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Accelerating Language Development Through Picture Book Reading: A Systematic Extension to Mexican Day Care

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Previous research demonstrates linguistic advances in middle-class 2-year-olds in the United States resulting from training parents to read with their children following a particular style. This style, called *dialogic reading,* encourages children to talk about picture books and gives them models and feedback for progressively more sophisticated language use. This research extends these procedures to a day-care setting using 20 Mexican 2-year-olds from low-income backgrounds. Children in the intervention group were read to individually by a teacher using dialogic reading techniques. The control group children were given individual arts and crafts instruction by the same teacher. Effects of the intervention were assessed through standardized language tests and by comparing the children's spontaneous language while they shared a picture book with an adult who was unaware of their group assignment. Differences favoring the intervention group were found on all standardized language posttests and on some measures of language production.

Whitehurst et al. (1988) reported that the language skills of middle-class 2-year-olds could be enhanced substantially by a short program of picture book reading in the home. The program lasted 1 month and involved training mothers to use special techniques while reading. These techniques were designed to alter roles during picture book reading so that the child gradually became the teller of the story depicted in a picture book, whereas the mother became an active listener, prompting, rewarding, and expanding her child's efforts to talk. Mothers began prompting with simple questions about the actors, objects, and actions depicted in a book's pictures; they then moved on to open-ended questions, for example, "What's happening on this page?" These techniques, labeled *dialogic reading,* produced significant changes in mean length of utterance (MLU) as well as language gains of 6 to 8.5 months on standardized tests of language development. This was based on a comparison of the intervention group with a control group of children who were read to as frequently as the intervention group but using the mothers' ordinary reading style. The magnitude of the mean differences between the two groups was as large at a 9-month follow-up as at a posttest immediately after the reading intervention. Comparisons of tape recordings of reading sessions at home demonstrated that mothers in the intervention group engaged in the techniques that were the targets of instruction, whereas mothers in the control group engaged primarily in straight reading and comment, leaving the child in the role of a passive listener.

These results are important in at least three respects. First, they represent the first and only experimental verification of a causal relation between the reading of ordinary picture books in the home and the development of language and preliteracy skills. Such a relation has been suggested by correlational and descriptive studies (Bus & van IJzendoorn, 1988; Share, Jorm, MacLean, Matthews, & Waterman, 1983; Snow & Goldfield, 1983; Wells, 1985a), has been the subject of theoretical interpretation (Moerk, 1985; Sulzby, 1985; Wells, 1985b), and has been assumed in what has become a cottage industry of hortatory books and articles for parents on the value of reading books to preschoolers (e.g., Bush, 1990; Copperman, 1986; Taylor & Strickland, 1986). A clear demonstration that shared picture book reading enhances language skills provides a much needed experimental anchor for these efforts.

Second, these results add to the short list of studies that unambiguously demonstrate the effects of "motherese" on children's language development. Nearly all studies of the effects of parental language on children's language development have been correlational and are open to alternative explanations, such as that relations between adult input and the complexity of child language are driven by the child rather than the adult. Reviewing this literature, Bates, Bretherton, Beeghly-Smith, and McNew (1982, p. 64) concluded that "social-causal theories have not yet obtained adequate empirical support [because of weak correlational data, and should be supplemented with] converging evidence from experiments in which types of adult input are manipulated systematically." Whitehurst and collaborators (1988) offered precisely this type of experimental support. Furthermore, this work has implications for the issue regarding the teachability and learnability of language by identifying specific strategies that facilitate the process of language learning (Schiefelbusch, 1989). Interactions between children and parents while reading picture books promise to be a fertile context for detailed investigations of the social and cognitive processes by which children acquire language (Cornell, Senechal, & Broda, 1988; Elley, 1989; Leung & Pikulski, 1990).

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Third, these results have clear relevance for application in the areas of early education and special education. One facet of this relevance is in understanding and enhancing ordinary verbal interactions between teachers and children. Studies have demonstrated that teachers tend to ask convergent questions of preschoolers (e.g., "Do you want a crayon?"—Wittmer & Honig, 1989) and then tend to either give no response to the child or simply repeat the child's answer (Weber & Shake, 1988). Convergent questions and minimal follow-up to a child's answers contrast strikingly with the open-ended questions and expansions that were part of the procedure used by Whitehurst et al. (1988) and that have been favored in instructional models (Becker, 1977; Sigel & Saunders, 1979). This suggests that there may be substantial room for improvement in the typical style of teacher–child verbal interaction, with corresponding gains in children's language development.

Another area of educational relevance, and the one on which the present study is based, is early intervention for children of low-income parents. Children who are raised in poverty suffer from disproportionately high rates of illiteracy and other forms of reading problems (Alexander & Entwisle, 1988). Reading difficulties among this group are tied to oral language deficiencies (Edmaston, 1984), which are in turn a function of variables in the home environment that precede the child's entry into school (Share et al., 1983). Significant social class variance in oral language skills may be tied to differences in shared book-reading activities in the home. For example, Ninio (1980) found that lower-class mothers were less likely than middle-class mothers to engage in a number of potentially instructive behaviors during story time. Correspondingly, lower-class children had smaller productive vocabularies than middle-class children. McCormick and Mason (1986) demonstrated large social class differences in the availability and use of printed materials in the home. For example, 47% of public-aid parents of preschoolers reported no alphabet books in the home, compared with 3% of professional parents.

Day care, Head Start, and other organized preschool programs would seem to offer an antidote to some of the verbal-interactional deficiencies in the homes of children of low-income parents, particularly as these programs receive increasing public support and enroll ever larger numbers of children. However, there are substantial differences in the quality of preschool programs on the dimension of verbal interaction (McCartney, 1984; Scarr & McCartney, 1988), with children from low-income families generally receiving less optimal stimulation (White, Schliecker, & Jacobs, 1989). Improvement in the quality of the verbal environment in child-care programs is a promising target for research and social policy that aims to improve the lives of children of low-income parents.

The present study extends the techniques of shared picture book reading used by Whitehurst et al. (1988) to children of low-income parents attending public day care in Mexico. Mexico, like most developing countries, faces critical problems in educating its population. The average level of educational attainment of the Mexican population fluctuates around the third and fourth grade (National Institute of Statistics, Geography, and Information, 1985). Much of this low level of educational attainment is due to school desertion: Only about 50% of children who enter first grade complete elementary school (National Bank of Mexico, Department of Social Studies, 1986), and many of these school deserters are retained in first grade because of very low levels of academic readiness (Department of Public Education, Mexico, 1986).

Enrollment in day-care centers and other preschools has expanded rapidly in Mexico, with over a 10-fold increase in day-care centers during the decade from 1976 to 1986 (Department of Public Education, Mexico, 1986). Part of this increase has been due to the influence on governmental social policy of research by Gomez Palacio and Ferreiro (1978). These researchers demonstrated that children from low-income backgrounds who had attended preschool were substantially more likely to have the requisite preliteracy skills for performance in first grade than were similar children who had not attended preschool. In this context, programs that improve the educational impact of day care on Mexican children can make a substantial contribution to the worthy national goal of increasing levels of literacy and educational achievement.

Method

Subjects

Twenty working-class 2-year-olds attending a public day-care center participated in this study. All subjects were monolingual, Spanish-speaking residents of Tepic, Mexico. There were 12 girls and 8 boys. Children ranged in age from 27 to 35 months at the beginning of the study. They had been attending the public day-care center an average of 15 months.

Families of children participating in the study had a mean income per month of 480,000 pesos ($192.00, given an exchange rate of 2,500 Mexican pesos per $1.00), with a range from 320,000 to 700,000 pesos. On the average, fathers attended school for 10.5 years (range = 6–13 years) and were blue-collar and semiskilled workers. Mothers had an average of 10.2 years of education (range = 8–13 years). The majority of mothers worked as secretaries or in semiskilled jobs (e.g., waitress or store attendant). Seven mothers were either single mothers or divorced.

All parents were literate and the majority reported occasionally reading newspapers, magazines, and comics. Four of the parents reported reading books, although not frequently. By self-report, parents seldom read with their children: Two parents reported reading with their child once or twice every 2 weeks, 7 parents read once or twice per month, and the remaining 11 parents read once per month or not at all. Only 2 children, those who were read to more often, had children's books of their own. In the rest of the households, the only printed materials that were accessible to the children were comics, magazines, and, in some, coloring books. Most mothers reported that their children entertained themselves looking at these materials. Families with older children typically had some children's books or textbooks used by the older children; however, the young children were usually not allowed to use these books "because they did not know how to take care of them."

All children were developing normally as measured by the Denver Developmental Screening Test (DDST; Frankenburg, Dodds, & Fandal, 1973). However, their linguistic ability was low as measured by standardized tests of vocabulary. Children's mean standard score was 88.2 on the Peabody Picture Vocabulary Test—Revised (PPVT-R) Form L (Dunn & Dunn, 1981) and was 76.5 on the Expressive One-Word Picture Vocabulary Test (EOWPVT; Gardner, 1981). These are tests of children's receptive and expressive vocabulary, respectively, on which, on the average, American children are expected to obtain a score of 100. The EOWPVT requires the child to name line drawings of objects, whereas the PPVT–R requires the child to point to line drawings of objects in response to the examiner's labeling of those objects.

The language tests were administered by translating each of the items into Spanish. The EOWPVT had two items with which Mexican children are generally unfamiliar: *pumpkin* and *chimney.* Accordingly, errors on these items were not counted as one of the six consecutive errors necessary to establish a ceiling on the test. Concerns may arise over the use of these tests in evaluating the linguistic skills of Mexican children given the lack of norms for this population. However, our primary purpose of this assessment was to evaluate differences in children's verbal skills as a function of the experimental intervention. The tests served that function even if the standard scores that were generated might not reflect performance in comparison with Mexican children in general.

Setting

The study was conducted at the facilities of a public day-care center in Tepic, Mexico. This day-care center provides services for children of all mothers who can demonstrate that they work outside their home. Although the population attending this institution is somewhat heterogeneous, the majority of the children come from low-income home environments. Children attend the day-care center every weekday for 7 to 8 hr a day.

This day-care center was shown to provide low-quality experiences as evaluated by the Early Childhood Environment Rating Scale (Harms & Clifford, 1980). The area of linguistic stimulation was particularly poor. The ratio of adults to children was approximately 1 to 9. Educational materials and toys were scarce and were not regularly available to the children. Story-time activities were not conducted at this center; nor were there any books available to the children. The only language-related activity performed regularly was singing.

A small room beside the children's bedroom was used to carry out the assessments and the intervention. This room contained a refrigerator, a cabinet, and some boxes with diverse materials. A small table and two children's chairs, located side by side, were placed in this room for conducting the study.

Materials

The study used five different children's books of the series, *Teo Descubre el Mundo* [Teo Discovers the World]: *Teo en la Escuela* [Teo at School], *Teo en la Granja* [Teo at the Farm], *Teo y Sus Amigos* [Teo and His Friends], *Teo en el Zoo* [Teo at the Zoo], and *Teo en la Feria* [Teo at the Carnival] (Denou, 1982). These books are Spanish children's books containing rich illustrations and short, descriptive texts. Each book describes the experiences of one boy, Teo, in different situations. Some of the same characters are found in each book.

Four different puzzles, 10 small coloring books, six cans of Play-Doh, paper, crayons, scissors, and glue were used in sessions with control children. Two telephones, a set of small dolls and furniture, and two toy cars were used for a free-play rapport situation. We used an audiotape recorder to record children's verbalizations while assessing their language in the context of book reading.

Procedure

Subject selection and pretest assessment. The study used a matched-pair experimental design. Potential subjects were identified through the records of the day-care center. All 2-year-olds from a working-class family background whose mothers agreed to participate in the study received an evaluation of their developmental and linguistic status. The DDST, PPVT-R Form-L, and EOWPVT were administered at this point. We averaged the language quotients obtained on the two language tests to obtain one mean language score for each child. We chose participating subjects from a pool of 27 potential subjects to form a sample of healthy, working-class children with vocabulary scores that were at least 0.5 standard deviation below the mean (i.e., 92.5). Pairs of children were matched as nearly as possible on the basis of their mean language scores, ages, family income, level of maternal education, family size, and gender. Children from each pair were then assigned randomly to the experimental and control conditions. Consistent with the matching procedure, the children did not differ significantly on any of the matching variables at pretest. Table 1 presents the characteristics of children in the experimental and control groups across these measures.

Intervention programs. The intervention programs consisted of thirty 10- to 12-min individual training sessions carried out every weekday during the children's preschool schedule. The overall duration of the interventions varied from 6 to 7 weeks depending on children's attendance at the day-care center and official holidays. Both interventions were carried out by a graduate student, henceforth referred to as the "teacher." Usually, sessions with experimental and control children were alternated throughout the day.

Dialogic-reading intervention. The experimental intervention was a variation of Whitehurst et al.'s (1988) dialogic-reading parent-training program. Training focused on the use of language-evocative strategies in a picture book situation and the presentation of finely tuned verbal models contingent on children's verbalizations.

During the first 2 weeks of the experimental intervention, the teacher selected the book to be used and cycled through the five books of the *Teo Descubre el Mundo* series. This was done so that the children became familiar with the five books. Subsequently, children selected the book to look at according to their own preferences.

Throughout the experimental intervention, children were presented with high rates of "who, what, when, where, how, and which" questions (referred to hereinafter as "wh- questions"), open-ended questions/directives, corrections, expansions, and praise contingent on children's verbal productions. In each session the teacher sat with an individual child and asked the child "to help the teacher to tell the story." The teacher and the child took turns in "telling the story" about each page. The teacher never read the text verbatim for the children.

The teacher always initiated "telling the story" by providing an open-ended question at the turn of each page (e.g., "What is going on here?"), waiting for the child to attend to the illustration, and then describing the events taking place in the picture (e.g., "Let's see what is going on in here, . . . here is Teo waking up, he is stretching"). When it was the child's turn, the teacher always provided an open-ended question and then waited for the child to produce a response. The teacher then acknowledged the child's verbal responses and expanded on them. The teacher waited for approximately 5 s for the child to produce another verbal response spontaneously. If the child failed to initiate a response, the teacher prompted the child to continue telling the story by asking him or her simple wh- questions related to the content of the picture about which the child had just talked (e.g., "Who is riding with Teo?" and "What is Teo feeding?"). If the child failed to provide a response, the teacher modeled the response and prompted the child to imitate. The teacher repeated the child's imitation, praised it, and ex-

Table 1
Mean Values of Demographic Characteristics of Children in the Experimental and Control Groups

Variable	Experimental	Control
Chronological age (months)	30.9	31.2
Family monthly income (pesos)	407,000	553,000
Years of maternal education	11.6	8.8
No. of siblings	2.1	1.8
Book reading		
Once a month	0.4	0.1
Twice a month	0.3	0.6
No. of books owned by child	0.7	0.4

panded on it. On the average, the teacher focused on five events per page to ask information, and she corrected or expanded on children's responses. Thus, on each session, experimental children were exposed to approximately 40 to 60 "language teaching sequences."

From the 11th session, the demands for children's level of verbal production were increased. When it was the child's turn to tell the story, pointing with accompanying statements such as "this" or "here" was not considered appropriate and, thus, the open-ended question was repeated. After the child had already given a response, and if the child did not spontaneously continue telling the story, the teacher would prompt him or her with another open-ended question (i.e., "What else?") before asking more specific questions. Complex wh-questions (e.g., "What is Teo doing?" and "Why is this boy crying?") were also introduced at this point. These complex questions were first presented contingent on children's labeling and were focused on those attributes or functions that the teacher had already modeled to the child in the form of expansions. The number and complexity of these questions increased according to children's progression in level of verbal production. The teacher continued providing high rates of expansions and positive and corrective feedback for children's verbalizations.

Control intervention. Children in the control group engaged in one-to-one activities with the teacher that were designed to foster their perceptual and fine motor skills, such as building puzzles, coloring books, cutting paper, tracing lines, and pasting. Activities were chosen to resemble those typically used in preschool curriculums. During the first week of the intervention, the teacher cycled through all the activities available to the children. Subsequently, the children were given a choice of what to work on. For example, in a session, a control child may be given the choice to make a paper clown, draw pictures to take home, or build puzzles.

No specific language stimulation was provided during the control sessions. That is, while working with these children, the teacher did not seek for opportunities to teach children vocabulary or to expand their sentences to model more complex structures. Rather, she would only engage in regular conversation by talking about the child's work (e.g., "You did a nice job" and "I like the way you did this"), the child's interests and preferences (e.g., "Are you making a doggy? Do you like dogs?"), or the child's activities (e.g., "Did you go to the park on Sunday?").

Posttest assessment. The effects of the dialogic-reading intervention on children's language were assessed through measures of children's spontaneous verbalizations while looking at a book and through standardized tests. During the assessment of spontaneous verbalizations, children interacted with an unfamiliar female adult who was trained to ask specific and open-ended questions while reading. The trained assistant was unaware of the children's experimental status. We introduced a 5-min free-play interaction before the picture book interaction to establish rapport between the child and the trained assistant. Subsequently, a child and the assistant looked at one of the children's books previously used in the intervention. This book was selected by the child. The book-reading interaction lasted until a child looked through the whole book; however, only the initial 7 min of the interaction were audiorecorded. The teacher was present at all of these sessions but sat away from the participants. These interactions took place within 1 week after the intervention was completed. Measures of overall rate of verbal production and measures of syntactic, semantic, and pragmatic characteristics of children's speech were collected. Table 2 presents a description of each of the observational categories subjected to analyses.

A licensed psychologist, working at the day-care center, conducted the posttest assessment of children's language on standardized tests. This woman was unaware of the children's experimental status and the purpose of the study. The examiner administered the PPVT–R Form-M, the EOWPVT, and the Verbal Expression subscale of the Illinois Test of Psycholinguistic Abilities (ITPA; Kirk, McCarthy, & Kirk, 1968). The PPVT–R and the EOWPVT were also administered at the pretest and were described previously. The ITPA subscale requires the child to produce descriptions of common objects (e.g., an envelope) in response to the examiner's question, "Tell me about this." Scores vary with the number and diversity of the child's responses. This measure was used because it taps an expressive domain that is conceptually distinct and developmentally subsequent to the child's ability to produce simple labels as measured by the EOWPVT. The PPVT–R and the ITPA were administered within 7 to 10 days after the intervention was completed. The EOWPVT was administered approximately 2 months after the intervention was completed. These assessments were conducted at the day-care facilities but not in the experimental setting. The teacher was not present.

Results

Data Collection

Children's spontaneous verbalizations were evaluated on the basis of transcripts of children's speech during the 3rd through 7th min of the audiorecorded picture book interaction of each child with the trained assistant. Transcripts were generated by six Spanish-speaking, bilingual coders who were unaware of the children's experimental status and the purpose of the study. To ensure fidelity of the data, we had each of these transcripts produced by two coders who worked sequentially. One coder first produced the original version of the transcript. All transcripts were then checked by a second coder, who produced the final version of the transcript and simultaneously scored the pragmatic function of each child's utterance. All coders served a similar number of times as the original and second coder for children in the experimental and control groups. Scoring was done according to the coding system presented in Table 2. Intercoder agreement was assessed by computing the kappa value of codings produced independently by two coders for 30% of the data set. The overall mean kappa value was .94, with each specific category being equal to or above .80.

Data Analysis

Test score data. We assessed the effects of the intervention on the standardized tests by conducting separate two-group (experimental vs. control), two-tailed t tests on children's standard scores. Each of these analyses revealed a significant group effect, indicating a higher performance by children in the experimental group than by children in the control group, $t(18) = 2.57$, $p = .019$, for PPVT–R; $t(18) = 3.06$, $p = .007$, for EOWPVT; and $t(18) = 3.38$, $p = .003$, for ITPA. Covarying out the effect of the pretest scores on the corresponding posttest scores generated even larger p values, $F(1, 17) = 9.49$, $p = .007$, for PPVT–R and $F(1, 17) = 40.13$, $p = .00004$, for EOWPVT; no analysis of covariance is presented for the ITPA because it was not given as a pretest. Figure 1 illustrates children's standard scores on the standardized tests at pretest and posttest. The mean values and standard deviations of these measures are presented in Table 3. These standard scores correspond to language age differences between the two groups of 3.3 months on the PPVT–R, 8.2 months on the ITPA, and 7.3 months on the EOWPVT.

Effect sizes were computed by dividing the mean difference between groups by the standard deviation for the control group

Table 2
Definitions and Examples of Verbal Behavior Categories of Child Language

Category	Definition/example
Grammatical dimension	
Mean length utterance	Mean number of words per utterance.
Mean maximum 5	Mean length of the five longest utterances produced.
Complex structures	Ratio of utterances containing complex syntactic structures, such as passives, compound sentences or conditionals over total number of utterances produced.
Semantic dimension	
Semantic diversity	Number of different words produced.
Noun diversity	Number of different nouns produced.
Adjective/modifiers diversity	Number of different adjectives and modifiers produced.
Verb diversity	Number of different verbs produced.
Pragmatic dimension	
Reduced imitation	Partial imitation of a preceding adult utterance. (M: This is Teo's bike. C: Bike.)
Exact imitation	Exact copy of adult's preceding utterance. May omit diexis ("This is a. . .") or imitative directives ("Say. . ."). (M: This is a tractor. C: Tractor.)
Expanded imitation	Copy of part of adult's preceding utterance adding new elements. (M: Look, a bird. C: The bird is flying.)
Initiations	Unsolicited comments referring to a new topic. (M: There is Teo. C: The man is eating.)
Topic continuations	Unsolicited comments continuing the topic of adult's previous utterance. (M: There is a ball. C: It's like mine.)
Questions	Any type of question demanding some verbal response from the adult. Includes yes/no questions and what-questions. (Did he fall? What is that?)
Answers	Any response to a adult question. (M: What is this? C: A train.)
Labels	Labels of objects shown in the illustrations. (That's an elephant.)
Refusal	Indication of noncompliance with adult's directions. (M: Let's see what is next. C: No!)
Vocalizations	Unintelligible utterances and nonword verbalizations.

Note. M = adult's responses; C = child's responses.

(Cohen, 1977; $d = 1.3$ for PPVT–R, $d = 1.29$ for EOWPVT, and $d = 2.08$ for the ITPA). The typical effect size in published reports of educational and psychological interventions is about .33, and even so-called large effect sizes are typically less than 1.00 (Cohen, 1977; Sedlmeier & Gigerenzer, 1989). The mean effect size of 1.56 across the three standardized tests in the present study demonstrates that the picture book program produced large effects on performance.

Verbal production data. We evaluated children's verbalizations during 5 min of interaction with the trained assistant to assess differences in the quantity and quality of the language produced by children in the experimental and control group. The significant results of this series of analyses are presented in Table 4. First, a two-group (experimental vs. control), one-way analysis of variance (ANOVA) was conducted on the total number of utterances produced. This analysis indicated that children in the experimental group produced a significantly greater number of utterances than children in the control group, $F(1, 18) = 4.7$, $p < .001$.

Subsequently, an analysis of the syntactic, semantic, and pragmatic characteristics of children's speech were performed. Separate two-group (experimental vs. control) univariate ANOVAs on the syntactic measures revealed that children in the experimental group were producing longer (i.e., larger MLU), $F(1, 18) = 4.1$, $p = .001$, and more complex sentences (i.e., number of compound sentences), $F(1, 18) = 4.7$, $p = .001$, than children in the control group, reflecting a higher level of syntactic complexity in their speech.

Semantic complexity of children's language was assessed through a two-group (experimental vs. control) multivariate analysis of variance (MANOVA) on the number of different nouns, verbs, and adjectives produced. This measure was used instead of type/token ratios (TTR), because TTR presents a large dependence on the size of the corpus of data, inflating values on small samples of language production (Richards, 1987). The MANOVA revealed significant group differences in the production of word categories, $F(3, 16) = 3.4$, $p < .05$. Subsequent univariate tests indicated that children in the experimental group produced a greater variety of nouns, $F(1, 18) = 4.1$, $p = .012$, and verbs, $F(1, 18) = p = .013$, than children in the control group.

A one two-group (experimental vs. control) MANOVA on the pragmatic characteristics of children's speech yielded significant group differences, $F(3, 16) = 7.8$, $p < .01$. Subsequent univariate ANOVAs revealed significant group differences in children's production of answers, $F(1, 18) = 6.2$, $p = .022$; initiations, $F(1, 18) = 12.1$, $p = .003$; and topic continuations, $F(1, 18) = 5.6$, $p = .029$, with experimental children producing higher rates of these types of verbalizations than control children (see Table 4).

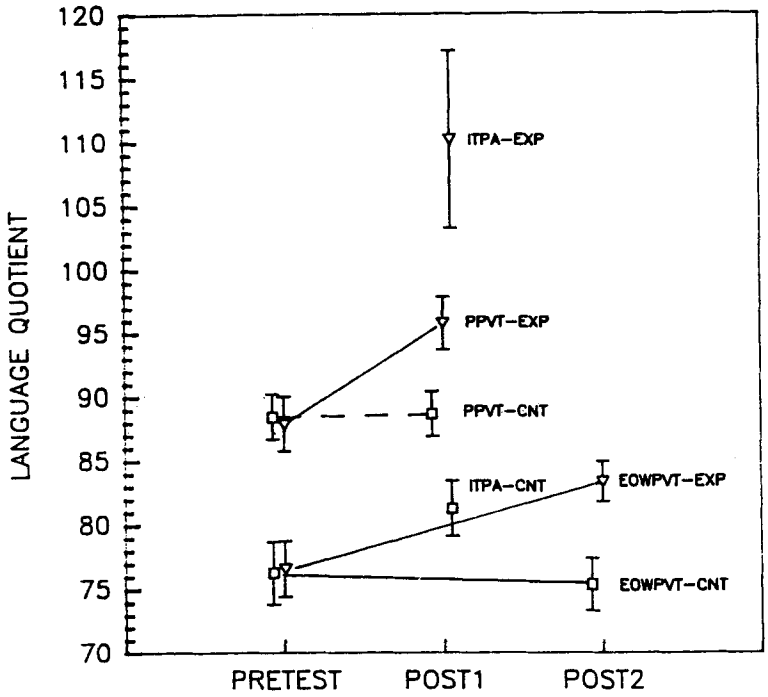

Figure 1. Standardized language quotients means and standard error of the mean at pretest, posttest (POST1), and delayed posttest (POST2) for children in the intervention and control groups. (Results are depicted for the experimental [EXP] and the control [CNT] groups for three tests: the Illinois Test of Psycholinguistic Abilities expressive subscale [ITPA], the Peabody Picture Vocabulary Test—Revised Form M [PPVT–R], and the Expressive One-Word Picture Vocabulary Test [EOWPVT].)

Discussion

This research extends the findings of Whitehurst et al. (1988) by demonstrating that a shared picture book intervention can work for Mexican children of low-income parents with below-normal language abilities and with a day-care teacher rather than a parent in the adult role. Both this research and Whitehurst et al.'s (1988) study demonstrate that large and enduring effects on children's language can be obtained from an intervention that encourages the child to talk about the pictures in shared picture books and provides the child with appropriate models and feedback for progressively more sophisticated language use.

The form of the findings in the present study differs somewhat from that of Whitehurst et al. (1988) in that the mean differences between experimental and control children as well as the standard deviations were smaller in this study. For example, in the previous study, the mean difference at posttest on the EOWPVT standard score was roughly 20 points and the standard deviation was about 22, whereas in the present study the mean difference was 8 and the standard deviation was 5.5. There are at least three possible reasons for the differences in

Table 3
Children's Standard Scores on Language Tests Before and After the Intervention

	Pretests				Posttests			
	Experimental		Control		Experimental		Control	
Instrument	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PPVT–R	87.9	6.5	88.5	5.4	95.8	6.4	88.7	5.3
EOWPVT	76.6	6.6	76.3	7.4	83.4	4.8	75.4	6.2
ITPA[a]	—	—	—	—	115.3	20.6	87.8	3.2

Note. PPVT–R = Peabody Picture Vocabulary Test—Revised; EOWPVT = Expressive One-Word Picture Vocabulary Test; ITPA = Illinois Test of Psycholinguistic Abilities.
[a] ITPA standard scores have been transformed from their published form ($M = 36$, $SD = 6$) to the more typical scale ($M = 100$, $SD = 15$) to make them comparable with the PPVT–R and EOWPVT.

Table 4
Group Differences in Children's Verbal Productions While Interacting With the Trained Assistant

Category	Experimental		Control	
	M	*SD*	*M*	*SD*
Language production				
Total utterances	58.7***	12.3	32.3***	11.5
Syntactic characteristics				
Mean length utterance	3.0**	0.4	2.1**	0.5
Complex sentences	7.0**	1.4	3.4**	2.1
Semantic characteristics				
Noun diversity	34.7*	10.5	22.2*	7.9
Verb diversity	13.9*	4.7	8.6*	2.9
Semantic diversity	61.4**	12.4	32.3**	11.5
Pragmatic characteristics				
Answers	18.6*	4.1	14.4*	6.2
Topic continuations	7.4*	2.0	5.4*	1.6
Initiations	13.7**	3.7	8.9**	1.9

* $p < .05$. ** $p < .01$. *** $p < .001$.

variance. First, children were selected because of their low language test scores in the present study, whereas no such restriction applied to the selection of subjects in the previous study. Second, children were matched and then assigned to groups in this study, whereas there was no matching procedure in the previous study. Third, children in this study were exposed to more similar experience, because the same adult served as the teacher and used the same books for all children, whereas each child's mother did the reading in the previous study using their own books. Thus, experimental control was tighter in the present study than in Whitehurst et al. (1988), which should result in decreased variance.

What explains the smaller mean differences between groups in the present study? Stanovich's (1986) notion of "Matthew effects" seems to be operative in these findings. Children at a lower level of language performance would elicit verbal interactions that are less complex than those elicited by more competent conversationalists. Thus, the rich get richer even when they are not given more, because they elicit more advanced patterns of stimulation and are better equipped to take advantage of what they are given. This genotype–environment correlation may contribute to the differential effects of the intervention based on children's skill level. If this is true, then shared-reading interventions for children from low-income backgrounds will have to last longer and be more intensive than would be necessary for children with a long history of shared picture book reading at home in order to achieve changes of similar magnitude.

The success of the dialogic-reading program in facilitating language development in children of low-income parents is relevant to three major areas of research: (a) the teachability of language, (b) the relation between picture book activities and language learning, and (c) early educational intervention research for disadvantaged children. The role that the environment plays in children's language learning is a critical issue in first-language acquisition (Hoff-Ginsberg, 1985; Rice & Schiefelbusch, 1989; Snow & Ferguson, 1977). Although there is no doubt that children need to be exposed to some form of language to learn to talk, the degree to which variations in the environment influence children's level of linguistic ability is the core of the learnability–teachability issue in language acquisition theory (Pinker, 1984). According to Schiefelbusch (1989), the teachability hypothesis requires the identification of the conditions that facilitate the learning of language. The present findings support this hypothesis by adding to the literature and demonstrating that level of semantic contingency and demand for verbal production within socially meaningful verbal exchanges are major facilitators of the language-learning process (e.g., Bates & MacWhinney, 1987; Moerk, 1986; Rondal, 1985; Whitehurst & DeBaryshe, 1989).

The second research area to which this work is relevant is the growing literature on the role of joint picture book reading in language development during the preschool years. Reading a book to a young child is a common activity in most middle-class homes and preschool programs in the United States. For instance, the middle-class parents in Whitehurst et al.'s (1988) control group reported reading to their 2-year-olds a mean of 8.2 times per week. Such activity usually involves the assumption that shared picture book reading promotes language learning and facilitates acquisition of literacy. We have shown here that it does, at least in some forms. However, the specific effects of reading activities on children's language have been poorly assessed. An important exception is Watson's (1989) demonstration in a longitudinal investigation of significant positive correlations between the frequency with which parents used superordinate labels (e.g., "That is an *animal*") and cognitive verbs (e.g., "What does that [word] *mean?*") when reading to their 2-year-olds and their children's knowledge of category labels 1 year later. The present research adds to these findings by demonstrating that the contemporary effects of shared reading extend to a wide range of categories of spontaneous language, including the diversity of nouns and verbs, MLU, and the child's efforts to initiate and continue conversations. All of these measures are important markers of linguistic development. For example, Bates, Bretherton, and Snyder (1988, pp. 161–162) identified verb density as "booster rocket" that allows some children who are behind linguistically to catch up with their age mates.

Intervention with children who are at risk of educational failure because of the conditions associated with poverty is the third area of research for which this study has implications. One issue that has been raised repeatedly in this area is the need to evaluate the effects of specific components of intervention programs to increase their efficiency and to serve as guidelines for curriculum development (e.g., Miller, 1979). This study has singled out picture book activities as one critical component of preschool curricula by demonstrating that active participation in picture book activities produces language gains for children of low-income parents. This evidence is important because, although many early intervention programs for economically disadvantaged children use picture book activities to teach language to children, the specific effects of this practice have not been evaluated empirically.

The present study adds significantly to the few other studies that have examined book-reading activities in the preschool classroom (Karweit, 1989; Morrow, 1988; Pemberton & Watkins, 1987). Other studies have been conducted in the context

of comprehensive intervention programs (e.g., Head Start). As a result, it is unclear to what extent other features of these programs may contribute to the obtained results. This is the first study that has examined the effects of classroom book reading with children as young as 2 years of age. Other studies have been conducted with children 3 years of age or older. This is important because correlational work has documented a positive relation between the age of onset of reading activities and later linguistic and literacy development (Wells, 1985b). Finally, as previously discussed, this study provides a fine-grained analysis of the effects of the intervention.

The implementation of this intervention in a regular Mexican day-care center is relevant to the potential application of early intervention programs in underdeveloped countries. These countries lack the economic resources to conduct thorough, intensive intervention programs such as Head Start. Small-scale intervention programs such as the present one constitute a more feasible form of intervention. This study demonstrated that within the poor conditions in operation at this day-care center, the dialogic-reading program had an impact on children's linguistic development. Although we did not evaluate the impact this program would have if applied regularly, we expect that continuous exposure to picture book activities would produce larger and more lasting effects than a 6-week intervention. Indeed, we have no reason to believe that a brief dialogic-reading intervention somehow inoculates children against the cognitive risks that are associated with poverty.

There are limitations to the interpretation of the present results. With respect to internal validity, the research design did not separate the effects of dialogic reading with an increased frequency of reading and children's familiarity with the book used at posttest. Although we recognize that these are important concerns in the evaluation of the generalized effects of this intervention, various factors support the fact that dialogic reading was critical for the effects observed. First, in our previous work (Whitehurst et al., 1988), we had demonstrated that dialogic reading had effects on children's language above those of mere exposure to reading and familiarity with reading materials. In that study, mothers in both control and experimental groups read to their children at home using their children's own books. Thus, the use of advanced forms of language by children exposed to the dialogic-reading style could not be attributable to a greater familiarity with the task or reading materials. Second, the superior performance of children in the experimental group in the diversity of language measures and on standardized tests suggests that these children had developed a greater skill in describing and "talking about" illustrations and objects different from those to which they had been previously exposed. On this basis, we believe that this study indicates that exposure to the dialogic reading contributed to the use of advanced forms of language and increased verbosity of children in the experimental group.

With regard to the external validity, the "teacher" in the present study was an advanced doctoral student attending a university in the United States who interacted with subjects one on one. This raises instructional and organizational issues. The instructional issue is the degree to which typical day-care teachers can be trained to engage in dialogic reading. Our previous success in training parents (Whitehurst et al., 1988) suggests that the procedures of dialogic reading are teachable within a short period of time to adults who have no background in psychology or linguistics. However, we do not yet know how this information can be transmitted to day-care teachers so that they will be motivated to use it. The organizational issue concerns group size. Dialogic reading requires frequent opportunities for a child to talk about a book with a responsive adult. That is why the present intervention was one on one. However, the staff-to-child ratio in the day-care center in which we conducted this research was 1 to 9, which is, incidentally, within the range of staff ratios that we have encountered in day-care centers in the United States. As Karweit (1989, p. 106) puts it, "the demographics of the classroom often are responsible for turning story time from an active listening and responding time into just another teacher-directed 'sit still and listen' activity." The issue of how to implement dialogic reading within the organizational and resource constraints of a typical day care or preschool classroom is, we believe, the most important applied question for future research.

Children's books are very late arrivals in human history. A product of the Enlightenment, they arrived in force only in the 19th century. The wide availability of children's books, and a belief in their importance reflect a number of this society's ideals, including the view that the cultural future is tied to the education of children. Whatever else picture books do, they function as a marker of these values. When one finds families and child-care institutions that do not give or read books to their children, as we did in the present research, one finds children on the cusp of modern society. Shared picture book reading is not a magic potion that can push academically and culturally marginal children into the mainstream: Academic failure is complex and multiply determined. However, with a complicated problem that cries out for any practical contribution, it seems as good a place as any for meaningful research and social policy initiatives.

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