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Maternal sensitivity to vocabulary development in specific language-impaired and language-normal preschoolers

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ABSTRACT
This study examined mothers' accuracy in predicting the responses their children gave and the scores they achieved on two standardized vocabulary tests. Three groups of 16 mothers and their preschool children (specific language-impaired; age-matched, language-normal; and younger, language-matched, language-normal) completed the Peabody Picture Vocabulary Test-Revised, Expressive One-Word Picture Vocabulary Test-Revised, and Vineland Adaptive Behavior Scales. Mothers overestimated their children's standardized receptive and expressive scores, with the exception that the mothers' estimates of the receptive vocabulary scores for language-impaired children did not differ from the actual test scores. Mothers of age-matched normals were best able to predict the labels their children used to name various pictured items. However, the overall estimates by mothers of language-impaired children were more accurate than those by mothers of language-normal children.

A substantial literature in the past twenty years has documented the nature of child-directed speech. One hypothesis regarding its use is that it results from adults adapting their speech to facilitate comprehension and language development in children (e.g., Bohannon & Hirsh-Pasek, 1984; Snow & Ferguson, 1977). For such adaptation to occur, parents need to be able to second-guess their children's knowledge. In the semantic domain this would entail predicting what expressions and terms children are likely to understand in a given context (Berko Gleason, Greif, Weintraub, & Fardella, 1977). The ability of parents to estimate their children's language development has heightened significance for the delayed child; parents may detect the delay or collaborate with a clinician by completing child-rating scales. For example, two recently developed inventories, the MacArthur Communicative Development Inventories (Fenson et al., 1993) and the Language

Development Survey (Rescorla, 1989, 1991; Rescorla, Hadicke-Wiley, & Escarce, 1993), rely on parental report as a basis for assessing language development. Other researchers have suggested that mothers of language-impaired children may contribute to these children's weaker language skills by being out of step with the child during their interactions (Peterson & Sherrod, 1982; Tiegerman & Siperstein, 1984). A potential contributor to such a mismatch would be inaccurate parental perceptions of a child's abilities.

Previous research on parental estimates of children's abilities largely has focused on global estimates of intellectual abilities in developmentally challenged children (e.g., Ewert & Green, 1957; Heriot & Schmickel, 1967; Schulman & Stern, 1959; Serbin, Steer, & Lyons, 1983). In these studies, parents were asked to estimate the mental age at which their child functioned. Alternatively, correlations were calculated between the total scores the children obtained on the tests and the scores from the rating scales and checklists completed by their parents (e.g., Chaffee, Cunningham, Secord-Gilbert, Elbard, & Richards, 1990). This research showed that, although both mothers and fathers overestimated their handicapped children's abilities, their estimates were positively correlated with the actual scores and generally fell correctly within the developmentally challenged range. However, parental estimates of total scores and actual total scores can be composed of different patterns of correct and incorrect responses. Thus, this "overall estimate" method may not accurately portray the parents' appreciation of their children's competence.

Exceptions to the overall estimate method include studies by Gorelick and Sandhu (1967), Sattler, Feldman, and Bohannon (1985), and Evans and Schmidt (1991); in these studies each mother was asked to complete each item of an intelligence or language test in the way she believed her child would respond. This method allowed researchers to examine the parents' accuracy in predicting the correctness and nature of the child's response to each item and provided a more detailed representation of the parents' understanding of their children's abilities. Both Berko Gleason et al. (1977) and Sattler et al. (1985) examined estimates of language ability and observed high positive correlations between actual total scores and total scores, based on the parents' predictions on each item. However, parents showed only somewhat better-than-chance accuracy, or worse, in predicting their child's responses to each individual item. Berko Gleason et al. (1977) reported 66% accuracy for language comprehension items, but only 37% accuracy for language production items. Similarly, Sattler et al. (1985) reported the mothers' accuracy in predicting responses to a receptive vocabulary test at 58%, corrected for chance. Thus, although parents are good at arriving at an estimate of the number of items their children can answer, they are less accurate at predicting their children's response to individual items.

As part of a longitudinal study of book-reading interactions in two mother–child dyads – one with a language-impaired child (age 3;9) and one with a younger, language-matched normal child (age 2;2) – Evans and Schmidt (1991) examined each mother's ability to predict her child's responses to receptive and expressive vocabulary tests. Here, both mothers

did well in predicting responses to the expressive vocabulary items. In contrast, on the receptive test, the mother of the language-impaired child correctly predicted 73% of her child's responses, compared with the 51% predicted by the mother of the language-normal child. Evans and Schmidt (1991) speculated that the mother's longer experience with the older, language-impaired child enabled her to have a better sense of her child's comprehension than the mother of the younger, normal child, whose quickly expanding receptive skills may have been less obvious and may have outstripped his expressive language. However, the case-study nature of this research does not allow for any generalizations to either population group.

The primary purpose of the present study was to examine maternal sensitivity to receptive and expressive vocabulary development in language-impaired and language-normal children. Three indices of accuracy were used: accuracy of total score, accuracy of predicting correctness item by item, and accuracy of predicting actual response item by item. A second purpose was to examine the extent to which birth order, child age, and child language level were associated with parental predictions. The effects of child age and language level were examined by including both age-matched and younger, language-matched controls in the study. We hypothesized that mothers of language-impaired children would be more accurate in their predictions, given their longer experience of observing their child's slower development. Birth order was included to account for the greater opportunity that first-born children have to engage in focused verbal interactions with their parents (McCabe, 1989); this may enable first-born and only-born children to advance more rapidly in their language development than later-born children (Ackerman-Ross & Khanna, 1989) and parents to be more attentive to their language growth. Finally, we were interested in the extent to which maternal estimates of language competence were correlated with the mothers' perceptions of other domains of competence.

METHOD

Subjects

Participants were divided into three groups, each consisting of 16 mothers and their children: specific language-impaired (L-I) children (mean age, 52 months); chronological age-matched (A-M), language-normal children (mean age, 52 months); and younger, language-matched (L-M), language-normal children (mean age, 39 months). Although we had hoped to include fathers in our sample, only half of the fathers in each of our three sample groups agreed to participate. Thus, this study focused solely on maternal estimates. Of the language-impared children, 10 exhibited expressive delays, and 6 exhibited both expressive and receptive delays, as determined by the speech and language pathologists who had diagnosed them as language-impaired. On the Leiter International Performance Scale (Leiter, 1948), a test of nonverbal test intelligence, all of these children obtained scores within the normal to above-normal range (M = 112; range, 90–139). The three groups of children were predominantly from middle-class families

Table 1. *Demographic and language test scores for language-impaired, language-matched, and age-matched groups*

	L-I		L-M		A-M	
Descriptor	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age (months)	52	9.5	39	10.1	52	8.9
Days per week in daycare	2.0	1.4	2.3	1.7	2.8	2.1
Sex distribution: girls	3	—	7	—	8	—
boys	13	—	9	—	8	—
Birth order: only born	1	—	2	—	2	—
first born	5	—	4	—	4	—
later born	10	—	10	—	10	—
EOWPVT-R raw score	22.1[a]	9.2	20.6[a]	8.5	37.3[b]	15.5
standard score	86.6[a]	11.7	103.8[b]	11.8	108.2[b]	15.5
PPVT-R raw score	39.3[a]	16.2	34.7[a]	17.2	58.8[b]	17.3
standard score	90.3[a]	14.2	104.6[b]	12.3	113.3[b]	14.4
Vineland communication	78.1[a]	11.3	103.6[b]	9.1	102.9[b]	7.2
daily living	95.9	11.6	103.3	8.9	103.2	10.6
socialization	84.6[a]	9.8	95.1[b]	10.3	96.6[b]	8.8
motor skills	89.2	17.5	98.9	8.5	100.3	11.6

Note: Group means differ at $p < .05$ when marked by different superscripts.

and did not differ in the mean number of days in daycare. In addition, the three groups were matched as closely as possible on gender and birth order (only- or first-born vs. second- or later-born).

Table 1 presents demographic characteristics and test scores for the three groups of children. The language-impaired group and the younger, language-matched group did not differ in their raw scores on the expressive and receptive vocabulary tests, but both groups obtained lower scores than the language-normal, age-matched group. Similarly, the expressive and receptive vocabulary standard scores for the two language-normal groups did not differ and were higher than those for the language-impaired children.

Procedure

Each child completed the two vocabulary tests in counterbalanced order. The Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1991), a measure of receptive vocabulary, requires the child to point to one of four pictures named by the examiner. The split-half reliability reported in the manual is .80 for ages 3;6 to 3;11. Children also completed the Expressive One-Word Picture Vocabulary Test-Revised (EOWPVT-R) (Gardner, 1990), a measure of expressive vocabulary; here, the child is

asked to name pictures. The manual reports a split-half reliability of .93 for children ages 3;6 to 3;11.

After the children's testing was completed, each mother was asked to complete each of these tests as she thought her child would. All mothers began with the first item on the test and stopped when they reached "ceiling" according to the standardized test instructions; if their child had progressed further, they continued on to the last item their child completed. For the PPVT-R, mothers were asked to answer "yes" or "no" to indicate whether the child could correctly select the named picture from the four alternatives. For the EOWPVT-R, mothers were asked to say what word they thought their child would use to name each item presented.

Lastly, all mothers completed the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984) for their child. For this scale, mothers were asked to report on their child's competence in four domains: communication, daily living skills, socialization, and motor skills. Split-half reliability ranges from .89 to .98.

Dependent variables

For the vocabulary tests, five maternal estimate variables were derived. The first four variables included the standard scores from the mothers' simulations of their child's performance on the PPVT-R and EOWPVT-R and the hit rates (0–100%) for the accuracy with which mothers predicted the correctness of their child's response to each item. The fifth variable was the hit rate for predicting the actual word the child used to name each expressive item, regardless of whether the name was a correct response according to the scoring key. Standard scores for the four domains of the Vineland Adaptive Behavior Scale were also used.

Data analysis

Our sample size was too small to allow for an adequate number of subjects in each cell of a Group × Gender × Birth Order analysis. Therefore, we initially conducted a two-way Group × Gender MANOVA to determine whether the child's gender affected any of the scores. No significant gender or Gender × Group interaction effects were found. Thus, gender was dismissed from subsequent analyses. These consisted of a two-way MANOVA (Group × Birth Order), followed by univariate F tests and Tukey post-hoc comparisons. Eight variables were entered for this analysis: the child's standard scores on the PPVT-R and EOWPVT-R, the estimated scores on the PPVT-R and EOWPVT-R (derived from maternal simulations of test performance), and the four standard subscale scores of the Vineland Scale. Paired t tests and correlational statistics were used to assess the correspondence between the actual child scores and the estimates from the mothers' simulations of child performance. A two-way MANOVA was also used to

Table 2. *Language test scores derived from maternal simulations*

	L-I		L-M		A-M	
Maternal report	*M*	*SD*	*M*	*SD*	*M*	*SD*
Simulated PPVT SS	99.6[a]	21.0	122.0[b]	21.58	129.6[b]	18.8
PPVT item accuracy	69.7%[a]	9.2%	68.3%[a]	8.1%	77.7%[b]	7.9%
Simulated EOWPVT-R SS	98.8[a]	28.8	113.4[b]	14.1	126.4[b]	20.5
EOWPVT-R naming accuracy	51.1%[a]	8.7%	52.4%[ab]	9.1%	59.3%[b]	8.2%
EOWPVT-R item accuracy	69.0%	7.6%	68.1%	8.3%	68.4%	5.7%

Note: Means with different subscripts differ at $p < .05$.

assess group and birth order effects on the three maternal hit rates. Finally correlations were computed between the four Vineland Scale scores and the actual and estimated language scores. In all of these analyses, alpha was set at .05.

RESULTS

Overall test performances

A two-way MANOVA (Group × Birth Order), using the children's actual standard scores and the estimated standard scores from maternal simulations, revealed a significant overall group effect, Wilk's lambda = .719, $F(16, 70) = 4.37$, $p < .0001$. Univariate tests showed that this multivariate effect pertained to the two subscales of the Vineland Scales, to the estimated standard vocabulary scores from the maternal simulation, and to the childrens' actual vocabulary scores.

Group differences were revealed on the Vineland communication scales, $F(2, 42) = 36.09$, $p < .0001$, and the Vineland socialization scales, $F(2, 42) = 7.01$, $p < .002$. In both cases, the language-impaired children obtained lower scores than the language-matched and age-matched, language-normal children, who did not differ from each other. Groups did not differ on the motor subscale, $F(2, 42) = 2.57$, $p < .008$, or the daily living skills subscale, $F(2, 42) = 2.17$, $p < .126$ (see Table 1 for means and standard deviations).

Group differences were also found in the mothers' simulations of their children's overall test performance (see Table 2 for means and standard deviations by group). Standard scores derived from maternal simulations of child performance differed on both the EOWPVT-R, $F(2, 42) = 8.88$, $p < .001$, and the PPVT-R, $F(2, 42) = 6.39$, $p < .005$. Mothers of language-impaired children correctly viewed their children's expressive and receptive vocabulary development as being poorer than the development of language-matched and age-matched controls, as simulated by their mothers.

The MANOVA revealed no significant multivariate effect for birth or-

der, Wilk's lambda = .725, $F(8, 35) = 1.65$, $p < .15$. There was also no significant Group × Birth Order interaction, Wilk's lambda = .617, $F(16, 70) = 1.19$, $p < .30$.

Score-estimation comparisons

Paired *t* tests within each group examined whether the actual child scores and the estimates from maternal simulations differed on the receptive and expressive vocabulary tests. Mothers of language-impaired children significantly overestimated their children's expressive vocabulary scores, $t(15) = -3.22$, $p < .01$, but their estimates and the actual scores did not differ on the receptive task. For the younger, language-matched children, mothers overestimated both sets of scores. They overestimated performance on the EOWPVT-R, $t(15) = -4.30$, $p < .01$, and on the PPVT-R, $t(15) = -2.49$, $p < .01$. Similarly, mothers of the age-matched group overestimated both their children's expressive vocabulary, $t(15) = -4.07$, $p < .01$, and their receptive vocabulary, $t(15) = -3.83$, $p < .01$. These overestimations averaged between 10 and 18 standard scores points.

Item-by-item accuracy

In this analysis we examined group differences in the hit rate, or accuracy, with which the mothers predicted the correctness and form of their child's response to each item. Means and standard deviations are presented in Table 2. A two-way MANOVA revealed a significant group effect, Wilk's lambda = .688, $F(6, 80) = 2.74$, $p < .01$. Univariate *F* tests showed a group effect for the mothers' accuracy in providing the words the children used to name each item of the EOWPVT-R, $F(2, 42) = 4.96$, $p < .01$. Here, mothers of the age-matched group accurately offered the labels the children used to name an item (59%) more often than did mothers of the language-impaired children (51%). The mothers' accuracy in naming items as their child had did not differ between the two language-normal groups, nor between the language-impaired children and their younger, language-age-matched controls.

Hit rates for whether the child would pass or fail each item on EOWPVT-R test did not differ between the groups, $F(2, 42) = .03$, $p < .96$. In contrast, there was a group effect on the mothers' ability to predict whether their child would pass or fail each item of the PPVT-R, $F(2, 42) = 4.88$, $p < .01$. Here, mothers of the chronological age-matched group were accurate 77.7% of the time. This hit rate was higher than that for mothers of language-impaired children (69.7%) and mothers of younger, language-age-matched children (68.3%), who did not differ from each other.

Finally, this MANOVA revealed no birth order effect, Wilk's lambda = .981, $F(3, 40) = .264$, $p < .85$, and no Birth Order × Group interaction effect, Wilk's lambda = 1.28, $F(6, 80) = 1.28$, $p < .27$.

Score-estimate correlations

Table 3 presents by group the correlations between the actual child standard scores and the mother's estimated standard scores. Correlations were significant for the language-impaired group for both the receptive and expressive vocabulary tests. For the younger, language-matched group, the actual estimate correlation was significant only for the expressive test. For the age-matched group, this correlation was significant only for the receptive test. In addition, actual receptive and expressive vocabulary scores were uncorrelated in the younger and language-impaired groups, but they were correlated among the language-normal 4½-year-olds.

Correlation with Vineland Adaptive Behavior Scales

Intercorrelations between the Vineland scores, the actual vocabulary scores, and the estimated vocabulary scores are shown in Table 3. For the younger, language-matched group and the age-matched group, maternal estimates of expressive language were correlated only with the mothers' report for the communication domain. In contrast, for the language-impaired group, maternal estimates for expressive language were correlated with all four domains of the Vineland scales. With respect to actual child expressive scores, there were positive correlations with the communication subscale for the language-impaired and language-matched group and with the socialization subscale for the age-matched group. For all three groups, the actual expressive scores were uncorrelated with the motor skills and daily living subscales. The actual receptive scores were uncorrelated with the Vineland scores in all four domains for all three groups.

DISCUSSION

Various indices of parental sensitivity to children's expressive and receptive vocabulary development were used in this study as a means of expanding on previous research, which showed that parents have a reasonably good idea of their children's general level of language competence. In particular, we asked mothers to complete tests of receptive and expressive vocabulary in the way they thought their child would, in order to get a sense of how well they could predict their child's language performance. In addition, we compared mothers of language-impaired children; same age, language-normal children; and younger, language-matched, language-normal children. We hypothesized that mothers of language-impaired children would be the most accurate in predicting their child's test performance. Given the child's slower vocabulary development, these mothers would have had more experience in observing this (more restricted) vocabulary acquisition.

The results of the study demonstrated a number of points. The most general point is that, depending on which index is used, different conclusions can be reached regarding whether mothers of language-impaired children are more or less knowledgeable about their children's vocabulary de-

Table 3. *Intercorrelation between actual and simulated language scores and with Vineland scores, by group*

	L-I				L-M				A-M			
	1	2	3	4	1	2	3	4	1	2	3	4
1. Child EOWPVT-R	—				—				—			
2. Child PPVT-R	.39				.20				.68**			
3. Est. EOWPVT-R	.64**	.65**			.62*	.26			.24	.40		
4. Est. PPVT-R	.25	.51*	.63**	—	.65*	.38	.59*	—	.61*	.74**	.58*	—
5. Communication	.50*	.43	.55*	.28	.61*	.11	.63**	.49	.22	.33	.60*	.52*
6. Daily living	.48	.43	.66**	.26	.09	−.19	−.02	.26	.30	.25	.47	.37
7. Socialization	.31	.40	.57*	.45	.31	−.08	.13	.00	.56*	.46	.40	.46
8. Motor	.20	.33	.57*	.44	.39	.27	.13	.08	−.10	−.32	.22	−.06

*$p < .05$; **$p < .01$.

velopment than mothers of language-normal children. However, for all indices, birth order had no effect. Thus, whatever advantage birth order might convey in enhancing children's language development (Tomblin, Hardy, & Hein, 1991), the same may not be said for the mothers' appreciation of the vocabulary their children understand and use.

Mothers of language-impaired children as more or less knowledgeable

The results from two of our indices supported our initial hypothesis and suggested that mothers of language-impaired children may be more knowledgeable about their children's vocabulary development than mothers of language-normal children. One index was the correlation between the actual child test scores and the estimated scores derived from maternal simulations of the child's test performance. In the case of the language-impaired group, the correlations were significant for both the receptive and expressive vocabulary tests. In contrast, the correlation was significant only for the receptive vocabulary test in the chronological age-matched group and significant only for the expressive vocabulary test in the younger, language-matched group. The other index was the absolute difference between the children's actual test scores and the mother's estimated test scores. Here, the estimated total scores for the receptive vocabulary test from the mothers of language-impaired children were not significantly different from their children's actual scores, whereas significant discrepancies were observed for the other two groups of children. These are encouraging results, given the emergence of parental report measures of language development and the critical role these may play for children suspected of having language delays. As with the MacArthur Communication Development Inventories (Fenson et al., 1993) and the Language Development Survey (Rescorla, 1989, 1991), the procedure of the present study required mothers to respond to specific items, which may enhance the accuracy of parental report rather than provide a global estimate of ability.

However, a different conclusion may be reached from an examination of the mothers' ability to predict the way their child actually responded to the individual items on the expressive and receptive vocabulary tests (i.e., their predictions of the form of their child's responses). Here, mothers of normal 4-year-olds were more accurate than mothers of children at a 3-year-old language level. In particular, they predicted the words their children used to label pictures on the expressive test more accurately than did mothers of language-impaired children. They also predicted whether their children would answer correctly on the items of the receptive vocabulary test more accurately than did mothers of language-impaired 4-year-olds and mothers of language-normal 3-year-olds.

This greater correspondence between how language-normal 4-year-olds answered each item and how their mothers predicted they would answer may reflect two factors. One explanation is that the hit rates of mothers of the language-normal 4-year-olds were based on a larger sample of items. These children reached ceiling later in the tests than did the other two

groups. The language-impaired children and the younger, language-matched controls answered an average of 39.6 and 38.1 EOWPVT-R items and an average of 50.7 and 48.1 PPVT-R items, respectively. In contrast, language-normal children answered 57.1 EOWPVT-R items and 73.3 PPVT-R items. Any errors made by the mothers of these language-normal children would have a smaller impact on the overall hit rate in this larger pool of items. A second explanation is that the language-normal 4-year-olds may have used a more standard and consistent vocabulary, which would be easier to predict than that of language-impaired or younger, language-normal children. An examination of responses on the expressive vocabulary test revealed that, on the early items (e.g., *apple*, *wagon*, *penguin*), the labels offered by all the children were similar. However, on higher items (e.g., *statues*, *luggage*, *typewriter*), language-impaired children frequently offered unusual labels. For example, a picture of luggage elicited "soupy," "jutja," and "pareds." When other children named the pictures, the name more often approximated the picture's actual label and thus may have been easier for mothers to guess.

Influence of performance in other domains on maternal language estimates

The only slightly disquieting aspect of the results regarding mothers of language-impaired children is the finding that their estimates of expressive language competence were positively correlated with the scores on all four domains of the Vineland Adaptive Behavior Scales, whereas the actual EOWPVT-R score was correlated only with the communication subscale. In particular, parental ratings of motor skill and daily living skills, which were uncorrelated with actual child language scores, were highly correlated with maternal estimates of expressive vocabulary development. In the other two groups, maternal estimates of expressive vocabulary were significantly correlated only with the communication subscale score. This suggests that mothers of language-impaired children may be more susceptible to "halo effects," whereby their perceptions of their children's competence in nonlinguistic domains may influence their perceptions of vocabulary development, or vice versa. Similarly, Chaffee et al. (1990) observed that parental estimates of expressive language skills were lower when they regarded the child as more stressful. Such a negative halo effect would serve to moderate the parents' tendency to overestimate competence, but it might also compromise their ability to appreciate areas of strength.

The generalizability of overestimation

The third major point emerging from the study is that, regardless of which index is used, mothers in all three groups overestimated children's performance on both vocabulary tests. In the age-matched group, 15 mothers overestimated the EOWPVT-R score (by an average of 21 standard score points); in the language-matched group, 13 mothers overestimated (by an average of 18 standard score points); and in the language-impaired group,

12 mothers overestimated (by an average of 13 standard score points). For the PPVT-R, 12 mothers of age-matched children overestimated (by an average of 13 standard score points), 11 mothers of the language-matched children overestimated (by an average of 9 standard score points), and 10 mothers of the language-impaired children overestimated (by an average of 8 standard score points). This positive estimation halo is consistent with previous research which has shown that parents tend to overestimate their children's level of intellectual functioning (Gorelick & Sandhu, 1967; Miller, Manhal, & Mee, 1989; Prout, Harper, Snider, & Lindgren, 1978; Schulman & Stern, 1959) and language development (Evans & Schmidt, 1991; Sattler et al., 1985). Some of the discrepancy between the children's test scores and maternal estimates may stem from the children not revealing their true competence in a test situation – a competence–performance gap which may be evident in other everyday situations such as interacting with unfamiliar caregivers or peers. Rather than being maladaptive, the tendency for mothers to overestimate what their child might say or understand could, in fact, be to the child's benefit in encouraging the acquisition and consolidation of new semantic knowledge.

Conclusion

The results of the present study are limited to the area of semantic development and to middle-class families. Nonetheless, the study offers a new perspective on the question of maternal sensitivity to language development in language-impaired children. While it is not known whether the mothers' speech to their language-impaired children is as much in tune with their children's vocabulary development as are their estimates, this study suggests that mothers of language-impared children are as knowledgeable, if not more so, about their children's vocabulary development as are mothers of language-normal children. Coupled with findings by Lasky and Klopp (1982), Conti-Ramsden and Friel-Patti (1983), and Whitehurst et al. (1988), one might hypothesize that the mothers of these children make as accurate inferences about their children's language development and interact with their children in as optimal a way as do the parents of language-normal preschoolers. Further research should be done to examine maternal input in concert with maternal estimates and to examine the generalizability of these findings to disadvantaged families, fathers, and syntactic aspects of language development. In addition, other groups with atypical language development, such as children with hearing impairments, developmental disabilities, and cerebral palsy, should be studied to determine the accuracy of maternal estimates and nature of maternal language in populations where there may be a distinct cleavage between competence in different domains of development.

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