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Socio-cultural differences and the adjustment of mothers' speech to their children's cognitive and language comprehension skills

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Abstract

This study compares the ways in which mothers with two different levels of education adjust to their 3-to-5 year-old children's cognitive and language comprehension skills when engaged in different tasks, such as doing jigsaw puzzles, seriation and laying a table. The children were divided into groups with a low and a high level of development, as measured by Raven's Matrices and the Reynell Language Comprehension Scale.

Using Wertsch's model [Wertsch J. (1985). *Vygotsky and the social formation of the mind.* Cambridge: Harvard University Press] as our basis, we analysed the cognitive demands contained in the mothers' speech (abbreviation and referential perspective). The results indicated that mothers of both educational levels adjusted their speech to their children's level of development. However, more educated mothers were more demanding and challenging with both low- and high-skilled children, using more abbreviated directives and a higher level of referential expressions. There were small differences between the task effects on the groups.

Keywords: Socio-cultural differences; Mothers' scaffolding speech; Zone of proximal development; Cognitive development

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1. Introduction

One of the most important aspects of instructional interactions between mothers and their children involves how the mothers' behaviour is contingent on the children's ages and current skills. One facet of the tutoring process in asymmetric adult–child dyads is the way in which strategies are adopted to match the difficulties the child experiences in relation to the task and his/her level of development. During play or problem-solving activities mothers alter their scaffolding strategies depending on their child's age (Freund, 1990; Gauvain, 1995; Greenfield, 1984; Rogoff, Ellis, & Gardner, 1984; Wertsch & Stone, 1985; Wood, Bruner, & Ross, 1976): they adapt the strategies they use to regulate the child's actions in accordance with both cognitive and language-related (particularly understanding) difficulties (Deleau, Gandon, & Taburet, 1993; Palacios, González, & Moreno, 1992; Sorsby & Martlew, 1991; Wertsch & Sammarco, 1985). Parent and Moss (1994) also show the effect of children's verbal skills on scaffolding strategies, which enable adults to use a greater or lesser amount of verbal mediation in order to communicate, regulate the action and adjust to children's skills.

1.1. Language and scaffolding strategies

The use of spoken language can also be related to cultural values (McNaughton, 1996), as in the case of the Navajo in the United States or the Gusii in Kenya (Rogoff, 1990). Similarly, in western societies not all social groups attach the same value to the use of spoken language, particularly where joint task–resolution interactions are concerned, and imitation and modelling often substitute the use of the word in interactive situations in which an adult attempts to teach a child. Studies on parents' educational practises reveal that non-verbal procedures and learning by observation are used more by parents with lower socio-cultural levels (Rogoff, 1990; Rogoff, Mistry, Göncü, & Mosier, 1993), whereas parents with higher socio-cultural levels seem to have incorporated more formal teaching practises, like using spoken language as the main interactive medium, into their own educational techniques (Bernstein, 1975, 1996; Delgado-Gaitan, 1993; Rogoff et al., 1993; Tudge, Putman, & Sidden, 1994).

However, the role that language plays in cognitive functioning, and particularly in metacognitive thinking and other higher mental functions (DeLoache & Brown, 1997/1979; Scribner & Cole, 1982; Vygotsky, 1985), justifies taking it into account when studying mothers' scaffolding interactions. For example, the skill needed to use plans or models as a source of information to guide action is different from that involved in spontaneous planning (Gauvain, de la Ossa & Hurtado-Ortiz, 2001). It is an important metacognitive skill (Flavell, 1979), which should be appropriated by the child within the context of meaningful interactions with adults. Recent research (Gauvain et al., 2001; Ossa & Gauvain, 2001) has showed that in a problem-solving context, when mothers directed children's attention to a plan with the aim of telling them what to do next or of conveying information to monitor the result of their actions, in a post-test pre-school children performed better in their use of the plan to anticipate action.

Moss (1992) highlighted the relationship between the developmental path followed by the children and the changes in interactive patterns and scaffolding procedures employed by mothers. She showed that metacognitive skills only enter the zone of proximal development when children are about 4 years old. Moss and Strayer (1990) also suggest that mothers of gifted children tend to encourage the use of metacognitive strategies more than mothers of children within the normal range of development, even when the behaviour of gifted children does not suggest autonomous metacognitive functioning. What is more, Bouffard-Bouchard and Gagné-Dupuis (1994) say that the educational practices of mothers with low social status are less directed towards stimulating their children's zone of proximal development than those displayed by mothers with high social status, and that this influences pre-school children's metacognitive development.

Heckhausen (1987), Wertsch (1985), McNaughton and Leyland (1990) and Lyytinen, Rasku-Puttonen, Ahoen, Poikkeus, and Laakso, (1995), amongst others, also show that adults adapt their scaffolding strategies to both their children's development and the difficulty of the task. Wertsch (1985) and Wertsch and Sammarco (1985) report that adults adjust their speech to children's language skills, and that when they use demanding cognitive expressions that are beyond the children's current skills, they are fairly ineffective.

A variety of studies on parental educational practises reveal how heterogeneous these are within a single culture and that the extent of a person's schooling has a significant differential impact (Tudge et al., 1999). Similarly, the tasks in which parents and children engage differ, depending on the parents' schooling and professional occupation (Farver, 1999; Haight, 1999; Tudge et al., 1999). Even when the tasks appear to be the same, they can form part of different activities (Leontiev, 1975), or take on different meanings and trigger different kinds of scaffolding (Gauvain, 1995; Wertsch, Minick, & Arns, 1984). In the studies by Wertsch et al. (1984) and Fidalgo (1990), for example, the construction of a puzzle with a model gave rise to different action-regulation behaviour on the part of the adults, depending on their level of schooling. The mothers with less schooling tended to employ direct verbal regulation more often and to pose fewer semiotic challenges. They also made more frequent use of demonstrations, but nevertheless ensured that the task was completed. The university-level mothers, on the other hand, resorted to indirect verbal regulation more frequently, posed more challenges and achieved higher levels when it came to transferring responsibility for carrying out the task to their children. These results were interpreted as being due to the different meanings which the situation took on in the mothers' perception of it: those with a higher level of education saw it as a process-oriented ludic didactic situation, while those with a lower level thought that it was a job that had to be done and their regulation was therefore product-oriented.

Mendonza (1995) also tells of the existence of significant differences in the ways in which mothers with different levels of schooling adapt their discourse to their children's skills. All the mothers in the study adapted to their children's developmental level, but the more educated mothers were more elaborate and established more relationships with the children's own experience when they read

story books. These differences were less evident when reading a more complex book, but the more highly educated mothers were always more sophisticated and subtle in their use of language.

However, no scaffolding is suited to all tasks and speech is not always the best way to guide children.

Therefore, within the overall framework of mothers' scaffolding discourse we must distinguish between that which can be attributed to their educational practises and the meaning of the ensuing contexts on the one hand, and that which involves the children's cognitive and language comprehension development on the other. Despite this, most studies on mother–child interactions at different socio-cultural levels do not control the variables related to the children's development.

In this study we address the following research questions: (1) if scaffolding procedures must remain a step ahead of the child's current skills in order to be sensitive to the zone of proximal development, then it is important to determine whether mothers from two distinct socio-cultural groups (with elementary and university-level education) function in the same way when their children possess similar cognitive and language comprehension skills; (2) what effect does the task have on mothers' scaffolding speech, namely as regards the task's inclusion in the home curriculum (didactic and domestic tasks)? and (3) how is the existence of a model for guiding action in a problem-solving context treated in mothers' scaffolding speech?

One of the most fundamental assumptions that guided Vygotsky was the social origin of higher mental functions, which he formulated in his general law of cultural development. According to this premise, any function in a child's cultural development appears twice, or on two planes: first between people as an inter-psychological category, and then, by means of a process of internalisation that transforms the process itself, within the child as an intra-psychological category. Focusing on the social processes led him to analyse the representational systems that are needed in order to participate in them, particularly the internalisation of speech (Vygotsky, 1985). Inspired by Vygotsky's analysis of private speech, Wertsch (1985) examined the changes that occur in abbreviation and the referential perspective in a communicative setting involving mother and child in a problem-solving context. His analysis is the basis for our own study.

1.2. Analysis of the content of mothers' speech

According to Wertsch, abbreviation and the referential perspective are two semiotic mechanisms that an adult employs when he/she interacts with a child in the role of a tutor. They serve to establish inter-psychological functioning between him/herself and the child and make it possible to make the transition to intra-psychological functioning. They also function as cognitive demands or semiotic challenges to which the child is exposed as he/she resolves the task.

The notion of semiotic challenge was first introduced by Rommetveit (1974) and is used by Wertsch (1985) to characterise the dialogical dynamic in the zone of proximal development. By semiotic challenge, Rommetveit means an utterance in

which the speaker presupposes that his/her interlocutor is able to infer information that he/she has not yet supplied. This challenge obliges the interlocutor to construct a set of presuppositions in order to be able to attribute a meaning to the speech. If communication is achieved, then the set of presuppositions constructed by the listener coincides with that of the speaker and means that inter-subjectivity is achieved. The process of creating presuppositions leads the child on to new situation definitions and higher levels of inter-subjectivity between him/herself and the adult.

1.2.1. Abbreviation

An abbreviation is a reduction of a complete and explicit linguistic representation (Wertsch, 1985). Every aspect of a given situation may be explicitly and integrally represented in the discourse, or else only some of them may appear. The smaller the number of aspects of the situation represented in the discourse, the greater the degree of abbreviation of the utterance in question. When the degree of abbreviation of the directives in a mother–child interaction is high and yet even so the child responds to its mother's demand in an appropriate way, the level of inter-subjectivity between them is also high – in other words, they share the same centre of attention and the same definition of the situation. The child consequently becomes more autonomous and responsible for resolving the problem at hand. The degree of abbreviation is determined on the basis of the analysis of each task, in accordance with the level of implicitness of the utterance. For example, during the completion of a jigsaw puzzle with a model, the utterance "*Look here*" can be an abbreviated directive if the mother points to the model when the child is trying to determine where to fit a given piece in the copy; but the same utterance can also be a non-abbreviated directive if the mother points to the place where the piece fits into the copy. In the former case the child must deduce that after looking at the model, he/she has to find the corresponding place in the copy.

1.2.2. Referential perspective

The referential perspective concerns the way in which a mother presents the objects in a task in order to direct her child's attention. However, a given referent may be identified in various different ways, or using different referential expressions, which serve to introduce the speaker's perspective on the referent that he/she is identifying.

This particular perspective injects varying amounts of information about the referent into the speech situation. Some referential expressions supply the minimum information needed to establish joint attention, whereas others contain the maximum amount of information, which in addition to enabling both members of the dyad to pay attention to the same object, provides information about the way in which the speaker wants the object in question to be perceived. However, there may be cases where the speaker does not seem to introduce a perspective about a referent – when he/she uses deictic expressions or non-verbal pointing, for example. Even if this is the case and the mother does not categorise the referent, she defines it minimally in terms of spatio-temporal coordinates.

Depending on the quantity of information that the adult supplies about the referent, Wertsch, McNamee, McLane, and Budwig (1980) and Wertsch (1985) identify three main types of referential expressions: (1) Deictic (deixis), non-verbal or verbal indexical signs, such as pointing, and *that one*, *this one*, which introduce the minimum amount of information about the way in which the object is to be perceived or thought about. The appropriate use of these semiotic devices introduces a minimal amount of information, as it presupposes that the referent already exists cognitively for the participants in the speech situation; but this does not ensure that participants think of the referent in the same way. (2) Common referring expressions – that is to say, the object's most common name or description, which is based on its most common function – are not situation-specific and can be employed in any other context as well. As Wertsch (1985) points out, these categorizations may be appropriate and informative, but they are not *maximally informative* (p. 170). Ex.: in a seriation of different-coloured rulers, the rulers can be referred to by colour or by length; even if categorization by colour is effective in terms of the end result, choosing this way of referring to a ruler constitutes a common expression, because it does not provide specific information about the way in which the ruler should be perceived in a series of lengths. Similarly, designating a piece of a jigsaw puzzle – one that depicts a horse, for example – by colour or shape does not provide any specific information on how to think about the object in that specific context. (3) Context informative expressions, which introduce the most information about the speech situation, in that they categorise the referent in such a way as to supply information about the specific manner in which the speaker perceives it in the situation in question. Ex.: "*the bigger ruler*" in the seriation, or "*the leg*" in the jigsaw puzzle.

1.2.3. Hypotheses

In the light of our research questions we formulated the following hypotheses:

(1) Independent of their socio-cultural background, mothers adapt their scaffolding speech to their children's cognitive and language skills. We therefore expect mothers to use more abbreviated directives and higher levels of referential expressions with high-skilled children. However, we also expect that mothers with a higher socio-cultural status will use abbreviated directives and higher levels of referential expressions more often than their lower-status counterparts.
(2) We expect that tasks will have some effects in both groups of mothers, in terms of their meaning and the metacognitive demands that are in play. We expect similar task effects when the tasks possess the same meaning for both groups. We therefore expect that if mothers perceive the tasks as didactic or domestic, they will employ a similar pattern of scaffolding speech.
(3) We expect that tasks which include a model to guide the action will elicit more abbreviated directives (directing the child's attention to the model) and more indexical signs than the other tasks, in both groups, but with significant differences between them; and that these differences will be attenuated when mothers of low socio-cultural status are more familiar with the objects.

2. Method

2.1. Participants

Fifty white mother–child dyads took part in the study. Twenty-five (Group 1) came from a low-social background in which the parents either worked in non-specialized jobs (on building sites, as cooks, domestic staff, shop attendants…) or were unemployed. The mothers had only attended compulsory schooling (range 4–10 years, mean 6.08, SD 2.29) and were aged between 23 and 44 (mean 32.04, SD 5.52). The other twenty-five (Group 2) belonged to the middle class, all held a university degree (years of schooling: range 15–20, mean 17.08, SD 1) and were aged between 26 and 40 (mean 33.64, SD 4.68). The children in both groups were aged between 3 and 5 (Group 1: range 37–71 months, mean 53.58 months, SD 10.06 months; Group 2: range 37–71 months, mean 53.12 months, SD 10.71). All the children spent the whole day at school and lived with both parents in the metropolitan area of Lisbon, Portugal.

2.2. Procedure and description of the tasks

All the mother–child dyads were observed performing tasks that were capable of eliciting different contexts and taking on different meanings. Two of the tasks – the didactic and the domestic ones – were supposed to possess the same meaning for both groups of mothers.

2.2.1. Description of the tasks

Task 1: To assemble a 12-piece wooden jigsaw puzzle portraying birds and a flower. The children were shown a puzzle that had already been completed and was intended to serve as a model. The following instruction was given to each child: "*Here you have a puzzle to make. I would like you to do it just like this one* (pointing to the model)*, and your mummy will help you.*"

This task was inspired by Wertsch's work. However, our previous observations indicated that the results were also partly due to the fact that the mothers with a lower social level displayed a certain amount of difficulty in performing the task and a lack of familiarity with the materials – something that in turn made them function as ingenuous tutors in relation to their children.

Task 2: We therefore set a second task in which we sought to eliminate some of these obstacles, but which was nonetheless comparable to the first one, particularly in terms of the presence of a model. It consisted of the construction of a seriation of 10 wooden rulers with two alternating colours and lengths that gradually diminished from 20.0 to 1.2 cm. The participants were also given a seriation that had already been arrayed and was intended to serve as a model. The instruction given to the child was: "*Here you have these rulers to sort out. I would like you to arrange them just like this* (pointing to the model)*, and your mummy will help you.*"

The inclusion in these two tasks of a model for use as a symbol introduces a transformation that modifies the flow of the action and the structure of the mental

functions in play. In order to understand the model's facilitating role in the resolution process it is necessary to establish a series of inferences and relationships that require specific referential operations and relationships. Seriation with a model makes it possible to highlight the use of verbal language and the metacognitive aspects of discourse and thereby to understand those relationships without mistaking them for difficulties with handling the material.

Task 3: Another task involved constructing a seriation of lengths of wooden rulers of the same size as those used in the second task, but all of different colours and without a model. The fact that each ruler was of a different colour made it possible to name them either by colour or by size. The instruction given to the children was: "*Here you have these little rulers all in a muddle. I would like you to sort them all out, but from the largest one to the smallest one, or from the smallest one to the largest one, so as to make a little staircase. Your mummy will help you.*"

The objective of this task was to elicit a didactic situation in the two groups. We expected that if the mothers in both groups understood this task as being intended to teach transitive relationships, they would make more references to the sizes of the rulers than to their colours.

Task 4: The last task sought to elicit a domestic chore situation and consisted of laying a table for three people. Plates, glasses and cutlery were provided for this purpose. The instruction given to the child was always: "*Let's imagine that now the three of us are going to have lunch and you have to lay the table. You have what you need here and I would like you to lay the table. Your mummy will help you.*"

A form-board puzzle was used as a warm-up task and all the children completed it easily. Then came the construction of the two series (it was performed in a balanced way: in both groups, 12 dyads began with the seriation with a model and 13 with the seriation without a model), followed by the puzzle and finally laying the table.

The mother–child interactions during these tasks lasted between 11 and 15 min and were videotaped.

2.3. Coding

The whole of the verbal and non-verbal behaviour of both mothers and children was transcribed from the videotapes, but only the mothers' speech was analysed.

2.3.1. Abbreviation

All the mothers' directives were coded as abbreviated directives (AD) and non-abbreviated directives (NAD). As we have already mentioned, the way in which an utterance is abbreviated is determined by each task, depending on the context in which it was made. We thus coded as AD (abbreviated directive) utterances like: *Look where you can put that one…; and now which one is it? Now it's a green one* (in the seriation with a model, while pointing to the model and not specifying the size, and in the presence of various green rulers); *You don't want to look up here* (pointing to the model, when the child tries to find the place where the piece/ruler fits in the copy, in both the puzzle and the seriation with a model); *Now the brown one* (pointing to the model for the puzzle).

The NAD (non-abbreviated directive) classification was allocated to utterances like: *Try this green one* (pointing to a ruler during the construction of a series with a model); *See which one is bigger*; *The bigger one comes next* (in the seriation without a model); *Now the spoon* (when the child has to choose what he/she is going to put on the table next); *It's there* (pointing to the place where a piece fits in the copy of the puzzle).

Twelve transcripts were coded by independent coders and the level of agreement between them was 0.82 (Cohen's Kappa).

2.3.2. Referential perspective

Target objects and concepts were selected for each task. The target objects in the jigsaw puzzle were the pieces. Ex.: *this one*, *that one*, with or without pointing (indexical signs); *the yellow one* (common referring expression); *the little bird*, *the wing*, *the flower* (context informative expression). In the seriation the target was the way in which the mothers presented the rulers. Ex.: *this one*, with or without pointing (indexical signs); *the red one* (common referring expression); *the biggest one*, *the next biggest one* (context informative expression). When it came to laying the table, besides the objects we also considered the way in which the mothers designated the places in which to put them. Ex.: *here and there* (indexical signs); *next to the plate* (common referring expression); *on the right*, *on the left*, *on the side of the hand you use to eat soup* (context informative expression).

These three types of expression and their aggregation in the same utterance were organised into three hierarchical levels of referring expressions, ranging from the presence of the instrumental function that provides the minimum information needed to ensure joint attention, up to the classification of the object that gives the maximum amount of information about the way in which the mother wants the child to perceive it in the specific context in question:

Level 1 Indexical verbal and non-verbal signs (pointing); indexical verbal and non-verbal signs and the simultaneous use of common referring expressions and non-verbal indexical signs. Ex.: *Look at this little bit here* (pointing to a detail in the puzzle); *Now this little yellow one* (pointing to a ruler in the seriation without a model); *On this side* (pointing to the place in which to lay a plate on the table).

Level 2 Common referring expressions; common referring expressions or indexical non-verbal signs, and the simultaneous use of context informative expressions. Ex.: *Now the cutlery* (pointing to the set); *The biggest one goes here* (pointing to a ruler and its place in the series without a model; *Now it's the pink one* (in the seriation without a model).

Level 3 Context informative expressions without any other referential expression. Ex.: *Now it's the head* (while doing the puzzle); *Put the knife* (laying the table); *Which is the next smallest one?* (in the seriation with and without a model).

Twelve transcripts were analysed by independent coders and the levels of agreement (Cohen's Kappa) between them were: non-verbal and verbal indexical signs 0.98; common referring expressions 0.87; context informative expression 0.88. For the three levels of aggregation, the levels of agreement (Cohen's Kappa) were: level 1: 0.90; level 2: 0.79; level 3: 0.86.

2.4. Evaluation of the children's level of development

We evaluated the children's cognitive level using Raven's Progressive Matrices and their level of language acquisition using the Comprehension Scale from the Reynell test (ages 1–7). The two instruments were applied during the week following the observation of the joint interaction.

2.5. Data analysis

The data were analysed using non-parametric tests, because several distributions differed significantly from the norm and were not homogeneous. In correcting type I errors we used the Bonferroni procedure and the Conover statistic for multiple non-parametric comparisons. Given our interest in the patterns assumed by the dependent variables in mothers' speech, some data are also presented in proportional form.

3. Results

3.1. Evaluating cognitive levels and language acquisition

All 50 children's scores in both texts either matched or exceeded the expected average for children of their age. However, an analysis of these results reveals significant differences between the children in the two groups: as expected, those from higher social backgrounds scored higher results with both Raven's Progressive Matrices and the Reynell Comprehension Scale (Table 1).

Using the Matrices and Reynell scores as our basis, we classified the children into two groups: a low skills group made up of the children who scored below the median, and a high skills group composed of the children who scored above the median in both tests (median Raven = 20; median Reynell = 59). In both groups there were discrepancies between some children's cognitive skill scores and their results in the language comprehension test (Group 1: five children returned high cognitive scores and low language comprehension scores; two scored low on cognitive skills and high on language. Group 2: four children received low cognitive scores and high language comprehension ones). These children were excluded from this part of the study, because it was not possible to control the variables in order to understand whether the mothers adapted to the children's cognitive level or to their comprehension of language, and because the number of dyads involved did not allow us to create other development-level-based groups.

Table 1
Results of the children's evaluations using Raven's Progressive Matrices and the Reynell Language Comprehension Scale

	Children in Group 1 (mothers with elementary education)	Children in Group 2 (mothers with university-level education)	*t*-test
Raven	Range 12–26 $M = 18.880$ SD = 3.455 $N = 25$	Range 14–29 $M = 21.520$ SD = 3.990 $N = 25$	$t = -2.500$ $p = 0.0159$
Reynell	Range 49–62 $M = 56.640$ SD = 4.261 $N = 25$	Range 56–67 $M = 61.560$ SD = 3.720 $N = 25$	$t = -4.349$ $p = 0.0001$

We thus retained only those children who scored above or below the median in both the development tests, and formed two groups (high skills and low skills) of children in each socio-cultural group (Table 2).

3.2. Abbreviation

3.2.1. Comparisons between socio-cultural groups

In an initial analysis we compared the use of abbreviated (AD) and non-abbreviated (NAD) directives by the mothers in the two socio-cultural groups. We found that the mothers with a low socio-cultural level tended to give more non-abbreviated directives (NAD) ($N = 39$, $U = 120$, $p = 0.026$), whereas the Group 2 mothers gave more abbreviated ones (AD) ($N = 39$, $U = 121$, $p = 0.028$) (Table 3), thereby confirming results that we had already obtained in the past.

Table 2
Distribution of the children in the two socio-economic groups in accordance with the classification based on the scores in Raven's Progressive Matrices and the Reynell Scale

Socio-cultural level	Low skills	High skills
Group 1 ($N = 18$)	$N = 13$ Age: Range 37–61 months; $M = 46.85$; SD = 8.11 Raven: Range 12–20; $M = 14.46$; SD = 2.63 Reynell: Range 49–59; $M = 53.85$; SD = 3.29	$N = 5$ Age: Range 54–66 months; $M = 60.2$; SD = 4.82 Raven: Range 21–23; $M = 21.6$; SD = 0.89 Reynell: Range 60–62; $M = 61.6$; SD = 0.89
Group 2 ($N = 21$)	$N = 8$ Age: Range 36–52 months; $M = 46.13$; SD = 5.62 Raven: Range 14–20; $M = 17.5$; SD = 2.14 Reynell: Range 56–59; $M = 57$; SD = 1.20	$N = 13$ Age: Range 39–71 months; $M = 60.38$; SD = 9.38 Raven: Range 22–29; $M = 24.69$; SD = 2.36 Reynell: Range 61–67; $M = 64.23$; SD = 2.17

Table 3
Abbreviation – number of abbreviated (AD) and non-abbreviated (NAD) directives given in each group, by task

Dyads	Task 1		Task 2		Task 3		Task 4	
	Low skills	High skills	Low skills	High skills	Low skills	High skills	Low skills	High skills
Group 1 ($N = 18$)	$N = 13$ AD – 66 NAD – 96	$N = 5$ AD – 28 NAD – 19	$N = 13$ AD – 38 NAD – 56	$N = 5$ AD – 15 NAD – 9	$N = 13$ AD – 22 NAD – 69	$N = 5$ AD – 12 NAD – 20	$N = 13$ AD – 33 NAD – 95	$N = 5$ AD – 7 NAD – 32
Total directives	162	47	94	24	91	32	128	89
Group 2 ($N = 21$)	$N = 8$ AD – 87 NAD – 88	$N = 13$ AD – 98 NAD – 22	$N = 8$ AD – 55 NAD – 47	$N = 13$ AD – 42 NAD – 23	$N = 8$ AD – 28 NAD – 49	$N = 13$ AD – 20 NAD – 36	$N = 8$ AD – 13 NAD – 50	$N = 13$ AD – 30 NAD – 24
Total directives	175	120	102	65	77	56	63	54

Task 1 – puzzle with model; task 2 – series with model; task 3 – series; task 4 – laying the table; Group 1 – low socio-cultural; Group 2 – high socio-cultural.

We used Mann–Whitney tests to compare the differences between the abbreviations that the two groups of mothers used to match their children's levels of development. They showed that compared to Group 1 mothers, the mothers with a higher socio-cultural level (Group 2) gave significantly more abbreviated directives (AD) to low-skilled children ($N = 21$, $U = 21.5$, $p = 0.013$) and tended to give less non-abbreviated ones (NAD) to high-skilled children ($N = 18$, $U = 15.5$, $p = 0.049$).

In order to get a clearer picture of the way in which the mothers adapted their speech to their children's skills, and bearing in mind that the two socio-cultural groups contained different number of children at each level of development, we also opted to make comparisons within groups.

3.2.2. Comparisons within groups

Low socio-cultural status mothers with low-skilled children produced significantly more non-abbreviated directives (NAD) ($N = 13$, $z = -3.112$, $p = 0.002$), but when they interacted with high-skilled children there were no differences in their use of abbreviations ($N = 5$, $z = -0.674$, $p = 0.5$).

High socio-cultural status mothers did not reveal significant differences between their use of abbreviated and non-abbreviated directives with low-skilled children ($N = 8$, $z = -1.352$, $p = 0.176$). However, when interacting with high-skilled children they produced significantly more abbreviated directives (AD) ($N = 13$, $z = -2.981$, $p = 0.003$).

As we can see from Fig. 1, in proportional terms the two groups of mothers employed the same discourse abbreviation pattern in response to their children's skills.

However, whereas the mothers with a low socio-cultural level ranged from a discourse that is not very abbreviated and is therefore not very demanding from the linguistic and cognitive point of view, to an averagely abbreviated one, mothers with a high socio-cultural level went from an averagely abbreviated discourse with low-skilled children to a much abbreviated one with high-skilled children.

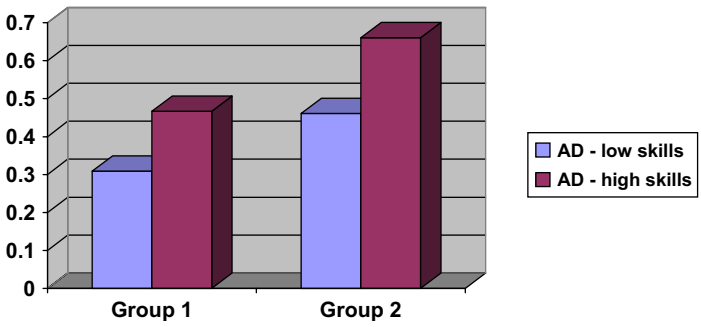

Fig. 1. Abbreviation – adjustment of mothers' directives to children's cognitive and language comprehension skills (mean proportion of abbreviated directives – AD; Group 1: low socio-cultural level; Group 2: high socio-cultural level).

3.3. Referential perspective

3.3.1. Comparisons between groups

The Mann–Whitney test did not reveal any significant differences between the two groups of mothers' ($N = 39$) use of the three levels of referential expressions.

When we compare the two groups of mothers' use of the referential perspective ($N = 21$) with low-skilled children we do not find differences in the level 1 and 2 expressions, while with the level 3 expressions there is a tendency for the mothers with a high socio-cultural level to use this type of referential expression more ($U = 32$, $p = 0.078$). Similarly, with the high-skilled children there are no significant differences between the two groups, just an unexpected tendency for the Group 2 mothers to use more level 1 expressions ($U = 18.5$, $p = 0.093$). However, as with the abbreviations, these results are necessarily distorted by the imbalance between the number of dyads in each group in each situation (Table 4).

3.3.2. Comparisons within groups

Low socio-cultural level mothers with low-skilled children displayed significant differences in their use of referential expressions ($N = 13$, Friedman $\chi^2 = 13$, df $= 2$, $p < 0.001$), particularly the more frequent use of level 1 expressions, compared to levels 2 ($p = 0.01$) and 3 ($p = 0.01$). This category of mothers did not reveal significant differences in their use of the three levels of referential expression with high-skilled children ($N = 5$, Friedman $\chi^2 = 2.8$, df $= 2$, $p = 0.396$) (Fig. 2).

When they interacted with low-skilled children, mothers with a high socio-cultural level did not display significant differences in the use of the three levels of referential perspective ($N = 8$, Friedman $\chi^2 = 2$, df $= 2$, $p = 0.407$). There were differences with the high-skilled children, however ($N = 13$, Friedman $\chi^2 = 6.863$, df $= 2$, $p = 0.028$), especially between expressions on levels 1 and 2 ($p = 0.008$).

Once again we see differences in the patterns of adaptation to the children's skills. In our hypotheses we expected that the use of level 1 expressions would decrease with high-skilled children, but this only happened in the case of the mothers with a lower socio-cultural level. However, the mothers with a high socio-cultural level continued to be more demanding with low-skilled children. It may be that the unexpected increase in high socio-cultural level mothers' use of level 1 expressions with high-skilled children (we may recall that these primarily occur in the context of abbreviated directives) is due to an assumption by the mothers that their children already categorise the objects in the same way as they do.

3.4. Task effects

3.4.1. Comparisons between groups

We only recorded significant differences between the two socio-cultural groups in their completion of the jigsaw puzzle with a model, when the mothers with a higher socio-cultural level gave significantly more abbreviated directives (AD) ($N = 39$, $U = 108$, $p = 0.01$) and the mothers with a low socio-cultural background tended to use more non-abbreviated ones (NAD) ($N = 39$, $U = 134.5$; $p = 0.059$). However,

Table 4
Referential perspective – number of referential expressions from each of the 3 levels produced in each group, by task

Dyads	Task 1		Task 2		Task 3		Task 4	
	Low skills	High skills	Low skills	High skills	Low skills	High skills	Low skills	High skills
Group 1 ($N = 18$)	$N = 13$	$N = 5$	$N = 13$	$N = 5$	$N = 13$	$N = 5$	$N = 13$	$N = 5$
	Level 1 – 165	Level 1 – 42	Level 1 – 60	Level 1 – 19	Level 1 – 57	Level 1 – 18	Level 1 – 78	Level 1 – 20
	Level 2 – 42	Level 2 – 18	Level 2 – 56	Level 2 – 17	Level 2 – 9	Level 2 – 3	Level 2 – 46	Level 2 – 26
	Level 3 – 24	Level 3 – 8	Level 3 – 16	Level 3 – 16	Level 3 – 32	Level 3 – 14	Level 3 – 77	Level 3 – 50
Total	231	68	132	52	98	35	201	96
Group 2 ($N = 21$)	$N = 8$	$N = 13$	$N = 8$	$N = 13$	$N = 8$	$N = 13$	$N = 8$	$N = 13$
	Level 1 – 70	Level 1 – 159	Level 1 – 41	Level 1 – 48	Level 1 – 14	Level 1 – 61	Level 1 – 26	Level 1 – 68
	Level 2 – 37	Level 2 – 62	Level 2 – 20	Level 2 – 65	Level 2 – 2	Level 2 – 23	Level 2 – 32	Level 2 – 36
	Level 3 – 22	Level 3 – 73	Level 3 – 24	Level 3 – 38	Level 3 – 23	Level 3 – 54	Level 3 – 49	Level 3 – 116
Total	129	294	85	151	39	138	107	220

Task 1 – puzzle with model; task 2 – series with model; task 3 – series; task 4 – laying the table; Group 1 – low socio-cultural; Group 2 – high socio-cultural.

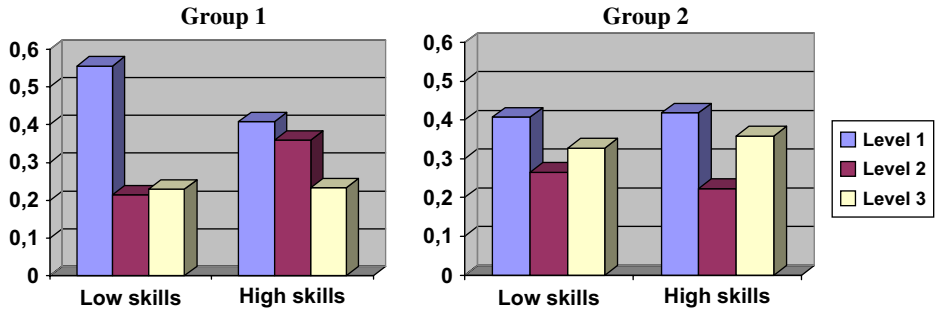

Fig. 2. Referential perspective – mean proportion of the three levels of referential expressions with low- and high-skilled children. (Group 1: low socio-cultural status; Group 2: high socio-cultural status).

when it came to laying the table, it was the mothers from the latter group who issued more non-abbreviated directives (NAD) ($N = 39$, $U = 78.5$, $p = 0.001$) (Fig. 3).

Moving on to the effect of the task on the referential perspective, the results of the inter-group comparison were as follows: there were no significant differences between the two groups of mothers as regards any of the referential expressions employed during the completion of the jigsaw puzzle with a model; when arranging the series with a model, there was a tendency for mothers with a higher socio-cultural level to use more level 3 expressions (context-referring expressions that characterise the referent by its size, without any other referential expression), $N = 39$, $U = 126$, $p = 0.033$; there were no significant differences between the two groups of dyads when they arranged a series without a model or when they laid a table (Fig. 4).

The mothers in the two groups displayed quite similar patterns in their use of the referential perspective in all the tasks except for the seriation with a model, when the mothers with a high socio-cultural level used a higher proportion of level 2 and level 3 expressions. We may recall that the level 2 expressions that were most often used in this task simultaneously characterised the referent by its colour and its size.

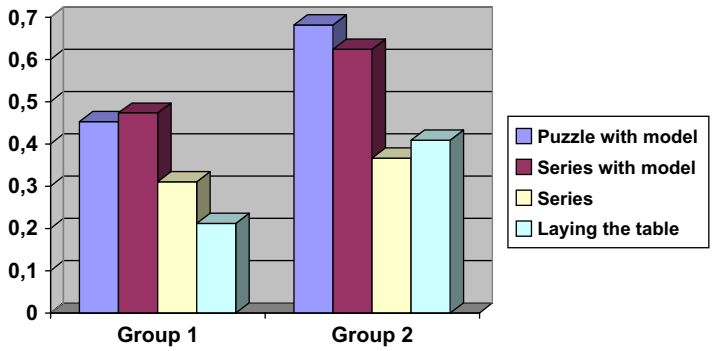

Fig. 3. Task effects on abbreviation – mean proportion of abbreviated directives (Group1: low socio-cultural status; Group 2: high socio-cultural status).

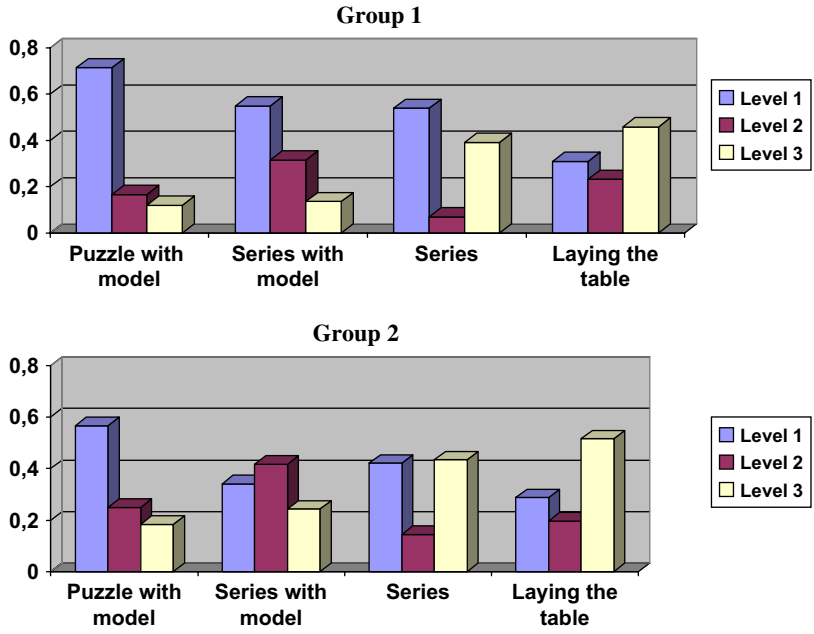

Fig. 4. Task effects on referential perspective – mean proportion for the three levels of referential expressions (Group 1: low socio-cultural status; Group 2: high socio-cultural status).

4. Discussion

Our results are in keeping with assumptions that underlie Vygotsky's notion of a zone of proximal development. They also support the idea that when working as a dyad, mothers with different socio-cultural levels are sensitive to their children's needs, and that children's skills influence the assistance provided by their mothers.

However, the scaffolding speech of the mothers with the lower socio-cultural level was always less challenging in their use of both abbreviation and the referential perspective, thereby confirming earlier results. These differences are reflected in the adaptation patterns that the mothers displayed in their interaction with children at similar levels of development.

More precisely, the low socio-cultural level mothers displayed a pattern of abbreviation and use of the referential perspective with high-skilled children that were similar to that which the high level mothers used with low-skilled children.

As Wertsch (1985) says, abbreviation and the referential perspective are two semiotic mechanisms that function in the mediation of processes from the inter-psychological level to the intra-psychological level. The different levels of mediation employed are not only determined by the limitations imposed by social exchanges, but also by those of a socio-biological nature that are inherent to each level of development (Mosier & Rogoff, 1994). There is nothing to tell us that the cognitive and language skills of the children with a lower socio-cultural level prevented them from functioning at a higher level than that allowed by their own mothers.

These differences in the scaffolding speech of mothers from different socio-cultural backgrounds have often been attributed to a lack of ecological validity on the part of the proposed tasks, both in terms of their significance in the family curriculum and as regards the mothers' familiarity with the objects concerned. However, in this study this argument can only partially (abbreviation) explain the differences we observed in the completion of the jigsaw puzzle. The fact is that the mothers' lack of familiarity with doing jigsaw puzzles can lead to ingenuous tutor scaffolding, but the same is not true of the domestic task, in which the mothers' directivity appears to more in accordance with a product rather than a process orientation, at least when it comes to abbreviation.

We can also note that in the tasks with a model, on average 60–70% of all the directives that appear in the speech of the high socio-cultural level mothers are abbreviated, whereas among the low socio-cultural level mothers these only account for 40–50% of the total. Conjugated with the use of deictics, in these tasks abbreviated directives constitute pointers calling the child's attention to the strategic importance of the model. The coordination of the child's attention to that importance not only results from the use of both verbal and non-verbal deictics, but also from an awareness of its symbolic meaning (Gauvain et al., 2001). Achieving this kind of coordinated attention takes an interplay of abbreviated directives, reflective assessments of the child's behaviour and non-abbreviated directives. We did not perform this kind of microanalysis in this research and we must clearly elucidate the nature of the differences we encountered.

In the series with a model we found that the mothers with a higher socio-cultural level divided the focus of their scaffolding speech between the model and references to the size of the rulers, but this does not appear to be the case with their counterparts with a lower socio-cultural level. The fact is that as we expected, this task attenuated some of the differences between the two groups of mothers, but also highlighted others.

In the series without a model the more highly educated mothers also tended to use more contextual expressions accompanied by deictics (level 2) and contextual expressions (level 3).

Nonetheless, the important thing is not the level of the semiotic challenge used, but rather the way in which the child responds to it. The issue that thus poses itself is the need to determine the effectiveness of the two patterns of regulatory discourse employed by the mothers. Lack of data about their effects following interaction does not enable us to say which is the more effective, but the expectation that a child will change to a sufficient extent as the result of a single social interactive experience during the construction of a series, for example, is not realistic. However, during interaction the children's participation in the task was quite similar in both groups.

Nevertheless, in the use of the model or a pre-established plan, in their post-test Ossa and Gauvain (2001) only registered significant differences in older children (6–7 years old), whereas when they needed to construct a plan, children aged between 3 and 5 benefited from previous interaction with their mothers (St-Laurent & Moss, 2002). These data seem to indicate that using a pre-existing cultural tool (a plan) is not the same process as constructing one's own plan.

Kontos (1983) argued that Wertsch's hypothesis that the adult–child interaction is a necessary precursor to the development of metacognitive skills has not been adequately studied. Her own studies appear to support a "theory of learning by doing", or increased strategy usage and awareness due solely to repeated attempts to solve a problem.

Our own hypothesis is that this may be true for some metacognitive skills, but not for others. In order to explore this hypothesis we think that it is useful to look at the approach that Gauvain et al. (2001) adopted to explain the relationship between the development of spontaneous planning skills and the skills needed to use an established plan. The authors refer to Vygotsky's notions of spontaneous and scientific concepts and the way they contribute to each other's development. Similarly, the construction of a series under the guidance of an adult who refers to the pieces by their relative dimensions from the start (as happened with the high socio-cultural level mothers) ought to differ from reliance on the adult beginning the series, while referring to the sizes in the process, and the child then completing it (as was the case with the lower socio-cultural level mothers). In the latter case the child's understanding of the expressions that refer to the relationships between the rulers is induced by the existing visual arrangement, whereas in the former children find it hard to understand what is meant.

The way in which these two types of scaffolding and understanding are combined in a child's development needs more systematic and longitudinal investigation, using qualitative microanalysis of the different patterns of mothers' scaffolding speech. This could also highlight how differences in mother–child interaction during pre-school years may account for the development of different domains and variables of metacognitive skills.

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