

# Language, Play, and Attention at One Year

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Relations among language production, language comprehension, play competence, and attention span were examined in 43 13-month-old toddlers. Flexible language production and flexible language comprehension covaried, and play competence covaried with flexible language comprehension and with attention span. In contrast, neither language production nor language comprehension related positively to attention span. Relations between production and comprehension, between comprehension and play, and between play and attention were maintained even when concurrent level of maternal stimulation was partialled, suggesting that these associations are not solely mediated by mothers' didactics. Structural equation modeling showed that the common variance underlying language comprehension and play competence differed from variance underlying play competence and attention span. This suggests that a play-language factor and a play-attention factor reflect different underlying mental capacities in the young child, and that play can be partitioned into at least two independent components.

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language production	language comprehension	play
attention span	maternal stimulation	

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The start of the second year represents a period of important transition in children's mental abilities (e.g., Mandler, 1983), such as the emergence of early language (Bates, Bretherton, & Snyder, 1988), pretense activity in play (Bates, Bretherton, Shore, & McNew, 1983; McCall, 1979; Ungerer & Sigman, 1984), and increased attention regulation (Krakow, Kopp, & Vaughn, 1981). Language production, language comprehension, play, and attention are all characterized by considerable individual variation at this time as well. Are these abilities in toddlers systematically related? If so, are those relations supported by external influences, such as maternal stimulation? Our study aimed to address these two questions.

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During the second year, children exhibit rapid increases in productive and receptive language when they begin to say and to understand sound sequences which function as true "naming" (Snyder, Bates, & Bretherton, 1981). At this time, children shift away from a "context-restricted," purely performative use of words or phrases to "flexible" use across contexts (Snyder et al., 1981; Volterra, Bates, Benigni, Bretherton, & Camiaoni, 1979). Similarly, play changes dramatically during the second year, developing from undifferentiated exploration and functional manipulation towards more sophisticated acts of pretense (e.g., Belsky & Most, 1981; Fein, 1981; McCall, 1979; O'Connell & Bretherton, 1984). Finally, over the short period of 12 to 18 months, sustained attention becomes longer, more controlled, and more focused (Kopp, 1987). Specifically, children make rapid strides in coordinating attention (Bakeman & Adamson, 1984; Harding & Golinkoff, 1979) and in disregarding extraneous environmental intrusions (Kopp, 1987).

During this period of rapid developmental change, large individual differences characterize children's language capabilities (Bates et al., 1988), pretense play (Belsky, Goode, & Most, 1980; Tamis-LeMonda & Bornstein, 1989), and ability to sustain attention to the environment (Kopp, 1987). To date, most studies that have examined variability among children across these domains have uncovered significant relations between dimensions of language production and language comprehension (Bates et al., 1988; Snyder et al., 1981; Volterra et al., 1979), between language and play (Bretherton & Bates, 1984; Ungerer & Sigman, 1984; Vibbert & Bornstein, 1989), and between play and attention (Jennings, Harmon, Morgan, Gaiter, & Yarrow, 1979; Power, Chapieski, & McGrath, 1985). However, no studies have assessed children's competencies across all four domains within the same population, and few have observed children at the very start of the second year (cf. Ungerer & Sigman, 1984; Vibbert & Bornstein, 1989).

The current study was designed principally to assess children's language production, language comprehension, play competence, and attention span at the start of this period of rapid development (13 months) in order to examine systematically interrelations among all four of these important areas of competence. It may be that individual differences are consistent across language production, language comprehension, play competence, and attention span, and thus relations among these domains are global; one interpretation of this circumstance is that a single process underlies individual variability in these seemingly divergent areas of development. Alternatively, relations across the four domains might be more differentiated, with certain abilities sharing variance; this circumstance would suggest that different underlying processes are at work in mental development.

A second purpose of the current study was to consider the role of maternal stimulation in relation to development of these several toddler abilities. To date, few studies have considered the part that maternal behaviors might play in individual differences in and associations among early toddler competencies. Specifically, didactic behaviors, in which mothers describe, demonstrate, label, and otherwise highlight properties, objects, and events in the environment, might function to enhance children's language, play, or attention. Although concurrent associations between maternal activity and toddler ability leave open the question of direction of effect, studies using experimental and path-modeling techniques lend support to the notion that these specific types of maternal activity play a meaningful part in the early development of language comprehension and/or language production (Bornstein, 1985; Olson, Bates, & Bayles, 1984; Ruddy & Bornstein, 1982; Tamis-LeMonda & Bornstein, 1989; Vibbert & Bornstein, 1989), play competence (Belsky et al., 1980; Tamis-LeMonda & Bornstein, 1989; Vibbert & Bornstein, 1989), and attention span (Belsky et al., 1980; Yarrow, Morgan, Jennings, Harmon, & Gaiter, 1982). Therefore, a conservative approach to assessing associations among toddler variables is to partial pertinent dimensions of maternal input which, through their relations with toddler competencies, might serve to maintain consistencies across those domains.

Based on prior theoretical and empirical work concerning children's early cognitive development, we expected there to be moderate relations between production and comprehension in language, between language and play, and between play and attention. Moreover, we expected maternal didactic stimulation to relate to these target areas of competence and potentially to mediate relations among toddlers' abilities.

## METHOD

### Sample

Forty-three toddlers (24 males, 19 females) and their mothers were visited in their homes when toddlers averaged 402 days (range = 391–411). Participants were recruited from private pediatric and obstetric groups in New York City. All children were healthy at the time of study. They came from middle- to upper-socioeconomic status households ( $M = 60$  on the Hollingshead Four Factor Index; Gottfried, 1985).

### Procedure

Data on language production, language comprehension, play competence, and attention span were collected during a 2½ hour home visit scheduled at the mother's convenience and at a time when she felt her toddler would be alert and rested. The home visit included a videotaped session of toddler and mother in free play and a detailed maternal interview of

the child's productive and receptive vocabularies. We chose to study dyads at home so that both toddlers and mothers would feel most at ease. The maternal interview took place after the videotaped play session.

**Language Measures.** Mothers were probed about their children's productive and receptive vocabularies using the Bates et al. (1988) language interview. This interview yields reliable language data and possesses concurrent and predictive validity for children's language performance (Bates et al., 1988; Bretherton & Bates, 1984). During the language interview, the experimenter read specific lexical items taken from general verbal categories (e.g., food) and asked the mother whether her child understood and/or produced each item, and if so, whether any specific gestural, vocal, or temporal cues were necessary in order for the child to display competence with the item. At the time of the interview, children either played with their own toys or were free to continue playing with the toys that were provided. Mothers were free to respond to toddlers' bids during the interview. In such instances, the experimenter waited until mother was again focused before continuing with questioning.

**Interaction.** Each dyad was videotaped for 15 min during free play. Because we were interested in whether maternal didactic stimulation related to the four child abilities, we studied toddler play and attention in a naturalistic free-play setting with mother. Mothers were told that the experimenter was interested in general dimensions of children's development and that they were to remain with their toddler, behave in their usual manner, and disregard the experimenter's presence as much as possible. No further instructions were given. A set of toys (doll, blanket, teapot with cover, two teacups, two saucers, two spoons, toy telephone, toy train, two small picture books, foam rubber ball, and a set of nesting barrels) was placed on the floor in front of toddler and mother. These toys afforded the child the opportunity to exhibit various levels of play from simple manipulation to more sophisticated pretense. All videotaped sessions had time simultaneously recorded to the nearest 0.1 s for subsequent scoring.

### **Scoring and Data Reduction**

Children's language data were obtained from the maternal language inventory, and children's play competence, attention span, and maternal stimulation were coded from the videotaped play session. Language, play, attention span, and maternal stimulation were each coded by a different person, so that coders were blind to the nature of the other data sets.

**Language Production and Comprehension.** Language data were scored according to procedures developed by Bates et al. (1988). Children were

credited with production if they demonstrated consistent and appropriate use of a sound which approached the phonetic version of the adult target word (e.g., "wawa" for water), and they were credited with comprehension if their behavioral response was appropriate to a particular word or phrase (e.g., stopping an action if mother said "no"). Production and comprehension of a word or phrase were further categorized as restricted, when contextual or other cues were necessary for mastery of the item, or flexible, when production and/or comprehension of a word or phrase was independent of context (Bates et al., 1988).

For analyses, we used the measures flexible language production and flexible language comprehension. These measures are thought best to index the extent to which children actually understand the idea that things have names (Bates et al., 1988; Snyder et al., 1981; Tamis-LeMonda & Bornstein, 1989); they are reliable and valid measures of second-year language (see Bates et al., 1988) and they are characterized by greater variability than their restricted counterparts,  $F(\max) = 10.05$  for comprehension and 6.38 for production,  $ps < .001$ .

Two coders independently scored audio recordings and transcripts of 10% of the language interviews so that coding reliability could be assessed. Agreement for numbers of words and phrases in production and in comprehension was calculated by dividing the number of agreements by the number of agreements plus disagreements. They averaged 92% for production and 97% for comprehension (ranges = 86–100% and 83–98%, respectively); agreement for the flexible–restricted language distinction averaged 92% for production and 90% for comprehension (ranges = 83–100% and 83–98%, respectively).

**Play Competence.** Child play behavior was categorized according to a 13-point validated play scale modified from Belsky et al. (1980). The play session was divided into 60 contiguous intervals of 15 s each. During each interval, the experimenter coded: (1) mouthing, (2) simple manipulation, (3) functional activity, (4) juxtaposition, (5) functional relational activity, (6) approximate pretense, (7) self-directed pretense, (8) other-directed pretense, (9) pretense involving object substitution, (10) sequencing of similar pretense acts, (11) sequencing of different pretense acts, (12) sequencing of similar pretense acts with an object substitution, and (13) sequencing of different pretense acts with an object substitution. During a given 15-s interval, each play level that occurred was credited only once, regardless of the number of times it occurred.

For analyses, play mean was calculated by summing across the play levels credited in each interval and dividing by the total number of play acts exhibited by the child. We analyzed play mean because it was a comprehensive index of children's ongoing play, and similar measures have been found to be reliable and valid (Hrncir, Speller, & West, 1985).

Moreover, play mean was characterized by variability across subjects and was normally distributed.

Interobserver reliabilities for play were obtained by having three independent coders score toddler play on 20% of the sample. Mean agreement across the 13 levels of play for matched intervals averaged 97% (range = 96–99%).

**Attention Span.** Each child's visual orienting during the play session was divided into attention episodes. An attention episode was defined as visual orientation to a target toy or toy group lasting a minimum of 2 s. The offset of an episode was signaled when the infant turned away from the target toy or toy group for more than 2 s. The onset and offset of each episode were noted to the nearest second based on the prerecorded time signal appearing on the tapes.

For each child, the mean length of the two longest episodes of uninterrupted attention was calculated. This index of attention was selected because it represented children's ability to focus on an object or related objects for prolonged periods, an index of attention found to be valid and reliable in the infant visual attention literature (Colombo, Mitchell, O'Brien, & Horowitz, 1987; Tamis-LeMonda & Bornstein, 1989) and in literature on attention during the second year (Power et al., 1985). Average maximum attention span was also characterized by variability and was normally distributed.

Interobserver reliabilities for attention span were obtained by having three independent coders score the attention of 20% of the toddlers. Pearson reliabilities ( $r$ ) calculated for the time data across attention episodes for each infant averaged .87 (range = .71–.97).

**Maternal Didactic Stimulation.** Maternal didactic stimulation was coded using the same 15-s contiguous intervals used for children's play. During each interval, the experimenter recorded whether mother actively attempted to direct her toddler's attention verbally, physically, or verbally and physically towards a property, object, or event in the immediate environment by demonstrating how something worked, pointing towards an object, naming an object, describing the unique qualities of an object with the purpose of engaging her child's attention towards that object, and so forth. Interactive behaviors which were not explicit didactics (e.g., simply talking to toddler, smiling at toddler, engaging in mutual regard, or responding to toddler vocalizations) were not counted.

A composite measure of maternal didactic stimulation was generated by tallying the number of coding intervals in which such encouragement occurred. This measure was chosen as representative of maternal stimulation because it is a comprehensive index of maternal didactic behavior, and it has been shown to possess both concurrent and predictive validity

for a variety of indices of cognitive development across different contexts (e.g., Belsky et al. 1980; Bornstein, 1985; Tamis-LeMonda & Bornstein, 1989; Vibbert & Bornstein, 1989) and different cultures (e.g., Bornstein, Azuma, Tamis-LeMonda, & Ogino, in press; Bornstein, Toda, Azuma, Tamis-LeMonda, & Ogino, in press; Sigman et al., 1988). Total didactic encouragement exhibited variability among mothers and was normally distributed.

Interobserver reliabilities for maternal didactic stimulation were obtained by having three independent observers code 15% of the sample. Percent agreement for matched intervals across sessions averaged 94% (range = 90–98%).

## RESULTS AND DISCUSSION

At the start of analyses, relations between demographic variables and the measured variables were examined. Neither maternal status (education, age, or socioeconomic class) nor infant status (weight at birth or age at testing) was associated with measures of language production, language comprehension, play competence, attention span, or maternal didactics; thus, these factors were not considered in analyses. In addition, patterns of toddler relations were essentially the same for male and female children; thus, analyses are based on the entire sample.

Results of this research are organized as follows. First, descriptive statistics for language production, language comprehension, play competence, and attention span are presented. Next, relations between maternal didactic stimulation and each of the toddler abilities are assessed, and relations among the four abilities are examined with and without the influence of maternal didactic stimulation considered. Finally, structural equation modeling is used to evaluate factors that may underlie pairs of toddler abilities.

### Descriptive Statistics

Descriptive statistics for the variables assessed are presented in Table 1. Overall, the present sample produced and comprehended an average of 7 and 39 flexible words, respectively. As expected, language comprehension was greater on average than language production,  $t(42) = 11.99$ ,  $p < .001$ , and was characterized by greater sample variation than was production,  $F(\max) = 8.78$ ,  $p < .001$ . These results are consistent with general results obtained by Benedict (1979) and specific results of Bates et al. (1988) on a sample of 32 13-month-olds for the same language inventory.

The majority of play actions exhibited by children was either exploratory (Level 2) or functional (Level 3), with periodic bouts of relational activity (Level 5) and pretense (Levels 7–11). The preponderance of lower play levels is captured by the average play level score which was about 4. Like

TABLE 1  
Descriptive Statistics of Toddler and Mother Activities

	<i>M</i>	<i>SD</i>	Range
<b>Toddler</b>			
Language production ( <i>N</i> flexible)	6.8	6.5	0-27
Language comprehension ( <i>N</i> flexible)	38.6	19.2	10-75
Play competence ( <i>M</i> level)	3.7	0.8	1.9-5.5
Attention span (seconds)	85.2	42.8	25-205
<b>Mother</b>			
Didactic encouragement (intervals)	48.0	8.6	24-60

language comprehension, children varied on how sophisticated their on-going play activity was, with some children exhibiting means as low as 1.9 and others exhibiting means as high as 5.5. These play data closely parallel descriptive studies on spontaneous play at the toddler stage of development (e.g., Belsky & Most, 1981; Vibbert & Bornstein, 1989).

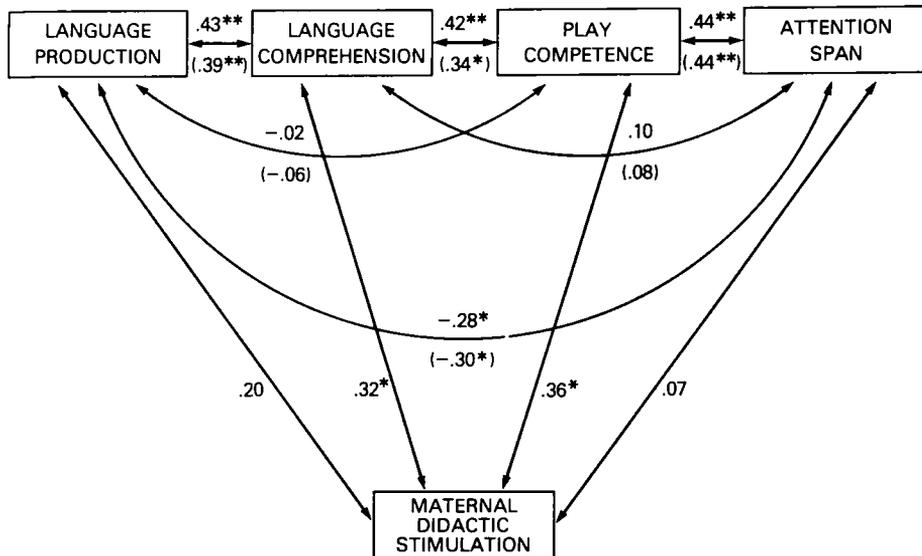
On average, children's longest attention spans lasted about 1½ min. However, some children maintained focus on a toy or toy group for as little as ½ min, whereas others attended for more than 3 min. Although differences in procedure, stimulus materials, and length of observation make it difficult to compare group trends on attention across diverse studies, the fact that individual children vary in their attention at this time is in agreement with prior research (e.g., Jennings et al., 1979; Power et al., 1985; Yarrow et al., 1982).

Finally, Table 1 shows that mothers on average engaged their toddlers didactically in about 75% of the intervals observed; some mothers exhibited didactics in only about 33% of the intervals, and others in 100%. Studies examining similar indices of maternal encouragement have also shown great individual differences among mothers on these behaviors at this period in their child's development (Belsky et al., 1980; Vibbert & Bornstein, 1989).

### Interrelations Among Toddler and Mother Variables

Figure 1 schematically presents zero-order associations among the variables flexible language production, flexible language comprehension, play competence, attention span, and maternal didactic stimulation; in addition, partial correlations among the toddler variables (i.e., after the influence of maternal didactic stimulation is removed) are presented in parentheses.

As shown, flexible language production related positively to flexible language comprehension, did not relate to play, and related negatively to toddlers' attention span; flexible language comprehension related positively to play competence but did not relate to attention; and, finally, play competence related positively to toddlers' attention span. In general, the obtained associations are consistent with those reported elsewhere in the



**Figure 1.** Interrelations among toddler variables and maternal didactic stimulation at 13 months. (Parentheses show relations with maternal didactic stimulation partialled.)

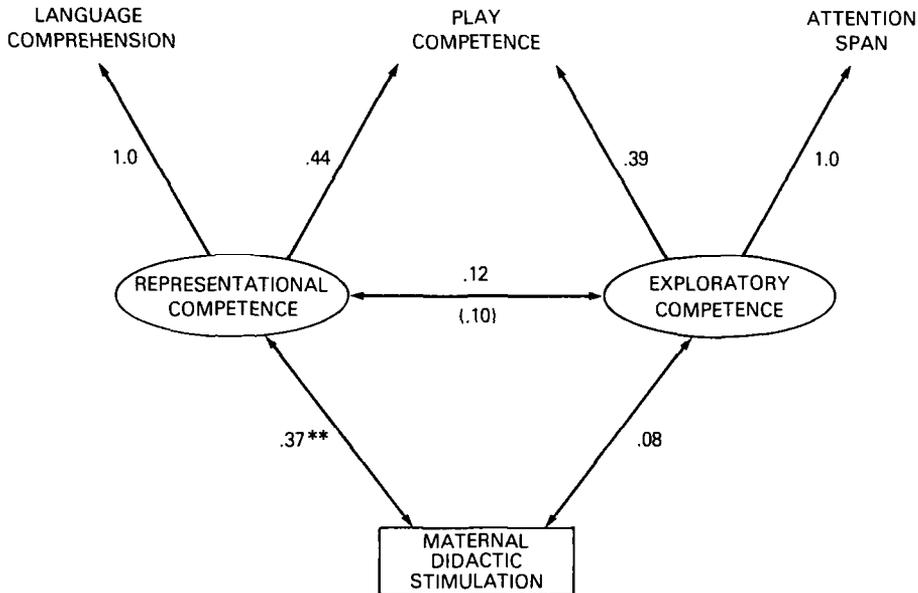
literature (e.g., Bates et al., 1988; Power et al., 1985; Ungerer & Sigman, 1984; Yarrow et al., 1984), although the moderate inverse relation between production and attention was unexpected. One possible interpretation of this finding is that sustained attention inhibits language production in toddlers (see also Rey-Barboza, Cabrera, & Anisfeld, 1989).

Also shown in Figure 1, mothers' didactic stimulation was significantly associated with toddlers' language comprehension and play competence, but not with their language production or attention span.

Finally, significant relations between flexible language production and flexible comprehension, between flexible language production and attention span, between flexible language comprehension and play competence, and between play competence and attention span were maintained even when maternal didactic stimulation was partialled, as shown by the correlations in parentheses in Figure 1. This suggests that these within-toddler relations are not solely explained by maternal didactic stimulation and may reflect common underlying competencies in the child. The fact that play shares variance with both comprehension and attention span (which are independent of one another), even after partialling maternal stimulation, points to the potential decomposition of play into two distinct components.

### Structural Equation Modeling

Structural equation modeling was used to examine relations among language comprehension, play competence, and attention span by forming



Goodness-of-Fit Index = .96

Adjusted GFI = .82

$\chi^2 (2) = 3.06, p = .22$

**Figure 2.** Interrelations among toddler representational competence, exploratory competence, and maternal didactic stimulation at 13 months. (Parentheses show relation with maternal didactic stimulation partialled.)

latent variables from pairs of related toddler measures. Language production was not included in this model because production demonstrated less variability and did not covary positively with play competence or attention span.

Because language comprehension related to play competence, and play competence related to attention span, but language comprehension did not relate to attention span, we asked whether variance that underlies flexible language comprehension and play competence was related to or different from variance that underlies play competence and attention span. To do this we formed two latent variables, one from children's language comprehension and play competence, and one from children's play competence and attention span. These two latent variables represented underlying shared variance with both error variance and variance not associated with the latent variable removed (Martin, 1987). The fact that significant zero-order relations between the original variable pairs used to form these factors remained after mothers' didactic stimulation was controlled (see Figure 1) supported the notion that these factors represent underlying abilities in children rather than being externally maintained.

The structural equation model represented in Figure 2 assesses relations between maternal didactic stimulation and the language comprehension/play competence factor, called *representational competence* (RC), and the play competence/attention span factor, called *exploratory competence* (EC), and tests relations between these two factors with maternal stimulation partialled. Both the goodness-of-fit and chi-square fit indices for this model were good, suggesting that the model (including the formation of the two latent constructs) was a fair approximation of the data. Mothers' didactic stimulation related significantly to RC but not to EC. Moreover, although both factors share the same index of children's play sophistication, they are independent, both before and after maternal stimulation is partialled.

### CONCLUSIONS

The goals of the present study were to assess relations among children's language production, language comprehension, play competence, and attention span at the start of the second year; to examine concurrent associations between maternal didactic stimulation and these areas of toddler competence; and, finally, to assess toddler relations with maternal didactic stimulation considered.

Our general findings suggest, first, that associations among toddler competencies at this age tend to be highly specific. A high level of ability in one area does not indicate high ability in all areas. Instead, individual differences appear to reflect independent underlying processes, with individual children being "specialists" rather than being generally more or less competent in a variety of domains (Gardner, 1983). This finding leads to a conceptualization of child abilities in terms of "profiles" and to a differentiated perspective on the ways particular experiences might mediate such patterns of ability.

In this connection, the multidimensional nature of play is noteworthy. Children's play competence shared unique and independent variance with their flexible language comprehension and with their attention span, suggesting that, at this time in childhood, play might be partitioned into at least two independent components. In fact, prior researchers have suggested that play competence reflects both cognitive and motivational factors (e.g., Hrcir et al., 1985; Yarrow et al., 1982). Consider the relation between play competence and language comprehension. Based on the conceptual similarities of play and language, and on their empirical associations, several researchers have hypothesized that they both stem from a single underlying cognitive capacity for symbolic representation (e.g., Bates et al., 1983; Bretherton & Bates, 1984; McCall, 1979; McCune, 1985; McCune-Nicolich, 1981; Tamis-LeMonda & Bornstein, 1989; Vibbert & Bornstein, 1989). Complementarily, mastery motivation or tempo might underlie the common variance shared by play competence and attention span. In fact,

children's motivation to master their environments often results in longer periods of object exploration (i.e., attention) and, therefore, increased competence in ongoing play (Jennings et al., 1979; Yarrow et al., 1983; Yarrow et al., 1982). Furthermore, it has been shown that play activity that is "continued over time" (again, longer attention duration) is more likely to result in a consolidation of information about play objects (Jennings et al., 1979). The fact that a latent variable formed from children's language comprehension and play (representational competence) was found to be independent of a latent variable formed from children's play and attention span (exploratory competence) lends additional empirical support to this multidimensional view of play.

In addition to the specificity characterizing relations among abilities in toddlers, maternal didactic stimulation was found to relate selectively, rather than globally, to toddler competencies. Specifically, it related to language comprehension and play competence and to the latent factor formed from these two individual variables, but not to attention span or to the latent factor of play competence and attention span.

Finally, significant associations among toddler abilities remained even after maternal didactic stimulation was partialled. This finding suggests that relations among specific toddler competencies reflect underlying abilities in toddlers and are not solely mediated by contemporaneous maternal stimulation.

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