This research explores certain properties, such as the quantity, syntactic complexity, and lexical diversity of the speech of teachers and children in different classroom situations in early childhood education. Specifically, it analyzes whether those properties shape differentiated language patterns according to the ongoing classroom activity. Forty seven interactions between children of medium-low and low socioeconomic status and their teachers in public educational institutions of the Province of Entre Ríos, Argentina, were analyzed. A multivariate analysis was carried out that combines techniques of factor analysis and classification. The results allow the situations to grouped into three classes: those comprised mostly of storybook reading situations, with long turns by the teacher and syntactic complexity in the children; those composed of corner play situations, where both the teacher and the children used a greater volume of speech; and those constituted mainly by round situations, with a lower overall volume of speech than in the other two classes. With the exception of lexical diversity, the linguistic properties contemplated contributed to explain the particular configurations of the interchanges in the storybook reading, corner play, and round situations. The results are discussed in light of the literature and the educational implications.

Keywords: language of educators, language of children, lexical diversity, amount of speech, syntactic complexity

Resumen

Esta investigación explora si ciertas propiedades como la cantidad, la complejidad sintáctica y la diversidad léxica del habla de maestras(os) y niños(as), configuran patrones de lenguaje diferenciados según distintas situaciones de aula de educación inicial. Para ello, se analizaron 47 situaciones de interacción entre alumnos(as) de nivel socioeconómico medio bajo y bajo y sus maestras en salas de establecimientos educativos públicos de la Provincia de Entre Ríos, Argentina. Se realizó un análisis multivariado que reúne técnicas de análisis factorial y de clasificación. Los resultados permitieron agrupar las situaciones en tres clases: compuesta mayormente por situaciones de lectura de cuentos, con turnos largos por parte de la maestra y mayor complejidad sintáctica en los(as) alumnos(as); compuesta por situaciones de juego de rincón, donde tanto la maestra como los(as) niños(as) desplegaron un mayor volumen de habla; y situaciones de ronda, en las que se identifica un volumen de habla menor que en las otras dos clases. Con excepción de la diversidad léxica, las propiedades lingüísticas consideradas contribuyeron a dar cuenta de las configuraciones particulares que asumen los intercambios en las situaciones de lectura de cuentos, ronda y juego de rincón. Se discuten los resultados a la luz de la literatura y de sus implicancias educativas.

Palabras clave: cantidad de habla, complejidad sintáctica, diversidad léxica, lenguaje de educadoras, lenguaje de niños y niñas

Introduction

There is currently a consensus regarding the relevance of the linguistic environment in contexts of upbringing, in that its characteristics, not solely pragmatic but also lexical and syntactic, can help explain differences in children's linguistic development (e.g. Casillas, Amaturi, Seidl, Soderstrom, Warlaumont, & Bergelson, 2017; Hart & Risley, 1995; Rosemberg, Alam, & Stein, 2014; Snow, 2014).

Kindergarten is a context of fundamental upbringing in the life of a child, constituting the first area of secondary socialization at a time when their oral language is in full development. For this reason, various studies have addressed the characteristics of language in interactions between the teacher and the children in the context of the classroom (Dickinson, Hofer, Barnes, & Grifenhagen, 2014; Dickinson & Porche, 2011; Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002; Strasser, Barra, Darricades, & Mendive, 2018; Whorral & Cabell, 2016).

The environment of interactions in which children are immersed in the classroom is shaped by a set of linguistic variables such as the quantity and diversity of words and the presence of specific, sophisticated terms, that is, in uncommon or abstract terms, the number of connectors and the average length of the utterances by the teacher and the other students. These linguistic variables give particular value to early childhood experiences in the school context. Large-scale studies (Vasilyeva & Waterfall, 2011; Yoshikawa et al., 2015) have revealed a relationship between the increase in children's linguistic skills and the experiences they have had in the classroom. Although it is no simple task to identify the factors in these experiences that have the greatest effect on this increase, one can assume that the aforementioned linguistic variables have an important influence (Vasilyeva & Waterfall, 2011).

In the context of Latin America, where there are significant socioeconomic differences in the uses of language and childhood vocabulary (Rosemberg et al., 2014; Strasser, Rolla, & Romero-Contreras, 2016), it is essential to study the linguistic environment in educational contexts. The fact that significant investments have been made in the majority of the countries in the region to expand educational coverage for young children makes it even more relevant to study the quality of the linguistic environment that is provided to students at school. This relevance is particularly evident if one considers the triple relationship between the quality of the language to which the child has been exposed in the first few years (linguistic input), childhood language, and achievements in school learning. Indeed, there is evidence that the development of various aspects of children's language, such as the breadth and diversity of vocabulary and syntactic complexity are conditioned by the properties of the linguistic input to which the child has had access in early interactions, as well as situational aspects of these interactions (Hart & Risley, 1995; Hoff, 2013; Huttenlocher et al., 2002; among others). In turn, vocabulary and mastery of complex syntax facilitate access to the writing system and the comprehension and production of oral and written texts (Biemiller, 2006; Goswami, 2003; Perfetti, 2007; Protopapas, Sideridis, Mouzaki, & Simos, 2007; Sénéchal, Oulette, & Rodney, 2006; Snow, Tabors, Nicholson, & Kurland, 1995) and, as a consequence, have an impact on schooling and the future life of children.

A few previous studies (Perry et al., 2018; Soderstrom & Witterbole, 2013) have addressed the impact of the structure of the activity on the amount of speech that the teacher and the children produce. However, they have not considered whether the various activities give rise to the emergence of speech patterns that are also characterized by the qualitative properties of the language of the teacher and the children. In line with current psycholinguistic models (Nelson, 2007), which are based on the sociocultural perspective (Vygotsky, 1986), this paper emphasizes the role of the activity and is intended to contribute to better understanding of how it mediates the quantity and quality of language that the child receives and has the opportunity to produce at the early level.

It is for this reason that the first objective of this study is to explore the quantity, the diversity of vocabulary, and the syntactic complexity of the language of the teachers and students in different situations in kindergarten. As a second objective, it proposes to identify the language properties of the teachers and the children that predominate in the characterization of storybook reading activities, corner play, and at the moment of initial exchange in the round that takes place during the normal school day in early childhood education.

The Relationship Between the Language of the Teachers and theChildren in Early Childhood Education

A series of studies carried out mainly in the United States examined the extent to which certain properties of the speech of teachers had an effect on the language of the children. Wasik & Hindman (2014) observed that the explicit use of unfamiliar vocabulary by teachers who formed part of an annual professional development program called Head Start[1] had a positive effect on the use of words by the students.

In a longitudinal study, Dickinson & Porche (2011) provided evidence of the relationship between the use of sophisticated vocabulary by teachers in situations of free play and expressions related to attention in group settings in preschool to the reading comprehension shown by the children in fourth elementary

[1] The teachers received a year of training in vocabulary teaching to develop the vocabulary of the children.

grade. In a later study, Toub et al. (2018) presented evidence of the impact of situations of guided play and storybook reading in children's learning of receptive and expressive vocabulary when measured in the short term. Meanwhile, the long-term measurements only showed an effect from storybook reading in receptive vocabulary.

The aforementioned studies have mainly focused on the effect of linguistic input—that is, the language that the child hears—ahead of the total quantity of words and different words, as well as on the degree of lexical diversity of children's speech. However, the relationship between linguistic input and the development of syntactic complexity has received less attention. The syntactic complexity of an utterance is defined by the type of internal structure involved. The most complex sentences are constructed syntactically from simpler sentences, through recursive operations of coordination and subordination that give rise to multi-clause sentences. In the case of the former, two or more clauses of the same level are connected based on a coordinating nexus. In the second, a subordinate or dependent clause is inserted into a matrix clause, within which it performs a particular syntactic function and cannot occur as an independent sentence.

According to the literature, multi-clause sentences, which involve a high level of syntactic complexity, emerge fairly late in childhood language (in the period between two and four years of age). In turn, coordinating and subordinating conjunctions usually begin to appear in the second half of the third year (for a summary see Bowerman, 1979). Taking into account both the relationship observed between certain properties of the educators' speech and children's linguistic development, as well as the time at which the children begin to produce complex sentences, the importance of studying the syntactic complexity of the speech of educators in the school context becomes evident.

Huttenlocher et al. (2002) studied the relationship between the syntactic complexity of the input that educators provided to children of 3.6 years of age—measured in 40 preschool classes at the beginning of the school year—and the increase in understanding complex syntax that the children showed throughout the year. They observed greater syntactic development in those groups of children whose teachers produced syntactically more complex speech. It should be noted that the increase in these skills was not correlated with the socioeconomic group of the students, which was also not correlated with the syntactic complexity of the teacher's speech. That is, the comprehension skills for complex syntax of the children in the low socioeconomic group could be increased, as could as those of their peers in the middle socioeconomic group. This situation, in turn, was possible because teachers who used syntactically more complex speech were not concentrated in schools with children of middle socioeconomic status. On the contrary, there was a correlation between the socioeconomic group of the children and their comprehension skills at the beginning of the school year.

The authors also identified that the syntactic complexity of the input specifically affected syntactic and non-syntactic abilities (e.g. mathematics). Finally, they observed that other more general characteristics of the teacher's education of children, such as giving positive feedback to children's utterances, although identified as being correlated with the increase in children's syntactic abilities, did not significantly predict this growth, unlike the syntactic properties of the input.

Classroom Activities and the Language of the Children

The studies carried out in kindergartens have shown that the language of the teachers can be important, not only in explicit situations of teaching-learning, but also in the many implicit teaching situations that occur in everyday school practices (Powell & Diamond, 2011).

Explicit language teaching is specially designed to increase particular skills (Marulis & Neuman, 2010). For example, storybook reading can adopt specific characteristics if it is designed with the explicit intention of promoting development of vocabulary (Sénechal, 2017), or it could be an instance of implicit teaching if the aim is to enjoy storybook reading (Marulis & Neuman, 2010). Similarly, children's play, lunching, and hygiene can also be implicit teaching situations (Strasser, Lissi, & Silva, 2009), as long as they can give rise to a matrix of interaction that expands the opportunities for language development. The potential of the situations in which the adult mediates the interaction between the students is increased when employing decontextualized uses of language, a complex syntax, and a diverse and sophisticated

vocabulary, as well as when the adult repeats and reformulates the words of the children, asks open questions, and induces them to make heuristic use of language (Uccelli, Rowe, Demir-Lira, Goldin-Meadow, & Levine, 2018).

A series of studies have analyzed the characteristics of language in different kindergarten teaching activities. As part of a comparative study of children's interactions at school and at home, Soderstrom & Witterbolle (2013) examined the quantity of speech addressed to the child as a function of the type of activity. Their results showed that the type of activity affects both the language directed at the students and the quantity of speech produced by them and the adult. They also found that the organized play activity was one in which the children produced more speech, probably because they had to concentrate on the activity and use the language to perform an action as part of a group. As regards free play, this was characterized by a smaller quantity of input and children's speech. Ibáñez, Ramírez & Rosemberg (2018) interpreted similar results, noting that the lower quantity of input in free play is due to the fact that it is a less structured activity of an exploratory nature, without an explicit teaching objective in which the teachers are limited to monitoring the children's activities. On the other hand, Goble & Pianta (2017) found that these types of games initiated by the children constitute environments in which children's linguistic production is limited, but not in the case of group games coordinated by the teachers and designed as situations of explicit teaching, which do result in greater use of language by the children.

In a longitudinal study that involved audio recordings in a classroom of children between two and three years of age for a year and with evaluations of expressive vocabulary at the beginning and end of the period, Perry et al. (2018) agreed that in structured activities the children produce more vocalizations, receive a greater amount of input from their peers and from the teacher, and participate in a larger number of turns of interaction with the teacher than in unstructured activities. In particular, the input that the children receive when they engage in turns of interaction with adults and the vocabulary that they hear from their peers explain the increase in their receptive and productive vocabulary.

Meanwhile, Dickinson et al. (2014) compared the effect of certain variables related to the educators—years of teacher training, participation in a specific intervention program—or to the organization of the classroom activity—whether it was a storybook reading situation, whether the activity was directed at the whole group or smaller groups—regarding the quantity and diversity of words, the presence of sophisticated vocabulary, and the syntactic complexity of the teachers' speech. The results showed greater differences depending on the activity and, to a lesser extent, participation in an intervention program. At times of storybook reading, the teachers used academic language to a greater extent, a diverse and sophisticated vocabulary, as well as a more complex syntax.

Other studies concur in underlining the potential of reading situations and discussion of stories and other activities for the development of language, such as, for example, the round of exchange at the beginning of the school day. For example, in a study with three- and four-year old children from vulnerable sectors of Chile, Strasser et al. (2018) observed that during the initial round children have more opportunities to interact with the language, and the teachers expand the sentences of the students more and use fewer instructions. On the other hand, Rosemberg (2013), studying a population in Argentina with similar sociodemographic characteristics, showed that although in these situations the teachers correct the words used by the children and expand their utterances, during storybook reading activities, they use a greater number and diversity of words.

This Study

While in previous studies an impact of the activity on the properties of the input has been observed, there has not been any specific analysis of whether the lexical and syntactic characteristics of the language of the educators and children in the various kindergarten situations have the potential to shape differentiated linguistic spaces. In this study, three dimensions of the teacher's speech and the children's speech are examined: the quantity of speech, the lexical diversity, and the syntactic complexity during the activities of storybook reading, free play, and round situations. The objective is firstly to examine the way in which the dimensions studied are generally related—without yet referring to the different situations in the kindergarten—and secondly, to analyze whether these dimensions acquire particular values, delimiting differentiated linguistic contexts that coincide with the different teaching activities studied.

Methodology

The corpus of this study was composed of 47 situations of interaction between children belonging to families of middle-low and low socioeconomic status and their teachers, all of whom were women. The situations were recorded in 10 children's classrooms in public institutions in the Province of Entre Ríos, Argentina, within the framework of the intervention project "La promoción del desarrollo lingüístico y cognitivo en jardines de infantes" (The promotion of linguistic and cognitive development in kindergartens, in English) (Rosemberg & Stein, 2012)[2]. Some 72.10% of the mothers of the children had only reached elementary schooling (seven years of formal schooling); 26.5% had either completed or not completed secondary education (12 years of schooling or less); and only 1.30% of mothers had university education. The children were an average of five years old, at which point they were already producing complex sentences and individual differences could be observed regarding their mastery.

Within the framework of the project, the teachers received specific training on the importance of interaction for language development and early literacy, as well as the didactic implementation of the situations that make up the typical structure at kindergarten (Rosemberg, Borzone, & Silva, 2010).

In order to carry out this study, we analyzed the language of the teacher and the children in round situations, corner play, and storybook reading. The round situations or "time to share", which usually take place at the beginning of the school day, were intended for the children to talk about their personal experiences. The intention in each situation was that one or two children, with the collaboration of the teacher, would formulate stories that were coherent and comprehensible to the other students. As the children spoke, the teacher wrote one of the stories on a sheet of poster paper. It was stipulated that the whole situation would last approximately 20 minutes. Meanwhile, the play situations were organized into three times:

- In the initial conversation the children and the teacher planned the situation, talked about the objects available in each corner, typically an area with toys to play "house", an area with jigsaws and board games, another with children's books and drawing and painting materials, and one for "construction" with different types of blocks and toy cars and trucks. The children selected the corner in which they were going to play and what they were going to do there.

- The second time consisted of the play itself. The situation ended with an exchange in which the children talked about what they had played and compared what they had planned with what they had actually played. It was stipulated that the corner game would last approximately 30 minutes.

- Finally, story reading situations frequently had a structure composed of three parts: activation of the experiences and previous knowledge of the students in relation to the theme of the story; reading aloud by the teacher; and finally, the group reconstruction of the story by the children and the teacher. The guidelines established an approximate duration of 30 minutes for the whole activity.

In this study we analyze 15 situations of story reading, 20 situations of corner play, and 12 round situations, which are part of the corpus of Rosemberg & Stein (2012). The audio of these situations was recorded by research assistants and the transcription was done following the CHAT (Codes for the Human Analysis of Transcripts) format.

Processing of data and measurement of variables

The transcripts were processed using the software Computerized Language Analysis, CLAN (MacWhinney, 2010) to obtain information about three dimensions of the teacher and children's speech—quantity of speech, lexical diversity, and syntactic complexity—in the situations that are the subject of this study. The variables that take these dimensions into account were operationally defined as follows:

[2] The funds to carry out this project were obtained from the "Programa de Promoción del Desarrollo Lingüístico y Cognitivo para los jardines de infantes de la Provincia de Entre Ríos" directed by C. R. Rosemberg and A. M. Borzone, financed by Fundación Arcor and subsidized by the Agencia de Promoción Científica y Técnica y el Consejo Nacional de Investigaciones Científicas y Técnicas, Project: "Aspectos lingüísticos y cognitivos del proceso de alfabetización de grupos en riesgo por pobreza: niños, jóvenes y adultos analfabetos y minorías étnicas". PICT 2539/2010 and PIP 2009-2011 Nº 112-200801-00834. Directors Ana M. Borzone and Celia R. Rosemberg.

- Quantity of speech: Total number of words used, considering each instance of use (number of tokens), as well as the number of lexemes (types).

- Lexical diversity: The moving average type-token ratio (MATTR) was used, which, unlike the traditional measurement of the type-token ratio (TTR), is not affected by the length of the text. The MATTR calculates an index of the lexical diversity measured in a moving window, which comprises a certain number of words. To obtain the index, the different types of words (types) are divided by the total number of words (tokens)—TTR—within that moving window which, in this analysis, included 10 lexical items. Thus, we proceed by estimating the TTR of the words from 1 to 10, then the TTR for the words from 2 to 11, then the TTR for the words from 3 to 13, and so on. Finally, the TTRs that were estimated were averaged (Covington & McFall, 2010; MacWhinney, 2010).

- Syntactic complexity of speech: Due to the age of the children, the medium length of the utterance—MLU—was ruled out as a measurement of syntactic complexity. This measurement is not sensitive to differences in childhood grammatical development after MLU 4. To evaluate the syntactic development of children of school age, it is common to use other measurements, such as the number of nominal and prepositional phrases per sentence, the use of complex structures, such as subordinate clauses (e.g. Loban, 1976), or, the understanding of coreference relations. Huttenlocher et al., (2002) found a strong correlation between the results obtained by using the average number of nominal syntagmas per utterance and the proportion of multi-clause sentences. Therefore, in this study, we used the quantity of complex utterances (e.g. consisting of more than one clause) used by the teacher and by the children. This measurement of syntactic complexity was obtained indirectly through the number of connectors and, more specifically, through the calculation of an index of connectors used, both for the children and for the teacher in each situation. The index of connectors, obtained by dividing the total number of connectors produced by the total number of words, provides a value between 0 and 1, suggesting the presence of greater syntactic complexity the closer the value is to 1. Since they represent the highest level of syntactic complexity, only connectors that establish subordination relationships were considered. The following connectors were selected for their frequency in speech and for being used almost exclusively to introduce dependent clauses: that, who, where, when, why. The medium length in words of the turns (MLT) of the children and the educators was also used as a complementary measurement.

Data Analysis

The data obtained were processed using the SPAD 5.6 software, which uses multivariate analysis methods, linking factor analysis and classification techniques (Moscoloni, 2005). First, a correlation analysis was carried out in order to explore the relationships between the quantity, the diversity of the vocabulary, and the syntactic complexity of the language of the teachers and the children. Second, a principal component analysis was carried out, a factorial technique to reduce an original set of continuous variables by detecting a smaller number of factors or components that explain the greater variation in the data. On this basis, a classification analysis was carried out with the objective of identifying classes in which the units of analysis (school situations) were grouped according to a set of similar characteristics. The value of this type of analysis essentially falls upon representation in a factorial space that allows an exploratory approach to its structure from a perspective that is more inductive than deductive, revaluing the role of individuals or situations.

This analysis requires a distinction between two large groups of variables linked to each other, since it responds to the same aspect of the phenomenon under study. The first group is constituted by the active variables that intervene in the constitution of the factorial axes and which will be the center of comparison of the data. The second group is formed by the illustrative variables, which do not participate in the elaboration of the axes, but allow a better understanding of them. In this study, the following active variables were considered, calculated from both the speech of the educator and the children: the number of connectors, the index of connectors (Index Con), the medium length of the turn (MLT), the number of lexemes (types), the number of words (tokens), and the lexical diversity (MATTR), all of them continuous. The situation (story, game, and round) was considered an illustrative (nominal) variable. The variables are shown in Table 1.

Table 1
Variables considered in the language of the educators and children

Name of variables		**Theoretical dimension**
Total number of connectors of children	Connectors-C	*Syntactic complexity of speech*
Total number of connectors of educators	Connectors-E	
Index of connectors in speech of children	Con-C Index	
Index of connectors in speech of educator	Con-E Index	
Medium length of turn of children	Mlt-C	
Medium length of turn of educators	Mlt-E	
Quantity of lexemes used by children (types)	Types-C	*Quantity of speech*
Total quantity of lexical instances used by children (tokens)	Tokens-C	
Quantity of lexemes used by educators (types)	Types-E	
Total quantity of lexical instances used by educators (tokens)	Tokens-E	
Moving average type-to-token ratio (MATTR) in children	Mattr-C	*Lexical diversity*
Moving average type-to-token ratio (MATTR) in educators	Mattr-E	

Source: Prepared by the authors.

Results

Properties of the speech of teachers and children in five-year-old classrooms

In the matrix of correlations in Table 2, we show the specific values of the intensity and directionality of the correlation between the linguistic variables that characterize the exchanges in the set of situations analyzed.

TABLE 2

In principle, if we analyze the correlations between the speech properties of the children, on the one hand, and the teacher, on the other, we observe that the volume of speech does not show a significant correlation with greater diversity in the vocabulary used (MATTR): this is observed both in the number of types of words—types—(teacher: .02, children: .28) and occurrences of words—tokens—(teacher: -.05; children: .25).

A greater volume of speech also does not imply that the speech uttered is more complex in syntactic terms. In children's speech, neither the number of word types—Types-C—nor the total number of words—Tokens-C—significantly correlate with the index of connectors used (.07 and .08, respectively). Something similar occurs regarding the teacher's speech. The number of connectors used by the children (Connectors-C) and the educator (Connectors-E), however, do correlate significantly with their respective quantity measurement—types and tokens. For example, the number of Types-C significantly correlates with the number of connectors they used (.54). This value is .52 in the case of the total number of words produced.

It should be noted at this point that the total number of connectors used in a situation is not a measurement of the degree of syntactic complexity, since this is affected by the length of the situation and, thus, by the amount of speech produced. As stated previously, eliminating the influence of the length of the situation (for example, the amount of speech) for the measure in question does not produce

a significant correlation between the amount of speech and its syntactic complexity. This is what occurs in the case of the connector index. Thus, the significance of the correlation between the total number of connectors and the number of types and tokens is simply another instance of correlation between variables of quantity of speech.

Another caveat should be made regarding the correlation between our complementary measurement of syntactic complexity (the medium length of the turn in words, MLT) and the amount of speech produced. As can be observed in Table 2, this correlation is positive in both the child and the educator's speech, but is only significant in the first case. In children's speech, then, the MLT correlates significantly with the number of word types (.56) and the total number of words (.59). This suggests that, when they talk more, children produce longer turns instead of producing a larger number of short turns.

Contrary to what is stated above, this would seem to indicate that, at least in the case of children, the increase in the quantity of speech does imply an increase in syntactic complexity. However, the fact that the medium length of the turn in words, or MLT, does not correlate with the index of connectors—both in the case of children (.19) and the educator (-.01)—suggests that the two variables do not measure the same thing. The MLT seems instead to be a measurement of the space for participation and communication that the children have in the interaction in the classrooms. It is also interesting to note that in children's speech the MLT measurement correlates with the MATTR diversity index (0.41).

On the other hand, if the relationships between the different variables of the teacher's speech are analyzed with those of the children in the group of situations, we can observe that the quantity of speech produced by the educators correlates significantly with the quantity of speech produced by the children: the number of types of words used by educators (Types-E) correlates with the number of Types-C (0.74) and the total of Tokens-C (0.70). The same is true of the total number of words used by the educators (Tokens-E) in relation to the two indicators mentioned above: Types-C (0.67) and Tokens-C (0.66).

However, in the situations analyzed, we observed no correlation between the index of connectors in the speech of the children and the teacher (.24), even though the relationship is positive. There is also no significant correlation between the lexical diversity of the educator's speech and that of the children, although the directionality of the relationship is also positive here (.23). The measurement of lexical diversity in the children's speech—MATTR—on the other hand, does correlate significantly with the teacher's index of connectors, although the correlation is low (0.29). Finally, the direction of the relationship between the MLT of the educator in words and the measurements of the quantity of children's speech is interesting: types (-.24) and tokens (-.22). Although the correlation is not significant, we can observe that the longer the teacher's turns are in the situations observed, the lower the quantity of children's speech.

Analysis of the speech classification of the teachers and the children

A classification analysis was then carried out that enabled greater knowledge of the data, since the information related to the variables was illustrated with the information related to the situations. The analysis of the active continuous variables gave rise to the formation of three classes, the grouping of which coincided in most cases with the classification of the situations according to the nominal illustrative variable (corner play, storybook reading and round situation). The classes were thus shaped by a situation characteristic to some of the central active continuous variables of the study (see Table 3).

Table 3
Result of classification analysis: classes formed and continuous active variables that contributed to their formation

Class 1: Story Activity (N=17)			
Continuous variables that contributed most	Average in class	Average in general sample	Test value **
Mlt-E	19.611	14.988	4.13
Con-C Index	0.037	0.029	2.7
Class 2: Play Activity (N=15)			
Continuous variables that contributed most	Average in class	Average in general sample	Test value
Types-C	268.133	154.915	5.74
Tokens-C	718.067	386.745	5.62
Types-E	481.533	350.021	3.54
Connectors-E	4	3.426	3.16
Tokens-E	1693.8	1210.6	2.98
Mlt-C	4.455	3.777	2.36
Class 3: Round Activity (N=15)			
Continuous variables that contributed most	Average in class	Average in general sample	Test value
Connectors-C	1.333	2.128	-4.04
Tokens-C	144	386.745	-4.12
Types-C	70.067	154.915	-4.3
CONCTORM	2.6	3.426	-4.54
Tokens-E	397.933	1210.6	-5.01
Types-E	154.533	350.021	-5.27

** *Note:* All test values ≥ 1.96.
Source: Prepared by the authors.

Table 2
Correlation values between continuous active variables

	Connectors-C	Connectors-E	Types-C	Tokens-C	Mattr-C	Types-E	Tokens-E	Mattr-E	Mlt-C	Mlt-E	Con-C Index	Con-E Index
Connectors-C	1.00 (99.99)											
Connectors-E	0**.37 (2.67)***	1.00 (99.99)										
Types-C	**0.54 (4.12)***	**0.54 (4.11)***	1.00 (99.99									
Tokens-C	**0.52 (3.90)***	**0.51 (3.82)***	**0.98 (16.05)***	1.00 (99.99)								
Mattr-C	0.11 (0.75)	0.25 (1.74)	0.28 (1.95)	0.25 (1.74)	1.00 (99.99)							
Types-E	0.47 (3.56)	**0.60(4.76)***	**0.74 (6.50)***	**0.70 (5.96)***	0.05 (0.35)	1.00 (99.99						
Tokens-M	0**.45 (3.31)***	**0.54 (4.18)***	**0.67 (5.57)***	**0.66 (5.42)***	0.04 (0.26)	**0.97 (14.09)***	1.00 (99.99)					
Mattr-E	-0.11 (-0.73)	0.21 (1.47)	0.11 (0.77)	0.10 (0.71)	0.23 (1.61)	0.02 (0.12)	-0.05 (-0.37)	1.00 (99.99)				
Mlt-C	0**.49(3.69)***	0.22(1.51)	0**.56(4.32)***	**0.59(4.66)***	**0.41(2.96)***	0.17(1.16)	0.10(0.68)	0.06 (0.38)	1.00 (99.99)			
Mlt-E	-0.05(-0.35)	0.20(1.39)	-0.24(-1.70)	-0.22(-1.55)	-0.06(-0.38)	0.19(1.34)	0.21(1.44)	-0.02 (-0.16)	-0.07 (-0.50)	1.00 (99.99)		
Con-C Index	0**.55(4.23)***	0.16(1.09)	0.07(0.51)	0.08(0.52)	0.03(0.22)	0.06(0.42)	0.12(0.82)	-0.20 (-1.37)	0.19 (1.31)	-0.03 (-0.21)	1.00 (99.99)	
Con-E Index	0.17(1.19)	0.23(1.62)	0.13(0.92)	0.09(0.65)	**0.29(2.05)***	0.26(1.80)	0.27(1.89)	-0.07 (-0.47)	0.00 (-0.02)	-0.01 (-0.10)	0.24 (1.66)	1.00 (99.99)

Note: *$p \geq 1.96$. In parenthesis. The Z value of each correlation value is stated.

Source: Prepared by the authors.

Class 1

This group mostly involved storybook reading situations: 12 of the 15 situations (80%) of storybook reading out of the total sample are in this group. In turn, these 12 situations represent 70.58% of the cases for this class, which also includes a round situation (case 40) and four play situations (cases 19, 20, 26, and 27).

The linguistic exchanges that comprise the situations grouped in this class are characterized by the measurement of the medium length of the educator's turn (Mlt-E) and the index of connectors used by the children (Index Con-C), which is greater than in the other situations of the general sample. In fact, in these situations longer turns are observed on the part of the teachers and greater syntactic complexity in the speech of the children, as measured by the index of connectors.

Class 2

This class groups almost entirely corner play situations: of the 20 corner play situations of the total sample, 14 of them (70%) are in this class. Likewise, the 14 situations of corner play grouped in this class represent 93.33% of the cases of this group. This class also includes a round situation (case 45).

In these exchanges, both the teacher and the children use a greater volume of speech than in the other situations. That is, they record a number of lexemes—types—and lexical occurrences—tokens—well above the general average, both in terms of the children's production and that of the educator. In turn, in this type of situation, the number of connectors produced by the educator is prominent.

In the case of the children, the number of lexical occurrences, as well as the lexemes and the average length of the turn, demonstrate the higher volume of children's speech in corner play. The significant contribution of the first two measurements—tokens and types—could suggest greater length of this type of situation compared to the other types analyzed. The contribution of the medium length of the speech of the child or MLT, on the other hand, suggests that during the corner play the children produce more prolonged turns and not simply more interventions than in the rest of the situations. It is worth remembering that this latter variable—the MLT—is not correlated with the index of connectors in children's speech, so its prominent contribution to the definition of play situations does not indicate that they have more complex syntactic child speech, but merely that the children have a broader space of participation that allows them to produce longer turns of intervention.

Class 3

This class includes round situations to a greater extent: 10 (83.33%) of the total of 12 round situations were grouped here. These 10 situations represent 66.66% of the cases of this class. Three story situations were found (cases 2, 3, and 15) and one of corner play (case 34), so it was the least homogeneous class of the three classes identified.

In this type of situation, a smaller volume of speech was recorded than that observed in general. Both the number of total words and the number of types of words or lexemes produced by the children and teachers are lower. Also, the number of connectors is lower in the speech of the teacher and children than in the rest of the situations. As noted in relation to class 2, this may be related to the duration of the activity.

In order to visualize the formation of the different classes, the cases analyzed were projected in the factorial space, indicating their pertinence to each class along with the illustrative categorical variable (indicated in Figure 1 as 1 = Story, 2 = Play, 3 = Round).

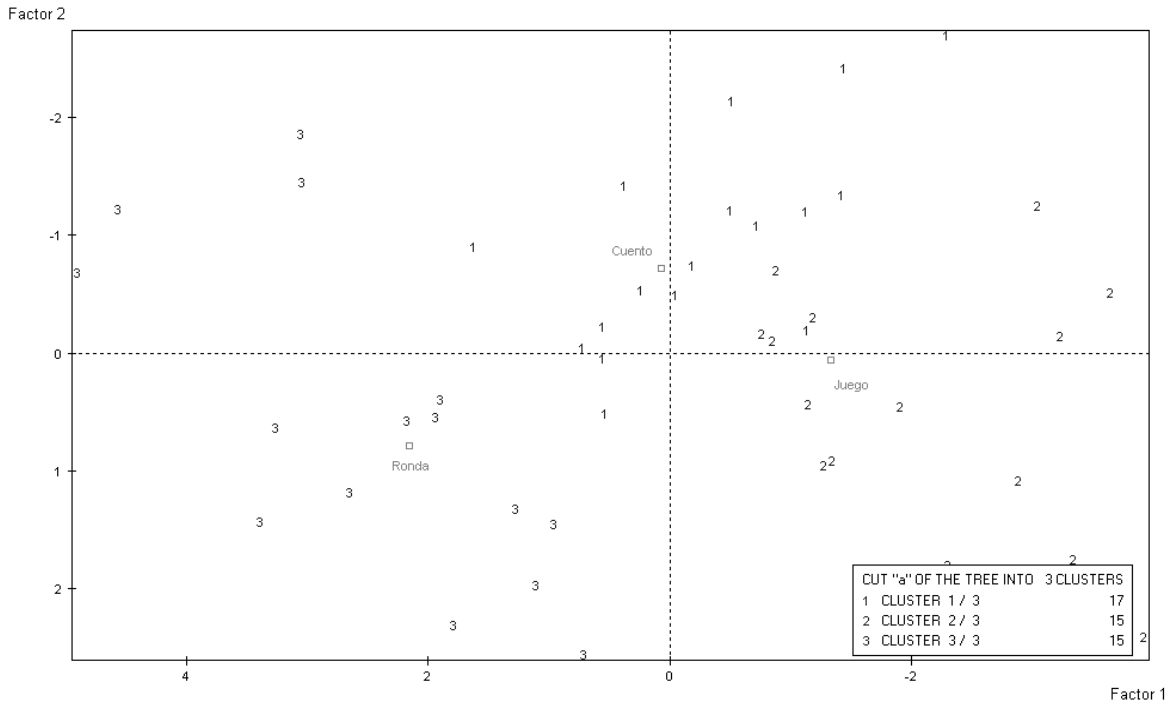

Figure 1. Graphic representation of the classes and the and the illustrative categorical variables in the factorial space.
Source: Prepared by the authors.

If this classification is analyzed in light of the central categories of this study, we can observe that both the quantity of speech and the syntactic complexity contributed significantly to the construction of the classes, but not the lexical diversity. In the story reading situations, the teachers produced longer turns and the children used more connectors depending on the amount of utterances, which suggests that they made the syntax of their turns more complex, including subordinate clauses in matrix clauses. On the other hand, in the corner play situations a greater volume of speech was recorded and, although the children produced long turns, this was not associated with complex syntax. Finally, round situations were characterized by a lower volume of speech: lexemes or different types of words, total words, and connectors.

Discussion

This study aimed to analyze the relationship between the properties of the speech of teachers and five-year-old children, as well as the role of these properties in the configuration of differentiated linguistic spaces that may or may not coincide with the different teaching situations in kindergarten: storybook reading, the round at the beginning of the day, and corner play. The analysis addressed variables that shed light on the following linguistic dimensions of the environment in the situations studied: volume of speech, lexical diversity, and syntactic complexity. In first place, the correlations between the different indicators were studied; and then we analyzed to what extent the variables under study helped shape the exchanges in the three types of situations.

In accordance with studies about adult-child exchanges in the family environment (Hoff, 2013), the results of the general analysis showed a significant correlation between the speech of the teacher and that of the children as regards the total number of lexical occurrences and lexemes or different words, as well as connectors.

Unlike the findings of Huttenlocher et al. (2002), there was no significant correlation between the syntactic complexity of the educator's speech and the speech of the children, although the relationship

between both variables is direct or positive. This is most likely due to methodological differences in the operationalization of syntactic complexity, especially regarding the measurement of children's speech, but also in relation to the teacher's speech. Huttenlocher et al. (2002) calculated the proportion of multi-clause utterances produced by the educator, based on the manual coding of sentences as simple or complex. On the other hand, the measurement of syntactic complexity used in the study—the index of connectors—is an approximate dimension of the proportion of multi-clause sentences rooted in the presence of selected subordinating conjunctions. It is thus more restrictive in that: it includes only certain frequent dependency relationships and excludes all complex or multi-clause sentences by coordination, as well as those with embedded propositions without the presence of an explicit coordinating link, such as: "I like to play in the square" On the other hand, in the study cited, the syntactic complexity in childhood speech was estimated through a test of comprehension of sentences that consisted of matching sentences with images, and not through spontaneous production by children in the context of the activity. As is usually acknowledged, the understanding of language often outstrips production, in such a way that, once again, the measurement included in this research is a little more restrictive than that considered by Huttenlocher et al. (2002).

Meanwhile, the index of lexical diversity in the teachers' speech did not show a significant correlation with the lexical diversity or with the volume of speech of the children. In relation to this, in various studies it has been pointed out that the lexical reiteration, to a certain extent divergent from the lexical diversity, is what characterizes discourse in children's classrooms (Macbeth, 2004; Menti & Rosemberg, 2014; Rosemberg & Silva, 2009). The reiteration facilitates mutual understanding between the teacher and the children. It manifests itself through self-repetitions or self-reformulations (Schegloff, 1979; Schegloff, Jefferson, & Sacks, 1977), through which the teachers try to clarify and/or emphasize aspects of their discourse (Macbeth, 2004; Rosemberg & Silva, 2009). Also, through total or partial repetitions of the children's utterances, the teachers encourage the children to continue participating and contributing to the topic with new words (Menti & Rosemberg, 2014; Rosemberg & Borzone, 2001; Rosemberg & Silva, 2009).

When the children have the opportunity to participate, producing long turns, they use different and more diverse words to a greater extent, as suggested by the positive correlation, albeit moderate, between the average length of the turn and the use of different types of words, as well as the index of lexical diversity in the children. As can be seen from the results of this study—and as has been indicated in other studies (Glas, Rossi, Hamdi-Sultan, & Batailler, 2018)—the average length of the turn seems to be a conversational measure rather than a measure of syntactic complexity, which simultaneously shows the skills of child production and the space for participation that provides a defined context of activity. Associated with this, the teacher's space for participation and the volume of total words and different words produced by the children are inversely related. Despite the fact that this relationship is not statistically significant, it suggests that the expansion of the teacher's space of participation by keeping the turn for more time is not accompanied by an increase in the children's production, but is instead the opposite.

So far, we have presented a characterization of the speech produced in the context of kindergarten, which is assumed to be a scenario with more or less homogeneous characteristics. However, the children's classroom is an area of varied interaction that gives rise to diverse activities with their own guidelines. This diversity deserves a study that addresses the particular configurations assumed by the speech produced in the kindergarten depending on the activities carried out. The analysis of classification carried out confirmed this intuition: the resulting classes mainly grouped one of the school situations studied, suggesting that they share characteristics between them that differentiate them from the rest. Thus, the activities of the kindergarten differ with regard to important variables in children's linguistic development: with the exception of lexical diversity, the other linguistic dimensions considered—syntactic complexity and lexical volume—contribute to shed light on the particular configurations assumed by the exchanges in the story reading, round and, corner game situations. In this regard, the results of this study agree with those carried out by Girolamantto & Weitzman (2002), Soderstrom & Witterbolle (2013), Ibáñez et al. (2018) & Dickinson et al. (2014), who emphasize that the vocabulary and other language properties of teachers and children vary in the different activities of classrooms.

In the storybook reading situations, the teachers produced longer turns and the utterances of the children were more syntactically complex. As has been stated, story reading provides opportunities for

children to use decontextualized and more complex utterances that are typical of a written oral style in situations of interaction with literate adults (Arrue, Stein, & Rosemberg, 2012; Rosemberg & Borzone, 2001; Rosemberg & Stein, 2012). The potential of these situations for the development of child language has been emphasized in numerous previous investigations (Coyne, Simmons, & Kame'enui, 2004; Harris, Golinkof, & Hirsh-Pasek, 2011; Neuman, 2011; Pentimonti, Justice, & Pianta, 2013; Sénéchal, 2017).

On the other hand, the corner play situations were mainly characterized by a greater volume of speech on the part of all the participants. This may be due to these having a longer time span, as well the structure of the activity. Indeed, in these situations, in each of the areas of the room, groups of children play simultaneously with different types of objects and toys, perform dramatizations, make constructions, assemble puzzles, and play board games together. In each of these areas the conversation between the children allows the development of the activity: their words are interlinked with the actions, the gestures, and narrative that underlie the game (Migdalek & Rosemberg, 2013; Rosemberg, 2008). The teachers approach each of the groups alternately and talk with the children, collaborating in the achievement of the objective and the actions involved in the play activity. Simultaneous conversations between groups of children can account for the fact that these situations are characterized by a greater volume of speech than other types of situations, such as story reading, as pointed out by Girolametto & Weitzman (2002). The relevance of these situations for children's linguistic development also lies in the fact that they give rise to the use of extended turns by children, which is correlated with lexical diversity.

The fact that in the round situations there was a lower volume of speech from the teachers and the children can also be explained by their length, that is, by the fact that these situations are usually shorter than the others, as specified in the methodology, but also due to the particular structure of the activity. Each day the teacher gives the speaking turn to two or three children so that they relate a personal experience, one at a time. The teacher collaborates with the child in constructing a coherent and cohesive story, within the framework of a format of dyadic interaction. The average lexical and lexeme occurrences refer mainly and almost exclusively to the speech of the participants, while the other children adopt a listening role. The strategies that the teacher uses to collaborate with the elaboration of the children's story have not been the subject of this study, but other research has shown that these situations can be beneficial to expand children's language (Rosemberg & Manrique, 2007; Strasser et al., 2018).

Studying the quality of the daily environments that make up the linguistic experience of children in the first two years of schooling is crucial because, based on this research, it addresses the need to expand the opportunities for the linguistic development of all of the children. The relevance of this analysis can be appropriately weighted according to the empirical evidence on the impact of the quantity, quality, and syntactic complexity of the utterances addressed to the children in their linguistic development (Dickinson & Smith, 1994; Dickinson & Porche, 2011; Girolametto, Weitzman, Van Lieshout & Duff, 2000, Hart & Risley, 1995; Hoff, 2013; Huttenlocher et al., 2002; Schneideman & Goldin Meadow, 2012; Vogt, Mastin, & Aussems, 2015).

The activities in classrooms shape environments with differentiated exchanges in terms of the language that teachers and children bring into play, and can, therefore, create specific opportunities for the development of children's language. Therefore, the characteristics adopted by the language used in each of these activities should become the subject of reflection in teacher training, so that the potential of each situation is demonstrated to strengthen the learning of the children. The results of this work can contribute to teacher training in a particular manner, as they reveal that it is the characteristics adopted by the teacher and/or children's speech in a particular activity—for example, more syntactically complex speech in storybook reading—that shapes their potential and can help teachers understand the impact that this activity has on children's performance. As Bowers & Vasilyeva (2011) & Vasilyeva & Waterfall (2011) claim, the particular manners in which the speech of the teachers and the children varies in the different activities in the classroom needs to be considered when designing pedagogical intervention programs in early education.

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